CLINICAL PHARMACY & PHARMACOTHERAPEUTICS

INTRODUCTION TO CLINICAL PHARMACY

- University of Michigan in the early 1960s
- Pioneered by: David Burkholder, Paul Parker & Charles Walton
- Concept: USA – unit dosing
- Decentralize – satellite pharmacy each area
- Rx + administration record

What is area of pharmacy concerned with the science and practice of rational medication use?

- ❖ **Clinical pharmacy –** practice of giving a drug
- ❖ Pharmacotherapeutics – indication/purpose of giving a drug

Which of the following statements best describe rational medication use?

- ❖ The patient receives medications appropriate for their clinical needs
- ❖ The doses administered to the patient meets the patient's need

Rational use

- Dose that meets individual requirements
- Adequate period of time
- Lowest cost (cost effectiveness)

The following statements best describe rational medication use except:

- ❖ Utilization of many medicines for the patient condition
- ❖ Antimicrobial medications should be administered to patients with viral infection as a prophylaxis

Irrational use

- Polypharmacy
- Inappropriate use of antibiotic
- Inadequate dose/dosage
- Antibiotics are used for viral infection
- Adherence of patient in general

A patient-centered practice in which the practitioner assumes responsibility for a patient's drug-related needs and is held accountable for this commitment

- ❖ **Pharmaceutical care** – responsible provision of drug therapy

The following function of pharmaceutical care:

- ❖ Identifying potential ad actual drug related problems
- ❖ Resolve actual drug-related problems
- ❖ Prevent potential drug-related problems

The following key elements of Care Process except: NOTA

- ❖ **Assessment** – establish full medical history
- ❖ **Care plan** – tailored to the need of the patient
- ❖ **Evaluation**

Expected outcomes

- Cure of disease
- Elimination/reduction of symptoms
- Arrest/slowing of disease
- Progress
- Prevention of disease
- Improvement of patient's quality of life

Which of the following is a drug use process indicator?

- ❖ Drug provision
- ❖ Drug administration

In establishing the needed drug as drug use indicator, the following should be considered?

- ❖ **Ensure appropriate medication for all medical problem**
- ❖ **Consider deprescribing medicines that are no longer appropriate**
- ❖ Prescribe additional medication for faster drug action – not consider because more drug-drug interaction
- Additional:
  - → Therapeutic goals
  - → Patient variables
  - → Formulary status
  - → Cost

In the provision drug as drug use indicator the following should be considered

- ❖ Facilitate the dispensing and supply process
- ❖ Ensure that the medicines are accurately prepared
- ❖ Dispense in ready-to-administer form

Patient Medication Profile

- ❖ It contains record of information relative to the drug therapy of the patient and serves as database to facilitate communication and consultation between pharmacist and other health professionals on drug allergies, ADRs, and Dis

Patient's Medical Chart

- ❖ It contains all significant clinical information, which enables the physician to give effective

continuing care to the patient and give basis for drug therapy plan for the patient

Progress Notes

❖ Used by all other medical professionals except for physicians for documentation, which serves as primary means of communication between members of the healthcare team.

Rational Drug Therapy

❖ Providing the most safe, correct medicine ad cost beneficial to patients

Medication Reconciliation

❖ It is the process of resolving discrepancies with what a patient has been taking in the past with what the patient should be taking at the present

Drug Utilization Review

❖ An authorized, structure, ongoing review of prescribing, dispensing and use of medication

What type of DUR involves the evaluation of patient's drug therapy before medication is dispensed:

❖ **Prospective**
→ Ex: Allergies
❖ Concurrent – ongoing monitoring during the treatment course
→ Ex: HTN, blood sugar, fever
❖ Retrospective – review of drug therapy after the patient received the medication
→ Ex: patient has infection
→ Diagnostic is imp. Here

GENERAL CLINICAL PHARMACY FUNCTION

1. Therapeutic Drug Monitoring

- Assuring steady state concentration in therapeutic range by blood concentration measurement of drugs with narrow therapeutic indices
- Narrow therapeutic index – drugs where small differences is dose/blood concentration may lead to ADR/ADE
→ High alert medication

Which of the following is a high alert medication (HAM) that requires therapeutic drug monitoring?

❖ **Insulin Glargine**
❖ **Morphine**
❖ Potassium Chloride Tablets – if inj. (HAM)
❖ NaCl solution above 0.9%

High Alert Medication Double Check Strength (APINCH)

- Always double check the strength
- **Anti-infectives**
→ Amphotericin – Nephrotoxic
→ Aminoglycosides – ototoxicity, vestibular toxicity & nephrotoxicity
- **Potassium & other electrolytes Injection**
→ Potassium
→ Magnesium
→ Calcium
→ Hypertonic NaCl >0.9%
- **Insulin**
→ All insulins regardless of dosage form, falls under HAM because it can cause Hypoglycemia
- **Narcotics & Opiates**
→ Hydromorphone
→ Oxycodone
→ Morphine
→ Fentanyl
→ Alfentanil
→ Remifentanil
- **Chemotherapeutic agents**
→ Vincristine
→ Methotrexate
→ Etoposide
→ Azathioprine
- **Heparin & Anti-coagulant drugs**
→ Heparin – anti-coagulant for pregnant
→ Warfarin – Category X: Teratogenic
→ Rivaroxaban
→ Dabigatran

2. Drug Information

- Information about medications to physicians, nurses, other healthcare practitioners

3. Patient Care Rounds

- Pharmacists are in integral part of the rounding team, and evaluate drug therapy and dosing during the rounds

4. Adverse Drug Events

- Prevention – right drug, dose, route, frequency, duration
- Detection – investigating unusual circumstances, reactions
- Mitigation – providing ready access to antidotes
- Medication error – the fault is the healthcare provider
- Adverse drug reaction – it happened at normal dose

All of the following causes risk of bleeding except?

- **Insulin Glargine**
- **Morphine**
- Rivaroxaban – anti-coagulants (can cause bleeding)
- Dabigatran – anti-coagulants (can cause bleeding)
  - → Type A-Extension – related to the pharmaceutical use of the drug

All of the following side effect of chemotherapeutic agents except: NOTA

- Hair loss (Alopecia)
- Constipation
- Anemia
- Nausea and vomiting

Side effects

- Not related to the pharmacologic use of the drug
  - → Minoxidil – hypertrichosis
  - → NSAIDs – gastric ulcer/irritation anemia
  - → Nitroglycerin – headache
  - → Diuretics – electrolyte intolerance

Which of the following is an adverse effect of Aminoglycosides: NANO

- **Nephrotoxicity**
- **Vestibulotoxicity**
- **Allergic reactions**
- **Neurotoxicity**

Aminoglycosides

- Ototoxicity – damaged auditory damage
- If auditory dysfunction – cochleo toxicity
  - → Ami, NeD, Kana Coch
    - Amikacin, Neomycin, Dihydrostreptomycin, Kanamycin, Cochleotoxicity
- If vestibular deficit – vestibular toxicity
  - → SGe Ves
    - Streptomycin, Gentamycin Vestibular toxicity

What type of Anemia is caused by contraindication of G6PD deficiency and an antibiotic or anti-malarial agent?

- **Hemolytic Anemia**
- G6PD Deficiency
  - → Flava Beans – common indication
  - → ADR Type B: Idiosyncratic reactions
    - Allergy to general anesthesia
      - > Malignant hyperthermia

What immunoglobulin is affected by Anaphylactic/ Immediate Hypersensitivity Reaction?

- **IgE** – involved in inflammation, allergic reaction & combating parasitic infection
- IgA – attachment
- IgG – mother to fetus
- IgM – made by baby

The following Drugs causes this Adverse Effect:

- **ASA/Ibuprofen**: Thrombocytopenia Purpura
  - → Can cause bleeding
  - → Cell associated w/ bleeding: Platelets – thrombocytes
- **Chloramphenicol**: Aplastic Anemia (rare type)
- **Methyldopa**: Hemolytic Anemia
  - → Pregnant patient w/ HTN
- Type B: Cytotoxic (usually in blood)
  - → IgG & IgM
  - → RBC & WBC

The following are adverse effect Type B (Inflammation) – Immune Complex Hypersensitivity except:

- **Arthralgia**
- **Glomerulonephritis**
- Myalgia
- Dysuria

The following could cause (Type 4) ADR Type B- Cell Mediated Type except:

- **Mantoux Reaction: Mycobacterium Tuberculosis**
- **Nickel**
- Lead
- Poison Ivy
- Pneumonitis
- Polyangiitis

Classify the type of ADR Type C:

- **A = Addiction** – person takes it compulsively, can cause potential harm & even you have desire to stop, you can't
  - → No benefit
  - → May crush ka, No advantage (addiction) but you have desire
- **B = Dependence** – you can't function (physical, physiological) w/o the drug
  - → Ex: Sedatives (Benzodiazepines)
  - → Have benefit
- **C = Tolerance** – loss of response to drug
  - → Ex: smoking cessation, morphine
- Utilization of Amphetamine – **A**
- Utilization of Benzodiazepines to induce sleep – **B**

- ❖ The px is not responsive to smoking cessation – C
- ❖ Drinking alcohol to lessen depression – **A**
- ❖ Continuous use of Sertraline to prevent panic attacks – **B**

Which of the following could cause vaginal adenocarcinoma?

- ❖ **Diethylstilbesterol** – due to long term use (can be a cause)
- ADR Type D: Carcinogenic – would increase risk of Cancer
  - → Ex: soot
    - Can cause cancer in scrotum
    - "soot wart"
  - → Ex: exposure to asbestos
    - Mesothelioma
    - Cancer in the thin layer of chest & abdomen

Match the Teratogenic effect with the medications:

- ❖ Benzodiazepine – Cleft lip
- ❖ Carbamazepine – Neural tube defect
- ❖ Phenytoin – Fetal hydantoin syndrome
- ❖ Isotretinoin – Craniofacial defects
  - → Could also cause neuro malformation
- ❖ Methimazole – Aplasia cutis

Which of the following is a drug reaction for the withdrawal syndrome (Type E – end of use) associated with benzodiazepines?

- ❖ **Rebound Insomnia**
- Tachyphylaxis – appearance of progressive disease in response to given dose due to repetitive administration
- Rebound Hypertension – Clonidine

Which of the following is an example of ADR Type F (failure of therapy)? NOTA

- ❖ Mantoux Reaction: Mycobacterium Tuberculosis
- ❖ Rebound Hypotension with the utilization of Clonidine
- ❖ Skin irritation after exposure to Poison Ivy
- ❖ Antimicrobial Resistance

ADR Type F

- Drug-drug interaction
- Use of counterfeit drug
- Drug instability
- Patient non-compliance
- Wrong product administration
- Drug resistance

5. Resuscitation or Code Blue

- Prepare medications that may be needed during a code
- Assist with dose calculations to ensure therapeutic dose

6. Medication Dosing

- Dosing adjustments:
  - → Organ dysfunction
    - Creatinine clearance in CKD patient
    - Low creatinine clearance = chronic/serious disease
  - → Age or weight
    - Pediatric and geriatric
  - → Switching between different routes of administration
    - When switching, same dosage strength

7. Formulary

8. Anticoagulation

- Heparin, Warfarin
  - → There should be protocols and processes for handling high risk drugs
  - → Daily monitoring of laboratory values and dose adjustment as appropriate
- PT-INR = less than 5
  - → Stop or reduce anticoagulants
- PT-INR = 5 to less than 9
  - → Temporary stop
- PT-INR = greater than 9 w/ bleeding
  - → Stop & give antidote (Vitamin K)
- PT-INR = Moderate to major bleeding
  - → Stop, give Vit K & FFP (fresh froze plasma)

9. Nutrition

- Sterile preparation of TPN
- Resolving incompatibilities and adjusting the nutritional formula as appropriate

10. Anti-Infective Stewardship

- Review antibiotic, antiviral, antifungal medication use by comparing to patient's condition, site of infection, culture & sensitivity results

11. Outcomes Management

- Participate in compliance with core measures by assuring core therapies are received by eligible patients

12. Managing Transitions of Care

- Medication reconciliation

13. Narcotic Stewardship

- Pain management using opioid analgesics
- Days of use = PCA
- Mefenamic acid
  - → Max: 7 days
  - → Can cause GI & cardio problem
- Ketorolac
  - → Max: 5 days
  - → Can cause GI & cardio problems

- Tramadol
  - → Max: 5 days
  - → Habit forming
  - → Structurally related to opioids, morphine
- Parecoxib
  - → Max: 3 days
  - → Can cause GI & cardio problems

14. Pharmacogenomics

- Relationship between genomes and the efficacy, elimination, and toxicities of medications
- Evaluate genetic code of patients in order to better predict a drug response

15. Medication Therapy Management

- Services that optimize therapeutic outcomes for individual patients
  1. Collection of data
  2. Assess the date for possible medication related to the problem
  3. List them by prioritizing the most important to deal w/
  4. Give solution

