DEPARTMENT OF CLINICAL PHARMACY AND PHARMACY PRACTICE
FACULTY OF PHARMACEUTICAL SCIENCES
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P.M.B 1515, ILORIN NIGERIA

PHARMACEUTICAL CARE WITH CASE STUDIES PRACTICAL MANUAL

PCP 515

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PREPARED BY:

DR. MUSLIM OLAKUNLE JAMIU

B.Pharm(ABU); PharmD(UNIBEN); M.Pharm(UNIBEN); FPCPharm(WAPGC, LAGOS), Ph.D(ABU)

PHARMACEUTICAL CARE WITH CASE STUDIES COORDINATOR

STUDENT IDENTIFICATION DATA

Name Of Students: ……..
(Surname first in upper case)

Student's Matriculation Number: ……

Session: ……....

SCHEDULES

CARDIOVASCULAR DISEASES

i. HYPERTENSION

Hypertension is defined by persistent elevation of arterial blood pressure. The Seventh Joint National Committee on the Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) classifies adult blood pressure.

Patients with diastolic blood pressure (DBP) values less than 90 mm Hg and systolic blood pressure (SBP) values greater than or equal to 140 mm Hg have isolated systolic hypertension.

A hypertensive crisis (blood pressure greater than 180/120 mm Hg) may be categorized as either a hypertensive emergency (extreme blood pressure elevation with acute or progressing target organ damage) or a hypertensive urgency.

CLINICAL PRESENTATION

Patients with uncomplicated primary hypertension are usually asymptomatic initially.

Patients with secondary hypertension may complain of symptoms suggestive of the underlying disorder. Patients with pheochromocytoma may have a history of paroxysmal headaches, sweating, tachycardia, palpitations, and orthostatic hypotension. In primary aldosteronism, hypokalemic symptoms of muscle cramps and weakness may be present. Patients with hypertension secondary to Cushing's syndrome may complain of weightgain, polyuria, edema, menstrual irregularities, recurrent acne, or muscular weakness.

DIAGNOSIS

Frequently, the only sign of primary hypertension on physical examination is elevated blood pressure.

The diagnosis of hypertension should be based on the average of two or more readings taken at each of two or more clinical encounters.

As hypertension progresses, signs of end-organ damage begin to appear, chiefly related to pathologic changes in the eye, brain, heart, kidneys, and peripheral blood vessels.

LABORATORY TESTS

All patients should be examined for the following laboratory investigation prior to initiating drug therapy include:

a. Urinalysis
b. Complete blood cell count
c. Serum chemistries: sodium, potassium, creatinine, fasting glucose, fasting lipid panel on the minimum

More specific laboratory tests are used to diagnose secondary hypertension. These include plasma norepinephrine and urinary metanephrine levels for pheochromocytoma, plasma and urinary aldosterone levels for primary aldosteronism, and plasma renin activity, captopril stimulation test, renal vein renins, and renal artery angiography for renovascular disease.

DESIRED OUTCOMES

a. The overall goal of treating hypertension is to reduce morbidity and mortality by the least intrusive means possible.
b. Goal blood pressure values are less than 140/90 for uncomplicated hypertension and less than 130/80 for patients with diabetes mellitus and chronic kidney disease.
c. SBP is a better predictor of cardiovascular risk than DBP and must be used as the primary clinical marker of disease control in hypertension.

CASE STUDY

TITLE:……

For the presented patient, outline your findings in the following stepwise manner

Steps	Task Performed	Remark
Patient ID		
Chief complaint		
History of present illness		
Immunization history		
Social history		

Medication History (Including herbal)		
Physical examination		
Inspection		
Palpation		
Percussion		
Auscultation		
Findings/tentative diagnosis		
Laboratory investigation		
Current medications		
Non-pharmacological therapy		
Determination for rationale from medications used		
Outcome of therapy		

Pharmaceutical care intervention and Follow up investigations required		

ii. HEART FAILURE

DEFINITION

Heart failure (HF) is a clinical syndrome caused by the inability of the heart to pump sufficient blood to meet the metabolic needs of the body. Heart failure can result from any disorder that reduces ventricular filling (diastolic dysfunction) and/or myocardial contractility (systolic dysfunction).

PATHOPHYSIOLOGY

Causes of systolic dysfunction (decreased contractility) are reduction in muscle mass (e.g., myocardial infarction [MI]), dilated cardiomyopathies, and ventricular hypertrophy. Ventricular hypertrophy can be caused by pressure overload (e.g., systemic or pulmonary hypertension, aortic or pulmonic valve stenosis) or volume overload (e.g., valvular regurgitation, shunts, high-output states).

Causes of diastolic dysfunction (restriction in ventricular filling) are increased ventricular stiffness, ventricular hypertrophy, infiltrative myocardial diseases, myocardial ischemia and infarction, mitral or tricuspid valve stenosis, and pericardial disease (e.g., pericarditis, pericardial tamponade).

