

Emergency Medicine Extender Program at Franciscan Health

This is an 8-week program in emergency medicine for medical students between the first and second years of medical school. This is an excellent opportunity to get hands-on clinical experience during the preclinical years of training. There is good exposure to a wide variety of illnesses in a short time through the emergency department. This life in the fast lane is an excellent opportunity to learn, practice and refocus after the first grueling year of medical school.

What the students do:

- Perform history and physical exams on patients.
- Perform procedures such as suturing, stapling, and CPR.
- Be a first-assist to the attending physician during a medical emergency.
- Become more confident interacting with patients and medical staff.
- Navigate the hospital electronic medical record (Epic) to find patient information make orders.

This program allows students to become better at performing history and physical exams, which is an important skill for the first two years of medical school. It helps reinforce the physical exam techniques that lead to a diagnosis. This is different from the standardized patients that students get to practice on in school. The students learn a lot about common tests to run for certain illnesses and how to interpret lab and imaging results. This program helps teach students to think like a doctor and form a differential diagnosis and plan. Navigating the EMR is an important part of this program, and students become familiar with finding patient information. This integrative experience allows students to get a glimpse of what medicine is like out of the classroom. It gives them a new passion and inspiration to start the second year of medical school and the USMLE Step 1.

Program Expectations

As part of this program, students will be expected to complete weekly history and physical exam write-ups for some of the patients in the ED. Below is a brief introduction into some of the important parts of the H&P. Most of the H&P's will be more focused than what is learned in class depending on the chief complaint of the patient.

Sample Write-Up

HPI: The history of present illness is an important part of the history and should gather all the information relevant to the chief complaint. A detailed HPI is critical to making a diagnosis. The following list gives a template for asking questions relating to the HPI. Also, include any pertinent positives and negatives in this section.

Where - location.

When – Timing—it is important to determine the chronology of the development of the problem—onset, duration and frequency.

Quality—It is important that the patient delineate the quality of the symptom, descriptors are key.

Quantity—It is important that the patient describe the severity of the symptoms.

Aggravating and Alleviating Factors—What worsens the symptom? What relieves the symptom?

Associated Factors—Are there other symptoms that were noted in conjunction with the chief concern?

Life Context—ask about the context of when this event occurred—e.g. what were you doing when this began?

Impact on Quality of Life—explore the effect of the illness on the patient’s general functioning.

ROS: The review of systems is an important part of the history that systematically assesses each body system of the patient. In the emergency patient, this section is not always completed in detail as it would be for an internal medicine visit. However, it is still important for the ED.

Below is a template for doing the ROS.

General: current health, change in weight; change in appetite; weakness; fatigue; fever, chills or sweats.

Endocrine: lethargy, heat or cold intolerance; loss of libido; polydipsia

Skin: rashes, lumps, sores; pruritus; color or texture changes; hair or nail changes; change in mole(s).

Head and Neck: headaches; trauma; dizziness; syncope; neck stiffness.

Eyes: changes in vision; pain, redness, tearing, scintillating scotomata; floaters; diplopia.

Ears: hearing loss or changes, tinnitus, otalgia, otorrhea.

Nose, Sinuses: rhinorrhea, congestion, epistaxis.

Mouth and Throat: dry mouth, hoarseness, pharyngitis, dysgeusia, dental issues.

Hematopoietic: lymphadenopathy; bleeding or ecchymosis; frequent or unusual infections.

Breasts: pain; masses; discharge, skin color changes, dimpling of the skin, nipple retraction.

Respiratory: cough; sputum; dyspnea; wheezing; hemoptysis; pleurisy.

Cardiovascular: chest pain; orthopnea; paroxysmal nocturnal dyspnea; edema; palpitations; syncope; claudication

Gastrointestinal: dysphagia; odynophagia; reflux; nausea; vomiting; hematemesis; eructation; constipation; diarrhea; melena; hematochezia; abdominal pain; jaundice; pruritus ani; change in bowel habits.

Urinary: frequency; urgency; dysuria; hematuria; nocturia; incontinence; hesitancy.

Female reproductive: vulvodynia; discharge; sores or lesions on vagina; menometrorrhagia; dysmenorrhea; amenorrhea; hot flashes; dyspareunia.

Male reproductive: scrotal mass; hernia; scrotal pain; urethral discharge; penile sores; bloody or premature ejaculation; erectile dysfunction.

Musculoskeletal: arthralgia, stiffness, or swelling; muscle pain or weakness; low back pain; difficulty moving or walking; fractures.

Neurologic: weakness; paresthesias; numbness; seizures; ataxia; change in mental status; memory disorders; tremor; vertigo; dysarthria.

Psychiatric: anxiety; depression; anhedonia; mania; intrusive thoughts; stress; hallucinations; delusions; cognitive changes; insomnia.

A&P: The assessment and plan portion of the write-up is also very important. This combines the information from the history and physical exam, and forms a differential diagnosis list. This should be organized based on a problem list, starting with the chief complaint. A different diagnosis list should be included under each problem. Each differential should be supported by pertinent positives and negatives from the history, physical exam and diagnostic testing. The plan should include any further evaluation of the patient based on the top diagnoses. It should also include an initial management plan for the patient based on the top diagnoses.

Neurology and its common diseases

Stroke

What is it?

- Strokes are either ischemic, hemorrhagic, or transient ischemic attacks.
 - In an ischemic stroke, a part of the brain does not get adequate blood supply due to narrowing or blocking of arteries.
 - In a hemorrhagic stroke, blood vessels leak causing bleeding into the brain.
 - In a transient ischemic attack (sometimes called a mini-stroke) is very similar to an ischemic stroke however all symptoms of the TIA resolve within 24 hours.

Common Presenting Symptoms

- Here are some of the most common stroke symptoms.
 - Facial droop
 - Difficulty speaking
 - Difficulty with movements
 - Loss of sensation
 - Weakness
 - Trouble with vision
 - Severe headache

Tests to Run

- Imaging studies should be run for every stroke patient to assess what damage has been done to the brain. Additionally, other studies can point to an etiology (EKGs can find

atrial fibrillation (a common cause of stroke) and blood tests can detect clotting disorders).

- Noncontrast CT (faster so usually preferred) or brain MRI
- Blood glucose levels
- EKG
- CBC including platelet counts
- PT and PTT
- Electrolytes

Treatment

- If a stroke patient comes in, you may hear a lot of discussion about whether or not TPA should be given.
 - TPA stands for tissue plasminogen activator and is only indicated in an ischemic stroke. As it breaks down blood clots, it could be very dangerous to use with hemorrhagic strokes.
 - The faster it is used after a stroke, the more effective. It should preferably be used within 3 hours of symptom onset but can be used up to 4.5 hours after symptom onset.
 - It should also not be given if the patient has had neurosurgery, head trauma, or a stroke within 3 months.
 - TPA should not be given if the patient has uncontrolled hypertension (>185 mmHg systolic or >110 mmHg diastolic) or a history of aneurysms.
 - There are other contraindications, but these are the main ones. Basically, if used properly TPA is an effective treatment for stroke, but like with all medications, it does not go without risks.
 - For hemorrhagic strokes common treatments include anticonvulsant (seizure activity is common after a stroke), antihypertensive agents, and diuretics (to decrease intracranial pressure). Again TPA is never given to a hemorrhagic stroke patient

In the words of Dr. Arthur Rosen: "Time equals brain". Stroke alert patients will usually move very rapidly through the CT scan etc.

Seizure

What is it?

