Acute coronary syndrome Dx	
Prinzmetal Angina	ECG : ST elevation / Normal in angiography.
Stable angina	Investigation: A.Rest ECG normal. *Best initial test for all forms of chest pain. B.Stress test (by exercise/chemical): (Stress ECG, Stress Echocardiogram, Stress Nuclear Isotopes)
Unstable Angina & NSTEMI	Investigation: A.Rest ECG: shows ST deviation and T wave abnormality. B.Cardiac Marker (CK-MB, Troponins): **+ve will indicate NSTEMI** / -ve indicate unstable angina. C.Stress test : (Positive as above) D.Catheterization with angiography based on result the patient undergo PCI or CABG

Arrhythmias Dx			
Tachyarrhythmias	ECG findings: (FAT & FAST) Wide and bizarre QRS complexes.		
Ventricular Fibrillation	ECG findings: No P waves identified + No QRS Identified		
Atrial Flutter	ECG findings: Saw-tooth baseline in inferior leads (II, III, aVF) (QRS complex after 2 or 3 p waves)		
Paroxysmal Supraventricular Tachycardia	AV Nodal Reentrant Tachycardia	ECG findings: Narrow QRS + no discernible P waves	
	Orthodromic AV Reentrant Tachycardia	ECG findings: Narrow QRS + P wave which may be discernible or may not	
Wolff-Parkinson-White Syndrome	ECG findings: Short PR interval + **delta waves** (upward deflection before QRS) + wide QRS complex. ●Most accurate test is Electrophysiology studies (EP).		
Multifocal atrial tachycardia	ECG findings: Variable P wave morphology and variable PR and RR intervals. At least three different P wave morphologies are required to make an accurate diagnosis.		
Diagnosis of AF	**S/S**	**S/S**	**cause**
		Irregularly irregular pulse palpitations	Irregular heart- beat
		Fatigue Diminished exercise capacity Breathlessness (dyspnoea) Weakness (asthenia)	Decreased cardiac output
		Dizziness and fainting (syncope)	hypotension
		Chest pain (angina)	Cardiac ischemia
		Thromboembolic TIA, stroke * Might be the first presentation.	Increased risk of clot formation
	ECG findings	Irregularly irregular rhythm, no identifiable P waves there is replacement of consistent P wave by fibrillatory waves that vary in size, shape, and timing (**350-600** beats/min), associated with an irregular, frequently rapid ventricular response . "AF ECG may show-Left ventricular hypertrophy, Pre-excitation, Bundle branch block or Prior MI"	
Investigations of AF	■**Transthoracic Echocardiography** (To rule out cardiac diseases) Used to identify: Size and functioning of atria and ventricles, Ventricle hypertrophy, Pericardial disease and Valvular heart disease. Note: it's the only way to be 99% sure that there is no clots in (LAA) ■**Laboratory tests**		

	Important parameters to assess include:Thyroid function,Renal function, Hepatic function, Serum electrolytes and Complete blood count. ■**Holter monitoring** (Portable ECG device "recorder"): Continuous monitoring for a short period of time (typically 24 hours) Useful for: Detecting asymptomatic AF, Evaluating patients with paroxysmal AF, Associating symptoms with heart rhythm disturbance and Assessing response to treatment. ■**Transoesophageal echocardiography** (for Selected patients): useful for: the only test to know thrombus existence Accurate assessment of risk of stroke), Sensitive detection of atrial thrombi> (Particularly the left atrial appendage, as it is the most common site of thrombi in patients with AF) ■**Exercise testing**. ■**Chest radiography**: allows evaluation of the lung parenchyma and identifies coexisting lung disease.

Valvular Heart Disease Dx			
Mitral Stenosis	**Echo color doppler test of choice**	**ECG**	**CX-ray**
	- Left atrial enlargement -Thick classified mitral valve -Narrowed fish mouth shaped orifice -Signs of RVF in advanced disease	-Atrial rhythm disturbance -Atrial fibrillation -Left atrial hypertrophy	-Assess left atrial enlargement -Straightening of the left heart border -Elevation of the left main bronchus -Second bubble behind the heart
Mitral Regurgitation	**Echo**	**ECG**	**CX-ray**
	-Mitral regurgitation -Dilated LA. -LV decreased -LV function	-Left atrial enlargement -Left ventricular hypertrophy.	-Cardiomegaly -Dilated LV -Pulmonary edema
Mitral Prolapse	Echo is the most useful tool		

Rheumatic Heart Disease Dx	
Acute rheumatic fever	No single test to diagnose ARF -Accurate diagnosis is important Diagnosis is primarily clinical and is based on a constellation of signs and symptoms, which were initially established as the -ECHO: to confirm/ refuse Dx of rheumatic cardidtis **Jones Criteria:** A firm diagnosis requires both of the following 1) 2 Major manifestations or 1 Major and 2 Minor manifestation of Jones Criteria 2) Evidence of a recent streptococcal infection:➔Increased or rising ASO titer or Anti-Dnase B titer➔A positive throat culture