CLINICAL PRESENTATION

The primary symptoms are dyspnea (particularly on exertion) and fatigue, which lead to exercise intolerance. Other pulmonary symptoms include orthopnea, paroxysmal nocturnal dyspnea, tachypnea, and cough. Fluid overload results in pulmonary congestion and peripheral edema

DIAGNOSIS

A diagnosis of HF should be considered in patients exhibiting characteristic signs and symptoms. A complete history and physical examination with appropriate laboratory testing are essential in the initial evaluation of patients suspected of having HF.

Ventricular hypertrophy can be demonstrated on chest x-ray or electrocardiogram (ECG).

DESIRED OUTCOME

The therapeutic goals for chronic HF are to improve symptoms and quality of life, reduce symptoms, reduce hospitalizations, slow disease progression, and prolong survival.

CASE STUDY

TITLE:……

For the presented patient outline, your findings in the following stepwise manner

Steps	Task Performed	Remark/ outcome
Patient ID		
Chief complaint		
History of present illness		
Immunization history		
Social history		
Medication History (Including herbal)		
Physical examination		
Inspection		
Palpation		
Percussion		

Auscultation		
Findings/tentative diagnosis		
Laboratory investigation		
Current medications		
Non-pharmacological therapy		
Determination for rational from medication (s) used		
Outcome of therapy		
Pharmaceutical care intervention and Follow up investigations required		

RESPIRATORY DISEASES: ASTHMA

DEFINITION

The National Asthma Education and Prevention Program (NAEPP) has defined asthma as a chronic inflammatory disorder of the airways in which many cells and cellular elements play a role. In susceptible individuals, inflammation causes recurrent episodes of wheezing, breathlessness, chest tightness, and coughing. These episodes are usually associated with airflow obstruction that is often reversible either spontaneously or with treatment. The inflammation also

PATHOPHYSIOLOGY

The major characteristics of asthma include a variable degree of airflow obstruction (related to bronchospasm, edema, and hypersecretion), BHR, and airway inflammation.

Sudden asthma attacks are caused by both unknown and known factors such as exposure to allergens, viruses, or indoor and outdoor pollutants, and each may induce an acute inflammatory response.

Inhaled allergens cause an early-phase allergic reaction characterized by activation of cells bearing allergen-specific IgE antibodies. There is rapid activation of airway mast cells and macrophages, which release proinflammatory mediators such as histamine and eicosanoids that induce contraction of airway smooth muscle, mucus secretion, vasodilation, and exudation of plasma in the airways. Plasma protein leakage induces a thickened, engorged, edematous airway wall and a narrowing of the airway lumen with reduced mucus clearance.

CLINICAL PRESENTATION
CHRONIC ASTHMA

Classic asthma is characterized by episodic dyspnea associated with wheezing, but the clinical presentation of asthma is diverse. Patients may also complain of chest tightness, coughing (particularly at night), or a whistling sound when breathing. These often occur with exercise but may occur spontaneously or in association with known allergens.

DIAGNOSIS
CHRONIC ASTHMA

The diagnosis of asthma is made primarily by a history of recurrent episodes of coughing, wheezing, or shortness of breath and confirmatory spirometry.

The patient may have a family history of allergy or asthma or have symptoms of allergic rhinitis. A history of exercise or cold air precipitating dyspnea or increased symptoms during specific allergen seasons also suggest asthma.

Spirometry demonstrates obstruction (FEV_1/FVC less than 80%) with reversibility after inhaled Î²$_2$-agonist administration (or at least a 12% improvement in FEV_1). Failure of pulmonary function to improve acutely does not necessarily rule out asthma. If baseline spirometry is normal, challenge testing with exercise, histamine, or methacholine can be used to elicit BHR.

DESIRED OUTCOME

CHRONIC ASTHMA

The NAEPP provides the following goals for chronic asthma management: (1) maintain normal activity levels (including exercise); (2) maintain (near) normal pulmonary function; (3) prevent chronic and troublesome symptoms (e.g., coughing or breathlessness in the night, in the early morning, or after exertion); (4) prevent recurrent exacerbations of asthma and minimize the need for emergency department visits or hospitalizations; (5) provide optimal pharmacotherapy with minimal or no adverse effects; and (6) meet patients' and families' expectations of care.

CASE STUDY

TITLE:……

Steps	Task Performed	Remark/ outcome
Patient ID		
Chief complaint		
History of present illness		
Immunization history		
Social history		
Medication History (Including herbal)		

Physical examination		
Inspection		
Palpation		
Percussion		
Auscultation		
Findings/tentative diagnosis		
Laboratory investigation		
Current medications		
Non-pharmacological therapy		
Determination for rational from medication (s) used		
Outcome of therapy		
Pharmaceutical care intervention and Follow up investigations		

required		

DIABETES MELLITUS

DEFINITION

Diabetes mellitus (DM) is a group of metabolic disorders characterized by hyperglycemia and abnormalities in carbohydrate, fat, and protein metabolism. It results from defects in insulin secretion, insulin sensitivity, or both. Chronic microvascular, macrovascular, and neuropathic complications may ensue.

