

GENERAL INTERNAL MEDICINE - CLINICAL TEACHING UNIT

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OBJECTIVES

Internal Medicine Objectives

1. Medical Expert

A. Abdominal Pain

- a) **Knowledge:** Students should be able to define, describe, and discuss:
 - i. Three principal types of abdominal pain:
 - Visceral pain
 - Somatoparietal or peritoneal pain
 - Referred pain.
 - ii. Relative likelihood of the common causes of abdominal pain based on the pain pattern and the quadrant in which the pain is located.
 - iii. Diagnostic discrimination between common causes of abdominal pain based on history, physical exam, laboratory testing, and imaging procedures.
 - iv. Symptoms and signs indicative of an acute/surgical abdomen.
 - v. The influence of age, gender, menopausal status, and immunocompetency on the prevalence of different disease processes that may result in abdominal pain.

- b) **Skills:** Students should be able to demonstrate specific skills, including:
 - i. History-taking skills: Students should be able to obtain, document, and present an appropriately complete medical history that differentiates among etiologies of disease, including:
 - Chronology
 - Location
 - Radiation
 - Character
 - Intensity
 - Duration
 - Aggravating or alleviating factors
 - Associated symptoms
 - Pertinent information about previous abdominal or pelvic surgeries, chronic medical conditions, sexual activity, medications, and family history.
 - ii. Physical exam skills: Students should be able to perform a focused physical exam in patients who present with abdominal pain in order to:
 - Establish a preliminary diagnosis of the cause
 - Assess the severity of the patient's presenting symptoms and signs
 - Determine the urgency of implementing diagnostic and treatment plans.
 - iii. Differential diagnosis: Students should be able to generate a prioritized differential diagnosis of the most important and likely causes of a patient's abdominal pain and recognize specific history,

physical exam, and laboratory findings that distinguish between the following diagnoses or conditions:

- Appendicitis
 - Cholecystitis (biliary colic)
 - Pancreatitis
 - Diverticulitis
 - Peptic ulcer disease including perforation
 - Gastroenteritis
 - Hepatitis
 - Irritable bowel syndrome
 - Small bowel obstruction
 - Acute mesenteric ischemia
 - Inflammatory bowel disease
 - Ruptured abdominal aortic aneurysm
 - Ureteral stones (renal colic)
 - Pelvic inflammatory disease
 - Ruptured ectopic pregnancy
 - Abdominal wall pain
 - Referred pain.
- iv. Laboratory interpretation: Students should be able to interpret specific diagnostic tests and procedures that are commonly ordered to evaluate patients who present with abdominal pain. Laboratory and diagnostic tests should include, when appropriate:
- CBC with differential
 - UA
 - Pregnancy test
 - Stool for occult blood
 - Hepatic function panel
 - Amylase and lipase
 - Abdominal obstructive series.
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- Students should be able to define the indications for, and interpret (with consultation) the results of:
 - Abdominal ultrasound
 - Abdominal CT scan
 - Paracentesis fluid studies
 - Upper gastrointestinal endoscopy
 - Sigmoidoscopy/colonoscopy
 - Barium contrast studies
 - Radionuclide scan of the hepatobiliary system.
- v. Management skills: Students should be able to develop an appropriate evaluation and treatment plan for patients that includes:
- Recognizing the role of narcotic analgesics and empiric antibiotics in treating selected patients who present with acute abdominal pain
 - Determining when to consult a gastroenterologist or a surgeon
 - Involving a surgeon as soon as possible when a patient is identified as having an acute abdomen
 - Selecting various tests and procedures commonly used to diagnose patients who present with symptoms of abdominal pain

- Recommending basic initial management plans for the various causes of abdominal pain listed in the differential diagnosis.