Investigations

Investigations

Recommended for all cases
White blood cell count
Erythrocyte sedimentation rate (ESR)
C-reactive protein (CRP)
Blood cultures, if febrile
Electrocardiogram (if prolonged P-R interval or other rhythm abnormality, repeat in 2 weeks and again at 2 months, if still abnormal
Chest X-ray, if clinical or echocardiographic evidence of carditis
Echocardiogram (consider repeating after 1 month, if negative)
Throat swab (preferably before giving antibiotics): culture for group A streptococcus
Antistreptococcal serology: both ASO and anti-DNase B titres, if available (repeat 10–14 days later if first test not confirmatory)

Heart Failure Dx

Echocardiography *Gold standard

•Best initial →TTE

-It assist the function of both ventricles, valvular abnormality, intracardiac shunts, wall motion abnormality (signify CAD).
-**Most important because it's the only way to distinguish systolic from diastolic failure.**
-It evaluate Ejection Fraction.
-chamber dilatation and/or hypertrophy
-follow up pts with long-term drug therapy

Other tests are used not to diagnose CHF, They are used to diagnose the cause of CHF:

Tests to know the etiology	
EKG	MI (old or recent) ,Heart block,Arrhythmia, LBBB
Chest x-ray	Dilated cardiomyopathy, pleural effusion,(Initial and best for pulmonary edema)
Cardiac catheter	Precise valve diameter, septal defects (when CAD or valvular suspected)
Blood tests	- CBC for→ anemia - Liver biochemistry(may be altered do to hepatic congestion) - Brain natriuretic peptide (BNP) , if normal(<100pg/mL) exclude heart failure (particularly pulmonary edema). - T4 & TSH - Electrolytes imbalance → Chronic renal insufficiency - Hemochromatosis
Endomyocardial Biopsy	Rarely done; to exclude infiltrative disease such as sarcoid or amyloid, for unexplained CHF.

Kerley b lines

Infective endocarditis	
Investigations	1-Initial test: ● Blood cultures:3 times, 3 different sites and 3 different needle→to identify the organism ● ECHO (hallmark) mostly TTE (vegetation , abnormality of the valves). 2- Further test: ● C.B.C : Shows leukocytosis + anemia ● ESR : Will be elevated ● RFT : Shows Glomerulonephritis ● URINE : Shows hematuria ● ECG: shows first degree block ● Chest X-Ray: Shows cardiomegaly, pulmonary embolism.
Diagnosis (Based on Duke criteria by either Two major criteria , one major and 3 minor criteria or 5 minor criteria.)	Major criteria
	1. **Positive blood culture** : → by common organism that cause IE ● Typical organism from two cultures ● Persistent positive blood cultures taken > 12 hrs apart ● Three or more positive cultures taken over > 1 hr ● Single positive blood culture for Coxiella burnetii. 2. **Positive imaging for IE** : ● Positive echocardiogram : vegetations , abscess, valve perforation ,prosthetic dehiscence ● Abnormal activity around prosthetic valve by CT , PET or F-FDG ● Paravalvular lesion by CT
	Minor criteria (BE FEVEER)
	1. **Predisposing condition**: cardiac abnormality , drug injection 2. **Fever** 3. **Vascular phenomenon** : janeway lesion . intracranial hemorrhage , major emboli . Mycotic aneurysm, septic pulmonary infarct , conjunctival hemorrhage 4. **Immunological phenomenon**: Osler's nodes , roth spot , rheumatoid factor , glomerulonephritis 5. **Positive blood culture**: organism not achieving major criteria.

Pulmonary embolism

diagnosis

❑ **History and Physical examination** ❑ **Initial tests**

1- CXR (chest x-ray) : usually normal , use to exclude alternative diagnosis. The abnormality can be seen **Atelectasis** (most common abnormality) or pleural effusion and less likely humpton hum & westermark sign

2- ABG : low PaO2 (due to Hypoxia)and PaCO2 (due to hyperventilation), metabolic acidosis respiratory alkalosis.

3- ECG (electrocardiogram) (**S1, Q3, T3**): shows sinus tachycardia , anterior T-wave inversion , ST-segment and T- wave changes, rarely right bundle branch block

Confirm test → Divided into two:

High Clinical suspicion

1. **CT angiogram (spiral CT):**
● Visualize Pulmonary vessels allow us to see small clots ● May miss clots in the periphery ● if the clots present → confirm PE. ● **Contradicated in Renal Insufficiency**

2. **Ventilation perfusion Lung scan (V/Q)**
Used when CT angiogram contraindicated or the result inclusive.

The test shows either:	
Normal V/Q →	Exclude the PE
High Probability	Confirm PE
Low or intermediate Probability (patient might have underlying chronic lung disease only)	Do Lower extremities duplex ultrasound

3. **Lower Extremity doppler ultrasound** :. IF the result is positive so we don't need to do further test because the treatment of PE = DVT

4. **Pulmonary Angiography** : Used when all above are equivocal It is the **gold standard** (can show the periphery)

Low clinical suspicion

● D-dimer assay : specific fibrin degradation product
Positive → start the steps of High clinical suspicion.
Negative → exclude the PE.

Bronchial Asthma

Dx

Initial test

● **Peak expiratory flow rate**(self-monitoring test) it will be decrease.

● **Arterial blood gases** : Typically shows 1-Resp. Alkalosis 2-Hypocapnia 3-⬇PCO2 4- hypoxemia may be present . ● **Chest x-ray** : usually normal but can shows hyperinflation Remember Best initial test is **ABG or PEF**. Then use CXR to exclude Pneumothorax and pneumonia.