16. Documentation

- Means by which healthcare professional communicate with one another
  1. Decision consultation w/ RPh
  2. Drug information question resolved
  3. Relevant serum drug concentration & their interpretation
  4. Patient education

MEDICATION ERROR

Medication Error Index

Type	Category	Result
No error	**Category A** Ala pa naman: No error occur	Circumstances or events that have the capacity to cause error
Error, No Harm	**Category B** Buti di umabot	An error occurred, but the medication did not reach the patient
	Category C Char wala pa	An error occurred that reached the patient, but did not cause the patient harm
	Category D Dapat i-monitor, reach the patient	An error occurred that resulted in the need for increased patient monitoring, but not patient harm
Error, Harm	**Category E** TemporarE(y)	An error occurred that resulted in the need for the treatment or intervention and caused temporary patient harm
	Category F (p)Frolonged hospitalization	An error occurred that resulted in initial or prolonged hospitalization and caused temporary patient harm
	Category G Grabe permanent	An error occurred that resulted in permanent patient harm
	Category H Hingalo	An error occurred that resulted in a near-death event (e.g., anaphylaxis, cardiac arrest)
Error, Death	**Category I** Iyak, tigok	An error occurred that resulted in patient death

Identify the type of Medication Error

- ❖ Patient experience hemorrhagic stroke and complete paralysis of the left part – **G**
- ❖ Bleed out in the surgery **– H**
- ❖ Warfarin caused Mucosal Bleeding **– E**
- ❖ Anticoagulant was ordered Q.O.D but was administered OD that caused low PT INR that required administration of Vit K and FFP – **D**
- ❖ The working area was not organized while the pharmacy assistant is filling the medication orders. – **A**
- ❖ The pharmacy assistant prepared the wrong dosage strength of warfarin but was corrected by the pharmacist – **B**
- ❖ Regular Metoprorol was administered to the patient instead of the extended release **– D**
- ❖ Patient died after the administration of Penicillin due to Anaphylaxis **– I**
- ❖ The patient was given multivitamins even though it was not ordered by the physician. **– C**

CARDIOVASCULAR SYSTEM DISEASES AND MANAGEMENT

Heart Failure "Congestive Heart Failure"

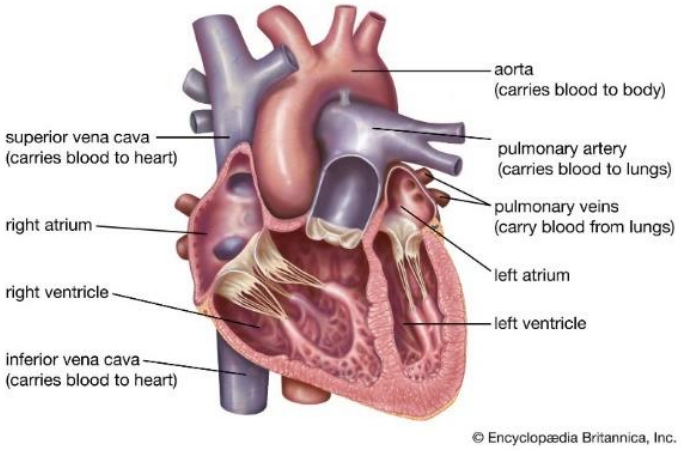
- It is a condition in which the cardiac output is insufficient to supply enough blood flow to meet the body's needs

Cardinal signs & symptoms

- Dyspnea (SOB)
- Fatigue
- Edema
- Rales (small clicking, bubbling or rattling sounds in lungs)
- Narrow arteries in the heart
- Hypertension/high blood pressure

Types

- Left sided heart failure
- Right sided heart failure
- Systolic heart failure
- Diastolic heart failure



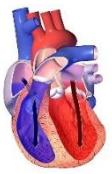
Left Sided Heart Failure

- Occurs in <u>left ventricle</u>
  → Pumps oxygen-rich blood to the body
- Most common type
- occurs when left ventricle doesn't pump efficiently
- Common cause of SOB, building fluid (edema)

Right Sided Heart Failure

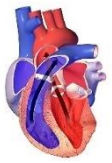
- Occurs in <u>right ventricle</u>
  → Pumping blood to your lungs to collect oxygen
- Can also cause lung disease if right ventricle is damaged
- Accumulation of blood to lungs

Systolic Heart Failure



- Occurs when the heart muscle losses its ability to contract
- Usually develops when your heart is weak or enlarged
- More common in men

Diastolic Heart Failure



- Heart contracts normally
- Heart muscle becomes stiffer than normal
- More common in women
- It can't fill enough blood

Types Question

- ❖ What is the most common type of Heart Failure?
  → <u>Left sided heart failure</u>
- ❖ This type of heart failure is more common in MEN.
  → <u>Systolic heart failure</u>
- ❖ This condition occurs when there is accumulation of blood in the lungs due to compromised left ventricle of the heart.
  → <u>Right sided heart failure</u>
- ❖ This occurs when the heart loses it's ability to contract.
  → <u>Systolic heart failure</u>
- ❖ This occurs when heart muscle becomes stiffer than normal.
  → <u>Diastolic heart failure</u>

Risk Factors

- <u>Age</u>
  → 65 years old above
- <u>Gender</u>
  → More common to men
- <u>Ethnicity</u>
  → African (50 yrs. old)-American (↑ risk)
- <u>Family history and genetics</u>
- <u>Diabetes</u>
  → Pioglitazone & Rosiglitazone causes worsening of heart failure
- <u>Obesity</u>
- <u>Medication</u>
  → Imatinib
  → Doxorubicin

Risk Factors Questions:

- ❖ Utilization of Chemotherapy drugs is a risk factor for heart failure. **T**
- ❖ Women has the higher risk for heart failure. **F**
- ❖ Asians has the highest risk for heart failure. **F**
- ❖ Rosiglitazone could cause heart failure. **T**
- ❖ Obesity itself is a risk factor for heart failure **T**

Causes

- Coronary artery disease
  - → Cholesterol & fatty deposits in heart arteries
  - → Less blood can reach the heart muscle
  - → Atherosclerosis: chest pain, angina
- Past heart attack (myocardial infarction)
  - → Occurs when the artery that supplies blood to heart muscle, gets blocked
  - → Denial of oxygen & nutrients into heart muscle tissue
- High blood pressure (hypertension or HBP)
  - → Uncontrolled blood pressure (major risk for developing HF)
  - → Heart pumps faster than normal
- Abnormal heart valves
  - → Can lead to endocarditis or a defect present at birth
  - → The valves does not open or close completely during each heartbeat
- Heart muscle disease
  - → Damage in heart muscle due to unknown, or by drugs/alcohol abuse
  - → "Dilated cardiomyopathy" or hypertrophic cardiomyopathy
  - → Myocarditis – inflammation
- Heart defects present at birth
  - → "Congenital heart disease
  - → Chambers did not develop well
- Severe lung disease
  - → When the lungs do not work properly, the heart needs to work harder to get available oxygen to the rest of the body

Which of the following is a possible cause of Heart Failure: NOTA

- ❖ Cardiomyopathy
- ❖ Rebound Hypotension
- ❖ Myocardial Infarction
- ❖ Congenital Heart Defects

The following is a possible cause of Heart Failure except:

- ❖ **Cardiomyopathy**
- ❖ **Age 65 and Above**

Signs and Symptoms

- 3 cardinal symptoms
  - → Dyspnea
  - → Edema
  - → Fatigue
- Swelling of abdomen – Ascites
- Shortness of breath
- Chronic coughing or wheezing
- Build-up of fluid (edema)
- Fatigue or feeling lightheaded
- Nausea or lack of appetite
- Confusion or impaired thinking
- High heart rate

Right-sided Heart Failure Manifestations: "AW HEAD"

- Anorexia & Nausea
- Weight gain (due to edema)
- Hepatomegaly (venous engorgement of liver)
- Edema (Bipedal)
- Ascites (water in abdomen)
- Distended neck vein

Left-sided Heart Failure Manifestations: "DO CHAP"

- Dyspnea (minimal to difficulty of breathing eve at rest)
- Orthopnea (relieved by elevated head pillow)
- Cough (initially dry & non-productive, large volume of sputum)
  - → Pink sputum indicates severe pulmonary congestion
- Hemoptysis (blood tinge sputum)
- Adventitious breath sounds (worsen due to pulmonary congestion) – "crackles"
- Pulmonary congestion

Which among the following is not a cardinal signs/symptom of HF?

- ❖ **Orthopnea**

Which among the following is a signs/symptom of Right Sided Heart Failure:

- ❖ **Dyspnea**

Which among the following is a signs/symptom of Left Sided Heart Failure

- ❖ **Hemoptysis**

ACC/AHA Classification

Stage	Disability
STAGE A	Patients at high risk for heart failure but without structural heart disease or symptoms of heart failure.
STAGE B	Patients with structural heart disease but without signs and symptoms of heart failure.
STAGE C	Patients with structural heart disease with prior or current symptoms of heart failure.
STAGE D	Patients with refractory heart failure requiring specialized interventions.

Diagnosis

- EKG
  - → Determines heart rate, rhythm & other info regarding heart condition
- Echocardiography
  - → Uses soundwaves to produce light images of your heart
  - → w/ favorable outcomes together w/ proper therapy
- Ejection Fraction
  - → Percentage of blood ejected out of the ventricle with each contraction

Ejection Fraction Measurement	What it Means
55-70%	Normal
40-55%	Below normal
Less than 40%	May confirm diagnosis of heart failure
<35%	Patient may be at risk of life-threatening irregular heartbeats Fatality/Death

- Heart/lung auscultation
  - → Clinical procedure of listening to cardiac sounds
  - → Reveals murmurs or value abnormalities
- BNP Blood test
  - → When you have HF, your heart produces more proteins
  - → It could identify heart failure, 80% of the time
  - → Thru simple blood test
  - → Normal value: 125 pg/mL
- X-ray
  - → Non-invasive test
  - → For enlarged cardiac shadows and consolidation of the lungs
- PET scan
  - → Produce picture of your heart

A test that uses sound waves to produce live images of your heart?

❖ **Echocardiography**

Which of the following diagnostic test for heart failure is done by listening to cardiac sounds?

❖ **Lung/heart Auscultation**

A test used to determine heart rate, heart rhythm and other information regarding the heart's condition.

❖ **Electrocardiography**

What is the normal value for BNP blood test?

❖ **Less than 100 pg/mL**

Treatment "BAND AID"

- Beta blockers
- ACE inhibitors; ARBs
- Nitrate hydralazine
- Diuretics
- Aldosterone antagonist
- Ivabradine
- Devices

What Beta Blocker is used for the treatment of Heart Failure?

❖ **Bisoprolol**

Beta-blocker "BiMeCar"

- Decreases the heart rate
- Decreases the myocardial oxygen demand, alleviates myocardial ischemia
  - → Bisoprolol
  - → Metoprolol succinate – for HF
  - → Carvedilol
  - → Metoprolol tartrate – HTN

Frequency of Administration

❖ Carvedilol – 20-50 mg BID
❖ Metoprolol – 200 mg qd
❖ Bisoprolol – 10 mg qd

The following are ace inhibitors utilized for the treatment of Heart Failure except

❖ **Lisinopril**

ACE inhibitors

- Dilate blood vessels to improve blood flow
- Decrease heart work
  - → Enalapril
  - → Captopril
  - → Ramipril

What is the frequency of Captopril to be utilized for the treatment of Heart Failure except:

❖ **50 mg TID**

What is the most common adverse effect of ACE Inhibitors?

❖ **Dry cough**

ARBs "TelVal I Los her Cande"

- block the action of angiotensin II by preventing angiotensin II from binding to angiotensin II receptors on the muscles surrounding blood vessels
  - → Telmisartan
  - → Valsartan
  - → Irbesartan

→ Losartan
→ Candesartan

- ARBS is an alternative for patient intolerant to ACE inhibitors because of incessant cough

Nitrates + Hydralazine combination is used as an alternative for ACEi and ARBs for patients who experienced what adverse effect?

❖ **Hyperkalemia**

- Commonly due to hyperkalemia & renal insufficiency
- Nitrates + Hydralazine – 2nd line tx for HF (given to patient who cannot tolerate ACEi & ARBs)
  → Improves survival of px w/ HF
  → Hydralazine – arterial dilator
  → Nitrates – venous dilator

What type of diuretic should be closely monitored during the course of treatment due to the potential of causing hypotension?

❖ **Loop diuretics**
→ Water pills
→ They relief ankle swelling & relieve breathlessness
→ Common problem: dehydration/electrolyte imbalance, reduce sodium and potassium in the blood
→ Common diuretics: Furosemide & Bumetanide

Which of the following diuretic prevents elevated aldosterone level in heart failure that promotes sodium and water retention that could lead to volume overload?