- A seizure occurs because of abnormal neuronal firing. Here is the classification of different types of seizures:
 - Focal (affects one part of the cortex)
 - Focal seizure with retained awareness (simple partial seizure) - The seizure affects a certain part of the brain and there is no loss of consciousness.

- Focal seizures with impaired awareness (complex partial seizure) - The seizure affects a certain part of the brain and there is a loss of awareness of their surroundings even if they appear awake.
- Generalized (affects many parts of the cortex)- most common is tonic-clonic
 - Tonic clonic- Begins with loss of consciousness followed by stiffening of the muscles and muscle jerks. After the seizure, the patient may fall into a deep sleep.
 - Absence seizure (less likely to show up in the ER) - occurs in childhood. They are characterized by impaired consciousness and “staring into space”
 - Clonic- rhythmic muscle contractions
 - Myoclonic- brief sudden muscle contractions that can affect any muscles but usually affect the arms
 - Tonic- muscle stiffening with impaired consciousness
 - Atonic- a sudden loss of all control of muscle groups resulting in collapse to the floor

What causes a seizure?

- Brain injury: stroke, subdural hematoma, subarachnoid hemorrhage, traumatic brain injury, hypoxic-ischemic injury, brain abscess, tumor
 - Infectious: meningitis or encephalitis
 - Metabolic imbalance: hypoglycemia, hyperglycemia, hyponatremia, hypocalcemia, uremia, hyperthyroidism, porphyria
 - Drug related: withdrawal state, drug poisoning or overdose.
 - Age-related: neurodegenerative dementia or Alzheimer’s disease

Tests to Run

- A thorough medical history is highly important to helping a seizure patient. Key questions include:
 - Has anyone in your family had a similar episode?
 - Have you ever had a similar episode?
 - Can you (or someone who witnessed the event) describe what happened?
 - What medications are you taking?
 - What you had any recent brain trauma?
 - Did the patient experience any triggers before having the seizure?
 - A complete neurological examination should be done
 - Electrolyte, glucose, calcium, CBC, renal and liver function tests, toxicology screens
 - EKG to rule out cardiogenic syncope
 - Lumbar puncture to rule out meningitis
 - EEG
 - Neuroimaging studies for people having a first seizure- MRI is generally preferred because it is more sensitive than a CT scan, but a CT can also be used.

Treatments

- Sometimes benzodiazepines and anti-seizure medications are given by paramedics or emergency room personnel. Although if the seizure has stopped then this treatment may not be necessary.
- A long term anti-seizure medication may be given if there is a high risk that the seizure may recur. The following factors increase the chance of a recurrent seizure and therefore need for an anti-seizure medication: epileptiform abnormalities on EEG, brain tumor, brain malformation or prior CNS infection abnormal neuro exam, first seizure occurs during sleep.

https://www-uptodate-com.proxy.medlib.uits.iu.edu/contents/evaluation-and-management-of-the-first-seizure-in-adults?source=search_result&search=causes%20of%20seizure&selectedTitle=1~150#H1860320207

Headache

How to approach a patient with a headache?

How did the pain begin? Sudden or gradual?

What were you doing when the pain began?

Describe the pain?

Where is the pain?

How long does the headache last?

Does anything make the pain better or worse?

Have you had headaches before?

Ask about associated symptoms: nausea, vomiting, photophobia, neck stiffness, fever

What is it/What causes it?

Many different kinds of head pain fall under the category of headache (throbbing, shooting etc.).

- There are many causes for headaches. Migraines, tension, and cluster headaches are considered primary headache disorders. Patients may also get headaches from a number of other conditions (secondary). This list is not comprehensive but includes some important things to think about.
- They are classified into many different types:
 - Migraine- described as a unilateral pulsating pain. May be accompanied by photophobia, nausea, vomiting, photophobia, and phonophobia. Migraines can be triggered by various things such as menstruation, weather changes, wine and others.

- Cluster- is described as a unilateral severe pain with accompanying autonomic symptoms such as lacrimation or nasal congestion. The episodes are short-lived and usually last between 15 to 180 minutes.
- Tension- often described as a mild bilateral pressure throughout the head.
- Secondary- A headache caused by some other condition. Pay attention to danger signs to catch these ones (SNOOP). If any of these are seen, a brain MRI or CT should be considered.
 - Systemic symptoms: fever, weight loss, pregnancy, cancer, immunocompromised state
 - Neurological symptoms: confusion or impaired consciousness, papilledema, focal neurological signs, meningismus, seizures
 - Onset: new onset (especially for >40 yr old) or sudden onset
 - Other: trauma, drugs, awakens patient from sleep, occurs when patient coughs, exerts themselves or has sexual activity.
 - Previous: history of previous headaches with progression

Patients with headaches may tell you things that may help to narrow down your differential

Things your patient tells you	Consider this on your differential
“I can’t see things that are in the periphery of my vision I have these really bad pulsing headaches on one side of my head”	Glaucoma
“I can’t see well in the same parts of both eyes” (visual field defect)”	Optic pathway defect such as pituitary tumor
“I have a really bad headache on my left side and I can’t see anything on that side”	Optic neuritis
“I have really blurry vision when I move my head around and my headaches are especially bad when I’m lying down. They usually get better when I sit up”	Increased ICP, also consider sleep apnea is the patient always says that they have headaches in the morning
“My headaches are better when I am lying down. but when I am sitting or standing the headaches are terrible!”	CSF leakage through arachnoid tear

“I get really nauseous and my headaches get worse when I move around, especially when I bend over.”	Brain tumor
“I get headaches occasionally and my blood pressure has always been really high”	Pheochromocytoma

Treatments/Tests

- If a patient has a danger sign, consider head imaging (CT or MRI).
- Lumbar puncture should be done if meningitis is suspected. Also, if a patient has a thunderclap headache and imaging does not show anything, and LP shows subarachnoid hemorrhage.
- NSAIDs and dopamine agonist are helpful drugs to get the patient back to baseline if a definite diagnosis can't be made.

https://www-uptodate-com.proxy.medlib.uits.iu.edu/contents/evaluation-of-the-adult-with-headache-in-the-emergency-department?source=see_link

https://www-uptodate-com.proxy.medlib.uits.iu.edu/contents/evaluation-of-headache-in-adults?source=search_result&search=headache&selectedTitle=1~150

Psychiatric Emergencies

Ethanol intoxication

What is it?

- A patient has arrived in the Emergency Room after consuming ethanol.
- Treatment of the patient will depend on how much the patient has consumed.

Treatment

- If patients have moderated ethanol intoxication and require fluids, they will be given an IV with fluids.
- If there is any question about the patient's mental status not improving or a chance that the patient underwent trauma, a head CT may be ordered. Intoxication can mask lethal head trauma.
- If patients are severely intoxicated, special attention should be paid to make sure that the patient is maintaining an airway. Intubation may be required if the patient is not maintaining an airway. Patients may also be given thiamine to prevent against Wernicke's encephalopathy.
- All intoxicated patients receive a rapid bedside glucose determination and dextrose infusion if they are hypoglycemic.

Benzodiazepine Overdose

What is it?

- Benzodiazepines are very commonly used drugs that are used anxiety, seizures, alcohol withdrawal, insomnia, and drug associated agitation.
- Ingestion is most serious when benzos are ingested with other sedative hypnotics like ethanol (may cause respiratory depression) or opioids.