B. Altered Mental Status

a) Knowledge: Students should be able to define, describe, and discuss:

- i. The differentiation of delirium, dementia, and depression.
- ii. The pathophysiology, symptoms, and signs of the most common and most serious causes of altered mental status, including:
 - Metabolic causes (e.g., hyper/hyponatremia, hyper/hypoglycemia, hypercalcemia, hyper/hypothyroidism, hypoxia/hypercapnea, B12 deficiency, hepatic encephalopathy, uremic encephalopathy, drug/alcohol intoxication/withdrawal, and Wernicke's encephalopathy)
 - Structural lesions (e.g., primary or metastatic tumor, intracranial hemorrhage, subdural hematoma)
 - Vascular (e.g., cerebrovascular accident, transient ischemic attack, cerebral vasculitis)
 - Infectious etiologies (e.g., encephalitis, meningitis, urosepsis, endocarditis, pneumonia, cellulites)
 - Seizures/ post-ictal state
 - Hypertensive encephalopathy
 - Low perfusion states (e.g., arrhythmias, MI, shock, acute blood loss, severe dehydration)
 - Miscellaneous causes (e.g., fecal impaction, postoperative state, sleep deprivation, urinary retention).
- iii. The importance of thoroughly reviewing prescription medications over-the-counter drugs, and supplements and inquiring about substance abuse.
- iv. The risk factors for developing altered mental status, including:
 - Dementia
 - Advanced age
 - Substance abuse
 - Comorbid physical problems such as sleep deprivation, immobility, dehydration, pain, and sensory impairment.
- v. The diagnostic evaluation of altered mental status.
- vi. Indications, contraindications, and complications of lumbar puncture.
- vii. Principles of management of the common causes of altered mental status.
- viii. Nonpharmacologic measures to reduce agitation and aggression, including:
 - Avoiding the use of physical restraints whenever possible
 - Using reorientation techniques
 - Assuring the patient has their devices to correct sensory deficits
 - Promoting normal sleep and day/night awareness
 - Preventing dehydration and electrolyte disturbances
 - Avoiding medications which may worsen delirium whenever possible
 - (e.g., anticholinergics, benzodiazepines, etc.).
- ix. The risks of using physical restraints.
- x. The risk and benefits of using low-dose high potency antipsychotics for delirium associated agitation and aggression.

b) Skills: Students should be able to demonstrate specific skills, including:

- i. History-taking skills: Students should be able to obtain, document, and present an age-appropriate medical history that differentiates among etiologies of altered mental status including eliciting

- appropriate information from patients and their families regarding the onset, progression, associated symptoms, and level of physical and mental disability.
- ii. Physical exam skills: Students should be able to perform a physical exam to establish the diagnosis and severity of disease, including:
 - Complete neurologic examination
 - Mental status examination
 - Fundoscopic examination.
 - iii. Differential diagnosis: Students should be able to generate a prioritized differential diagnosis recognizing specific history and physical exam findings that suggest a specific etiology for altered mental status.
 - iv. Laboratory interpretation: Students should be able to recommend when to order diagnostic and laboratory tests and be able to interpret them, when appropriate:
 - CBC with differential
 - Electrolytes, BUN/Cr, GLC, hepatic function panel, Ca
 - ABG
 - Toxicology screen
 - VDRL
 - Vitamin B12 and thiamine measurements
 - Thyroid function tests
 - Urinalysis and urine culture
 - Blood cultures
 - Cerebrospinal fluid analysis.
 - Students should be able to define the indications for and interpret (with consultation) the results of:
 - Cranial CT
 - Cranial MRI
 - Electroencephalogram.
 - v. Management skills: Students should be able to develop an appropriate evaluation and treatment plan for patients that includes:
 - Recognizing that altered mental status in an older inpatient is a medical emergency and requires that the patient be evaluated immediately.
 - Writing appropriate fluid and replacement orders for patients with common electrolyte and metabolic disturbances.
 - Writing appropriate antibiotic orders for the treatment of common infectious etiologies.
 - Ordering appropriate nonpharmacologic and pharmacologic interventions for patients with acute altered mental status with accompanying agitation and aggression.
 - Determining when to obtain consultation from a neurologist or neurosurgeon.
 - Utilizing hospital and community resources for patients with permanent or disabling conditions to help assist their transfer back to the community or rehabilitation facility.