❖ **Spironolactone**

- Also used for HTN
- Elevated aldosterone in HF = promotes Na & H_2O = would cause volume overload that would result to myocardial hydrosis
- Key facts about Diuretics:
  → It is your heart workload
  → ↓ work load = ↓ blood pressure
  → Also relieve the cardinal sign: SOB
  → Reduces swelling & bloating

Which of the following is an adverse effect of ivabradine? AOTA

❖ **Headache**
❖ **Dizziness**
❖ **Blurred vision**

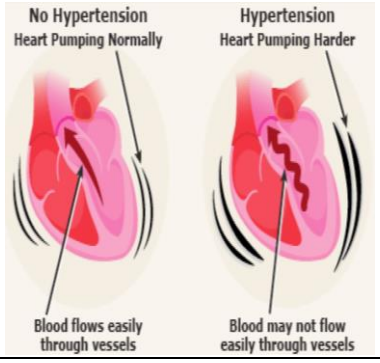
- Ivabradine
  → Can help heart slowdown, alternative for beta blockers
  → For Heart rate >79 BPM

The following are devices used for Heart Failure? NOTA

❖ Pacemakers
❖ Cardiac resynchronization therapy
❖ Implantable cardioverter defibrillators

Hypertension

- It is a condition in which the cardiac output is insufficient too high blood pressure (HBP or hypertension) is when the blood pressure, the force of the blood pushing against the walls of the blood vessels, is consistently too high
- Systolic: <140 mmHg
- Diastolic: 90 mmHg
- Normal – 140/90
- DOC for hypertension (ACEIs, ARBs), diuretics (Thiazides)
- **Blood pressure** is a measure of the force that your heart uses to pump blood around your body



Tablet 3. Classification of Blood Pressure in Adults (age ≥18 years

Classification	Systolic BP (mmHg)		Diastolic BP (mmHg)
Normal	<120	AND	<80
Prehypertension	120-139	OR	80-89
Stage 1 HTN	140-159	OR	90-99
Stage 2 HTN	≥160	OR	≥ 100

w/o comorbidity

Population	Blood Pressure Goal (Systolic/Diastolic)
<60 years old	<140/90 mmHg
>60 years old	<150/90 mmHg
>18 yrs old w/ Chronic Kidney Disease (CKD)	<140/90 mmHg
>18 yrs old w/ Diabetes	<140/90 mmHg

What would be the Blood Pressure Goal of a 37 years old patient if the patient has a co-morbidity of chronic kidney disease.

❖ **<140/90 mmHg**

What would be the blood pressure category of an adult patient with a BP of 180/100

❖ **Stage 2 Hypertension**

Mang Jose is a 50 y/o truck driver who, although asymptomatic is noted to have elevated blood pressure during his yearly check-up. From a previous BP of 134/90 last year his current BP is 146/90. What is the classification of his BP?

❖ **Stage 1 Hypertension**

This type of hypertension has no identifiable cause of high blood pressure.

❖ **Primary Hypertension** (or essential HTN)
- → Due to genetics of lifestyle
- → Cannot be cured, but it could be controlled
- → 90% w/ HTN, falls under this category
- → Most common

- Secondary Hypertension
  - → Less than 10% is the occurrence
  - → Noncommon
  - → This is caused by underlying condition like CKD

Which of the following is an etiology of secondary hypertension

❖ **Chronic diffusion glomerulonephritis**

- Vascular = Renal Artery disease, coaction of aorta
  - → ReAd Co Ao
- Renal: Pyelonephritis & Polycystic kidneys
  - → Crush di Glowing pag may Pye Pol
- Endocrine: Cushing syndrome, Pheochromocytoma, primary hyper aldosteronism, hyperthyroidism, hyperparathyroidism
  - → Pheo pag may Cush, hyper x3

What type of hypertensive crisis has a systolic blood pressure of >180 mmHg and diastolic blood pressure of >120 mmHg and with no target organ damage

❖ **Hypertensive Urgency**

- Patient may experience:
  - → Severe headache
  - → SOB
  - → Nose bleed
  - → Anxiety
- First line tx:
  - → Captopril
  - → Clonidine
  - → Labetalol
  - → Urgent CC Label

What type of hypertensive crisis has a systolic blood pressure of >180 mmHg and diastolic blood pressure of >120 mmHg and with target organ damage

❖ **Hypertensive emergency**
- → Requires medical attention
- → Headache is common

- First line tx:
  - → Nitroprusside
  - → Fenoldopam
  - → Nicardipine
  - → Labetalol
  - → Nitro Fenol kay Nica pero walang label

Risk Factors

- Cannot be controlled
  - → Age
    - ➢ Men – >55
    - ➢ Women – >65
  - → Race
  - → Family history
- Can be controlled
  - → Stress
  - → Unhealthy diet
  - → Smoking
  - → Overweight
  - → Sedentary life
  - → Alcohol
  - → Too much salt intake

Which of the following are risk factors for hypertension that can be controlled?

❖ **Salt intake**

❖ **Pregnancy**

Which of the following are causes of hypertension? AOTA

❖ **Stress**

❖ **Salt intake**

❖ **Age**

❖ **Obesity**

Signs and Symptoms

- Headache
- Nosebleed
- Irregular heartbeat
- Chest pain
- Vision disturbances
- Fatigue
- Numb hand and foot
- Nausea and vomiting
- Retinopathy
  - → Reduced vision

→ Eye swelling
→ Bursting of blood vessel
→ Double vision accompanied w/ headache

Which of the following is a sign of Hypertensive Retinopathy?

❖ **Reduced vision**
❖ **Bursting of a blood vessel**

Which of the following is a sign of Cardiomegaly? AOTA

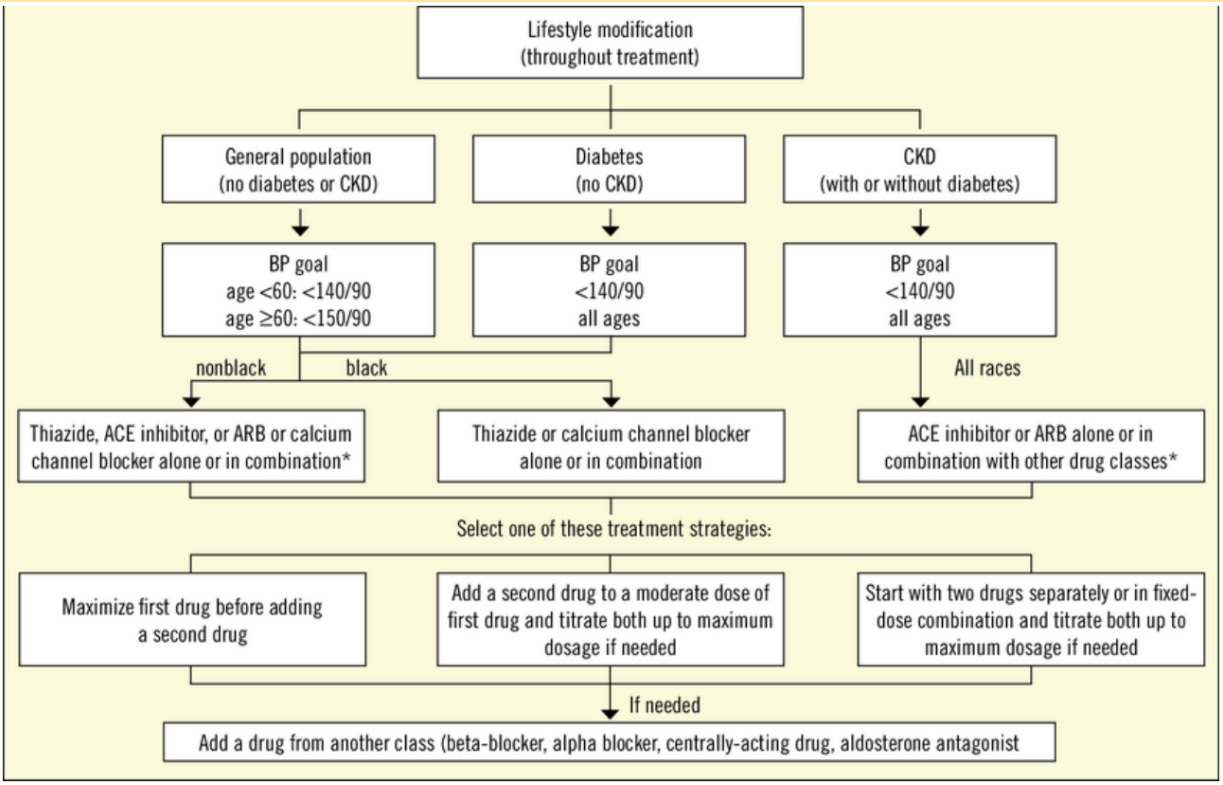
❖ **Heart palpitations**
❖ **Dizziness**
❖ **Swelling**
❖ **Shortness of breath**

- Cardiomegaly
  → SOB
  → Chest pain
  → Heart palpitation
  → Arrhythmia
  → Dizziness
  → Panting
  → Rapid exhaustion w/ physical activity
  → Swelling

Diagnosis

- Blood pressure monitoring
- Fundoscopic examination
- Cardiopulmonary examination
- Urine test
- Peripheral vascular exam

Treatment



Which of the following Is a long-acting diuretic?

❖ **Thiazide diuretic**
- Long acting – given once daily
- Advantage: ↓ frequency
- Site of action: proximal tubule

What is the ideal route of administration for Thiazide diuretics?

❖ **Oral**

Thiazide diuretics causes decreased electrolytes except?

❖ **Calcium**
- Magnesium, Sodium Potassium

True of False

❖ Thiazides lowers NA+ levels in the ascending Loop of Henle – **False**
❖ Thiazides lose efficacy if GFR <30-40 mL/min – **True**
❖ Hydrochlorothiazide is the only real thiazide – **True**
❖ Thiazide is effective in lowering the BP by 15-20mmHg – **False**
❖ Chlorthalidone is longer acting compared to other Thiazides – **True**
❖ The initial suggested dose for HCTZ is 12.5 mg to 25 mg per day – **True**

- ❖ The target dose of HCTZ per day is 100 mg - **False**
- ❖ Chlortalidone should be initiated at 25 mg - **False**
- ❖ The target dose of Chlortalidone is 25 mg – **False**

Which CCB is usually in a sustained release onset of action?

- ❖ **Nicardipine**

- CCB for HTN
  - → Amlodipine
  - → Felodipine
  - → Nicardipine (sustained release)
  - → Nifedipine (long-acting)
  - → Nisoldipine
  - → Isradipine

Calcium channel blockers bind to calcium channels found in the blood vessels. As a result of the calcium channel blockade, CCBs cause vasodilation (widening) of the blood vessels

- ❖ **True**

Amlodipine prescribed dose (mg/day)

- ❖ **2.5 to 10 mg**

Felodipine prescribed dose (mg/day)

- ❖ **2.5 to 10 mg**

Nicardipine sustained-release prescribed dose (mg/day)

- ❖ **60 to 120 mg**

Nisoldipine prescribed dose (mg/day)

- ❖ **17 to 34 mg**
- ❖ Isradipine – 5-10mg

Which of the following is a side effect of Calcium Channel Blocker? AOTA

- ❖ **Headache**
- ❖ **Dizziness**
- ❖ **Flushing**
- ❖ **Swelling of arms and legs**

- Serious side effects: chest pain

True or False (CCB)

- Non-Dihydropyridines are effective for BP lowering – **False**
- Nifedipine is a long acting CCB – **True**
- Nimodipine has has high lipid solubility – **True**
- DHP affect peripheral resistance – **True**
- Non-DHP affect peripheral resistance, heart rate and contractility – **True**

Categorize the following ACE inhibitors. Choose A if Sulfhydryl-containing, B if Dicarboxyl containing and Cif Phosphorus Containing:

- ❖ Enalapril – **B**
- ❖ Quinapril – **B**
- ❖ Captopril – **A**
- ❖ Fosinopril – C
- ❖ Lisinopril – **B**

- Sulfhydryl-containing
  - → Captopril
  - → Cap Sul
- Dicarboxyl-containing
  - → Enalapril
  - → Lisinopril
  - → Quinapril
  - → Ramipril
  - → Perindopril
- Phosphorus containing
  - → Fosinopril
- ACE inhibitor used for HTN
  - → Benazepril
  - → Captopril (common under tongue)
  - → Enalapril
  - → Fosinopril
  - → Perindopril
  - → Lisinopril
  - → Moexipril
  - → Quinapril
  - → Ramipril
  - → Trandolapril

The following ace inhibitors are used for hypertension except? NOTA

- ❖ Lisinopril
- ❖ Enalapril
- ❖ Quinapril
- ❖ Trandolapril

What is the teratogenic effect ace inhibitors?

- ❖ **Fetal Anuria**
- ❖ Malformation

What is the hormone in the body that causes constriction (narrowing) of the blood vessels?

- ❖ **Angiotensin II**

- Prevents formation of Angiotensin II by blocking the enzyme that converts angiotensin I to angiotensin II

What is the hormone stimulated by Angiotensin II which holds both sodium and water in the body?