PATHOPHYSIOLOGY

Type 1 DM accounts for up to 10% of all diabetes cases. It generally develops in childhood or early adulthood and results from immune-mediated destruction of pancreatic B2 cells, resulting in an absolute deficiency of insulin. There is a long preclinical period (up to 9 to 13 years) marked by the presence of immune markers when B2-cell destruction is thought to occur. Hyperglycemia occurs when 80% to 90% of B2 cells are destroyed. There is a transient remission followed by established disease with associated risks for complications and death. The factors that initiate the autoimmune process are unknown, but the process is mediated by macrophages and T lymphocytes with circulating autoantibodies to various.

Type 2 DM accounts for as many as 90% of DM cases and is usually characterized by the presence of both insulin resistance and relative insulin deficiency. Insulin resistance is manifested by increased lipolysis and free fatty acid production, increased hepatic glucose production, and decreased skeletal muscle uptake of glucose. Î²-Cell dysfunction is progressive and contributes to worsening blood glucose control over time. Type 2 DM occurs when a diabetogenic lifestyle (excessive calories, inadequate exercise, and obesity) is superimposed upon a susceptible genotype.

CLINICAL PRESENTATION

TYPE 1 DM

Individuals with type 1 DM are often thin and are prone to develop diabetic ketoacidosis (DKA) if insulin is withheld or under conditions of severe stress with an excess of insulin counterregulatory hormones.

Between 20% and 40% of patients present with DKA after several days of polyuria, polydipsia, polyphagia, and weight loss.

TYPE 2 DM

Patients with type 2 DM are often asymptomatic and may be diagnosed secondary to unrelated blood testing. However, the presence of complications may indicate that they have had DM for several years.

Lethargy, polyuria, nocturia, and polydipsia can be seen on diagnosis; significant weight loss is less common.

DIAGNOSIS

Screening for type 2 DM should be performed every 3 years in all adults beginning at the age of 45. Testing should be considered at an earlier age and more frequently in individuals with risk factors (e.g., family history of DM, obesity, habitual physical inactivity).

The recommended screening test is a fasting plasma glucose (FPG). Normal FPG is less than 100 mg/dL.

Impaired fasting glucose (IFG) is defined as FPG of at least 110 mg/dL but less than 126 mg/dL.

Impaired glucose tolerance (IGT) is diagnosed when the 2-hour postload sample of the oral glucose tolerance test (OGTT) is 140 mg/dL or greater but less than 200 mg/dL.

The diagnostic criteria for DM are contained in Table 18-1.

Pregnant women should undergo risk assessment for GDM at their first prenatal visit and proceed with glucose testing if at high risk (e.g., marked obesity, personal history of GDM, glycosuria, or a strong family history of DM).

DESIRED OUTCOME

The goals of therapy in DM are to ameliorate symptoms of hyperglycemia, reduce the onset and progression of microvascular and macrovascular complications, reduce mortality, and improve quality of life. Desirable plasma glucose and glycosylated hemoglobin (HbA_{1c}) levels are

CASE STUDY

TITLE:……

Steps	Task Performed	Remark
Patient ID		
Chief complaint		

History of present illness		
Immunization history		
Social history		
Medication History (Including herbal)		
Physical examination		
Inspection		
Palpation		
Percussion		
Auscultation		
Findings/tentative diagnosis		
Laboratory investigation		
Current medications		

Non-pharmacological therapy		
Determination for rational from medication (s) used		
Outcome of therapy		
Pharmaceutical care intervention and Follow up investigations required		

GASTROINTESTINAL DISEASES

PEPTIC ULCER DISEASE

DEFINITION

Peptic ulcer disease (PUD) refers to a group of ulcerative disorders of the upper gastrointestinal (GI) tract that require acid and pepsin for their formation. Ulcers differ from gastritis and erosions in that they extend deeper into the muscularis mucosa. The three common forms of peptic ulcers include Helicobacter pylori (HP)-associated ulcers, non-steroidal anti-inflammatory drug (NSAID)-induced ulcers, and stress-related mucosal damage (also called stress ulcers).

PATHOPHYSIOLOGY

The pathogenesis of duodenal ulcers (DU) and gastric ulcers (GU) is multifactorial and most likely reflects a combination of pathophysiologic abnormalities and environmental and genetic factors.

Most peptic ulcers occur in the presence of acid and pepsin when H. pylori, NSAIDs, or other factors disrupt normal mucosal defense and healing mechanisms. Acid is an independent factor that contributes to disruption of mucosal integrity. Increased acid secretion has been observed in patients with DU and may result from HP infection. Patients with GU usually have normal or reduced rates of acid secretion.

Alterations in mucosal defense induced by HP or NSAIDs are the most important cofactors in peptic ulcer formation. Mucosal defense mechanisms include mucus and bicarbonate secretion, intrinsic epithelial cell defense, and mucosal blood flow. Maintenance of mucosal integrity and repair is mediated by endogenous prostaglandin production.

H. pylori infection causes gastritis in all infected individuals and is causally linked to PUD. However, only about 20% of infected persons develop symptomatic PUD. Most non-NSAID ulcers are infected with HP, and HP eradication markedly decreases ulcer recurrence. H. pylori may cause ulcers by direct mucosal damage, impairing mucosal defense via elaboration of toxins and enzymes, altering the immune/inflammatory response, and by increasing antral gastrin release, which leads to increased acid secretion.