Tests to Run

- Glucose test to rule out hypoglycemia
- ECG to rule out drugs that may affect the QRS or QTc intervals
- Head CT if there is evidence of trauma
- Altered mental status with fever should cause evaluation for meningitis or other infections

Treatment

- Assess airway, breathing and circulation (ABCs), if patient cannot maintain an airway, then intubation may be necessary
- In most cases, patients will receive a history and physical
- Flumazenil is a competitive antagonist so can reverse benzo sedation. It can produce withdrawal seizures, so is very controversial and should be used with caution.

Opioid Overdose

Symptoms

- Decreased mental status
- Decreased respiratory rate
- Decreased tidal volume
- Decreased bowel sounds
- Miotic pupils (not always present)

Tests to run

- Rapid serum glucose should be taken in all patients
- ECG may be necessary as some opioids like loperamide and methadone have cardiac effects
- Chest imaging may be necessary if aspiration pneumonia or ARDS is suspected

Treatment

- ABCs should be addressed
- Naloxone (opioid antagonist) is the recommended treatment to reverse opioid overdose.
- Opioid withdrawal may occur after naloxone administration and should be treated symptomatically

https://www-uptodate-com.proxy.medlib.uits.iu.edu/contents/acute-opioid-intoxication-in-adults?source=search_result&search=opiod%20overdose&selectedTitle=1~146#H11

Amphetamines

Symptoms

- Diaphoresis
- Hypertension
- Tachycardia
- Severe agitation
- Psychosis
- Hyperthermia

Tests to run

- Fingerstick glucose
- EKG
- If intoxication is severe, these tests may be necessary: (Basic serum electrolytes, lactate, CPK, aminotransferases, PT and PPT, renal function tests, urinalysis)

Treatment

- Agitation (with benzos or atypical antipsychotics) and hyperthermia (nondepolarizing agents is necessary) should be addressed.
- Hypertension may need to be treated with vasodilators

Alcohol Withdrawal

What is it?

- Alcohol withdrawal is the body's response to the abrupt cessation of "prolonged sustained" alcohol usage.
- Generally it occurs because the body has become accustomed to the inhibitory effects of alcohol and therefore when alcohol usage stops, an overwhelming excitatory input causes over activity of the central nervous system

Common symptoms (usually most symptoms resolved within 48 hours, with the exception of DT)

- Insomnia
- Tremulousness
- Anxiety
- GI issues
- Headache
- Diaphoresis
- Palpitations
- Seizures (occur once of many over a short period of time, consistent seizures usually related to status epilepticus and require further work up)
- Hallucinations
- Delirium tremens- (begins 48-96 hours after drinking cessation and lasts for 1-5 days)- characterized by hallucinations, disorientation, tachycardia, hypertension, hyperthermia, agitation, and diaphoresis

Tests to Run

- A history should be obtained from the patient to assess drinking history.

- LP and head CT may be necessary to rule out other life threatening conditions that present similarly to alcohol withdrawal such as meningitis, intracranial hemorrhage, metabolic issues, drug overdose, hepatic failure, or a GI bleed.

Treatment

- Patients can be treated with benzodiazepines to manage agitation
- Patients should also be given fluids to accommodate for hypovolemia, common in withdrawal.
- Delirium tremens is a very dangerous condition and should be monitored carefully and treated with benzodiazepines. Benzos and barbiturates work synergistically on the GABA channels and may be a very effective treatment for patients in DT.

https://www-uptodate-com.proxy.medlib.uits.iu.edu/contents/management-of-moderate-and-severe-alcohol-withdrawal-syndromes?source=search_result&search=alcohol%20withdrawal%20treatment&selectedTitle=1~130

Suicide Attempt

What is it?

- An attempt by a patient to take their own life.
- Suicide falls within the top 10 causes of death in many countries and therefore it is common to see cases in the Emergency Room
- Patients that suffer from psychiatric disorders have an increased risk of suicide.

Treatment

- Firstly, the patient should be assessed for immediate risk by assessing ABCs (Airway, Breathing, Circulation)
- I will not assess how to treat each type of suicide attempt here, given how varied they are. However, for each patient, injuries will be treated in a different manner depending on whether they are pharmacologically induced or trauma.
- Once the patient is stable, the patient should be in a room where they cannot potentially harm themselves.
- Include family members in their treatment plan so that they can help to keep the patient safe.
- Psychiatric disorders should be investigated and treated aggressively to reduce risk of further suicide attempts. Medications that can be lethal if taken in excess such as TCAs or MOAIs. SNRIs and SSRIs are safer if taken in excess. Lithium should also be considered as it has been seen to decrease rates of suicide when added to the patient's medication regimen.
- Psychotherapy has been shown to reduce future suicide attempts and therefore patients should be offered as a treatment.
- Psychiatric hospitalization should be considered after a suicide attempt as it can help to reduce risk of future suicide as well.

Psychosis

What is it?

- Psychiatric condition defined as loss of contact with reality.
- Psychosis can increase a patient's risk of harming themselves or their family so should be treated urgently.
- Is caused by primary psychotic disorder (schizophrenia, schizophreniform disorder, schizoaffective disorder, delusional disorder, brief psychotic disorder, schizotypal personality disorder, major depressive disorder with psychotic features, bipolar disorder with psychotic features), ingestion of substances (many induce psychosis) other medical conditions (delirium, endocrine disorders, hepatic and renal disorders, infectious diseases, demyelinating disorders, metabolic disorders, neurodegenerative disorders, vitamin deficiencies, and neurological disorders).

Symptoms

- Delusions
- Hallucinations
- Thought disorganization
- Agitation

Tests to run

- Primary psychotic disorders are diagnoses of exclusion, so other medical causes should be ruled out.
- Assess timeline of symptoms
- Mental status exam (Sample: http://medschool.slu.edu/agingsuccessfully/pdfsurveys/slumsexam_05.pdf)
- Blood panel to assess for fluid and electrolytes, CBC, hepatic panel, TSH, FTA-ABS, urinalysis and urine drug screen, vitamin B12 levels, HIV tests
- Consider running these tests depending on the case: head CT, EEG, LP, heavy metal screen, rheumatologic workup, hormone levels

Treatment

- Symptomatic treatment of psychosis should occur with antipsychotic medication.
- Depending on the diagnosis (mood disorder or associated with other medical condition), the patient should be treated accordingly.

https://www-uptodate-com.proxy.medlib.uits.iu.edu/contents/clinical-manifestations-differential-diagnosis-and-initial-management-of-psychosis-in-adults?source=search_result&search=psychosis&selectedTitle=1~150

Respiratory Emergencies

How to approach a patient with shortness of breath?

History- questions to ask

How did the shortness of breath begin? Sudden or gradual onset?

Is there anything that makes the shortness of breath better or worse?

Do you have chest pain?

Do you feel an abnormal heart or have palpitations?

Do you have swelling in the lower extremities?

Have you had a syncopal or near syncopal episode?

Are you coughing up blood?

Ask about associated symptoms: cough, sputum, fever, chills

Ask about previous history of pulmonary embolism, deep vein thrombosis or clotting disorder

Ask about smoking history (pack years)

Pneumonia

What is it? Infection of the lung.

Symptoms:

- Cough
- Fever
- Pleuritic pain
- Dyspnea
- Sputum production (thick purulent sputum for bacterial infections and watery for atypical infections)
- Chills
- Crackles on auscultation
- Tachypnea
- Tachycardia.

Tests to run:

- CBC to look for leukocytosis and left shift.
- Procalcitonin and C-reactive protein may be elevated in bacterial infection
- Chest radiograph to look for infiltrates or consolidation.
- Blood cultures to determine bacteremia and organism.
- Urine antigen tests for *Legionella*, and *S. pneumoniae*.