- ❖ **Aldosterone**

True or False (ACEi)

- ❖ Inhibition of the formation of Angiotensin II would increase BP – **False**
- ❖ Ace inhibitor shows to reduce proteinuria – **True**
- ❖ Ace inhibitor could cause reduction GFR – **True**
- ❖ Ace inhibitor could cause angioedema – **True**

- ❖ If a patient has a prior history of angioedema with one ACEi just shift to another ACEi – **False**

In emergency cases of hypertension captopril's onset of action is:

- ❖ **15 minutes onset orally**
- ❖ **5-10 minutes sublingually**

True or False

- ❖ ARBs have been shown to be equally effective as ACE inhibitors, but with less side effects - **True**
- ❖ ARBS and ACEi have similar mechanism, these two medications should be given together for greater efficacy – **False**
- ❖ Low blood pressure is a common side effect with ARBS – **True**
- ❖ ARBS could cause cough and angioedema – **True**
- ❖ ARBS has no risk for fetus – **False**

Initial Dose for ARBs

- ❖ The initial suggested dose for Candesartan is
  - → **8-32mg**
- ❖ The initial suggested dose for Irbesartan is
  - → **150-300mg**
- ❖ The initial suggested dose for Losartan is
  - → **25-100mg**
- ❖ The initial suggested dose for Olmesartan is
  - → **20-40mg**
- ❖ The initial suggested dose for Telmisartan is
  - → **20-80mg**

What type of Beta Blockers is advisable in the treatment of Hypertension?

- ❖ **Cardioselective (2nd gen)**
  - → Atenolol
  - → Bisoprolol
  - → Metoprolol tartrate
  - → Esmolol

What 3rd generation beta-blocker has anti-hypertensive effect?

- ❖ **Nebivolol**
- 3rd generation – mild to moderate uncomplicated HTN & HF

True or False

- ❖ Beta-blockers are second-line therapy is based on studies showing that beta-blockers had a higher incidence of heart attack or stroke when used for HTN in patients without a specific indication for use – **True**
- ❖ Beta-blockers should be used as primary therapy if a patient has a compelling indication (recent stroke or heart attack). – **True**
- ❖ Taper dose over 7 days when discontinuing to prevent rebound hypertension – **False**
- ❖ Beta Blockers with vasodilation affect HR, Contractility, BV and Peripheral resistance – **True**

Choose A if this side effect/ADR of Beta-blocker and Choose B if not.

- ❖ Bronchospasm – **A**
- ❖ Decrease libido – **A**
- ❖ Cough – **B**
- ❖ Hyperglycemia – **B**
- ❖ Tiredness and fatigue – **A**

- Side effects/ADR of Beta blockers
  - → Bronchospasm because C/I: Asthma
  - → Hypoglycemia
  - → Peripheral vasoconstriction
  - → Exacerbation of HF
  - → Hypertriglyceridemia
  - → Impair glucose tolerance
  - → Bradycardia
  - → Tiredness & fatigue (nonselective BB)

This works centrally in the brain to block neurotransmitters (Chemicals that communicate to the body) from increasing the heart rate and blood pressure.

- ❖ **Central alpha-2 blockers**
  - → Dizziness
  - → Drowsiness
  - → Headache

Which of the following is not a side effect of Alpha 2-agonist? AOTA

- ❖ Dizziness
- ❖ Drowsiness
- ❖ Fatigue
- ❖ Headache

This causes small blood vessels to remain open, which lowers blood pressure.

- ❖ **Alpha-1 blockers**

RESPIRATORY SYSTEM DISEASE AND MANAGEMENT

Tuberculosis

- an airborne bacterial infection caused by the organism *Mycobacterium tuberculosis* that primarily affects the lungs, although other organs and tissues may be involved.

Case Question

Name: Juan Dela Cruz
Age: 61 Gender: Male
Chief Complaint: Mang Juan went to the hospital with the complaint of cough for more than 2 weeks and not relieved with carbocisteine. He told the physician he's having fevers, body pain, and chills too.
Px history: Mang Juan is diabetic, underweight, and chain smoker

The physician's initial diagnosis for Mang Juan's disease is tuberculosis. What is the causative agent for tuberculosis?

❖ **Mycobacterium Tuberculosis**

Mang Juan's showed the symptoms of 2 weeks cough, feeling tired, body pain, fever and chills. What type of TB is Mang Juan experiencing?

❖ **Active TB**

Choose A if the signs/symptoms described latent TB and Choose B if active TB ad C if both

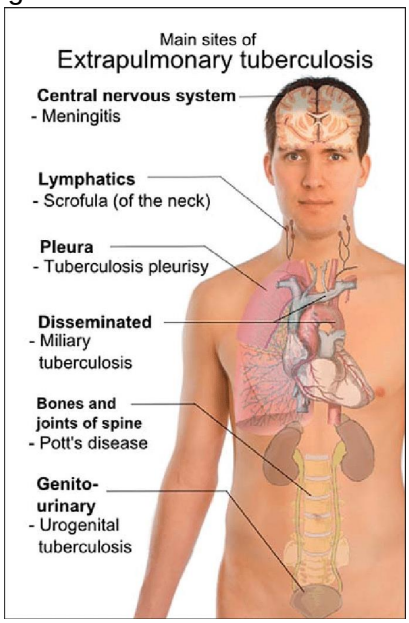
❖ The patient doesn't feel sick and has no symptoms – **A**
❖ The patient may spread TB bacteria to others – **B**
❖ The patient skin and blood test result indicating TB infection – **C**
❖ The patient Has a normal chest X-ray and a negative sputum smear – **A**
❖ The patient shows symptoms such as cough, fever and chills. **– B**

Types

- Latent TB
  → TB lives but doesn't grow in the body
  → Doesn't make a person feel sick or have symptoms
  → Can't spread from person to person
  → Can advance to TB disease
- TB Disease
  → TB is active and grows in the body
  → Makes a person feel sick and have symptoms
  → Can spread from person to person
  → Can cause death if not treated

Forms

- **Pulmonary at lungs**
- **Extrapulmonary** – meningitis, TB Pleurisy, Miliary TB, Pott's disease, Scrofula of the neck
  → Meningitis – fever, constant headache, neck stiffness, nausea, drowsiness that could lead to coma
  → Scrofula – swollen glands
  → Miliary TB – fever that may worsen in the evening, chills, dry cough that may occasionally be bloody (hemoptysis), fatigue, weakness, SOB, poor appetite, weight loss, night sweats
  → Pott's Disease – Severe back pain, myalgia, urogenia



A form of tuberculosis that shows symptoms of non-productive cough and pleuritic chest pain. Other symptoms include fever, night sweats, weight loss, malaise, and dyspnea.

❖ **Tuberculosis Pleurisy**

If the patient is experiencing Urogenital type of TB which signs and symptoms is a prominent manifestation of this form?

❖ **Blood in the urine**

Which of the following might be a contributing factor to Mang Juan's TB? AOTA

❖ **He's diabetic**
❖ **He's a chain smoker**
❖ **He's 61 years old**

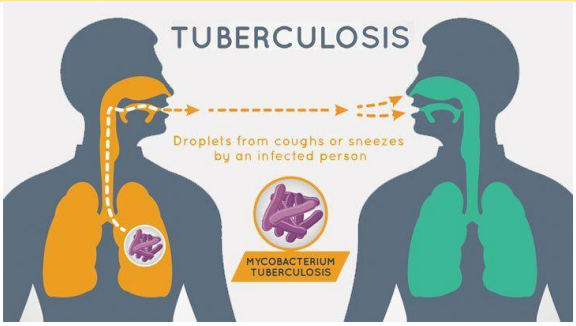
Risk Factors

- Weakened immune system
- Traveling or living in certain areas
- Poverty and substance abuse
- Where you work or live

Mang Juan asked if TB is contagious and his concern is that they live in a small house with her wife, 2 kids and 4 grandchildren. Will it be a high risk if this is the situation at home?

❖ **True**

Mode of Transmission



The physician asked if Mang Juan is experiencing hemoptysis. What is hemoptysis?

❖ **Blood originated from lungs/bronchial tubes**

Signs and Symptoms

- Loss of appetite
- Fever
- Weight loss
- Night sweats
- Fatigue
- Weakness
- Cough
- Hemoptysis
- Chest pain
- Chills

Mang Juan underwent a diagnostic test procedure to test for his immunity for tuberculosis using tuberculin syringe administered intradermally. What's the diagnostic test procedure used?

❖ **Mantoux Test**

Diagnosis

- Mantoux Skin test
  - → It is checked 48-72 hours later
  - → Encircle the site and should not touch the area
  - → **≥5 mm**
    - HIV positive
    - Recent contract with an active TB patient
    - Nodular or fibrotic changes on chest X-ray
    - Organ transplant

  - → **≥10 mm**
    - Recent arrivals (<5 yrs) from high-prevalence countries
    - IV drug users
    - Resident/employee of high-risk congregate settings
    - Mycobacteriology lab personnel
    - Comorbid conditions
    - Children <4 yrs old
    - Infants, children, & adolescents exposed to high risk categories

  - → **≥ 15 mm**
    - Persons with no known risk factors for TB

- IGRA "Interferon Gamma Release Assay"
  - → Checks a persons immune reactivity

	QFT-GIT	T-Spot
Initial Process	Process whole blood within 16 hours	Process peripheral blood mononuclear cells (PBMCs) within 8 hours, or if T-Cell Xtend® is used, within 30 hours
***M. tuberculosis* Antigen**	Single mixture of synthetic peptides representing ESAT-6, CFP-10 & TB7.7	Separate mixtures of synthetic peptides representing EST-6 & CFP-10
Measurement	IFN-g concentration	Number of IFN-g producing cells (spots)
Possible Results	Positive, negative, indeterminate	Positive, negative, indeterminate, borderline

- Sputum Test (aka Acid fast Bacillus stain)
  - → Lowenstein Jensen Agar
- Sputum Smear
  - → Ziehl-Neelsen staining – first bacteriologic clue
- Chest Xray
  - → For visible sputum

Treatment

- always treat with more than one drug
- 6 months regimen are effective; children are treated like adults but with dose adjustments
- Rifampicin, Isoniazid, Pyrazinamide, Ethambutol, Streptomycin

RIPES

- Rifampicin
  - → Orally and best given in an empty stomach
  - → Given 600 mg daily or intermittently
  - → Lesser absorption for patients with AIDS, diabetes and GI problems
- Isoniazid
  - → It could cause peripheral neuropathy
  - → With Vitamin B6 for peripheral neuropathy

- Pyrazinamide
  - → After 2 months of Iso and rifampin
  - → Combination: Rifampicin: 120 mg, Isoniazid: 50mg, and Pyrazinamide: 300 mg
- Ethambutol
  - → First-line treatment during the 1960s because it is better tolerated by patients
- Initial phase (2 months)
  - → Rifampicin, Isoniazid, Pyrazinamide, Ethambutol
- Continuation phase (4 months)
  - → Rifampicin & Isoniazid

Second-line treatment

- Aminoglycosides (particularly: Amikacin and Kanamycin)
- Polypeptides:
  - → Capreomycin, Viomycin, Enviomycin
- Fluoroquinolones:
  - → Ciprofloxacin, Levofloxacin, Moxifloxacin
- Thiomedese:
  - → Ethionamides
- Prothionamide:
  - → Cycloserine, P-aminosalicylic acid

Third-line treatment

- Rifabutin
- Macrolides: Clarithromycin (but not very effective)
- Linezolid (best for MRSA not effective for TB)
- Arginine

Mang Juan was diagnosed with compromised renal function what would be the recommendation in his drug regimen?

❖ **Reduce dose of Ethambutol**

Special Consideration

- Children: reduce dose
- Pregnancy: except Streptomycin (teratogenic and ototoxic)
- Kidney (renal): lessen Ethambutol

Prevention and Control

- Finish the entire course of medication
- Healthy lifestyle and environment
- Ventilation
- Isolation of patient
- BCG vaccination
- Natural sunlight
- Personal hygiene
- Wear a mask
- Always cover the mouth

Asthma

- A common lung disorder in which inflammation causes the bronchi to swell and narrow the airways, creating breathing difficulties that may range from mild to life-threatening.
- Heterogeneous disease, usually characterized by CHRONIC AIRWAY INFLAMMATION
  - → No cure for asthma but it can be controlled.
  - → Defined by the history of respiratory symptoms such as wheeze, shortness of breath, chest tightness, and cough in any or all of these combinations
  - → In this pandemic, we usually would resort to the definition of asthma according the patient's history
  - → Varies over time and in intensity, together with variable expiratory airflow limitation
  - → Demographics of patients with bronchial asthma:
  - → Pedia: 2x males > females
  - → Adults: Equal prevalence

Case Question

Name: Ada Atienza
Age: 53 Gender: Female
Chief Complaint: Ms. Atienza, went to the emergency room with a complaint of dyspnea.
Px history: Ms. Ada is asthmatic and was recently diagnosed with hypertension and was prescribed with ace inhibitors. The patient however took her husband's antihypertensive drug metoprolol, thinking it has the same indication and there will not be a problem.