Nonselective NSAIDs (including aspirin) cause gastric mucosal damage by two mechanisms: (1) a direct or topical irritation of the gastric epithelium, and (2) systemic inhibition of the cyclooxygenase-1 (COX-1) enzyme, which results in decreased synthesis of protective prostaglandins.

Use of corticosteroids alone does not increase the risk of ulcer or complications, but ulcer risk is doubled in corticosteroid users taking NSAIDs concur- rently.

Epidemiologic evidence links cigarette smoking to PUD, impaired ulcer healing, and ulcer-related GI complications. The risk is proportional to the amount smoked per day. Smoking does not increase ulcer recurrence after HP eradication.

Although clinical observation suggests that ulcer patients are adversely affected by stressful life events, controlled studies have failed to document a cause-and-effect relationship.

Coffee, tea, cola beverages, beer, milk, and spices may cause dyspepsia but do not increase PUD risk. Ethanol ingestion in high concentrations is associated with acute gastric mucosal damage and upper GI bleeding but is not clearly the cause of ulcers.

CLINICAL PRESENTATION

Abdominal pain is the most frequent symptom of PUD. The pain is often epigastric and described as burning but can present as vague discomfort, abdominal fullness, or cramping. A typical nocturnal pain may awaken patients from sleep, especially between 12 am and 3 am.

Pain from DU often occurs 1 to 3 hours after meals and is usually relieved by food, whereas food may precipitate or accentuate ulcer pain in GU. Antacids provide rapid pain relief in most ulcer patients.

Heartburn, belching, and bloating often accompany the pain. Nausea, vomiting, and anorexia are more common in GU.

The severity of symptoms varies from patient to patient and may be seasonal, occurring more frequently in the spring or fall.

Pain does not always correlate with the presence of an ulcer. Asymptomatic patients may have an ulcer at endoscopy, and patients may have persistent symptoms even with endoscopically proven healed ulcers. Many patients (especially older adults) with NSAID-induced ulcer-related complications have no prior abdominal symptoms.

Complications of ulcers caused by HP and NSAIDs include upper GI bleeding, perforation into the peritoneal cavity, penetration into an adjacent structure (e.g., pancreas, biliary tract, or liver), and gastric outlet obstruction. Bleeding may be occult or present as melena or hematemesis. Perforation is associated with sudden, sharp, severe pain, beginning first in the epigastrium but quickly spreading over the entire abdomen. Symptoms of gastric outlet obstruction typically occur over several months and include early satiety, bloating, anorexia, nausea, vomiting, and weight loss.

DIAGNOSIS

The physical examination may reveal epigastric tenderness between the umbilicus and the xiphoid process that less commonly radiates to the back.

Routine laboratory tests are not helpful in establishing a diagnosis of uncomplicated PUD. The hematocrit, hemoglobin, and stool hemoccult tests are used to detect bleeding

DESIRED OUTCOME
The goals of treatment are relieving ulcer pain, healing the ulcer, preventing ulcer recurrence, and reducing ulcer-related complications. In HP-positive patients, the goals are to eradicate the organism, heal the ulcer, and cure the disease with a cost-effective drug regimen.

CASE STUDY

TITLE:……

Steps	Task Performed	Remark
Patient ID		
Chief complaint		
History of present illness		
Immunization history		
Social history		
Medication History (Including herbal)		
Physical examination		

Inspection		
Palpation		
Percussion		
Auscultation		
Findings/tentative diagnosis		
\Laboratory investigation		
Current medications		
Non-pharmacological therapy		
Determination of rationale for medications used		
Outcome of therapy		
Pharmaceutical care intervention and Follow up investigations required		

RENAL FAILURE

ACUTE RENAL FAILURE

DEFINITIONS

Acute renal failure (ARF) has no unifying definition. Most criteria include a combination of absolute serum creatinine (S_{cr}) value with change in either S_{cr} or daily urine output.

A popular definition is an increase in S_{cr} of 0.5 mg/dL in patients with previously normal renal function or an increase of more than 1.0 mg/dL in patients with chronic renal disease. Unfortunately, S_{cr} is not a sensitive test; its use can delay recognition of ARF.

PATHOPHYSIOLOGY

Alterations to any of the basic kidney components (vasculature, glomeruli, tubules, and interstitium) can cause ARF. The manifestations of ARF depend on which components are involved.

ARF can be categorized as prerenal (resulting from decreased renal perfusion), intrinsic (resulting from structural damage to the kidney), postrenal (resulting from obstruction of urine flow from the kidney out of the body), and functional (resulting from hemodynamic changes at the glomerular level) (Table 73-1).

CLINICAL PRESENTATION

The presentation can be subtle and depends on the setting. Outpatients often are not in acute distress; hospitalized patients may develop ARF after a catastrophic event.

Symptoms in the outpatient setting include change in urinary habits, weight gain, or flank pain. Clinicians typically notice symptoms of ARF before they are detected by ninpatients.