Conformity test

● Pulmonary function tests (**Spirometry**): *Most accurate test

❑Before Bronchodilation (albuterol): shows decrease in expiratory flow , FEV , FVC and FEV/ FVC

❑After Bronchodilation(albuterol) : shows Increase at least 12% FEV

	● **Bronchoprovocation test:** *Most accurate test if the patient asymptomatic ❑Give the patient methacholine (muscarinic agent) or histamine shows decrease of FEV at least 20 %.
Acute exacerbation of asthma Dx	**Diagnostic Tests** 1- **PEF** → decreased (not done when patient has acutely shortness of breath) 2- **ABG** (increase A-a gradient) 3- **Chest X-ray** (because the most common cause of acute exacerbation is pneumonia).

Cough	
Acute Cough	No tests are indicated in a patient with acute cough → most acute cough resolve within 2 weeks.
Sub-Acute Cough	● History and Chest examination ● PFT (spirometry) or PEF: Measure of airflow obstruction
Chronic Cough	● History(including occupation) & Examination ● CHEST X-RAY ● PFT (Spirometry). ● CBC: if the infection is suspected. ● Bronchoscopy : if the diagnosis is unknown after above workup

Chest X-Ray and Differential of Cough

Normal CXR:	Abnormal CXR:
- Gastro-oesophageal reflux. - Post-nasal Drip. - Smokers cough/Chronic Bronchitis. - Asthma. - COPD. - Bronchiectasis. - Foreign body	- Left ventricular failure. - Lung cancer. - Infection/ TB. - Pulmonary fibrosis. - Pleural effusion

COPD & bronchiectasis	
COPD investigations **X ray is the best initial test while PFT is the most accurate**	1. Chest X-ray a. To look for other diseases: lung cancer, CHF, and bullae 2. High resolution CT scans: used, particularly to show emphysematous bullae. 3. Lung function tests A. **Spirometry** → gives FEV1/FVC a. which should be decreased and do not improve with bronchodilators (vs. asthma)

	B. **Lung volumes** might be measured a. Expect them to be increased (Increased total lung capacity TLC), functional reserve capacity (FRC) and residual volume. b. Decreased vital capacity. C. **Gas transfer value** (**DLCO**) a. Suspect emphysema if it is decreased - increased blood in the lungs (pulmonary hemorrhage, Goodpasture syndrome)→ ↑**DLCO** D. **Pulse oximetry** a. Less than 93% → patient might need oxygen therapy E. **Measure alpha 1 antitrypsin levels** in patients with premature emphysema (< 50 years) especially (cirrhosis) F. **ABG** a. Low **PaO2** Normal **PaCO2** b. Low **PaO2** High **PaCO2** c. **pH** acidic or low normal. d. HCO3 raised (compensatory metabolic alkalosis)
Bronchiectasis investigations	1. Should **culture** patient's sputum because they often have special infections (Pseudomonas aeruginosa) and we should know their antibiotic sensitivity by culture in order to properly treat it 2. **CT scan** (the best non-invasive test) shows dilated bronchi most accurate test, study of choice." 3. **Chest x-ray**: best initial test. It might be normal BUT in advanced cases it may show 1 to 2 cm cysts and crowding of bonchi (tram tracking) 4. Can also look for diseases that cause this condition For example: screen for ciliary dysfunction, CF.

Pleural effusion	
Dx	1- **History** & 2- Physical **examination** → gives 85% of diagnosis. 3- **Chest x-ray**: Initial diagnostic test for pleural effusion. ● Postero-anterior and lateral look for: blunting of costophrenic angle. About 250 mL of pleural fluid must accumulate before an effusion can be detected. ● Lateral decubitus films (patient lying on one side) are more reliable for detecting small pleural effusions, with the new technology even (10 ml) of fluid is detected. 4-**Ultrasound**: More sensitive and specific and it can detect minimal fluid. ● It will help you to rule out others like pneumothorax and fluid collection. ●Can help identify free vs. loculated effusions. 5- CT scan: (when there is malignant suspicion). More reliable than CXR for detecting effusions. ● For additional information about parenchymal lung or mediastinum like more consolidation or masses.

	6- Thoracocentesis: It's aspiration of fluid. Provides diagnosis in 75% of patients and therapeutic as it provides relief for large effusions. *After you get the fluid send fluid for CBC, protein, LDH, glucose, gram stain, and cytology. THE 5 C's 1. C**ytology**: to tell you if there's malignancy or not. 2. C**ulture**: for diagnosis of a. Parapneumonic effusion b. Empyema c. TB 3. C**ell count**: a. Neutrophils → Parapneumonic and Empyema b. Lymphocytes → Malignancy, TB, Connective tissue disease. c. Eosinophils → Lymphatic obstruction, Fungal Infection, Drugs (FYI). 4. C**olor**: a. Red : Blood (Hemorrhagic effusion): Malignancy, TB, Connective tissue disease. b. White: Lymphatic obstruction: Lymphoma, Thoracic duct injury, Chylothorax. c. Turbid Pneumonia (Parapneumonic effusion) d. Yellow "most common color" Any of the mentioned causes above can cause yellow, but the most common cause is CHF → because of proteins. e. Black. f. Purulent (white mixed with greenish color) → Pus → Empyema. 5. C**hemistry**: For certain test to minimize your DDX. g. PH → low in empyema. h. Glucose → low in infections and malignancies. i. Proteins.