Patient Ada's daughter informed the physician that her mother experiences symptoms during the day and wake up every night due to asthma. What is this type of asthma based on severity?

❖ **Severe persistent asthma**

Types Based on Severity

- Intermittent Asthma – symptoms occur in less than twice a week and wake up less than twice a month
- Mild persistent asthma – symptoms two or more days a week and wake up three to four nights a month
- Moderate persistent asthma – have symptoms at least every day and wake up one or more nights a week
- Severe persistent asthma – symptoms during the day and wake up every night due to asthma

Types

- Exercise induced asthma
  - → Exercise commonly makes asthma symptoms worse.
  - → With treatment and monitoring, people with exercise-induced asthma can continue to participate in physical activities.
  - → The more inflamed the airways are, the less exercise it takes to cause symptoms
- Nocturnal asthma
  - → Worsening of asthma at night is very common and treatment of underlying causes can help greatly.
  - → As with exercise, when asthma is a problem at night, it usually means that the inflammation in the airways is worse.
- Occupational asthma
  - → Workplace exposure to certain chemicals or dusts can induce asthma.
  - → These exposures can cause an allergic type of reaction or be an irritant to the airways. Quick recognition and control of workplace exposures is important.
- Steroid resistant asthma (severe asthma)
  - → While the majority of patients respond to regular inhaled glucocorticoid (steroid) therapy, some people are steroid resistant.
  - → These people do not respond to steroids at normal doses.
  - → Speak with your healthcare provider about an action plan for working with this type of asthma.
- Allergic asthma
  - → Allergies can make asthma symptoms worse. So, it is best to avoid the things to which you are allergic.

Choose A if the statement/word stated below is a risk factor for asthma and B if NOT

- ❖ Atopy – **A**
- ❖ Patients who has hypertension has high risk for asthma – **B**
- ❖ Obesity – **A**
- ❖ Ethnicity – **A**
- ❖ Patient with tuberculosis are most likely to have asthma – **B**

Risk Factors

- Endogenous factors
  - → Atopy
  - → Genetic predisposition
  - → Airway hyperresponsiveness
  - → Gender
  - → Ethnicity
  - → Obesity
  - → Early viral infections
- Environmental factors
  - → Indoor allergens
  - → Outdoor allergens
  - → Occupation sensitizer
  - → Passive smoking
  - → Respiratory infection
  - → Air pollution (diesel particulates, nitrogenous oxides)
  - → Diet
  - → Dampness and mold exposure

Causes

- Triggers or “must avoid”
- Allergens
- Upper Respiratory Tract Viral Infections
  - → May start with a runny nose, itchy throat, sore throat, & mild cough progressing eventually into a full-blown acute attack in spite of maintenance medications
- Exercise (exception, and only during acute attacks)
  - → Of all the triggers, exercise is the only one that is NOT discouraged and everything else they must avoid
  - → Exercise may only be avoided if the patient has an acute attack and has uncontrolled asthma and they must be managed differently
- Hyperventilation
- Cold Weather/Air
- Noxious Gases (sulfur dioxide & irritant gases)
- Drugs (Beta-blockers, Aspirin)
- Stress-induced Asthma
- Irritants (household sprays, paint fumes, strong smells)

Patient Ada, complained of different signs symptoms which of the following complaint correlates to asthma? Choose A if this is a sign and symptom of asthma and B if not.

- ❖ Patient Ada’s chief complaint is difficulty of breathing – **A**
- ❖ Upon lung auscultation, wheezing is present as well. – **A**
- ❖ Her blood pressure decreases – **B**
- ❖ Chest Pain – **A**
- ❖ Coughing – **A**

Signs and Symptoms

- Shortness of breath
- Chest tightness or pain
- Wheezing when exhaling
  → Common sign of asthma in children
- Trouble sleeping
  → Caused by SOB, coughing or wheezing
- Coughing or wheezing
  → Worsened by a respiratory virus, such as a cold or the flu

Diagnosis

- Physical exam
  → Auscultations:
    ➢ Pneumonia,
    ➢ bronchitis,
    ➢ COPD,
    ➢ upper airway dysfunction,
    ➢ endobronchial obstructions
- Spirometry
  → Measures the airway flow
  → What to expect during a spirometry test:
    1. Height and weight measurement
    2. Nos is clipped to encouraged mouth breathing
    3. Blow into mouthpiece connected to spirometer. Repeat 3 times
    4. Spirometer creates graph of lung function

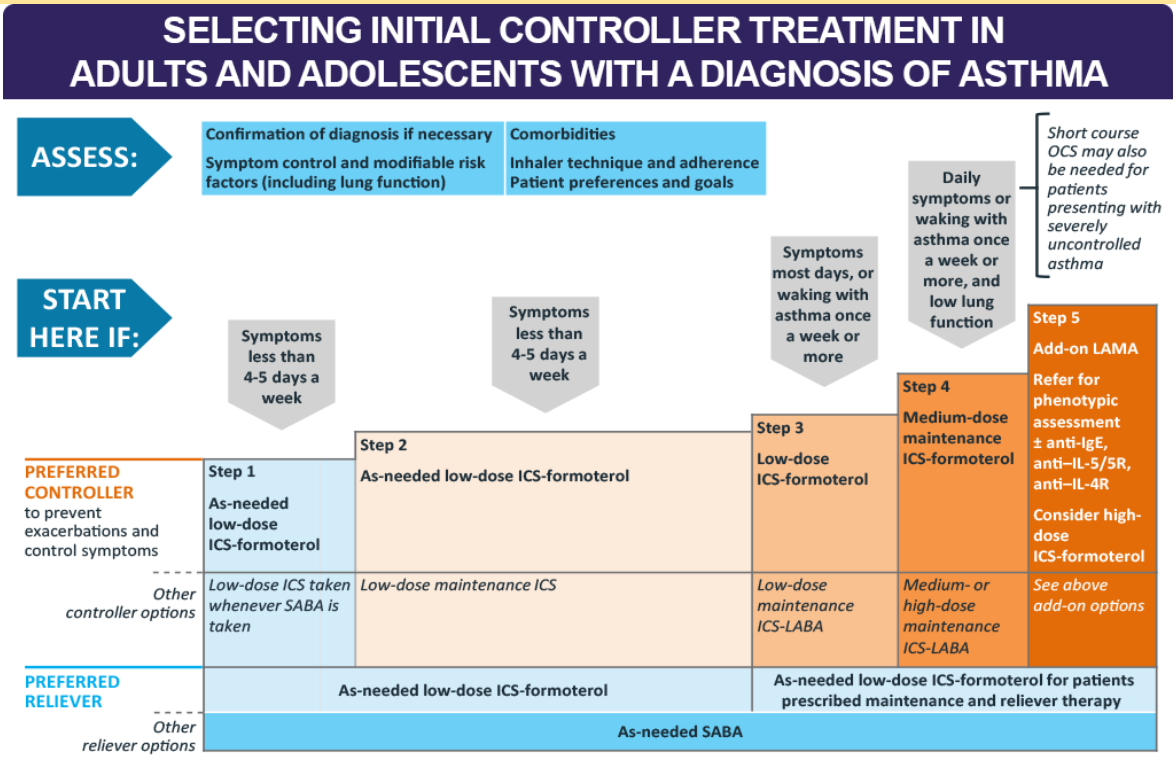
% of Personal Best	Level of Control
80-100%	Well controlled
50-80%	Partly controlled, action likely needed
<50%	Poorly controlled, aggressive management

- Peak Expiratory Flow Test (PEFR)
  → Measure the flow rate using the peak flow meter
- Fractional exhaled nitric oxide (FeNO)
  → Checks the swelling of the airways

Which of the following are used as controller in a patient experiencing asthma:

❖ **Inhaled cholinergic agents**

Treatment



BDP = beclomethasone dipropionate; FEV_1 = forced expiratory volume in 1 second; HDM SLIT = house dust mite sublingual immunotherapy; ICS = inhaled corticosteroid; Ig = immunoglobulin; IL = interleukin; LABA = long-acting β_2-agonist; LAMA = long-acting muscarinic antagonist; LTRA = leukotriene receptor antagonist; OCS = oral corticosteroid; SABA = short-acting β_2-agonist.

GINA. Global Strategy for Asthma Management and Prevention. Updated 2021 (https://ginasthma.org/wp-content/uploads/2021/05/GINA-Main-Report-2021-V2-WMS.pdf). Accessed 7/25/21.

What is the initial drug of choice for inhaled corticosteroid:

❖ **Budesonide**
❖ Beclomethasone

Which of the following is used in the management of Acute Asthma Attack:

❖ **Oxygen**
❖ **Magnesium sulfate**

Which of the following is a short acting beta agonist?

- **Salbutamol**
- **Terbutaline**

What would be the best therapeutic recommendation for patient Ada in her treatment:

- **Discontinue her metoprolol and recommend ARBs to lessen the possibilities of cough that could trigger asthma attack.**
- **Retain the Fluticasone + Salmeterol of the patient**

Management of Acute Asthma (O SHIT ME)

- Oxygen
- Salbutamol
- Hydrocortisone
- Ipratropium
- Theophylline
- Magnesium sulfate (2g IV over 2 minutes)
- Escalate care for intubation of ventilation

Reliever Medication

Short-Acting Beta Agonist (SABA)

- Mainstay and First line agents
  - → Salbutamol
    - In adults, continuous or Intermittent, every 20 minutes for 3 doses over an hour
  - → Terbutaline

Inhaled anticholinergic agents

- Ipratropium
- Tiotropium

Long-Acting Beta Agonist (LABA)

- Formoterol
- Salmeterol

1. only be added if regular use of standard-dose ICS has failed to control asthma adequately
2. not be initiated in patients with rapidly deteriorating asthma
3. be introduced at a low dose and the effect properly monitored before considering dose increase
4. be discontinued in the absence of benefit
5. be reviewed as appropriate; stepping down therapy should
6. be considered when good long-term asthma control has been achieved

Oral Bronchodilators

- Slow-release Theophylline

High Dose SABA

- only considered if conventional doses do not achieve adequate symptom control.
- (Salbutamol 2.5-5mg per dose; Terbutaline continuous SQ infusion)

Controller Medication

Anti-inflammatory agents

- Inhaled Corticosteroids
  - → the initial drugs of choice, with a starting dose for an adult of beclomethasone or budesonide 400 µcg/day (or an equivalent) given in divided doses.
- Cromolyn sodium
  - → a mast cell stabilizer and inhibits the early and late asthmatic response to allergen challenge, as well as inhibiting exercise-induced bronchospasm and neutrally mediated bronchoconstriction.
  - → It is only effective by inhalation, remarkably non-toxic, and used in conjunction for patients not responding completely to the inhaled β2 - agonists.

Leukotriene Receptor antagonist

- Montelukast, Zileuton, and Zafirlukast
- As add-on therapy in step 4; then a 4–6-week trial should be undertaken. Value in aspirin-induced asthma.

Anti-IgE Monoclonal Antibodies

- Omalizumab
- Used for the treatment of severe persistent IgE (30–1500 iu/mL) – mediated asthma as add- on therapy

Oral Corticosteroids

- Prednisone, Prednisolone, & Methylprednisone
- Should only be used, at step 5, as a single morning dose to minimize adrenal suppression

Steroid-sparing agents

- Immunosuppressive agents such as methotrexate, ciclosporin, and gold can be tried in an attempt to reduce a regular steroid dose.

URINARY SYSTEM DISEASES AND MANAGEMENT

Urinary Tract Infection

- A urinary tract infection (UTI) is an infection in any part of your urinary system — your kidneys, ureters, bladder and urethra. Most infections involve the lower urinary tract — the bladder and the urethra

Bacteria that often causes UTI

- Gram Negative bacteria
  - → Escherichia coli
  - → Klebsiella
  - → Proteus mirabilis
  - → Pseudomonas aeruginosa
- Gram Positive bacteria
  - → Enterococci
  - → Streptococci
  - → Staphylococcus saprophyticus (common in young women)
- Fungi
  - → Candida
  - → Histoplasma capsulatum
- Miscellaneous (not always but may cause)
  - → Mycobacterium tuberculosis

Which of the following microorganism could cause UTI?