Signs include edema, colored or foamy urine, and, in volume-depleted patients, orthostatic hypotension.

DIAGNOSIS

Rapid diagnosis of ARF is essential; delayed recognition can worsen nephrologic injury.

Physical examination should include assessment of the patient's volume and hemodynamic status.

DESIRED OUTCOME

The primary goal of therapy is to prevent ARF. If ARF develops, the goals are to avoid or minimize further renal insults that would delay recovery and to provide supportive measures until kidney function returns.

CASE STUDY

TITLE:……

Steps	Task Performed	Remark
Patient ID		
Chief complaint		
History of present illness		
Immunization history		
Social history		
Medication History (Including herbal)		
Physical examination		
Inspection		
Palpation		
Percussion		

Auscultation		
Findings/tentative diagnosis		
Laboratory investigation		
Current medications		
Non-pharmacological therapy		
Determination of rationale for medications used		
Outcome of therapy		
Pharmaceutical care intervention and Follow up investigations required		

CHRONIC RENAL FAILURE

DEFINITION

Chronic kidney disease (CKD) is a progressive loss of function over several months to years, characterized by gradual replacement of normal kidney architecture with interstitial fibrosis. Progressive kidney disease or nephropathy is generally synonymous with CKD.

End-stage kidney disease (ESKD) occurs when the glomerular filtration rate (GFR) falls below 15 mL/min per 1.73 m^2 body surface area and requires dialysis or transplantation to remove uremic toxins and maintain hemodynamic stability.

PATHOPHYSIOLOGY

Susceptibility factors increase the risk for kidney disease but do not directly cause kidney damage. Susceptibility factors include advanced age, reduced kidney mass and low birth weight, racial or ethnic minority, family history, low income or education, systemic inflammation, and dyslipi- demia.

Initiation factors initiate kidney damage and can be modified by drug therapy. Initiation factors include diabetes mellitus, hypertension, autoimmune disease, polycystic kidney disease, and drug toxicity.

Progression factors hasten decline in kidney function after initiation of kidney damage. Progression factors include glycemia in diabetics, hypertension, proteinuria, and smoking.

Most progressive nephropathies share a final common pathway to irreversible renal parenchymal damage and ESKD. Key pathway elements are loss of nephron mass, glomerular capillary hypertension, and protein- uria.

Many uremic toxins accumulate in patients with ESKD and alter organ, immune, and other bodily functions. Patients ultimately develop secondary complications such as anemia, hyperparathyroidism, renal osteodystrophy, and metabolic acidosis.

CLINICAL PRESENTATION

The clinical presentation of CKD depends on the patient's residual renal function and is initially silent (Figure 74-1).

Every major organ system is affected by CKD. Classic signs and symptoms are asterixis, pruritus, dysgeusia, nausea, vomiting, anorexia, encephalopathy, and

bleeding. Signs and symptoms are not useful for detecting CKD because they do not occur in early stages.

DESIRED OUTCOME

The primary goal is to identify at-risk patients and initiate appropriate interventions early, thereby slowing or halting progression of CKD to ESKD.

CASE STUDY

TITLE:……

Steps	Task Performed	Remark
Patient ID		
Chief complaint		
History of present illness		
Immunization history		
Social history		
Medication History (Including herbal)		
Physical examination		
Inspection		
Palpation		

Percussion		
Auscultation		
Findings/tentative diagnosis		
Laboratory investigation		
Current medications		
Non-pharmacological therapy		
Determination of rationale for medications used		
Outcome of therapy		
Pharmaceutical care intervention and Follow up investigations required		

HEMATOLOGICAL DISEASES

SICKLE CELL DISEASE

DEFINITION

Sickle cell syndromes are hereditary disorders characterized by the presence of sickle hemoglobin (HbS) in red blood cells (RBCs).

PATHOPHYSIOLOGY

The most common abnormal hemoglobin in the United States is hemoglobin S. Two genes for hemoglobin S (HbSS) result in sickle cell disease or sickle cell anemia, which occurs in 0.3% of African Americans. One gene for hemoglobin S (HbS) results in sickle cell trait, which occurs in 8% of African Americans. Hemoglobin C, another abnormality, occurs in 2% to 3% of African Americans.

Pathology is more likely to occur with HbSS but can occur with HbS, especially if it coexists with hemoglobin C or thalassemia.

The clinical manifestations of sickle cell disease are attributable to impaired circulation, RBC destruction, and stasis of blood flow. These problems are attributable to disturbances in RBC polymerization and to membrane damage.

Polymerization allows deoxygenated hemoglobin to exist as a semisolid gel that protrudes into the cell membrane, distorting RBCs into sickle shapes. Sickle-shaped RBCs increase blood viscosity and encourage sludging in the capillaries and small vessels. Such obstructive events lead to local tissue hypoxia and accentuate the pathologic process.

Repeated cycles of sickling, upon deoxygenation, and unsickling, upon oxygenation, damage the RBC membrane and cause irreversible sickling. Rigid, sickled RBCs are easily trapped, shortening their circulatory survival and resulting in chronic hemolysis.