Sputum collection for Gram stain and culture is controversial, but is done sometimes.

Treatment:

- Previously healthy patients without signs of sepsis may be given a macrolide or doxycycline.
- In comorbid patients at higher risk, a respiratory fluoroquinolone (moxifloxacin, gemifloxacin, levofloxacin) or beta-lactam plus a macrolide may be used.

- For patients requiring hospitalization, a respiratory fluoroquinolone or antipneumococcal beta-lactam (cefotaxime, ceftriaxone, ampicillin-sulbactam) plus a macrolide should be used.
- Special considerations include risk for pseudomonas or MRSA.

Pulmonary Embolism

What is it? Embolism from DVT that gets lodged in pulmonary vessels.

Symptoms:

- Sudden onset dyspnea
- Pleuritic chest pain
- Tachypnea
- Tachycardia
- Hypoxemia
- Possible Unilateral leg swelling.

Suspicion of PE is based on a WELLS score. A score <2 is low risk, 2-6 is intermediate risk, and >6 is high risk.

- Clinical symptoms of deep vein thrombosis (DVT) (3 points)
- Other diagnoses are less likely than PE (3 points)
- Heart rate >100 (1.5 points)
- Immobilization three or more days or surgery in previous four weeks (1.5 points)
- Previous DVT/PE (1.5 points)
- Hemoptysis (1 point)
- Malignancy (1 point)

Low risk patients are assigned a PERC score. A patient who fulfills all 8 criteria has a low enough likelihood of PE that no further testing is necessary. If not all criteria are fulfilled, a negative D-dimer can rule out PE. A negative D-dimer in an intermediate risk patient also rules out PE.

- Age <50 years
- Heart rate <100 beats/minute
- Oxyhemoglobin saturation \geq 95 percent
- No hemoptysis
- No estrogen use
- No prior DVT or PE
- No unilateral leg swelling
- No surgery/trauma requiring hospitalization within the prior four weeks

If PE is still suspected after these criteria, a CT pulmonary angiogram can be performed to definitively diagnose PE.

Tests to run: CBC may show leukocytosis and increased erythrocyte sedimentation rate (ESR).

Lactate may be elevated.

AST may be elevated.

Creatinine is helpful in determining if kidney function is good enough for CT contrast.

BNP and Troponin may be elevated but is nonspecific for PE.

D-dimer is not for diagnosis, but may be used for ruling out PE as discussed above.

V/Q scan: Patients with high probably V/Q scan and high clinical probability should be treated for PE.

Treatment: After the diagnosis of PE is made, anticoagulation therapy may be used. Also, ablation of the embolus can be performed by interventional radiology for larger emboli.

COPD exacerbation

What is it? An acute event that worsens the patient's respiratory conditions more than the regular variation. An estimated 70% of cases are the result of an infection that exacerbates the patients normally compromised respiratory system. The other 30% are caused by allergies, PE, or other unknown causes.

Symptoms:

- Hypoxemia
- Dyspnea
- Respiratory distress
- Cyanosis
- Tachypnea
- Wheezes
- Accessory breathing muscles
- Diaphoresis
- Agitation.

Tests to run: Assess O2 saturation.

Obtain ABG if severe exacerbation.

Chest radiograph to look for pneumonia, pulmonary edema, CHF, etc.

CBC for signs of infection.

BMP for electrolyte imbalance.

Glucose.

BUN and creatinine.

EKG for any arrhythmias.

Troponin and BNP if uncertain about the etiology of dyspnea.

Treatment: Oxygen therapy to keep SpO2 88-92%.

Noninvasive positive pressure ventilation may be necessary and is preferred over tracheal intubation.

Inhaled beta agonist and anticholinergic agent to reduce bronchoconstriction.

Inhaled corticosteroid.

Systemic glucocorticoids for longer acting control.

Antibiotic treatment is controversial but generally used for severe exacerbations with suspected bacterial infection.

Pneumothorax

What is it? Air in the pleural space causing the affected lung to collapse. This can quickly develop into a tension pneumothorax, where the pressure compresses the pericardium and compromises cardiac function. Primary spontaneous pneumothorax occurs without a precipitating event (usually the patient is in their 20s), while secondary pneumothorax occurs as a result of another event (infection, trauma, etc.).

Symptoms:

- Dyspnea
- Unilateral chest pain on affected side
- Diminished breath sounds unilaterally
- Tracheal deviation
- Labored breathing
- Hemodynamic compromise (tachycardia, hypotension) may suggest tension

pneumothorax.

Tests to run: Pulse oximetry.

Chest radiograph.

Arterial blood gas if SpO₂ is <92%.

CT may be used to better visualize pneumothorax if chest X-ray is inconclusive or cannot visualize well.

Treatment: Hospitalization is generally required especially if it is secondary to another disease. Oxygen is given to all patients to help absorb air out of the pleural space. For patients with very small pneumothorax (<1cm), supplemental oxygen and observation may be enough. For larger pneumothorax, chest tube thoracostomy is necessary to remove the air. Needle aspiration may be successful if the pneumothorax is between 1 to 2 cm from the chest wall. Needle decompression is necessary to relieve pressure on a tension pneumothorax before placement of the chest tube. Surgery to repair the pleura may be necessary in severe cases or in the case of trauma.

Cardiovascular Emergencies

How to approach a patient with chest pain?

History- questions to ask

Where is your pain located?

Ask about past medical history?

- Coronary artery disease risk factors: hypertension, smoking, diabetes, obesity, hypercholesterolemia

Has this pain occurred before?

Does the pain radiate?

- Pain radiating to neck, jaw shoulder or arm is usually consistent with cardiac ischemia

Describe what the pain feels like?

How severe is it?

Is there anything that makes the pain better or worse?

Are you having any other symptoms?

- Nausea, vomiting, shortness of breath, syncope

How long have you had the pain? Does it come and go?

Aortic Aneurysm:

·What is it: A bulge or ballooning in the wall of the aorta. There are two types of aortic aneurysm:

a. Thoracic aortic aneurysms (TAA) - these occur in the part of the aorta running through the chest.

b. Abdominal aortic aneurysms (AAA) - these occur in the part of the aorta running through the abdomen

·**Common Symptoms:** Symptoms may not show up until the aneurysm is large or has burst. Symptoms of a TAA include chest pain, shortness of breath, coughing, hoarseness. AAA most commonly present with back pain, abdominal pain that is severe and comes on quickly. A rupture aneurysm may cause clammy skin, dizziness, syncope, and shock

·Tests to Run: Chest X- Ray may be able to show a TAA, but isn't definitive. A chest CT for a TAA is needed. For a AAA an initial abdominal ultrasound showed initially be done, and followed up with a abdominal CT.

·Possible Treatment: Aneurysms without symptoms or smaller than 5cm generally don't require surgery, but monitoring with CT scans every 1-3 years based on size. Symptomatic aneurysms or aneurysms larger than 5cm often require surgery, either an open repair or an endovascular stent graft.

Acute Myocardial Infarction:

·What is it: the irreversible death (necrosis) of heart muscle secondary to prolonged lack of oxygen supply (ischemia) due to a blockage of one or multiple coronary arteries.

·Common Symptoms: Fatigue, diaphoresis, shortness of breath, pain that radiates to the jaw, neck, shoulder, or left arm, back, nausea, feeling of impending doom. The most common symptom is chest discomfort that can range from a dull ache to crushing pain. This pain lasts from 30-60 minutes and may go away and come back.