- ❖ **Staphylococcus saprophyticus**
- ❖ **Mycobacterium tuberculosis**

Classify what type of UTI based on the following signs and symptoms: A. Urethritis B. Cystitis C. Pyelonephritis D. Vaginitis

- ❖ Vaginal itching or irritation – **D**
- ❖ Upper back and side (flank) pain – **C**
- ❖ Hematuria – **B**
- ❖ Pelvic pressure – **B**
- ❖ Shaking ang chills – **C**

Types

Urethritis

- common in sexually active patients with symptoms and presumptively for STDs. Urethra is affected.
  - → May feel burning during urination
  - → Sometimes there are discharge
- Regimen
  - → Ceftriaxone 250 mg IM + Either 1 g of Azithromycin OD or Doxycycline 100 mg BID x 7 days

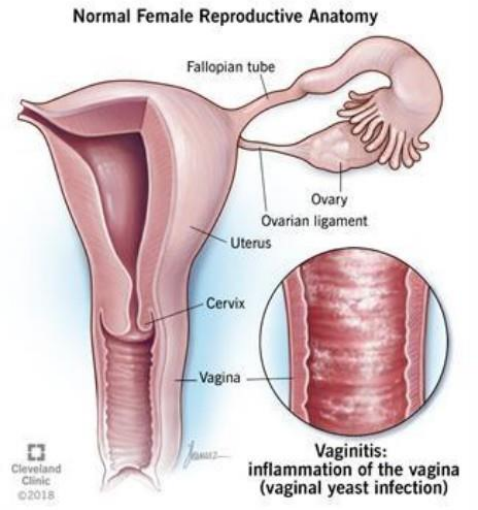
Cystitis

- Infection in the bladder
- Signs and Symptoms
  - → Pelvic Pressure
  - → Lower Abdomen Discomfort
  - → Frequent Painful Urination
  - → Present Hematuria (blood in the urine)
- First-line treatment
  - → Nitrofurantoin 100 mg BID x 3 days (Limitation: Contraindicated if CrCl is less than 60 mL/min)
  - → Co-trimoxazole (Trimethoprim/sulfamethoxazole) 160/800 mg BID x 3 days

Pyelonephritis

- Infection in the kidneys
- Patients are usually immunocompromised with this and at risk with septicemia, etc.
- Signs and symptoms
  - → Upper back and side (flank) pain
  - → Usually accompanied by high fever
  - → Shaking and Chills
  - → Nausea
  - → Vomiting Bladder
- Treatment
  - → Ciprofloxacin 500 mg BID x 7 days
  - → **Second option**: TMP/SMX 160/800 mg BID x 14 days

Vaginitis



- Infection in the vagina
- Signs and symptoms
  - → Change in color, odor, or amount of discharge from the vagina
  - → Vaginal itching and irritation
  - → Pain during intercourse
  - → Painful urination

→ Some instances of light vaginal bleeding or spotting

- Treatment
  → Metronidazole Gel or Tablet
  → **Second option**: Clindamycin Cream

Signs and Symptoms

Infant (common in boys than girls)

- Asymptomatic UTI is common to 2% in boys in their first few months
- Symptoms:
  → Failure to thrive
  → Fever
  → Diarrhea
  → Vomiting
  → apathy
- Limitation in diagnosis: Urine sample is not enough for urinalysis
- Major risk factor for the development of renal scarring
- Complications are chronic pyelonephritis, renal failure, hypertension to adulthood

Children

- Pre-school 5% in girls and 0.5% in boys
- Older Children Bacteriuria 1.2% in girls and 0.03% in boys
- Symptoms:
  → Dysuria (frequent urination),
  → hematuria (blood in urine),
  → acute abdominal pain,
  → vomiting (may raise suspicion for appendicitis)

Adult

- Bacteriuria 10% of adult women have symptomatic UTI each year and 2-5% of women have recurrent UTI at the peak age of incidence common in early 20s
- **Common Symptoms**: Dysuria, hematuria, fever, rigor, loin pain
- **Systemic Symptoms**: Extreme Malaise

Elderly (both sexes have prevalence in bacteriuria)

- At least 20% in women and 10% in men
- Symptoms are not diagnostic because symptoms are fairly common in the elderly
- **Non-specific systemic manifestations**: Confusion, falls (deterioration of pre-existing DM or CHF)

Risk Factors

- Female anatomy (women have shorter urethra and closer to the anus than men: prone to bacteria penetration and E. Coli exists in the anus)
  → 90% E. coli causes UTI in women
- Sexual activity
- Certain types of birth control
- Menopause
- Urinary tract abnormalities
- Blockages in the urinary tract
- A suppressed immune system
- Catheter use
- A recent urinary procedure

Diagnosis

- Successful: Sample is uncontaminated urine (from mid urination)
- Dipsticks
- Microscopy (first step in laboratory diagnosis): examine under 40x objective
  → Observe Excess WBC (usually in symptomatic UTI)
  → More than 10 per high power field is abnormal
- Culture
  → Have at least 100,000 bacteria per mL
  → Without infection: around 1,000 bacteria per mL

True or False

❖ Alkaline substances such as citrates is used because by making the urine more alkaline, they make the environment more hostile to bacterial growth and improve the results of antibiotic therapy. – **True**
❖ Cephalosporins, nitrofurantoin and norfloxacin are the first choices in patients with signs of upper UTI or kidney infection – **True**
❖ 7-day regimens are as effective as longer regimens in the cases of trimethoprim and quinolones. – **False** (3-day regimen)
❖ Short-course regimens such as 3-day or even single-dose therapy is suitable for men. – **False** (women)
❖ Short courses of b-lactams are generally less effective than trimethoprim and quinolones – **True**

Treatment

Upper UTI

- First line:
  - → Cephalosporins,
  - → Nitrofurantoin,
  - → Norfloxacin
- Alkaline substances or citrates (considered by making the urine more alkaline, they make the environment more hostile to bacterial growth)
- Severe upper UTI which could cause nausea, vomiting and fever may require hospital treatment with antibiotics given IV

Uncomplicated Lower UTI

- Trimethoprim
- Cefalexin
- Co-amoxiclav
- Nitrofurantoin
- Quinolones
- Men: 7-10 days;
- Women: 3 days/single dose therapy
- Quinolones overuse is likely to increase resistance (best reserved for treatment failure)

What is the First-line treatment (Medication, Dosage and Frequency) for the following types of UTI?

Urethritis	Ceftriaxone 250 mg IM	Either 1g of Azithromycin OD or Doxycycline 100mg BID x 7 days
Cystitis	Nitrofurantoin 100 mg BID x 3 days	Co-trimoxazole 160/800mg BID x 3 days
Pyelonephritis	Ciprofloxacin 500mg BID x 7 days	Second option: TMP/SMX 160/800 mg BID x 14 days
Vaginitis	Metronidazole Gel or Tablet	Second option: Clindamycin Cream

Antibiotics that can be used to treat UTI in children	Therapeutic dose
Therapeutic dose Trimethoprim (TMP) 'Alprim'	4 mg/kg BD Max: 150 mg BD
Trimethoprim–sulfamethoxazole (TMP–SMX) 'Bactrim'	4 + 20 mg/kg BD Max: 16 0+ 180mg BD
Cephalexin 'Keflex'	12.5mg/kg QID Max: 500 mg QID
Amoxycillin and Clavulanic acid 'Augmentin'	22.5 + 3.2 mg/kg BD Max: 875 + 125 mg BD
Nitrofurantonin 'Macrodantin'	Not recommended for therapeutic UTI treatment in children

Children should be treated from 7-10 day course
Renal scarring occurs at 5—15% of children

Bacteriuria of Pregnancy

- Could both affect the mother and baby
- Preeclampsia (High blood pressure and protein)
- Co-amoxiclav is cautioned because of relative lack of clinical experience in pregnant women (although category-wise is it considered)
- Trimethoprim is contraindicated without folate supplementation in thefirst trimester because of cousin neural tube defects
- Nitrofurantoin should be avoided close to the time of expected delivery because of the risk of hemolysis in the baby.
- Ciprofloxacin could affect growing joints of the baby.

Case Question

Name: Ada Atienza
Age: 16 Gender: Female
Chief Complaint: "Over the past 24 hours, I've been alternating between urinating frequently to needing to urinate and not being able to. She also observed blood in her urine
Px history: Ms. Ada has history of UTI 6months ago, had bulimia but patient stated that she is trying to eat better and is not vomiting anymore. She denies flank pain and fever. The patient informed you that she is allergic to Bactrim

Lab Test
WBC, 10-15 cells/hpf
RBC 20-25 cells/hpf
Bacteria: Many
Nitrite negative

Urinalysis Parameter	Normal Values
Aspect	Clear
Colour	Pale yellow-yellow
Odour	Atypical
Reaction (pH)	Acid (5,5-6)
Acid	No
Nitrites	Negative
RBC	0-4 cells/hpf
WBC	0-5 cells/hpf

Case Question

- ❖ With the signs and symptoms stated what type of UTI is present?
  - → **Recurrent UTI**
- ❖ What is the diagnostic test of choice?
  - → **Urinalysis**
- ❖ What is the indication of urinary tract infection based from the patient's urinalysis result?

→ **RBC present in the urine is one of the indications of Cystitis, WBC is slightly increased as well due to infection.**

- ❖ What is the suggested initial medication for the patient?
  - → Nitrofurantoin 100 mg BID x 3 days (with consideration that the patient is allergic to TMP/SMX, you cannot give TMP/SMX.)
- ❖ The patient was experiencing recurrent UTI – **True**
- ❖ Quinolones could also be recommended to the patient – **False**

DIGESTIVE SYSTEM DISEASE AND MANAGEMENT

Peptic Ulcer Disease

- Peptic ulcers are open sores that develop on the inside lining of your stomach (gastric) and the upper portion of your small intestine caused by stomach acid and pepsin (duodenal)
- Stomach → Acids & Pepsin → Digestion → Mucus barrier
  - → Stomach will secrete acids and pepsin to aid digestion. In order to protect itself from being digested or damaged, it produces a mucus barrier.
  - → During digestion, the body starts to produce a mucus barrier that covers the stomach lining. The stomach acids and pepsin erodes the gastrointestinal lining when H. pylori, NSAIDS or other factors disrupt the normal mucosa, defense and healing mechanisms are the reasons why peptic ulcers occur.

Case Question

Name: Ado Atienza
Age: 56 Gender: Male
Chief Complaint: Ado presents to the emergency department on Sunday evening complaining of intermittent burning epigastric pain for more than 2 months. His pain is non-radiating and occurs to the right of his epigastrium. The pain changes in intensity and is worse with meals. He also has notice intermittent belching, being bloated, being weak when walking, and complains of nausea after eating. Since last Friday, he has been having black, tarry bowel movements. He does not have any history of PUD or GI bleeding and has not experienced anorexia or vomiting. The patient is currently taking diclofenac for osteoarthritis
Px history: COPD x 10 years Type 2 DM x 10 years Osteoarthritis x 15 years in the right shoulder

Case Question

- What type of Peptic ulcer disease is the patient experiencing? – **gastric ulcer**
- What is the diagnostic test of choice? – **urea breath test**
- What medication is the first line treatment for this type of ulcer? – **PPI/H2blocker + amoxicillin/ tetracycline/metronidazole/clarithromycin**
- Does spicy food affect PUD? – **yes**
- What microorganism is commonly present in PUD? – **H. pylori**
- What is the antibiotic of choice? **– amoxicillin/ tetracycline/metronidazole/clarithromycin**

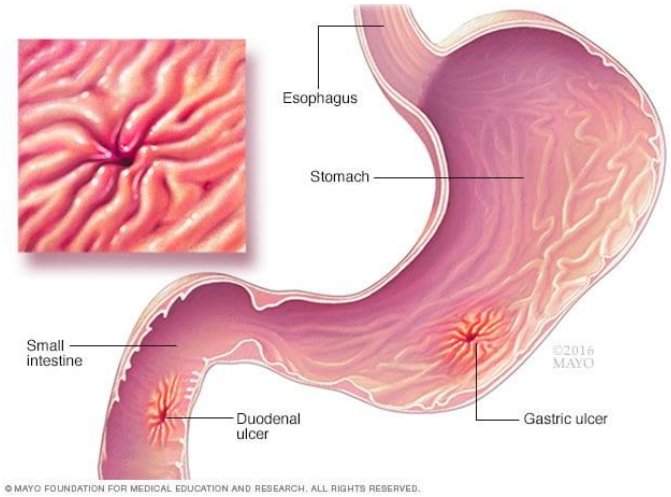
Types

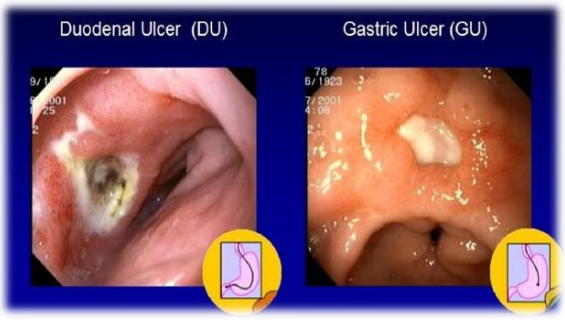
	Duodenal Ulcers	Gastric Ulcers
Location	Occur on the inside of the upper portion of your small intestine (duodenum)	Occur on the inside of the stomach
Pain	Pain relieved by meal	Pain increased by meal
Onset	Occurs 2-3 hrs after meal	Occurs 30min-1hr after meal
Incidence	Most common type	Not as common
Symptoms	Melena occurs	Vomiting occurs
Duration	Acute or chronic	Chronic
Age	Any age especially 30-40	Middle age 50-60
Sex	More in male	More in female