Additional contributing factors include functional asplenia (and increased risk of bacterial infection), deficient opsonization, and coagulation abnormalities.

CLINICAL PRESENTATION

Sickle cell disease involves many organ systems. Clinical manifestations depend on the genotype.

The feature presentations of sickle cell disease are hemolytic anemia and vasoocclusion. Symptoms are delayed until 4 to 6 months of age when HbS replaces fetal hemoglobin (HbF). Common findings include pain with fever, pneumonia, splenomegaly and, in infants, pain and swelling of the hands and feet (e.g., hand-and-foot syndrome or dactylitis).

The usual clinical signs and symptoms of sickle cell disease are chronic anemia; fever; pallor; arthralgia; scleral icterus; abdominal pain; weakness; anorexia; fatigue; enlarged liver, spleen, and heart; and hematuria.

Children experience delayed growth and sexual maturation, and characteristic physical findings such as protuberant abdomen and exaggerated lumbar lordosis.

Acute complications of sickle cell disease include fever and infection (e.g., sepsis caused by encapsulated pathogens such as Streptococcus pneumoniae), stroke, acute chest syndrome, and priapism. Acute chest syndrome is characterized by pulmonary infiltration, respiratory symptoms, and equivocal response to antibiotic therapy.

DIAGNOSIS

Sickle cell disease is usually identified by routine neonatal screening programs using isoelectric focusing.

Laboratory findings include low hemoglobin; increased reticulocyte, platelet, and leukocyte counts; and sickle forms on the peripheral smear.

DESIRED OUTCOME

The goal of treatment is to reduce hospitalizations, complications, and mortality

CASE STUDY

TITLE:……

Steps	Task Performed	Remark
Patient ID		
Chief complaint		
History of present illness		
Immunization history		

Social history		
Medication History (Including herbal)		
Physical examination		
Inspection		
Palpation		
Percussion		
Auscultation		
Findings/tentative diagnosis		
Laboratory investigation		
Current medications		
Non-pharmacological therapy		
Determination of rationale for medications used		

Outcome of therapy		
Pharmaceutical care intervention and Follow up investigations required		

ONCOLOGY: BREAST CANCER

DEFINITION

Breast cancer is a malignancy originating from breast tissue. This chapter distinguishes between early stages, which are potentially curable, and metastatic breast cancer, which is usually incurable.

PATHOPHYSIOLOGY

The development of malignancy is a multistep process with preinvasive (or noninvasive) and invasive phases.

The strongest risk factors are female gender and increasing age. Additional risk factors include endocrine factors (e.g., early menarche, nulliparity, late age at first birth, estrogen therapy), genetics (e.g., personal and family history, mutations of tumor suppresser genes [BRCA1 and BRCA2]), and environment (e.g., radiation exposure).

Breast cancer spreads via the bloodstream early in the course of the disease, resulting in relapse and metastatic disease after local therapy. The most common metastatic sites are lymph nodes, skin, bone, liver, lungs, and brain.

The likelihood of developing metastatic disease is related to prognostic factors as described below.

CLINICAL PRESENTATION

The initial sign in more than 90% of women with breast cancer is a painless lump that is typically solitary, unilateral, solid, hard, irregular, and nonmobile. Less common initial signs are pain and nipple changes. More advanced cases present with prominent skin edema, redness, warmth, and induration.

Symptoms of metastatic breast cancer include bone pain, difficulty breathing, abdominal enlargement, jaundice, and mental status changes.

Approximately 80% of women first detect some breast abnormalities themselves.

It is increasingly common for breast cancer to be detected during routine screening mammography in asymptomatic women.

DIAGNOSIS

Initial workup for a woman presenting with a localized lesion or suggestive symptoms should include a careful history, physical examination of the breast, three-dimensional mammography, and possibly other breast imaging techniques such as ultrasound.

Breast biopsy is indicated for a mammographic abnormality that suggests malignancy or a mass that is palpable on physical examination.

STAGING

Stage is based on the size of the primary tumor (T_{1-4}, presence and extent of lymph node involvement (N_{1-3}, and presence or absence of distant metastases (M). Simplistically stated, these stages may be represented as follows:

Early Breast Cancer

Stage 0: Carcinoma in situ or disease that has not invaded the basement membrane.

Stage I: Small primary tumor without lymph node involvement.

Stage II: Metastasis to ipsilateral axillary lymph nodes.

Locally Advanced Breast Cancer

Stage III: Usually a large tumor with extensive nodal involvement in which node or tumor is fixed to the chest wall; also includes inflammatory breast cancer, which is rapidly progressive.

Advanced or Metastatic Breast Cancer

Stage IV: Metastases to organs distant from the primary tumor.

PATHOLOGIC EVALUATION

The pathologic evaluation of breast lesions establishes the histologic diagnosis and presence or absence of prognostic factors.

Most breast carcinomas are adenocarcinomas and are classified as ductal or lobular.

Carcinoma in situ may be a preinvasive cancer or a marker of unstable epithelium that represents an increased risk for developing aggressive cancer.