·Tests to Run: A patient that presents with chest pain should be given an EKG to check for ST-segment elevation, 80% of MI's can be diagnosed based on EKG. Troponin tests should be

ordered, and rechecked every 3 hours to see if ischemia is worsening. A patient with EKG abnormalities and normal Troponin should be reevaluated every 3 hours for increases in Troponin. Because the presentation of MI can be extremely variable and mimic other common chest complaints a Chest X-ray should be ordered. You may also consider ordering a D-Dimer for PE.

· Possible Treatment: A patient with a confirmed ST Elevation Myocardial Infarction (STEMI) should be given baby aspirin immediately, as well as nitroglycerin if chest pain is present. Patients may need a stent placed or possibly bypass surgery.

Acute Pericarditis:

·What is it: An inflammation and swelling the pericardium, which is the thin sac like membrane surrounding the heart. Causes can range from infection, to autoimmune, to chest trauma.

· Common Symptoms: Sharp piercing chest pain over the center or left side of the anterior chest, which is generally more intense when breathing in. Shortness of breath when reclining, heart palpitations, fatigue or weakness, cough, or low grade fever.

·Tests to Run: CBC and blood culture to determine if the pericarditis is caused by infection, EKG abnormalities can be caused by pericarditis, Chest X-ray may show an enlarged cardiac silhouette, echocardiogram can show abnormalities in the heart beating as well as pericardial inflammation.

·Possible Treatment: Mild cases tend to resolve on their own and can be managed with OTC pain killers. Other anti-inflammatory drugs may be used, such as Mitigare. For more severe cases pericardiocentesis or pericardiectomy may be required.

Aortic Dissection:

·What is it: a condition in which the inner layer of the aorta (Tunica intima), tears. Blood surges through the tear, causing the inner and middle layers (Tunica media) of the aorta to separate.

·Common Symptoms: Sudden severe chest pain or upper back pain that is described as a tearing or ripping sensation. Loss of consciousness, shortness of breath, weak pulse/and or blood pressure in one arm compared to the other.

·Tests to Run: Based on the patient's condition a Chest X-ray may be able to show a widening of the aorta. However the more common test would be a CT with contrast of the chest and abdomen.

·Possible Treatment: Initial therapy may be to give beta blockers or other drugs to lower blood pressure and slow heart rate; this may stop the dissection from growing. Ultimately emergency surgery will be needed to remove the dissected portion of the aorta and replace with a synthetic graft.

Atrial Fibrillation (Afib):

·What is it: an irregular and often rapid heart rate where both the atria beat chaotically and irregularly out of coordination with the ventricles. The atria may beat up to 300-400 times per

minute. The chaotic movement of blood in the atria may form thrombi and greatly increase the risk of stroke.

- Common Symptoms: Some people with A-Fib have no symptoms and are unaware of their condition until discovered on physical exam. For those who have symptoms they commonly are palpitations with sensations of a racing heartbeat that may be uncomfortable or feels irregular. Weakness, fatigue, lightheadedness, shortness of breath, chest pain, or dizziness may also be common.

- Tests to Run: An EKG will often show A-Fib, however in patients with a history of managed A-Fib you may need to run a full cardiac workup (CXR, Troponin, D-Dimer, CBC, and Metabolic panel) to rule out other heart conditions. If there is no A-Fib on EKG the patient may need a portable EKG device in order to try and catch A-Fib attacks. It's also often helpful to run a complete metabolic panel and Thyroid Stimulating hormone tests to try and figure out if the A-Fib is secondary to another problem.

- Possible Treatment: The atrial fibrillation treatment that is most appropriate for you will depend on how long you've had atrial fibrillation, how bothersome your symptoms are and the underlying cause of your atrial fibrillation. Generally, the treatment goals for atrial fibrillation are to Reset the rhythm/control the rate, prevent blood clots, reduce stroke risk. This can be done by electrically or chemically cardioverting the heart in the hospital, and controlling rate and rhythm with drugs such as Cardizem or Amiodarone, and possibly start the patient on a blood thinner.

Deep Vein Thrombosis (DVT):

- What is it: a blood clot that forms in a vein deep in the body. Most deep vein clots occur in the lower leg or thigh. A deep vein thrombosis can break loose and cause a Pulmonary Embolism. Sitting for long period of time, such as on long flights, car or train rides increases the likelihood of DVT's and PE's

- Common Symptoms: Warmth and tenderness over the vein, skin redness, unilateral swelling and edema in the affected leg or side of pelvis, pain in affected area.

- Tests to Run: An elevated D-Dimer would suggest a thrombus, but isn't diagnostic of a DVT as hospitalized patients may have an elevated D-Dimer for multiple reasons. A venous ultrasound of the area of concern is diagnostic for DVT. A Wells score can be used to predict the likelihood of a DVT.

- Possible Treatment: Initial treatment for a DVT is to start anticoagulation therapy with Fondaparinux or unfractionated Heparin. Patient may also need to wear compression stockings at home, as well as increase movement at home. In high risk populations a IVC filter may be needed.

Endocarditis:

- What is it: An infection of the inner lining of the heart (endocardium). There are many ways to develop Endocarditis, so the underlying cause needs to be found. People at risk typically have damaged or artificial heart valves, heart defects, or are IV drug users.
- Common Symptoms: Symptoms can vary depending on the pathogen responsible, but common signs include fever, chills, a new or changed murmur, fatigue, shortness of breath, chest pain when breathing, or swelling in the feet, legs, or abdomen.
- Tests to Run: CBC to look for evidence of infection (elevated white counts, Neutrophils vs. Lymphocyte), blood culture to determine if there is a pathogen in the blood, Echocardiogram, and EKG which may show changes in electrical activity.
- Possible Treatment: High doses of IV antibiotics are needed for bacterial causes of Endocarditis. Surgery may be needed to replace any damaged valves.

Myocarditis:

- What is it: Myocarditis is an inflammation of the heart muscle (myocardium). This inflammation can affect the heart's electrical system leading to rapid or abnormal heart rhythms. Viral infections usually cause Myocarditis, such as adenovirus, parvovirus, and echoviruses amongst others.
- Common Symptoms: Chest pain, rapid or abnormal heart rhythms, shortness of breath at rest or during activity, ankle or leg swelling, fatigue, and body aches.
- Tests to Run: CBC to check for infection, blood culture for bacteria, EKG to check for changes in electrical activity, Chest X-ray to show the size of the heart and to determine if there is fluid around the heart, echocardiogram to show the structural beating of the heart to look for cardiac enlargement, valve problems, or fluid around the heart.
- Possible Treatment: Most cases of Myocarditis improve on their own without treatment. The patient should refrain from exercise for 3-6 months. In more severe cases ACE inhibitors or beta blockers may be prescribed to help treat Dysrhythmias or heart failure. Stronger IV antiviral medications may be needed or ventricular assist devices.

Pericardial Tamponade:

- What is it: When fluid accumulates in the pericardial sac and results in compression of the heart. This can occur both due to disease processes like cancer or kidney failure as well as chest trauma.
- Common Symptoms: Symptoms and their time to onset may vary based on the underlying cause of the Tamponade. Common symptoms include cardiogenic shock, shortness of breath, weakness, lightheadedness, and cough. Beck's Triad of converging systolic and diastolic blood pressures, distended jugular veins, and muffled heart sounds are associated with Cardiac Tamponade.
- Tests to Run: Echocardiogram will show an enlarged pericardial sac containing fluid.
- Possible Treatment: Initial therapy with drugs that increase blood pressure can help keep the heart beating effectively. The fluid must be drained either through a needle through the chest

wall or emergency surgery. Ultimately the underlying cause of the Tamponade must be found and addressed.