Pneumonia Dx	
CAP	❑History and Physical examination : To differentiate is it upper or lower respiratory tract infection ❑CXR(lateral and PA) : Differentiate between pneumonia and acute bronchitis ● Acute Bronchitis → Normal ● Atypical Pneumonia → Diffuse reticulonodular (interstitial) infiltration ●Typical Pneumonia → Either lobar consolidation or Multilobar consolidation ❑Sputum Gram stain and Culture : To determine specific organism of typical Pneumonia ❑Blood culture ❑ Specific diagnostic test :

<table>
<tr><td></td><td>
<table>
<tr><th>Organisms</th><th>Diagnostic test</th></tr>
<tr><td>Mycoplasma pneumoniae (commonest)</td><td>Cold agglutinin, PCR,Serology, Special culture media.</td></tr>
<tr><td>Chlamydia pneumoniae</td><td>Rising serological titre.</td></tr>
<tr><td>Legionella spp.</td><td>Urine antigen, culture.</td></tr>
<tr><td>Coxiella burnetii (Q fever)</td><td>Rising serologic titers.</td></tr>
<tr><td>Pneumocystis jiroveci (PCP)</td><td>Bronchoalveolar lavage (BAL).</td></tr>
<tr><td>Chlamydia psittaci</td><td>Rising serologic titers.</td></tr>
<tr><td>Viruses: influenza virus (A and B), adenoviruses, parainfluenza virus, RSV.</td><td>Not specified</td></tr>
</table>
❏Bronchoscopy and thoracentesis → unclear etiology + patient doesn't respond to treatment
</td></tr>
<tr><td>Ventilator Associated pneumonia</td><td>Bronchoalveolar lavage but most accurate is lung biopsy.</td></tr>
</table>

Hypertension Dx	❏**Measure the BP By either ;** ● Sphygmomanometer : from 3-6 visits. ● Home Blood Pressure Monitoring : patient record the results in about 2 weeks→ then doctor takes average of the readings ● Ambulatory Pressure Monitoring: for anxious people a device fixed in the arm for 24 hours. ❏**History and physical examination**:. ● Abdominal Bruit auscultated in flank → secondary HTN caused by Renal artery stenosis. ● Upper limbs BP > lower limbs → secondary HTN caused coarctation of aorta (radiofemoral delay) ● Episodic HTN with flushing,palpitation,headache and sweating → Pheochromocytoma ● Weakness with Hypokalemia → Hyperaldosteronism (Conn's) ● Acne + abdominal striae → cushing's ● Congenital adrenal hyperplasia → hairy woman ❏**lab tests** ● Urinalysis ● Fasting Glucose level ● Cholesterol screening ● ECG

<table>
<tr><td>Acute Kidney Injury Dx</td><td>● Best initial test is BUN and Creatinine. ● Best initial imaging is Renal sonogram (without contrast)
<table>
<tr><th colspan="6">Lab findings in AKI</th></tr>
<tr><td>Etiology</td><td colspan="2">Pre-renal</td><td>Post-renal</td><td colspan="2">Renal</td></tr>
<tr><td rowspan="2">Signs</td><td colspan="3" rowspan="2">Discussed in the Diagnosis of ARI</td><td>ATN</td><td>AIN</td><td>AGN</td></tr>
<tr><td>Hypovolemia , hypotension</td><td>Skin rash</td><td>Presentation of primary disease</td></tr>
<tr><td>Urinalysis (urine sediment)</td><td colspan="2">Hyaline casts</td><td>-</td><td>“Muddy brown” casts</td><td>WBCs casts, Eosinophils
Hansel stain for Eosinophils</td><td>RBCs casts,RBCs</td></tr>
<tr><td>BUN/Cr ratio</td><td colspan="3">> 20:1</td><td colspan="3">< 20:1 (10:1)</td></tr>
<tr><td>FENa</td><td colspan="3"><1%</td><td colspan="3">>2% - 3%</td></tr>
<tr><td>Urine osmolarity</td><td colspan="3">>500 mOsm/kg</td><td>< 350 mOsm/kg</td><td colspan="2">>350
variable</td></tr>
<tr><td>Urine sodium</td><td colspan="3">< 20 mEq/L</td><td>>20 mEq/L</td><td colspan="2">variable</td></tr>
</table></td></tr>
<tr><td>Pre-renal</td><td>Clear history of hypoperfusion or hypotension.</td></tr>
<tr><td>Post-renal</td><td>- Renal ultrasound to identify the area of obstruction commonly would show dilated collecting system (hydronephrosis).
- Distended bladder or massive release of urine after inserting catheter.</td></tr>
<tr><td>Renal (Acute Tubular necrosis ATN)</td><td>CVA, ischemic digits, blue toe syndrome, absent pulses, livedo reticularis, low serum C3 & C4, peripheral eosinophilia , eosinophiluria, FENa (>2%)</td></tr>
<tr><td>Renal (Acute Interstitial Nephritis (AIN))</td><td>History of systemic disease known to be associated with AIN ➔ Skin rash ➔ Esinophilia ➔ WBC cast in urine ➔ Eosinophiluria not common ➔ Renal biopsy</td></tr>
</table>