PROGNOSTIC FACTORS

Tumor size and the presence and number of involved axillary lymph nodes are primary factors in assessing the risk for breast cancer recurrence and subsequent metastatic disease.

Hormone receptors are used as indicators of prognosis and to predict response to hormone therapy.

The rate of tumor cell proliferation, nuclear grade, and tumor (histologic) differentiation are also independent prognostic research factors.

Additional potential prognostic factors include overexpression of erb-B2 oncogene (or HER-2/neu), cathepsin-D, angiogenic growth factors, and mutations in the tumor suppressor p53 gene. HER-2/neu status is of interest because targeted therapy is available; however, the testing method is controversial. The widely used method, immunohistochemistry (IHC), can yield false-positive results at the 2+ level, which should be confirmed by fluorescence in situ hybridization (FISH) testing.

DESIRED OUTCOME

The goal of therapy with early and locally advanced breast cancer is cure. The goals of therapy with metastatic breast cancer are to improve symptoms, improve quality of life, and prolong survival.

CASE STUDY

TITLE:……

Steps	Task Performed	Remark
Patient ID		
Chief complaint		
History of present illness		
Immunization history		
Social history		
Medication History (Including herbal)		

Physical examination		
Inspection		
Palpation		
Percussion		
Auscultation		
Findings/tentative diagnosis		
Laboratory investigation		
Current medications		
Non-pharmacological therapy		
Determination of rationale for medications used		
Outcome of therapy		
Pharmaceutical care intervention and Follow up		

investigations required		

UROLOGY: BENIGN PROSTATIC HYPERPLASIA

DEFINITION

Benign prostatic hyperplasia (BPH), a nearly ubiquitous condition, is the most common benign neoplasm of American men and occurs as a result of hormone-driven prostate growth.

PATHOPHYSIOLOGY

The prostate gland comprises three types of tissue: epithelial or glandular, stromal or smooth muscle, and capsule. Both stromal tissue and capsule are embedded with Î±$_1$-adrenergic receptors.

The precise pathophysiologic mechanisms that cause BPH are not clear. However, both intraprostatic dihydrotestosterone (DHT) and type II 5 Î±-reductase are thought to be involved.

BPH commonly results from both static (gradual enlargement of the prostate) and dynamic (agents or situations that increase Î±-adrenergic tone and constrict the gland's smooth muscle) factors. Examples of drugs that can exacerbate symptoms include testosterone, Î±-adrenergic agonists (e.g., decongestants), anticholinergics (e.g., antihistamines, phenothiazines, tricyclic antidepressants, anticholinergic antispasmodics, and anticholinergics for Parkinson's disease).

CLINICAL PRESENTATION

Patients with BPH can present with a variety of signs and symptoms. Symptoms vary over time and can improve, remain stable, or worsen spontaneously.

Obstructive signs and symptoms result when dynamic and/or static factors reduce bladder emptying. Patients experience urinary hesitancy; urine dribbles out of the penis, and the bladder feels full even after voiding.

Irritative signs and symptoms result from long-standing obstruction at the bladder neck. Patients experience frequency, urgency, and nocturia.

Complications include chronic kidney disease, gross hematuria, urinary incontinence, recurrent urinary tract infection, bladder diverticula, and bladder stones.

DIAGNOSIS

Diagnosis of BPH requires a careful medical history, physical examination, objective measures of bladder emptying (e.g., peak and average urinary flow rate, postvoid

residual urine volume), and laboratory tests (e.g., blood urea nitrogen [BUN] and prostate-specific antigen [PSA]).

Medication history should include all prescription and nonprescription medications as well as dietary supplements.

On digital rectal examination, the prostate is usually, but not always, enlarged (more than 20 g), soft, smooth, and symmetric.

DESIRED OUTCOME

BPH treatment is aimed primarily at relieving manifestations of the disease that are bothersome for the patient. A secondary, but controversial, aim is to prevent serious complications in selected patients.

TREATMENT

Management options for BPH include watchful waiting, drug therapy, and surgical intervention.

The choice depends on the severity of signs and symptoms (Table 80-1), with an emphasis on the patient's perception.

CASE STUDY

TITLE:……

Steps	Task Performed	Remark
Patient ID		
Chief complaint		
History of present illness		
Immunization history		

Social history		
Medication History (Including herbal)		
Physical examination		
Inspection		
Palpation		
Percussion		
Auscultation		
Findings/tentative diagnosis		
Laboratory investigation		
Current medications		
Non-pharmacological therapy		
Determination of rationale for		

medications used		
Outcome of therapy		
Pharmaceutical care intervention and Follow up investigations required		

BONE AND SOFT TISSUE DISEASES: OSTEOARTHRITIS

DEFINITION

Osteoarthritis (OA) is a common, slowly progressive disorder affecting primarily the weight-bearing diarthrodial joints of the peripheral and axial skeleton. It is characterized by progressive deterioration and loss of articular cartilage resulting in osteophyte formation, pain, limitation of motion, deformity, and progressive disability. Inflammation may or may not be present in the affected joints.