If ulcer is in the stomach (gastric), a high amount of gastric release, acids, and pepsin are released when eating. More acids on mucus lining that are not protected

Determine what type of ulcer choose A for duodenal and B for gastric

- ❖ Melena occurs – **Duodenal**
- ❖ Pain is relieved by meal **– Duodenal**
- ❖ Vomiting occurs – **Gastric**
- ❖ More common in female – **Gastric**
- ❖ Occur at the inside of the stomach **– Gastric**





Signs and Symptoms

- Feeling of fullness, bloating or belching
- Fatty food intolerance
- Heartburn
- Nausea
- Less often but severe type of symptoms:
  - → Vomiting or vomiting blood
  - → Dark blood in the stool
  - → Trouble breathing
  - → Feeling faint
  - → Unexplained weight loss
- Condition associated to PUD is Zollinger-Ellison Syndrome
  - → Hypersecretion of gastric acid caused by gastrin secreting tumor

Which of the following is a risk factor for PUD? AOTA

- ❖ **Age**
- ❖ **Infection by *Helicobacter Pylori***
- ❖ **Drinking alcohol**
- ❖ **Smoking**

Risk Factors

- *H. pylori*
- Age
- Family history
- Stress
- Smoking
- NSAIDs
- Spicy food
- Alcohol

Which of the following is checked during physical exam for PUD? AOTA

- ❖ **Check bloating of the abdomen**
- ❖ **Listens to sounds within your abdomen using a stethoscope**
- ❖ **Taps on abdomen to check for tenderness or pain**

Diagnosis

Physical exam

- A physical exam may help a doctor diagnose a peptic ulcer. During a physical exam, a doctor most often.
  - → checks for bloating in your abdomen
  - → listens to sounds within your abdomen using a stethoscope
  - → taps on your abdomen checking for tenderness or pain
- During diagnosis, usually the medical doctor asks for the medical history for certain reasons such as:
  - → If the patient is taking any NSAID medications (e.g., Aspirin)

→ Some medications that could triggering bleeding (e.g., Anticoagulants)

Urea breath test (gold standard)

- Incorporated in a special drink that contains urea to detect if there is H. pylori present. This test is the gold standard for checking H. pylori.
- Urea is a waste product that your body makes as it breakdowns proteins.
- Observation:
  → If H. pylori are present, the bacteria will change this waste product into carbon dioxide.

Stool test

- Used to study a sample of a patient's stool. Stool test also shows if there is a presence of H. pylori.

Endoscopy

- Usually performed by a gastroenterologist or surgeon that uses an endoscope to see the inside of the upper GI tract. This procedure takes place at a hospital or at an out-patient center

What is the most accurate non-invasive test for *H. pylori*

❖ **Urea breath test**

Test for *H. pylori*

Invasive	Non-Invasive
Histology	Urea Breath test ▪ Most accurate non-invasive test
Biopsy (rapid) Urease test ▪ Test of choice at endoscopy ▪ Rapid results	Fecal antigen test ▪ Useful in children ▪ Easier to perform
Culture ▪ Not for initial diagnosis	Serologic test ▪ Cost-effective alternative for the initial diagnosis

Treatment

Table 12.3 *Helicobacter pylori* eradication first-line regimens	
Standard (7 days)	PPI twice a day, amoxicillin 1 g twice a day, clarithromycin 500 mg twice a day Or PPI twice a day, amoxicillin 1 g twice a day metronidazole 400 mg twice a day
Penicillin allergy (7 days)	PPI twice a day, clarithromycin 250 mg twice a day, metronidazole 400 mg twice a day
Penicillin allergy and previous Clarithromycin exposure	PPI twice a day, tripotassium dicitratobismuthate (De-nol) 240 mg four times a day Tetracycline 500 mg four times a day, Metronidazole 400 mg twice a day
*Alternatively, bismuth subsalicylate 525 mg four times a day (Pepto-Bismol). PPI doses for H. pylori eradication: esomeprazole 20 mg, lansoprazole 30 mg, omeprazole 20–40 mg, pantoprazole 40 mg, rabeprazole 20 mg. PPI, Proton pump inhibitor.	

Table 12.3 *Helicobacter pylori* eradication second-line regimens	
Standard (use whichever was not used first line)	PPI twice a day, amoxicillin 1 g twice a day, clarithromycin 500 mg twice a day Or PPI twice a day. amoxicillin 1g twice a day, metronidazole 400 mg twice a day
Previous clarithromycin and metronidazole exposure	PPI twice a day, quinolone twice a day, tetracycline 500 mg twice a day
Penicillin allergy with no previous quinolone exposure	PPI twice a day, metronidazole 400 mg twice a day, levofloxacin 500 mg twice a day
Penicillin allergy with previous quinolone exposure	PPI twice a day, tripotassium dicitratobismuthate (De-nol) 240 mg four times a day, tetracycline 500 mg four times a day, metronidazole 400 mg twice a day
Alternatively, bismuth subsalicylate 525 mg four times a day (Pepto-Bismol). PPI, Proton pump inhibitor. PPI doses for H. pylori eradication: esomeprazole 20 mg, lansoprazole 30 mg, omeprazole 20–40 mg, pantoprazole 40 mg, rabeprazole 20 mg	

DRUG 1	DRUG 2	DRUG 3	DRUG 4
PPI-based Triple Therapy			
PPI once or twice daily	Clarithromycin 500mg twice daily	Amoxicillin 1g twice daily or Metronidazole 500mg twice daily	
Bismuth-based Quadruple Therapy			
PPI or H2RA once or twice daily	Bismuth subsalicylate 525mg four times daily	Metronidazole 250-500mg four times daily	Tetracycline 500mg four times daily
Non-Bismuth Quadruple or "Concomitant" Therapy			
PPI once or twice daily on days 1 through 10	Clarithromycin 250-500mg twice daily on days 1-10	Amoxicillin 1g twice daily on days 1 through 10	Metronidazole 250-500mg twice daily on days 1 through 10
Sequential Therapy			
PPI once or twice daily on days 1 through 10	Amoxicillin 1g twice daily on days 1 through 5	Metronidazole 250-500mg twice daily on days 6 through 10	Clarithromycin 250-500mg twice daily on days 6 through 10
Hybrid Therapy			
PPI once or twice daily on days 1 through 14	Amoxicillin 1g twice daily on days 1 through 14	Metronidazole 250-500mg twice daily on days 7 through 14	Clarithromycin 250-500mg twice daily on days 7 through 14
Second-line (Salvage) Therapy for Persistent Infections			
PPI or H2RA once or twice daily	Bismuth subsalicylate d 525mg four times daily	Metronidazole 250-500mg four times daily	Tetracycline 500mg four times daily
PPI once or twice daily	Amoxicillin 1g twice daily	Levofloxacin 250mg twice daily	
PPI-based Triple Therapy			
PPI once or twice daily	Clarithromycin 500mg twice daily	Amoxicillin 1g twice daily or Metronidazole 500mg twice daily	

- 10-14 days
- PPI should be taken 30 to 60 minutes before meal
  → effect: once daily < twice daily
  → substitution is acceptable (do not replace with H2RA unless PPI cannot be tolerated)

Therapeutic Recommendations:

1. Antibiotic medications to kill H. pylori (usually given in combination e.g., Clarithromycin and Amoxicillin)
2. Medications that block acid production, reduce acid production, neutralize stomach acids (e.g., PPI, H2RA and Bismuth subsalicylate)
3. Bismuth based Quadruple Therapy protects the lining of stomach and small intestines

GERD

- Gastroesophageal reflux disease (GERD) is a digestive disorder that occurs when acidic stomach juices, or food and fluids back up from the stomach into the esophagus.
  → It is caused by reflux of acids or biles from the stomach into the esophagus or beyond causing symptoms or complications.
  → Often called as "heartburn" which is common manifestation
  → A retrograde (or backward against normal flow) of stomach contents into the esophagus
  → Towards the oral cavity movement of contents, would be vomiting if the stomach contents exited in the mouth but in GERD, they do not.
  → Underlying cause: usually the problem in the integrity of lower esophageal sphincter (LES)
  → LES keep stomach contents in the stomach and not flow back to the esophagus

Which of the following is best describes GERD? AOTA

- ❖ A **retrograde (backward, against normal flow) of stomach contents into the esophagus**
- ❖ **Also known as "heartburn"**

❖ **The underlying cause is usually a problem with the integrity of the lower esophageal sphincter (LES)**

Primary aggressive factor, injures esophageal tissues through denaturation of protein

❖ **Acid**

Choose A if it is an aggressive factor (Promote GERD) or Choose B Defensive Factors (Prevent GERD)

❖ Esophageal Clearing - **B**
❖ Saliva – **B**
❖ Bile acids and pancreatic enzymes **– A**
❖ Gastric emptying – **B**
❖ Pepsin **– A**

Causes

Aggressive Factors (Promote GERD)

- Acid
  → primary aggressive factors; usually injures esophageal tissue through denaturation of proteins
- Pepsin
  → produces esophagitis (inflammation of esophagus)
- Bile acids and pancreatic enzymes
  → if the patient suffers from duodenogastric reflux (backward movement of materials from duodenum to stomach). Happens to patient who undergo gastric surgery

Defensive Factors (Prevent GERD)

- Lower esophageal sphincter
  → acts as barrier to keep gastric contents in the stomach
- Esophageal clearing
  → reflux of gastric contents but may not cause injury into esophageal epithelium.
  → The reflux state is properly returned to the stomach.
  → This is determined by the duration of exposure
- Saliva
  → acts as natural antacid
- Tissue resistance
  → esophageal epithelium consists of stratified squamous epithelial with a surface coating of tissue. This helps prevent chemical or mechanical injury
- Gastric emptying
- Upper esophageal sphincter
  → it helps prevent laryngopharyngeal reflux

Considered the diagnostic gold standard in patient with GERD

❖ **Ambulatory 24-hour pH monitoring**

Diagnosis

Ambulatory 24-hour pH monitoring

- most frequently performed;
- it determines the amount of gastroesophageal acid reflux and has 70% - 90% specificity rate.
- “Gold standard for GERD”

Acid Perfusion (Bernstein) Test

- used to support acid reflux as the cause of the symptoms.
- The esophagus is perfused with 0.1N HCl, reproductive of chest pain with acid perfusion, implicates GERD as the cause of the chest pain.

Choose A if it is Esophageal or Choose B if Extraesophageal

❖ Hoarseness – **B**
❖ Regurgitation – **A**
❖ Epigastric pain – **B**
❖ Belching – **A**
❖ Choking – **B**

Signs and Symptoms

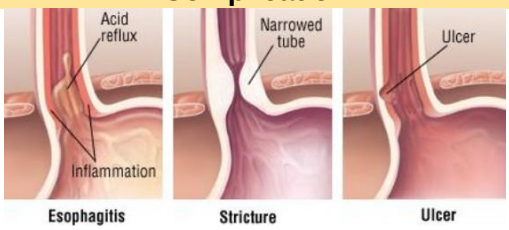
Esophageal

- Heartburn (pyrosis)
  → internal burning sensation on throat or back
  → Usually if heartburn is the symptoms, it is distribute in need within 5 mins by antacid
- Regurgitation (waterbash)
  → Reflux of sour/bitter material into the mouth usually at night when lying down or bending over.
  → Suggestion: when lying down, the pillow should be elevated
- Dysphagia
  → Indicates narrowing/stricture of the esophagus
- Odynophagia
  → Esophageal ulceration
- Belching

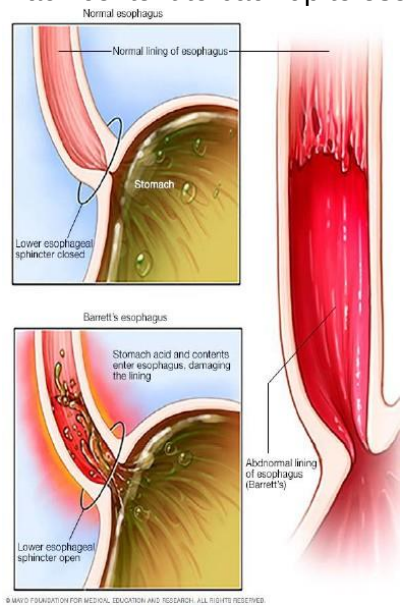
Extraesophageal

- Wheezing
- Choking
- Hoarseness
- Sore throat
- Epigastric pain
- Globus sensation
- Non-cardiac chest pain

Complication



- Esophagitis - inflammation of esophagus
- Stricture - narrowed tube
- Ulcer - upper portion
  - → All of this occurs on the upper part of stomach/LES
  - → The LES serves as the protection so that the gastric content will not go to the esophagus
- Barrett's esophagus - normal esophageal cells are replaced with abnormal cells. Thought to be caused by long standing GERD which causes the stomach content to back up to esophagus



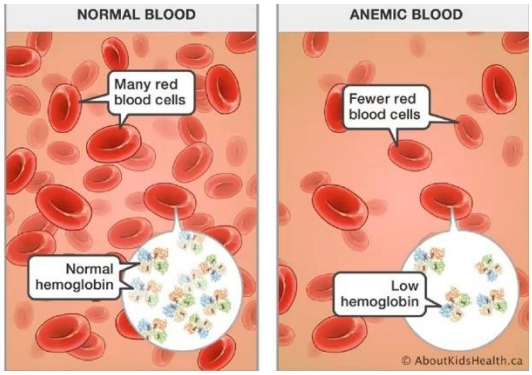
Treatment

- Antacids
  - → usually for heartburns; reduces the number of episodes and quantity of reflux state; neutralizes stomach acids after 3 hours if taken 1 hour after the meal. Not given to patients younger than 2 years old.
- Alginates
  - → alginic acids reacts with saliva to form
- H_2-blockers
  - → competitively blocks the histamine receptors in gastric parietal cells thereby preventing acid production
- Omeprazole
  - → PPI; significantly more effective than H2 blockers and antacid and highly effective in preventing acid production.