GLOMERULAR DISEASES Dx	1. Urinalysis (hematuria, proteinuria, RBC casts). 2. Blood tests (renal function tests). 3. **Needle biopsy of the kidney (is the most accurate test** to establish a diagnosis (though not always needed). ❖ Glomerular diseases are named based on their histopathological characteristics seen under the microscope. ❖ Glomerular diseases can be presented clinically as: A) Nephrotic syndrome B) Nephritic syndrome.
nephrotic Syndrome	1. The best initial test is a urinalysis, however since renal function varies with the time of day, as well as posture (flat or upright), the UA is not sufficiently accurate 2. The urine albumin/creatinine ratio: gives a measure of the average protein produced over 24 hours 3. The urine albumin/creatinine spot urine ratio is equal to a 24-hour urine

	4. **Renal biopsy is the most accurate test** **Urine Analysis in Nephrotic Syndrome will show :** – Proteinuria or called Nephrotic range proteinuria (>3.5 g/24h urine) – No RBCs (some times few are occasionally seen). – No RBCs casts – Fat (Lipiduria)(Fatty casts, oval fat bodies & fat droplets). – No WBCs (few may be seen).
IgA Nephropathy (Berger diseases)	• Needs kidney biopsy to reach the diagnosis. • The diagnosis is made by finding abnormal deposition of IgA
Post streptococcal glomerulonephritis (PSGN)	• Serum will show positive Antistreptolysin (ASO) titer.also anti-DNAse antibodies. • Low C3, Normal or slightly low C4 in the serum. • No need for biopsy. • May have positive throat culture.
Lupus Nephritis	*Kidney biopsy is mandatory to make the diagnosis. *Low complements (C3, C4) level along with the positive Lupus marker (Antinuclear antibody ANA), abnormal urine analysis & abnormal renal function should make you think of its presence.
ANCA vasculitis	• Diagnosis is made by kidney biopsy and positive ANCA titer in the serum. • Hemoptysis , SOA, chest x-ray abnormal , hematuria , increase PB, increases carnitine in blood (whiter ANCA or goodpasture)

Chronic Kidney Failure investigations	-Family history can suggest PCKD (**Polycystic kidney disease**) or hereditary nephritis ● CBC: Anemia, thrombocytopenia ● Urinalysis: Hematuria and proteinuria may indicate cause. Proteinuria indicates risk of progressive CKD requiring preventive ACE inhibitor or ARB therapy ● Measure Cr clearance to estimate GFR ● urea & Serum electrolytes Uremia Hyperkalemia, hypocalcemia and hyperphosphatemia ●PTH: Secondary hyperparathyroidism ●Vit-D: Hypovitaminosis D ● Renal ultrasound: evaluate size of kidneys/rule out obstruction ○ Small kidneys are suggestive of chronic renal insufficiency with little chance of recovery. ○ Presence of normal-sized in (DM, amyloid, MM) or large kidneys does not exclude CKD. ● Renal biopsy—in select cases to determine specific etiology.

Acute Viral Hepatitis Dx	**Laboratory Test** ❑Increased direct bilirubin. ❑Liver function test (LFT) increase 5-10 times above normal, both ALT or AST (**ALT Higher**) ● Increased ratio of alanine aminotransferase (ALT) to aspartate aminotransferase (AST). ❑Increased alkaline phosphatase Note: Severity of Disease is assessed by the prothrombin time (PTT), and serum bilirubin. Specific Diagnostic Tests. ❑PCR : which tells the amount of active viral replication. (Disease activity of hepatitis) ❑Serology (antibody and antigen) ● Hepatitis **A, C, D, and E** : The "**best initial diagnostic test**" for each of these is simply an IgM antibody for the acute infection and IgG antibody to detect resolution of infection. ● Hepatitis B
Hepatitis A	**Anti-HAV: -IgM** diagnostic of acute infection. fall to low levels within about 3 months of recovery (acute) **-IgG** previous infection or immunity. persists for years (chronic)
Hepatitis B	**HBsAg**: - Present in acute or chronic infection - Detectable as early as 1-2 weeks after infection

	- It persists in chronic hepatitis regardless of whether symptoms are present or not. If virus is cleared, then HBsAg is undetectable. In **acute liver failure from hepatitis B**, the liver damage is mediated by viral clearance and so HBsAg is negative, with evidence of recent infection shown by the presence of hepatitis B core IgM ● **HBeAg**: - Reflects active viral replication, and presence indicates infectivity. - Appear shortly after HBsAg. ● **Anti-HBsAg Antibody:** - Present after vaccination or after clearance of HBsAg, usually detectable 1 to 3 months after infection. - In most cases, it indicates immunity. ● **Hepatitis B core antibody (Anti-HBc)**: - Assay of IgM & IgG combined. - Useful because it may be the only serologic marker of HBV infection during the "window peek" in which HBsAg is disappearing, but anti-HBsAg is not yet detectable. ● **Viral load: HBV** DNA measured by **PCR**; if it persists > 6 weeks, patient is likely to develop chronic disease
Hepatitis C	**Serum serology:** ● **Hepatitis C antibody (Anti-HCV)** : Key marker of HCV infection. Sometimes not detectable until months after infection, so its absence does not rule out infection. ● **Viral load: HCV** RNA measured by **PCR** . Detectable 1 to 2 weeks after infection- more sensitive than HCV antibody.