C. Anemia

a) Knowledge: Students should be able to define, describe, and discuss:

i. Classification of anemia based on red cell size:

- **Microcytic:**
 - Iron deficiency
 - Thalassemic disorders
 - Sideroblastic anemia
- **Normocytic:**
 - Acute blood loss
 - Hemolysis

- Anemia of chronic disease (e.g., infection, inflammation, malignancy)
 - Chronic renal insufficiency/erythropoietin deficiency
 - Bone marrow suppression (e.g., bone marrow invasion, aplastic anemia)
 - Hypothyroidism
 - Testosterone deficiency
 - **Macrocytic:**
 - Ethanol abuse
 - B12 deficiency
 - Folate deficiency
 - Drug-induced
 - Reticulocytosis.
 - Liver disease.
 - Myelodysplastic syndromes.
 - Hypothyroidism.
- ii. Morphological characteristics, pathophysiology, and relative prevalence of each of the causes of anemia.
 - iii. The meaning and utility of various components of the hemogram (e.g., hemoglobin, hematocrit, mean corpuscular volume, and random distribution width).
 - iv. The classification of anemia into hypoproliferative and hyperproliferative categories and the utility of the reticulocyte count/index.
 - v. The potential usefulness of the white blood cell count and red blood cell count when attempting to determine the cause of anemia.
 - vi. The diagnostic utility of the various tests for iron deficiency (e.g., serum iron, total iron binding capacity, transferrin saturation, ferritin).
 - vii. The genetic basis of some forms of anemia.
 - viii. Indications, contraindications, and complications of blood transfusion.
- b) Skills: Students should be able to demonstrate specific skills, including:
- i. History-taking skills: Students should be able to obtain, document, and present an age-appropriate medical history, that differentiates among etiologies of disease, including:
 - Constitutional and systemic symptoms (e.g., fatigue, weight loss)
 - History of gastrointestinal bleeding or risk factors for it.
 - Abdominal pain.
 - Prior history of anemia or other blood diseases.
 - Medications.
 - Diet.
 - Alcohol use.
 - Menstrual history.
 - Family history of anemia or other blood diseases.
 - ii. Physical exam skills: Students should be able to perform a physical exam to establish the diagnosis and severity of disease, including:
 - Pallor (e.g., palms, conjunctiva, nail beds).
 - Mouth (e.g., glossitis, cheilosis).
 - Hyperdynamic precordium, systolic flow murmur.
 - Lymph nodes.
 - Spleen.
 - Nervous system.
 - iii. Differential diagnosis: Students should be able to generate a list of the most important and most common causes of anemia, recognizing specific history, physical exam, and laboratory findings that suggest a specific etiology.

iv. Laboratory interpretation: Students should be able to recommend when to order diagnostic and laboratory tests and be able to interpret them when appropriate:

- Hemoglobin and hematocrit.
- Red cell indices (e.g., MCV and random distribution width).
- White blood cell and platelet count.
- Reticulocyte count.
- Iron studies (serum iron, TIBC, ferritin, transferrin).
- Serum B12 and folate.
- Haptoglobin.
- Lactic dehydrogenase (LDH).
- Hemoglobin electrophoresis.
- Blood smear.
- Students should be able to define the indications for and interpret (with consultation) results of:
 - Bone marrow biopsy.

D. Chest Pain

a) Knowledge: Students should be able to define, describe and discuss:

- i. Symptoms and signs of chest pain that may be due to an acute coronary syndrome such as unstable angina or acute myocardial infarction.
- ii. Symptoms and signs of chest pain that are characteristic of angina pectoris.
- iii. Symptoms and signs of chest pain due to other cardiac causes such as:
 - Atypical or variant angina (coronary vasospasm, Prinzmetal angina).
 - Pericarditis.
 - Aortic dissection.
 - Valvular heart disease (aortic stenosis, mitral valve prolapse).
 - Non-ischemic cardiomyopathy.
 - Syndrome X.
- iv. Symptoms and signs of chest pain due to gastrointestinal disorders such as:
 - Esophageal disease (GERD, esophagitis, esophageal dysmotility).
 - Biliary disease (cholecystitis, cholangitis).
 - Peptic ulcer disease.
 - Pancreatitis.
- v. Symptoms and signs of chest pain due to pulmonary disorders such as:
 - Pneumonia.
 - Spontaneous pneumothorax.
 - Pleurisy.
 - Pulmonary embolism.
 - Pulmonary hypertension/cor pulmonale.
- vi. Symptoms and signs of chest pain due to musculoskeletal causes such as:
 - Costochondritis.
 - Rib fracture.
 - Myofascial pain syndromes.
 - Muscular strain.
 - Herpes zoster.
- vii. Symptoms and signs of chest pain due to psychogenic causes such as:
 - Panic disorders.
 - Hyperventilation.
 - Somatoform disorders.
- viii. Factors that may be responsible for provoking or exacerbating symptoms of ischemic chest pain by:

- Increasing myocardial oxygen demand.
 - Tachycardia or tachyarrhythmia.
 - Hypertension.
 - Increased wall stress (aortic stenosis, cardiomyopathy).
 - Hyperthyroidism.
 - Anemia.
 - Hypoxemia.
- ix. Risk factors for the development of coronary heart disease:
- Age and gender.
 - Family history of sudden death or premature CAD.
 - Personal history of peripheral vascular or cerebrovascular disease.
 - Smoking.
 - Lipid abnormalities (includes dietary history of saturated fat and cholesterol).
 - Diabetes mellitus.
 - Hypertension.
 - Obesity.
 - Sedentary lifestyle.
 - Cocaine use.
 - Estrogen use.
 - Chronic inflammation.
- x. Physiologic basis and/or scientific evidence supporting each type of treatment, intervention or procedure commonly used in the management of patients who present with chest pain.
- xi. Role of a critical pathway or practice guideline in delivering high quality, cost-effective care for patients presenting with symptoms of chest pain in the outpatient clinic, emergency room or hospital.
- b) Skills: Students should be able to demonstrate specific skills, including:
- i. History-taking skills: Students should be able to obtain, document, and present an appropriately complete medical history that differentiates among the common etiologies of chest pain.
- The initial medical history should allow students to categorize the patients' symptoms as angina pectoris, atypical angina or non-cardiac chest pain. (PC, CS)
 - Specifically, the medical history of a patient with chest pain should contain information about those clinical characteristics that are typical of angina pectoris:
 - Substernal location.
 - Precipitated by exertion.
 - Relieved by rest or nitroglycerin.
 - Onset, duration, severity, radiation, presence or absence of associated symptoms (such as dyspnea, diaphoresis or lightheadedness).
 - The history of a patient with chest pain should also contain information about:
 - Risk factors for coronary heart disease.
 - Previous history of ischemic heart disease or valvular heart disease (rheumatic fever, cardiac murmurs).
 - Previous history of peripheral vascular disease or cerebrovascular disease.
- ii. Physical exam skills: Students should be able to perform a focused physical exam that includes the following elements:
- Accurate measurement of arterial blood pressure and recognition of the typical blood pressure findings that occur in patients with aortic stenosis, aortic insufficiency, and pulsus paradoxus)
 - Assessment of major arterial pulses for abnormalities, including bruits.
 - Assessment of the neck veins for jugular venous distention and, when necessary, evaluation for abdominal jugular reflux.
 - Assessment of the conjunctiva and optic fundus.