PATHOPHYSIOLOGY

Early in OA, cartilage water content increases, possibly as a result of a damaged collagen network that is unable to constrain proteoglycans, which subsequently gain water. As OA progresses, cartilage proteoglycan content decreases, possibly through the action of metalloproteinases.

Changes in glycosaminoglycan composition also occur, with decreased keratan sulfate and an increased ratio of chondroitin 4-sulfate to chondroitin 6-sulfate. These changes may interfere with proper collagen-proteoglycan interaction in cartilage. The collagen content does not appear to change until severe disease is present. Increases in collagen synthesis and altered distribution and diameter of the fibers are seen.

Enhanced metabolic activity characterized by increased matrix synthesis controlled by chondrocytes suggests a reparative response to damage. However, there continues to be a loss of proteoglycan, reflecting a net loss as degradation proceeds faster than synthesis.

The subchondral bone adjacent to articular cartilage also undergoes more rapid bone turnover, with increases in both osteoclast and osteoblast activity. There is associated release of vasoactive peptides and matrix metalloproteinases, neovascularization, and subsequent increased permeability of the adjacent cartilage. This sequence of events

leads to continued cartilage degradation and eventually cartilage loss, resulting in painful, deformed joints.

Fibrillation, a splitting of the noncalcified cartilage, exposes the underlying bone, which may ultimately lead to microfractures of the subchondral bone. With continued progression, cartilage is eroded completely, leaving denuded subchondral bone that becomes dense, smooth, and glistening (eburnation).

Microfractures result in the production of callus and osteoid. New bone (osteophytes) forms at the joint margins, away from the area of cartilage destruction. Osteophytes may be an attempt to stabilize joints rather than a destructive aspect of OA.

Inflammation, noted clinically as synovitis, occurs and may result from release of inflammatory mediators such as prostaglandins from chondrocytes.

CLINICAL PRESENTATION

The prevalence and severity of OA increase with age. Potential risk factors include obesity, repetitive use through work or leisure activities, joint trauma, and heredity.

The clinical presentation depends on duration and severity of disease and the number of joints affected. The predominant symptom is a localized deep, aching pain associated with the affected joint. Early in OA, pain accompanies joint activity and decreases with rest. With progression, pain occurs with minimal activity or at rest.

Joints most commonly affected are the distal and proximal interphalangeal (DIP and PIP) joints of the hand, the first carpometacarpal (CMC) joint, knees, hips, cervical and lumbar spine, and the first metatarsophalangeal (MTP) joint of the toe.

DIAGNOSIS

The diagnosis of OA is dependent on patient history, clinical examination of the affected joint(s), and radiologic findings.

Primary (idiopathic) OA, the most common type, has no known cause. Subclasses of primary OA are localized OA (involving one or two sites) and generalized OA (affecting three or more sites. The term erosive OA indicates the presence of erosion and marked proliferation in the proximal and distal interphalangeal hand joints.

Secondary OA is associated with a known cause such as rheumatoid arthritis or another inflammatory arthritis, trauma, metabolic or endocrine disorders, and congenital factors.

Criteria for the classification of OA of the hips, knees, and hands were developed by the American College of Rheumatology (ACR). The criteria include the presence of

pain, bony changes on examination, a normal erythrocyte sedimentation rate (ESR), and characteristic radiographs.

For hip OA, a patient must have hip pain and two of the following: (1) an ESR less than 20 mm/h, (2) radiographic femoral or acetabular osteophytes, or (3) radiographic joint space narrowing.

For knee OA, a patient must have knee pain and radiographic osteophytes in addition to one of the following: (1) age greater than 50 years, (2) morning stiffness of 30 minutes' or less duration, or (3) crepitus on motion.

Radiologic evaluation is necessary for the accurate diagnosis of OA. Radiographic changes are often absent in early, mild OA. With disease progression and loss of cartilage, there may be joint space narrowing, subchondral bony sclerosis, and development of marginal osteophyte and cysts. In late OA, subluxation and deformity may be apparent. Osteopenia and joint erosions are uncommon except in erosive OA.

No specific clinical laboratory abnormalities occur in primary OA. The ESR may be slightly elevated in patients with generalized or erosive inflammatory OA. The rheumatoid factor test is negative. Analysis of the synovial fluid reveals fluid with high viscosity. This fluid demonstrates a mild leukocytosis (less than 2000 WBC/mm^3) with predominantly mononuclear cells.

DESIRED OUTCOME

The major goals for the management of OA are to (1) educate the patient, caregivers, and relatives; (2) relieve pain and stiffness; (3) maintain or improve joint mobility; (4) limit functional impairment; and (5) maintain or improve quality of life.

CASE STUDY

TITLE:……

Steps	Task Performed	Remark
Patient ID		
Chief complaint		
History of present illness		
Immunization history		

Social history		
Medication History (Including herbal)		
Physical examination		
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Palpation		
Percussion		
Auscultation		
Findings/tentative diagnosis		
Laboratory investigation		
Current medications		
Non-pharmacological therapy		
Determination of		

rationale for medications used		
Outcome of therapy		
Pharmaceutical care intervention and Follow up investigations required		