Gastrointestinal Bleeding Dx	**Tests to order in patients with GI bleeding:**
	• Hematemesis: Upper GI endoscopy is the initial test
	• Hematochezia:
	  ○ 1st rule out any anorectal cause (e.g., hemorrhoids)
	  ○ Colonoscopy should be the initial test (because colon cancer is the main concern)
	• Melena:
	  ○ Upper endoscopy is usually the initial test (because it's most likely upper GI bleeding)
	  ○ Colonoscopy if no bleeding site identified by endoscopy
	• Occult blood:
	  ○ Colonoscopy is the initial test (because colon cancer is the main concern)
	  ○ Upper endoscopy if no bleeding site is identified by colonoscopy	

	Lab tests	- Stool guaiac test for occult blood - Hemoglobin/hematocrit level ● May not be decreased in acute bleeds ● Level >7 to 8 g/dL is generally acceptable in young, healthy patients without active bleeding ● Most elderly patients (especially with cardiac disease) should have Hb >10 g/dL - Mean corpuscular volume (MCV) ● Low MCV suggests iron deficiency anemia (chronic blood loss) ● Acute bleeding → normocytic RBCs - Coagulation profile (platelet count, PT, PTT, INR) - LFTs, renal function - BUN-creatinine ratio

		● Elevated with upper GI bleeding ● Suggestive of upper GI bleeding if there's no renal insufficiency ● The higher the ratio the more likely the bleeding is from upper GI
	Upper endoscopy	- Most accurate diagnostic test in evaluation of upper GI bleeding - Both diagnostic and therapeutic - Most patients with upper GI bleeding should have endoscopy within 24 hours.
	Nasogastric tube	-It is often the initial procedure to determine whether it's upper or lower GI bleeding - Used to empty the stomach to prevent aspiration - False -ve findings are possible: 1. Intermittent upper GI bleeding. Or 2. Lesion in the duodenum - Evaluation of aspirate: ● Bile but no blood → upper bleeding unlikely ● Bright red blood or "coffee grounds" → upper GI bleeding ● Nonbloody aspirate (clear gastric fluid) → upper unlikely but cannot be ruled out (may be in the duodenum)
	Anoscopy or proctosigmoidoscopy	- Can exclude anal/rectal source - Perform if there is no obvious bleeding from hemorrhoids
	Colonoscopy	- Identifies the site of lower GI bleed (in 70% of cases) - Can be therapeutic
	Bleeding scan Radionuclide scanning	- Reveals bleeding even with a low rate of blood loss - Does NOT localize the lesion - Its role is controversial, but may help determine whether arteriography is needed
	Arteriography	- Definitively locates the point of bleeding (unlike bleeding scan) - mostly used with **lower** GI bleeding - performed during active bleeding - potentially therapeutic (endoscopy & colonoscopy are too) (embolization or intra-arterial vasopressin infusion)
	Exploratory laparotomy	Last resort

Jaundice Dx	❑History and Physical Examination: ● **Biliary stone obstruction**: Fever Pale stool dark urine & Tender abdomen. ● **Biliary malignant obstruction** : Associated constitutional symptoms. ● **Liver cirrhosis**: Lower edema, dilated veins, splenomegaly and ascites.

	● **Alcohol abuse**: Parotid gland enlargement, gynaecomastia, and Dupuytren's contracture. ❑**Laboratory Test**: ➢Total bilirubin with fractionation of the bilirubin (direct and indirect) ○ **Indirect hyperalbuminemia** → CBC, Reticulocyte count, haptoglobin ,LDH, peripheral smear may aid in the diagnosis of hemolysis. ○ **Direct hyperalbuminemia**→ LFT's may point to the cause. ➢CBC, Creatinine ○ **Leukocytosis** might indicate the presence of biliary tract obstruction or other inflammatory disorder that may be associated with cholestasis. ○ **Anemia** leaves open the possibility that a hemolytic disorder is responsible for bilirubin overload. ○ **Thrombocytopenia** (Low platelet count) is suggestive of portal hypertension or alcohol abuse. ➢PT,INR, Albumin ○ An **increased PT and INR** when coupled with a **low albumin** is indicative of synthetic liver dysfunction and suggestive of cirrhosis or acute liver failure. ➢**LFT** (ALT, AST, ALP, GGT) ○ **Aminotransferases** (ALT and AST): - ALT is more specific and sensitive than AST for liver damage - ALT and AST usually have similar increase, exception in alcoholic hepatitis AST is higher that ALT ratio may be >2:1. Why? Due to **Pyridoxine deficiency in alcoholics** , and for ALT to be produced in the serum we need pyridoxal phosphatase. - ALT & AST are **mildly** elevated in→ chronic viral hepatitis or alcoholic hepatitis - ALT & AST are **moderately** elevated in → acute viral hepatitis - ALT & AST **severely** elevated in →Severe viral hepatitis or extensive hepatic necrosis due to: 1- Ischemia (vascular injury) 2- acetaminophen toxicity - ALT & AST are normal or low in Cirrhosis or metastatic liver disease. - ALT & AST can be elevated in asymptomatic patients. ○ **Alkaline phosphatase** (**ALK-P**) - Not specific to liver, also found in bone gut and placenta. - ALK-P is elevated when there is an obstruction to bile flow (cholestasis). - If levels are high measure GGT to confirm obstruction, if normal suspect bone,intestinal disease or pregnancy. ○ **Gamma-glutamyl- transferase (GGT**) - Often is used to confirm that AKL-P elevation is of hepatic origin.