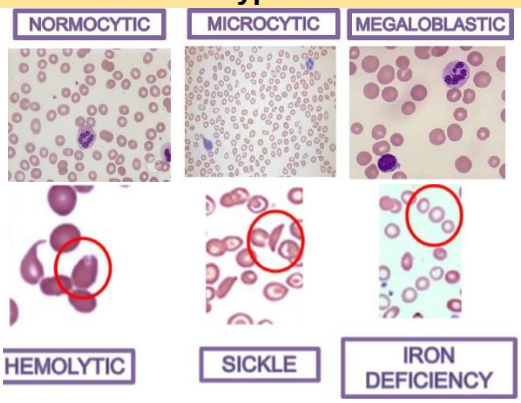
CIRCULATORY SYSTEM DISEASES AND MANAGEMENT

Anemia

- A condition that develops when your blood lacks enough healthy red blood cells or hemoglobin.
- Cardinal symptoms: Having anemia makes you feel tired and weak



Types



Hemolytic

- RBCs are destroyed faster than the body can create. Inherited or developed.

Sickle

- A type of hemolytic anemia which is caused by a defective form of hemoglobin that forces RBC to form a crescent (sickle shape)

Iron deficiency

- most common type;
- usually caused by shortage of iron in the body;
- common in pregnant women specifically first trimester (supplemented with folic, iron);
- suffered from severe blood loss;
- heavy menstruation; ulcer; cancer; chronic uses of aspirin

Vitamin deficiency

- deficiency in vitamin B12 and folate.
  - → Pernicious anemia - there is enough vitamin B12 but the body does not process it right away

Aplastic anemia

- rarest but the most dangerous type of anemia.
- The body does not produce enough RBC.
- Usually caused by infection, sometimes autoimmune diseases, or exposure to chemicals (common cause is chloramphenicol)

Normocytic

- blood problem which means normal site of RBCs of the patient but has low number of RBC

Microcytic

- term described for RBC that are smaller than normal. In other words, the body has fewer blood cells than normal and the RBCs are also too small.

Megaloblastic

- condition which produces unusually large RBCS

Signs and Symptoms

- Fatigue
- Weakness
- Pale or yellow skin
- Irregular heartbeats
- Shortness of breath
- Chest pain
- Cold hands and feet
- Headache

Diagnosis

- **Hematologic test**
  - → Complete Blood Count (CBC)
    - Hgb
    - Hct
    - RBC
    - WBC
    - Platelet count
    - PT
    - ESR

A protein in RBC that carries oxygen

❖ **Hemoglobin**

Total Hemoglobin

- Is a protein in RBC that carries oxygen
- Hemoglobin test measures how much hemoglobin is in the blood
- Low hemoglobin level may be due to:
  - → ✓ Various types of anemia
  - → ✓ GI bleeding or heavy menstrual period
  - → ✓ Low levels of folate, iron, vitamin B6 or B12
- Levels higher than normal indicates:
  - → Certain birth defects of the heart
  - → **Cor pulmonale** – defined as alteration in the structure and function of the right ventricle of the heart caused by primary disorder of a respiratory system (heart failure)

Inherited disorders in w/c RBC are destroyed

❖ **Thalassemia**

Hematocrit

- It measures percentage by volume of packed RBCs in a whole blood sample
- It aids in the diagnosis of polycythemia vera, anemia, and abnormal states of dehydration
- **Polycythemia Vera** – Neoplasm in which the bone marrow makes too many red blood cells.
  - → Low HCT suggests anemia, hemodilution, or massive blood loss
    - ➢ **Hemodilution** – decrease concentration as after hemorrhage of cells and solids in the blood resulting in anemia
  - → High HCT indicates polycythemia vera, hemoconcentration due to blood loss and dehydration
    - ➢ **Hemoconcentration** – decrease in plasma volume which causes a simultaneous increased concentration of the blood cells and commonly tested constituents of the blood

Polycythemia Vera

- Type of blood clot cancer in bone marrow produces too many RBCs and these excess cells weaken the blood, slowing its flow which causes serious problems such as blood clot

White Blood Cell Differential

- Used to evaluate the distribution and morphology of WBCs, providing more specific information about a patient's immune system
- Five types of leukocytes:
  - → Neutrophils
  - → Eosinophil
  - → Basophils
  - → Lymphocytes
  - → Monocytes
- The differential count is the percentage of each type of WBC in the blood
- High levels are associated with various allergic diseases and reactions to parasites

Neutrophils

- Most abundant WBC
- Neutropenia is associated with malignancy and drug toxicity
- there is low level of neutrophil leading to a susceptibility to infection

Eosinophil

- Inactivation of mediators of released from mast cells therefore it is apparent in allergic reactions

Basophils

- Basophilia present in malignant disorders such as leukemia (begins in the bone marrow and results in high numbers of abnormal WBCs) and myelofibrosis (bone marrow disorder that disrupts the body's normal function, normal production of blood cells)

Lymphocytes

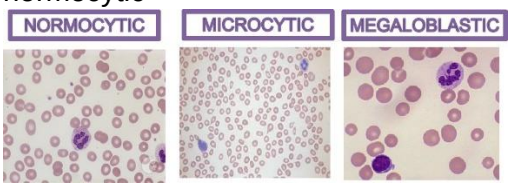
- Second most abundant WBC, usually found in the spleen and lymphatic tissues
- Increase occurs primarily in viral infections

Monocytes

- Macrophages, increased in bacterial infections

Red Cell Indices

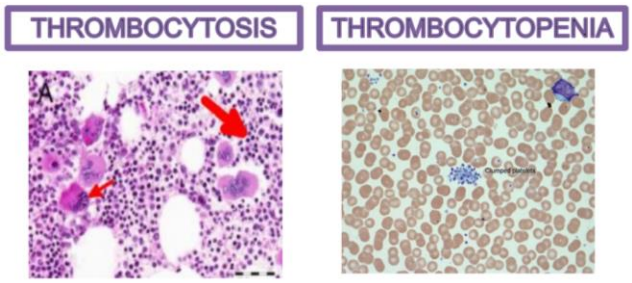
- Provide important information about the size, Hb concentration, and Hb weight of an average RBC
- Aid in the diagnosis of and classification of anemia
- Mean corpuscular volume (MCV)
  → average size of erythrocytes, and indicates whether they are microcytic, macrocytic, or normocytic



- Mean corpuscular hemoglobin (MCH)
  → Refers to the average quantity of hemoglobin present in a single red blood cell
- Mean corpuscular hemoglobin concentration (MCHC)
  → concentration of hemoglobin in 100 mL of packed RBCs. It helps to distinguish pale from normally coloured RBCS

Platelet Count

- Is one of the most important screening tests of platelet functions
- Used to evaluate platelet production, assess the effects of chemotherapy or radiation therapy of platelet production, diagnose and monitor thrombocytopenia
- Normal platelet count ranges from 150,000 to 450,000 platelets/ microliter of blood
- Low platelets can indicate dengue
- Platelets are important for "blood clotting"
- Idiopathic thrombocytopenia is an autoimmune disease wherein the body produce antibodies that destroy platelets



Thrombocytopenia

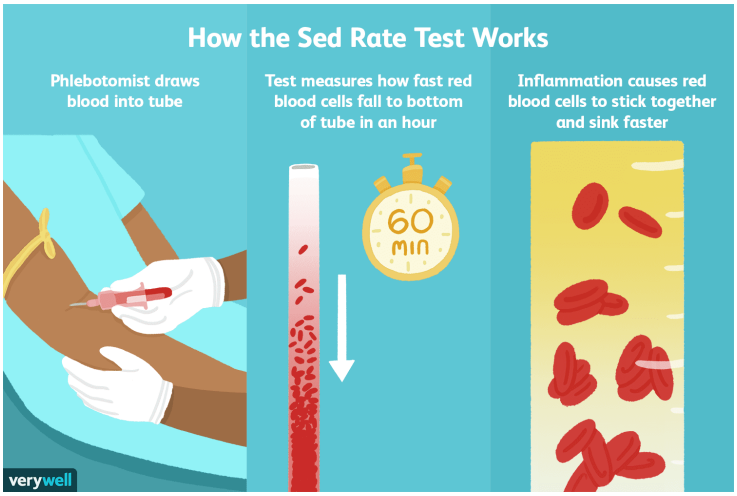
- Increased risk of bleeding due to injury or disease which could lead to death.
- This is a disorder in which the body produces few platelets

Thrombocytosis

- This is a disorder in which the body produces too many platelets

Erythrocyte Sedimentation Rate (ESR)

- Measure of settling rate of red cells in a sample of anticoagulated blood
- Used primarily to measure progress and response to treatment of inflammatory diseases
- Usually a test that assesses rheumatoid arthritis, rheumatic fever, muscular diseases, IBD, heart diseases, kidney diseases and some other cancers

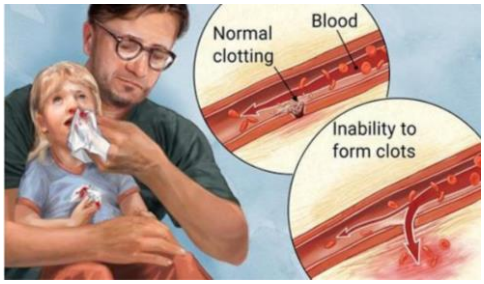


Bleeding Time

- Used to measure the duration of bleeding after a measure skin incision
- Determines how quickly the blood clots to stop the bleeding
- Bleeding time depends on the elasticity of the blood vessel wall and on the number and functional capacity of platelets

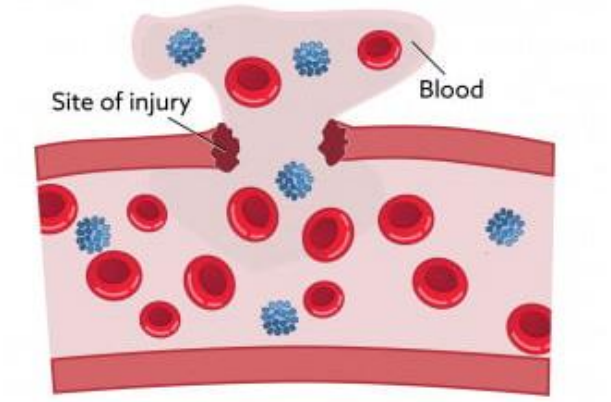
Hemophilia

- An inherited bleeding disorder in which a person lacks low levels of certain proteins or clotting factors



Von Willebrand Disease

- With von Willerbrand's disease, clot formation does not happen as it should.
- A bleeding disorder that is caused by the deficiency of von willerbrand factor, type of protein that helps the blood clot



Monitoring Anticoagulant Therapy

- **Types of Coagulation Tests**
  - → Prothrombin Time (PT)
    - ➢ Evaluates ability to clot
    - ➢ Vitamin K dependent factors (II, VII, IX)
  - → International Normalized Ratio (INR)
    - ➢ Ensures that results from a PT test are the same from one lab to another
  - → Partial Thromboplastin Time (PTT)
    - ➢ Determines if blood-thinning therapy is effective
    - ➢ Most common method I monitoring heparin

Treatment

- Iron deficiency anemia
  - → Iron supplements
- Vitamin deficiency anemia
  - → Vitamin B12 and folate supplements
- Anemia of chronic disease
  - → no specific treatment and usually the focus is addressing the underlying causes
- Aplastic anemia
  - → blood transfusion to boost the red blood cells and bone marrow transplant
- Hemolytic anemias
  - → avoid medications that could cause anemia such as methyldopa and treating related infections;
  - → taking immunosuppressants or blood transfusion or plasmapheresis could also be used
- Sickle cell anemia
  - → administration of oxygen, pain relieving drugs and oral or intravenous helps reduce pain and prevent complication, blood transfusion, folic acid supplements and bone marrow transplant
- Thalassemia
  - → blood transfusion, folic acid supplements or bone marrow transplant