Rheumatic Fever:

- What is it: An inflammatory disease that often affects the heart, which develops as a complication of inadequately treated Streptococcus Pyogenes infection. The infection can damage heart valves, most commonly the Mitral valve. Most commonly found in 5-15 year old children.
- Common Symptoms: Fever, painful or tender joints, red or swollen joints, chest pain, heart murmur, fatigue, Sydenham's Chorea
- Tests to Run: Blood tests for S. pyogenes antibodies, ESR to check for markers of inflammation. Echocardiogram to look for damage to any heart valves.
- Possible Treatment: Oral Penicillin or beta lactam antibiotic will take care of the remaining strep infection. Preventative antibiotics for Rheumatic fever may be prescribed for 5 years or longer. NSAIDs may be used to reduce inflammation. Damaged heart valves may need to be replaced.

Spontaneous Coronary Artery Dissection (SCAD):

- What is it: a condition in which the inner layer of one of the coronary arteries (Tunica intima) tears. Blood surges through the tear, causing the inner and middle layers (Tunica media) of that coronary artery to separate. Far more common in women than men, and is the primary cause of MI in young, fit, healthy women with no obvious risk factors for MI.
- Common Symptoms: Symptoms are very similar to that of Myocardial infarction, with the most common being persistent chest pain.
- Tests to Run: Because the symptoms are the same for an MI, and full heart work up should be done. To test specifically for SCAD a selective Coronary Angiography should be done
- Possible Treatment: Coronary artery bypass surgery is often needed to bypass the affected segment of artery.

Stable Angina Pectoris

- What is it: Chest pain or discomfort caused by a reduction in blood flow to the heart muscle most commonly due to Coronary artery disease caused by physical exertion or emotional stress. Almost 10 million Americans have angina each year.
- Common Symptoms: Retrosternal chest discomfort such as pressure, heaviness, squeezing, burning or choking. Pain is often preceded by exertion or emotional stress and is localized to the epigastrium. The pain usually lasts for 1-5 minutes and is relieved by rest or nitroglycerin.
- Tests to Run: Full cardiac work up to check for MI if pain does not resolve spontaneously.
- Possible Treatment: People with stable angina tend to have symptoms resolve when they rest, or take nitroglycerin.

Sudden Cardiac Arrest:

- What is it: the sudden, unexpected loss of heart function, breathing and consciousness. Sudden cardiac arrest usually results from an electrical disturbance in the heart that disrupts its pumping action, stopping blood flow to the rest of the body
- Common Symptoms: Sudden collapse, no pulse, no breathing, loss of consciousness.
- Tests to Run: EKG may be able to show if the heart is in a type fibrillation that is shockable, or in asystole. Patient will need complete blood work and full workup to determine the cause of the arrest.
- Possible Treatment: Patient needs immediate CPR and advanced airway. If EKG shows a shockable rhythm (V-Fib as an example) electric cardioversion is needed. Epinephrine should be given intravenously 1mg every 3-5 minutes.

Unstable Angina Pectoris:

- What is it: Chest pain or discomfort caused by a reduction in blood flow to the heart muscle most commonly due to Coronary artery disease that occurs at rest and gets worse over time. Unstable angina can increase the chances of an MI in the near future.
- Common Symptoms: Chest pain or discomfort with radiation to neck, jaw, shoulder, back, or left arm. Tightness or squeezing in the chest. Shortness of breath. Typically lasts 15- 20 minutes and does not respond to nitro.
- Tests to Run: Full cardiac work up to rule out MI.
- Possible Treatment: Initial treatment may be to start blood thinners. The patient may also need to have an angioplasty or coronary artery stent placed to reduce risk of future MI.

Nephrology/Urology:

How to approach patient with urinary symptoms?

Anatomically orient yourself and adjust to whether the patient is female or male

History- questions to ask

- How did your symptoms begin?
 - Sudden onset or progressive
- Does anything make your symptoms worse? Better?
- Can you describe the pain?
- Are you able to void spontaneously?
- Do you experience frequency, urgency, pain while urinating, and incontinence?
- What color is your urine?
- Have you had these symptoms in the past?

- Ask about associated symptoms: fever, chills, nausea, vomiting, cough, dyspnea, and chest pain that can cause pain radiating to flanks
 - If female ask about gynecologic symptoms: menses, vaginal discharge, any vaginal bleeding that is abnormal

Acute Kidney Failure:

- What is it: A sudden inability to filter waste products from the blood stream. Acute Kidney failure often develops over the course of a few hours to a few days. Causes of acute kidney failure can range from infection, to autoimmune diseases, cancer, obstructions or trauma.
- Common Symptoms: Decreased urine output, fluid retention, drowsiness, shortness of breath, fatigue, confusion, and nausea.
- Tests to Run: Urine output measurements and urinalysis to help determine the cause of the kidney failure, complete metabolic panel to check electrolytes as well as Creatinine and BUN. Depending on the suspected cause of the kidney failure an Ultrasound or CT may be of use.
- Possible Treatment: Ultimately treating Acute Kidney damage is dependent on finding the cause of the failure. Treatment typically requires hospitalization.

Bladder Calculus:

- What is it: Hard masses of minerals, often made of calcium or magnesium, that accumulate in the urinary bladder. This happens often when the bladder cannot be fully emptied causing minerals to settle in the bladder and accumulate.
- Common Symptoms: Often these stones are asymptomatic and are incidental findings on radiographs. When they do cause symptoms they tend to cause lower abdominal pain, pain in the testicles or penis in men, a burning sensation during urination, blood in the urine, cloudy or abnormally dark colored urine.
- Tests to Run: A physical exam showing bladder enlargement along with consistent symptoms is highly likely of a bladder stone. Urinalysis will tend to show the presence of RBC's in the urine. An ultrasound or Abdominal X-ray will show a stone.
- Possible Treatment: If a stone is large enough to have symptoms it generally will need to be removed. Drinking lots of fluids may help the chance the stone passes naturally, but since most stone occur due to incomplete bladder drainage, this often does not work. A Cystolitholapaxy may be done in which a small tube is inserted through the urethra into the bladder and the stone is broken up using a laser or ultrasound and removed.

Cystitis:

- What is it: Cystitis is an inflammation of the urinary bladder. This most commonly occurs due to a bacterial urinary tract infection that ascends through the urethra into the bladder, though it

doesn't have to be infectious in nature. Less commonly it can be caused by adverse reactions to some prescription drugs. Cystitis can affect anyone but is more common in women.

- Common Symptoms: Urinary urgency, a burning sensation during urination, passing frequent small amounts of urine, blood in the urine, cloudy or foul smelling urine, pelvic discomfort, pressure in the abdomen, low grade fever.

- Tests to Run: A urinalysis showing bacteria and hematuria along with the clinical presentation is enough to diagnose cystitis. Urine cultures may also be done in case the infection does not resolve with antibiotics.

- Possible Treatment: Often uncomplicated cases of Cystitis will respond to a 3 day course of TMP-SMX along with Pyridium which is a analgesic.

Glomerulonephritis:

- What is it: Inflammation of the glomeruli in one or both kidneys due to infection or as a part of another disease such as Lupus or diabetes. Treatment again depends on the underlying cause of the Glomerulonephritis.