	○ **Prothrombin time - PT** is not prolong until most of liver's synthetic capacity (80%) is lost. - It reflects the severity of damage and advanced liver disease. ● Acetylcysteine is given for acetaminophen toxicity. ● Low or normal aminotransferases is due to reduce number of functioning hepatocyte. ● The liver synthesizes all clotting factors except factor 8 and VWF. ● GGT is sensitive also for alcohol abuse→liver might be normal yet GGT is still elevated. ❑**Specific test** (based on result) ➢High levels of ALP, GGT (suspected extrahepatic obstruction) : ● **CT or US** (for fatty liver or cirrhosis) ● **ERCP** ● **PTC** ● **MRCP** ➢High levels of ALT, AST (suspected intrahepatic) ● Viral Hepatitis serologies ● Alcohol level ● Drug level for Tylenol ● Urine toxins: cocaine ● Doppler US ● ANA , ASMA ,IgG, AMA , celiac screen 2 3 4 ● Serum Ceruloplasmin ● Fibroscan ❑Liver Biopsy should be considered if needed (unknown reason yet) ● Normal LFT and **Conjugated** hyperbilirubinemia→ Rotor syndrome or dubin Johnson syndrome. ● Normal LFT and **Unconjugated** hyperbilirubinemia→ hemolysis or gilbert syndrome.

Liver cirrhosis	●**Biopsy (Gold standard)** ● Noninvasive tests : 1- Serum score systems 2- Elastography (e.g fibroscan) Assess Severity and Prognosis of Liver Disease : 1-**ChiId-Turcotte-Pugh score or Child Criteria (CPT score) (The best)** MELD score (model for end-stage liver disease)
Primary Sclerosing Cholangitis	most accurate test is Endoscopic retrograde cholangiopancreatography
Ascites	Diagnostic aspiration of ascitic fluid should be carried out in an new ascites, Routine: 1. Cell count and differential 2. Albumin and total protein "To measure SAAG"
Spontaneous bacterial peritonitis	Diagnosis: PMN count (>250 cells/mm3) and positive ascitic fluid bacterial culture
Hepatorenal syndrome	present as: azotemia, oliguria, hyponatremia, hypotension,low urine sodium < 10 mEq/L.
Portopulmonary Syndrome	○Suggested by echocardiography ○ Confirmed right heart catheterization

Hepatocellular carcinoma (Hepatoma)	●Blood tests (Alpha Fetoprotein AFP) ● Radiology (most important) Dynamic CT and MRI ●Biopsy only performed when there is diagnostic doubt as there is risk of tumor seeding in the percutaneous needle biopsy tract.

IBD Dx	
Crohn's Disease	❑**Endoscopy** with biopsy (Colonoscopy Or sigmoidoscopy) ❑**Imaging**: MR enterography ❑**Serological Test** :presence of Anti-Saccharomyces cerevisiae antibodies (ASCA) ,used when the diagnosis is unclear . ❑**Stool marker (fecal calprotectin**) : differentiate between IBS and IBD.
IBD	**Lab test** : ❑**Fecal leukocyte** : Positive → Stool culture (to role out infection) ❑**Stool marker (fecal calprotectin**) : differentiate between IBS and IBD. Specific test : ❑Endoscopy with biopsy (Colonoscopy Or sigmoidoscopy) ❑**Imaging**: MR enterography ❑**Serological Test** : used when the diagnosis is unclear . ● Anti-Saccharomyces cerevisiae antibodies (ASCA) → crohn's ● Antineutrophil cytoplasmic antibodies (pANCA) → UC

Esophageal Diseases Dx	
Achalasia	○Esophagogastroduodenoscopy (EGD) is done for alarm symptoms (to rule out cancer): 1. Onset after age 60 2. Anemia 3. Heme-positive stools, 4. >6-month duration of symptoms, 5. Weight loss. ○ **Chest X-ray**: ✓ Absent of gastric bubble. ✓ Wide mediastinum/esophagus. ✓ Fluid level. ○ Barium Swallow: -acceptable to do first in most patients- ✓ Esophageal dilatation. ✓ Terminal part of the esophagus show "bird's beak" beak-like. ○ Manometry -is the most accurate diagnostic test-