- Assessment of the extremities to ascertain skin condition, including color, temperature and the presence of edema, xanthomas, cyanosis and clubbing.
 - Assessment of the lungs for crackles, rhonchi, rubs and decreased breath sounds.
 - Inspection and palpation of the anterior chest to identify right and left sided heaves, lifts, and thrills.
 - Auscultation of the heart to determine rhythm, intensity of heart sounds, splitting of S2 and the presence of rubs, gallops (S3, S4, summation) or extra heart sounds (e.g., clicks).
 - Auscultation of the heart to detect the presence of heart murmurs. When a heart murmur is present, students should be able to:
 - Identify timing (systolic vs. diastolic, holosystolic vs. ejection).
 - Describe pitch, location and pattern of radiation.
 - Gauge significance (innocent vs. pathologic, sclerosis vs. stenosis).
- iii. Differential diagnosis: Students should be able to generate a prioritized differential diagnosis and recognize specific history, physical exam, and laboratory findings that suggest a diagnosis of myocardial ischemia rather than a non-ischemic cause of chest pain (GI, pulmonary, musculoskeletal, psychogenic or undetermined).
- iv. Laboratory interpretation: Students should be able to recommend when to order diagnostic and laboratory tests and be able to interpret them, when appropriate:
- Cardiac biomarkers indicative of myocardial necrosis.
 - 12-lead ECG.
 - Chest radiograph.
 - ABG.
 - Students should be able to define the indications for, and interpret (with consultation) the results of the following diagnostic tests and procedures:
 - Echocardiogram (transthoracic and transesophageal).
 - Exercise stress test.
 - Stress thallium (myocardial perfusion scan).
 - Dobutamine stress echocardiography.
 - Coronary angiography.
 - Ventilation/perfusion lung (V/Q) scan.
 - Pulmonary embolism protocol CT scan.
 - Pulmonary angiography.
- v. Management skills: Students should be able to develop an appropriate evaluation and treatment plan for patients that includes:
- Identification of the indications, contraindications, mechanisms of action, adverse reactions, significant interactions, and relative costs of the following medications:
 - Anti-platelet agents (aspirin, clopidogrel)
 - Nitroglycerin and long-acting nitrates
 - Beta-blockers
 - Angiotensin-converting enzyme inhibitors
 - Calcium channel blockers
 - Antithrombotic therapy (heparin, warfarin)
 - Glycoprotein IIb/IIIa inhibitors
 - Lipid-lowering agents

E. Dyspnea

a) Knowledge: Students should be able to define, describe, and discuss:

- i. Major organ systems/pathologic states causing dyspnea and their pathophysiology, including:
- Cardiac.
 - Pulmonary.

- Anemia/hypovolemia.
 - Acid-base disorders and other metabolic derangements.
 - Neuromuscular weakness.
 - Central neurologic derangements.
- ii. The symptoms, signs, and laboratory values associated with respiratory failure and ventilatory failure.
- iii. The alveolar-arterial oxygen gradient and the pathophysiologic states that can alter it.
- iv. The potential risks of relying too heavily on pulse oximetry as the sole indicator of arterial oxygen content.
- v. The common causes of acute dyspnea, their pathophysiology, symptoms, and signs, including:
- Pulmonary edema.
 - Pulmonary embolism.
 - Pneumonia.
 - Acute exacerbation of COPD.
 - Asthma.
 - Cardiac ischemia.
 - Pneumothorax.
 - Anxiety.
- vi. The common causes of chronic dyspnea their pathophysiology, symptoms, and signs, including:
- Congestive heart failure.
 - COPD.
 - Pulmonary parenchymal disease.
 - Pulmonary vascular disease.
 - Anemia.
 - Neuromuscular weakness.
- vii. Basic treatment options for the common causes of acute and chronic dyspnea.
- viii. The utility of supplemental oxygen therapy and the potential dangers of overly aggressive oxygen supplementation in some pathophysiologic states.

b) Skills: Students should be able to demonstrate specific skills, including:

- i. History-taking skills: Students should be able to obtain, document, and present an age-appropriate medical history, that differentiates among etiologies of disease, including:
- Quantity, quality, severity, duration, ameliorating/exacerbating factors of the dyspnea.
 - Associated symptoms such as fevers, chills, sweats, orthopnea, paroxysmal nocturnal dyspnea, wheezing, edema, chest pain, cough, sputum production, hemoptysis, palpitations, nausea, anxiety, dizziness, orthostasis, weakness.
 - History of pulmonary, cardiac, neuromuscular/neurologic, renal, hepatic, and coagulopathic disorders.
 - Risk factors for deep vein thrombosis/pulmonary embolism.
 - Ingestion of drugs and toxic substances, administration of IV fluids.
 - smoking and environmental exposures.
- ii. Physical exam skills: Students should be able to perform a physical exam to establish the diagnosis and severity of disease, including:
- Accurately determining respiratory rate and level of respiratory distress. Assessing the use of accessory muscles for breathing.
 - Accurately measuring pulsus paradoxus.
 - Identifying bronchial breath sounds, rales, rhonchi, wheezes, and subcutaneous emphysema.
 - Identifying signs of pulmonary consolidation and hyperresonance.
 - Identifying signs of pleural effusion.
 - Identifying signs of elevated central venous pressure.
 - Identifying signs of hypovolemia.