- Common Symptoms: Pink or cola colored urine from RBC's in the urine, foamy urine due to proteinuria, high blood pressure, edema in the hands feet and abdomen

- Tests to Run: Urinalysis will typically show large amounts of RBC's and increased protein in the urine. A CBC and metabolic panel to look for signs of infection and to measure electrolytes, Creatinine, and BUN. If there is suspicion of kidney damage a CT scan may be necessary.

- Possible Treatment: Treatment will be based on the underlying cause of the inflammation.

Nephrolithiasis:

- What is it: Hard deposits of minerals and salts that form typically in the renal pelvis. From there they travel through the ureter to the bladder and are excreted. Stones tend to be made of calcium and form when urine mineral concentrations are high.

- Common Symptoms: Mild to severe flank pain on the side of the stone, pain that radiates to the lower abdomen and groin, pain coming in waves or fluctuating, pain during urination, pink, brown, or red urine, nausea and vomiting, urinary urgency.

- Tests to Run: Urinalysis tends to show RBC's. CT scan to confirm the stone.

- Possible Treatment: Stone smaller than 5mm will pass on their own. Typically the patient will receive a narcotic pain killer and be told to drink lots of water and given a urine strainer to catch the stone. Stones between 5-10mm have progressively less chance of spontaneous passage, and stone over 10mm will not pass on their own. Large stone may be broken up using sound waves in extracorporeal shock wave lithotripsy. Stones can also be removed surgically or with a ureteroscope.

Nephrotic Syndrome:

·What is it: A non-inflammatory condition in which the arteries of the glomeruli become hyalinized leading to an increase in cell membrane permeability to protein and other compounds. This is often a component of Glomerulonephritis, and can be caused by many different disease processes.

·Common Symptoms: Severe edema around the hands, ankles and feet due to a decrease in oncotic pressure. Foamy urine caused by excess urinary protein, weight gain due to excess fluid retention.

·Tests to Run: Urinalysis showing large amount of proteins, blood albumin levels will be decreased, Creatinine and BUN should also be measured to assess renal function.

· Possible Treatment: Treatment will involve finding the underlying cause of the Nephrotic syndrome and addressing that. Diuretics can be used to reduce edema

Pyelonephritis:

What is it: An inflammation of the kidney tissue, calyces, and renal pelvis. It is commonly caused by bacterial infection that has spread up from the urinary tract or travelled through the bloodstream to the kidneys.

Common Symptoms: Unilateral (although can be bilateral) flank pain that may be mild to severe, fever (though not always present, nausea, vomiting, body chills, bloody urine, abdominal pain.

Tests to Run: In moderate to severe cases patient may have elevated WBCs on a CBC. Urinalysis will show bacteria, RBCs, and usually proteins in the urine. Urine culture may be done to determine the exact organism responsible.

Possible Treatment: For more severe cases of pyelonephritis, or complicated cases, hospital admission is necessary. IV rehydration is needed in order to maintain hydration. IV antibiotics are used to clear the infection, typically TMP-SMX, an oral beta lactam or amoxicillin are used, and in severe cases (life-threatening) Levofloxacin may be used.

Gastrointestinal

How to approach patient with abdominal pain?

Anatomically orient yourself and adjust to whether the patient is female or male

- RUQ
- RLQ
- LUQ
- LLQ

History (questions to ask)

- Where is your pain? How long has it been there?
 - Remember: the location of the pain can change with time as the disease manifests itself
- Does the pain radiate anywhere?

- Ex: pain that radiates to the flank or genitals can be a kidney stone or ruptured AAA
- How did the pain begin? Was it a sudden or gradual onset?
 - Sudden onset of pain can indicate a serious underlying disorder
 - Inflammatory etiologies usually develop over many hours to days and are less severe at onset
- What were you doing when the pain began?
- What does the pain feel like?
- On a scale of 1-10, how bad is your pain?
- Is there anything that alleviates your pain or aggravates it?
- Have you ever experienced this pain before or has anyone in your family ever experienced something like this?
- Ask about associated symptoms
 - GI: nausea, vomiting, diarrhea, constipation, bleeding
 - UG: dysuria, frequency, urgency, hematuria
 - OB/GYN: pregnancy, menses, STI's, sexual activity, vaginal discharge
 - Cardiopulmonary: cough, dyspnea, chest pain
 - PMH: hospitalizations, surgeries, chronic illnesses, medications, allergies, OB/GYN, psychiatric illnesses, childhood illnesses, immunizations

Physical Exam

- General appearance
- Vitals
- Inspection: look for distention, masses, scars, bruising
- Auscultation: listen for bowel sounds or bruits
- Percussion
- Palpation

Common Clinical Diagnosis and Scenarios

- Appendicitis
 - Signs and Symptoms
 - Periumbilical or epigastric pain that migrates to RLQ
 - RLQ pain
 - Nausea, vomiting
 - Diarrhea
 - Low fever
 - Abdominal tenderness to palpation
 - Guarding

- Rebound tenderness
 - Work-up
 - Clinical signs
 - Abdominal CT
 - CBC
 - Tx: appendectomy is the standard of care, an alternative strategy is antibiotic therapy with appendectomy reserved for those who do not respond to that treatment
- Cholecystitis, cholangitis, cholelithiasis
 - What: inflammatory disease of the gallbladder
 - Signs and Symptoms
 - Acute RUQ or epigastric pain
 - Nausea, vomiting
 - Fever can be present in cholecystitis and cholangitis
 - RUQ tenderness to palpation
 - Murphy's sign (patient abruptly stops deep inspiration during palpation of RUQ)
 - Work-up
 - Hepatic Panel
 - Ultrasound
 - Amylase, Lipase
 - Blood culture
 - Tx: initiation of IV broad spectrum antibiotics (ie: monotherapy with a beta-lactam/beta-lactamase inhibitor- ampicillin-sulbactam, piperacillin-tazobactam) and a cholecystectomy or placement of cholecystostomy tube
- Pancreatitis
 - What: acute inflammatory process of the pancreas
 - Signs and Symptoms
 - Epigastric or LUQ pain
 - Radiation to back
 - Abdominal tenderness to palpation
 - Vomiting
 - Distention
 - History of alcohol abuse or gallstones
 - Work-up
 - Amylase
 - Lipase
 - Abdominal CT with contrast
- Diverticulitis
 - What: inflammation of the pouches in the large bowel wall.

- Signs and Symptoms
 - LLQ abdominal pain
 - Nausea, vomiting
 - Constipation
 - Diarrhea
 - Rectal bleeding
 - LLQ tenderness, guarding, rebound
 - Fever
 - Heme-positive stools
- Work-up
 - Clinical symptoms
 - Abdominal CT
- Tx: IV or oral antibiotic therapy (ex: oral- trimethoprim-sulfamethoxazole plus metronidazole; IV- piperacillin-tazobactam)
- Ectopic Pregnancy
 - What: pregnancy that occurs outside of the uterus
 - Signs and Symptoms
 - Abdominal or pelvic pain
 - Vaginal bleeding
 - Amenorrhea
 - Nausea, vomiting
 - Dizziness
 - Abdominal or pelvic tenderness
 - Work-up
 - Urine pregnancy test
 - Quantitative beta-hCG- assesses whether the increase in concentration is consistent with an abnormal pregnancy
 - Endovaginal ultrasound
 - Hematocrit- the patient may experience hemodynamic instability if there is a rupture and hemorrhage of the fallopian tubes (usually where the pregnancy is implanted)
 - Tx: surgery is required when emergency treatment is necessary; methotrexate therapy is a potential option for hemodynamically stable patients.