	✓ Elevated LES Pressure with no or partial relaxation amplitude contraction, no propagating (simultaneous). ○ **Upper endoscopy** ✓ Will show normal mucosa; useful in some patients to exclude malignancy
Esophageal Cancer	○ **Barium Swallow**: **-best initial test-** ○ Upper endoscopy with biopsy -required for confirmation-
Esophageal Diverticula	○ **Barium swallow -is the best diagnostic** for diverticula Note: Endoscopy Should be avoided
Infectious Esophagitis	○ Barium swallow ○ Endoscopy with biopsy
GERD	○ Endoscopy -only in refractory cases- biopsy to assess mucosal changes. ○ Barium swallow -helpful in identifying complication (strictures/ulcerations)- ○ 24 Hours pH monitoring -most accurate "sensitive and specific"- ○ Manometry -if a motility disorder is suspected-
Benign esophageal stricture	**endoscopy**, when biopsies of the stricture can be taken to exclude malignancy. Endoscopic balloon dilatation is helpful.
Gastric volvulus	**Diagnosis: CXR (air bubble in the chest) and barium swallow.** **Endoscopy is the investigation of choice**

Abdominal pain & IBS Dx	
Abdominal pain	❑History ● Type of pain ● Location and radiation ● Character and Severity ● Onset (sudden…) and duration ● Exacerbating or relieving factor ● Associated symptoms (fever,vomiting ● Medications (aspirin or NSAIDs) ❑**Physical Exam:** ● General and Vital Signs (Abnormality of vital signs suggest acute abdomen.) ● **Guarding** : ➢Voluntary: Diminished by having patient flex their knees ➢Involuntary: Reflex spasm of abdominal muscles ● Rigidity ● Rebound (can be normal in 25%): Suggests peritoneal irritation ❑**Labs**: ● CBC ● LFT ● Renal function ● Urine analysis (To exclude renal stones, pyelonephritis) ● X-ray (to check for obstruction (air fluid level) or perforation) ● US abdomen ● CT scan (To seek evidence of pancreatitis, retroperitoneal collection or masses, including an aortic aneurysm
Peptic ulcer disease	**Endoscopy** (most accurate test)

Acute pancreatitis	● Serum Amylase and lipase (Best initial test) ● CT-scan (,most accurate test)
IBS	**By Rome III criteria** : Recurrent abdominal pain or discomfort > or = 3 days per month in last 3 months: 1. Pain or discomfort imorove with defecation 2. Symptoms onset is associated with change in frequency of stool 3. Symptoms onset is associated with change in form of stool ● Ask about Alarm symptoms that suggest other serious diseases . (to exclude them) ❑PR bleeding , Weight loss ❑Family history of cancer , Onset >45 years of age ❑Fever , Anemia ❑Progressive deterioration, Steatorrhea and dehydration ● Order CBC, renal panel, fecal occult blood test, stool examination for ova and parasites, erythrocyte sedimentation rate, and possibly a flexible sigmoidoscopy.

Chronic diarrhea & Malabsorption Dx	
Malabsorption Investigations	1) **Laboratory Tests**: ➢Hematological tests: - CBC "to detect anemia" - Serum iron, vitamin B12 and Folate - Prothrombin time ➢**Electrolytes and chemistries**: - Hypokalemia, hypocalcemia, hypomagnesemia, and metabolic acidosis. - Protein malabsorption may cause hypoproteinemia and hypoalbuminemia. - Fat malabsorption can lead to low serum levels of triglycerides, cholesterol. - ESR which is elevated in Crohn's disease and Whipple's disease. ➢**Stool analysis** - Stool pH may be assessed. Values of ➢**Bacterial overgrowth**: - Bacterial overgrowth cause an early rise in breath hydrogen - Diagnosed by jejunal culture. - 14c D–xylose breath test, high sensitivity and specificity ➢**Serology**: - No serologic tests are specific for malabsorption - Serum Anti-TTG and antiendomysial antibodies can be used to help diagnose celiac sprue - Serum IgA to rule out IgA deficiency - Determination of fecal elastase and chymotrypsin (2 proteases produced by the pancreas) can be used to try to distinguish between pancreatic causes and intestinal causes of malabsorption. 2) **Imaging studies**:

	➢**Small bowel barium studies** : ● Strictures ● Mucosal changes ● Diverticula (bacteria overgrowth usually occurs) ➢CT scan of the abdomen: ● Strictures, mucosal changes ● Diverticula,wall thickness ● Masses, lymph nodes ➢(**ERCP**): ● Pancreatitis (duct changes, or calcification in chronic pancretitis) ● Biliary diseases ➢Plain abdominal x-ray film: ● Pancreatic calcifications are indicative of chronic pancreatitis 3) Endoscopy: ➢U**pper endoscopy with small bowel mucosal biopsy:** Examples: - Celiac sprue - Giardiasis - Crohn's disease - Whipple's disease - Amyloidosis - Lymphoma ➢**Lower GI endoscopy**:for colonic and terminal ileal pathology (e.g Crohn's disease)
Celiac	**Investigation** : • Small intestine biopsy demonstrate villous atrophy. • Stool → ↑ Fat • Serology is +ve for IgA to tissue transglutaminase or IgG to deamidated gliadin or anti-endomysial antibodies
Chronic diarrhea	**Investigations**: ● CBC, Look for anemia, WBC elevation ● ESR ● Electrolytes ● Total protein and albumin ● TFT ● Stool: occult blood, C/S (stool culture and sensitivity), ova and parasites C-D toxins (if history is suggestive) ● CT (might be helpful for Diverticulitis and IBD suspected.) ● Colonoscopy/ sigmoidoscopy (if unknown of chronic diarrhea→ due to risk of perforation) Specific Investigations The history and physical examination may point toward a specific diagnosis for which testing may be indicated

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