Pelvic Inflammatory Disease

- What: acute infection of the upper genital tract in women, involving any or all of the uterus, fallopian tubes and ovaries. Can also involve the neighboring pelvic organs.
- Signs and Symptoms
 - Lower abdominal pain
 - Vaginal discharge
 - Abnormal vaginal bleeding

- Urinary symptoms
 - Fever
- Work-up
 - Cultures for GC, chlamydia
 - Pregnancy test
 - Consider syphilis, HIV testing
- Tx: antibiotic therapy: doxycycline for *C. trachomatis* or azithromycin; clindamycin and gentamicin for *N. gonorrhoeae* and *C. trachomatis*

Common labs

Total Hemoglobin (Hgb or Hb): A test used to determine the amount of hemoglobin in the blood. Hgb is the pigment part of the erythrocyte, and the oxygen-carrying part of the blood.

Hematocrit (Hct): The hematocrit measures percentage by volume of packed red blood cells in a whole blood sample.

A count of actual (or estimated) number of RBC's per cubic mm of whole blood. Normal Values: males: 4.5 to 6.0 million/cu mm blood females: 4.0 to 5.5 million/cu mm blood
 Clinical Implications: The RBC count is useful for determining such problems as anemia and hemorrhage. In combination with other hematology tests, it can be quite useful for diagnosis. This test can also give an indirect estimate of the hemoglobin levels in the blood.

Mean Corpuscular Volume (MCV) -The volume of the average RBC
 Clinical Implications: The MCV indicates the relative size of the RBC's.

Reticulocyte Count (Retic count): This is a test for the estimation of the actual numbers of reticulocytes in the blood. Reticulocytes are the immature RBC's.
 The retic count is an indication of the production of RBC's by the bone marrow.

White Blood Cell Count (WBC, Leukocyte count): A laboratory test that counts the actual number of WBC's in the blood.
 WBC's are our body's first line of defense against invading bacteria and most other harmful organisms.

Prothrombin Time (PT): This test is a measure of phase III of the clotting process. Prothrombin is also known as factor II of the coagulation factors. It is produced by the liver and requires vitamin K for its synthesis. In liver disease, PT is usually prolonged.

Partial Thromboplastin Time (PTT)

It is used to detect Phase II defects in the clotting process. It will usually detect deficiencies in all clotting factors except factors VII and XIII.

Creatine Phosphokinase(CPK), Creatine Kinase (CK): This is a blood chemistry test to measure the amount of enzyme in the blood. The CPK enzyme is found in high concentration in heart and skeletal muscle; low concentration is brain tissue.

Serum CPK/CK will be elevated in skeletal muscle disease, in acute MI, in cerebral vascular disease, vigorous exercise, IM injections, electrolyte imbalance, and hypokalemia.

Troponin: tests are primarily ordered to help diagnose a heart attack and rule out other conditions with similar signs and symptoms.

Troponin I and troponin T are proteins found in heart muscle and are released into the blood when there is damage to the heart.

Reference Range: 0.01-0.04 ng/mL

D-dimer: D-dimer concentration may be determined by a blood test to help diagnose thrombosis. It is a fibrin degradation product, a small protein fragment present in the blood after a blood clot is degraded by fibrinolysis.

Reference Range: 0-500 ng/mL

Potassium, (K+): Potassium is one of the important electrolytes in the body. Cardiac arrhythmias and neurological disturbances are seen with high or low levels of this electrolyte.

Creatinine: A test for creatinine levels in blood. Creatinine is a nonprotein end product of creatine metabolism. Creatine is an end product of protein metabolism, formed in the liver, kidneys, intestine, pancreas. Test used to assess renal glomerular filtration and screen for renal damage.

This test provides a sensitive measure of renal damage, because renal impairment is virtually the only cause of creatinine elevation.

Specific Gravity: Specific gravity is the weight of the urine as compared to water. Specific Gravity will increase with the amount of dissolved particles (concentrated) in it. Specific gravity will decrease when the water content is high and the dissolved particles are low (less concentrated).

Protein: Only a very small amount of protein should be excreted into the urine in a 24-hour period (normal is 0- trace).

Serum Bilirubin: This test is a measure of the bilirubin in the blood. Bilirubin is present in blood at all times due to the breakdown of hemoglobin which occurs all the time. Normally,

bilirubin is removed from the blood by the liver. Increased serum bilirubin levels indicate obstructive disease of the liver, hemolysis or actual liver cell damage.

Common Laboratory Values:

Electrolytes

- Ammonia: 15-50 $\mu\text{mol/L}$
- Ceruloplasmin: 15-60 mg/dL
- Chloride: 95-105 mmol/L
- Copper: 70-150 $\mu\text{g/dL}$
- Creatinine: 0.8-1.3 mg/dL
- Blood urea nitrogen: 8-21 mg/dL
- Ferritin: 12-300 ng/mL (men), 12-150 ng/mL (women)
- Glucose: 65-110 mg/dL
- Inorganic phosphorous: 1-1.5 mmol/L
- Ionized calcium: 1.03-1.23 mmol/L
- Magnesium: 1.5-2 mEq/L
- Phosphate: 0.8-1.5 mmol/L
- Potassium: 3.5-5 mmol/L
- Pyruvate: 300-900 $\mu\text{g/dL}$
- Sodium: 135-145 mmol/L
- Total calcium: 2-2.6 mmol/L
- Total iron-binding capacity: 45-85 $\mu\text{mol/L}$
- Total serum iron: 65-180 $\mu\text{g/dL}$ (men), 30-170 $\mu\text{g/dL}$ (women)
- Transferrin: 200-350 mg/dL
- Urea: 1.2-3 mmol/L
- Uric acid: 0.18-0.48 mmol/L
- Zinc: 70-100 $\mu\text{mol/L}$

Hematology

- Hemoglobin: 13-17 g/dL (men), 12-15 g/dL (women)
- Hematocrit 40%-52% (men), 36%-47%
- Glycosylated hemoglobin 4%-6%
- Mean corpuscular volume (MCV): 80-100 fL
- Red blood cell distribution width (RDW): 11.5%-14.5%
- Mean corpuscular hemoglobin (MCH): 0.4-0.5 fmol/cell
- Mean corpuscular hemoglobin concentration (MCHC): 30-35 g/dL
- Reticulocytes 0.5%-1.5%
- White blood cells (WBC) 4-10 $\times 10^9/\text{L}$
- Neutrophils: 2-8 $\times 10^9/\text{L}$

- Bands: $< 1 \times 10^9/L$
- Lymphocytes: $1-4 \times 10^9/L$
- Monocytes: $0.2-0.8 \times 10^9/L$
- Eosinophils: $< 0.5 \times 10^9/L$
- Platelets: $150-400 \times 10^9/L$
- Prothrombin time: 11-14 sec
- International normalized ratio (INR): 0.9-1.2
- Activated partial thromboplastin time (aPTT): 20-40 sec
- Fibrinogen: 1.8-4 g/L
- Bleeding time: 2-9 min

Lipids

- Triglycerides: 50-150 mg/dL
- Total cholesterol: 3-5.5 mmol/L
- High-density lipoprotein (HDL): 40-80 mg/dL
- Low-density lipoprotein (LDL): 85-125 mg/dL

For a more complete list please refer to this link from the American Board of Internal Medicine:
<https://www.abim.org/~media/ABIM%20Public/Files/pdf/exam/laboratory-reference-ranges.pdf>