- Identifying S3 gallop, edema, and pallor.
 - Identifying signs of deep vein thrombosis.
- iii. Differential diagnosis: Students should be able to generate a prioritized differential diagnosis recognizing specific history and physical exam findings that suggest a specific etiology of dyspnea.
- iv. Laboratory interpretation: Students should be able to recommend when to order diagnostic and laboratory tests and be able to interpret them,
- Electrolytes, BUN/Cr, GLC.
 - Pulse oximetry.
 - ABG.
 - Chest radiograph.
 - 12-lead ECG.
- Pulmonary function tests.) Students should be able to define the indications for and interpret (with consultation) the results of:
 - Ventilation perfusion scintigraphy.
 - Chest CT.
 - Venous Doppler studies.
 - Cardiac stress test.
 - Echocardiography.

F. Fever

a) Knowledge: Students should be able to define, describe, and discuss:

- i. Physiology of the acute febrile response, including the:
 - The differences in clinical manifestations between immunocompetent and immunocompromised patients.
- ii. Risk factors and co-morbidities that are important in determining the host response to infection (e.g., neutropenia, asplenia, cirrhosis, alcoholism, diabetes, corticosteroid use, malnutrition, T cell dysfunction)
- iii. Etiology of fever in special populations, including patients with a history of:
 - Neutropenia due to cancer-related myelosuppression.
 - HIV disease.
 - Intravenous drug abuse.
 - Recent international travel or immigration.
 - Concomitant skin rash and lymphadenopathy.
- iv. Pathophysiology and clinical presentation of patients with sepsis syndromes
- v. Common causes of prolonged fever without apparent source, including:
 - FUO in a normal host.
 - Nosocomial FUO.
 - Neutropenic FUO.
 - FUO associated with HIV disease.

b) Skills: Students should be able to demonstrate specific skills, including:

- i. History-taking skills: Students should be able to obtain, document, and present an age-appropriate medical history that differentiates among etiologies of disease, including:
 - Chronology, duration and pattern of fever.
 - Associated symptoms.
 - Immune status and baseline co-morbidities.
 - Immunization status.
 - Relevant history of exposures.
 - Occupational, travel, family, and sexual history.

- Medication history, including use of over-the-counter and illicit drugs.
- ii. Physical exam skills: Students should be able to perform a complete physical exam to determine the severity of disease and establish a preliminary hypothesis about the cause of fever.
- iii. Differential diagnosis: Students should be able to generate a prioritized differential diagnosis recognizing specific history and physical exam findings that suggest a specific etiology:
 - Infection.
 - Rheumatologic disease/inflammatory disorder.
 - Malignancy.
 - Drug reaction.
- iv. Laboratory interpretation: Students should be able to recommend when to order diagnostic and laboratory tests and be able to interpret them when appropriate:
 - CBC with differential.
 - UA with exam of urinary sediment.
 - Chest radiography.
 - Blood cultures.
 - Urine cultures.
 - Sputum Gram stain and cultures.
 - Sputum AFB stain and culture.
 - ESR and/or specific rheumatologic tests.
 - PPD.
 - Cerebrospinal fluid analysis (color, opening pressure, chemistries, cell counts, staining, cultures, cytology, cryptococcal antigen, VDRL).
 - Chemistries, Gram stain, and culture of abnormal fluid collections (e.g., pleural effusion, ascites, abscesses).
 - Stool culture of enteric pathogens.
 - Stool Clostridium difficile toxin assay.
 - Stains and cultures from the throat, urethra, anus, cervix, vagina.
 - Students should be able to define the indications for and interpret (with consultation) the results of:
 - CT imaging.
 - Echocardiography.
- v. Management skills: Students should be able to develop an appropriate evaluation and treatment plan for patients that includes:
 - Developing an appropriate evaluation plan for patients with fever including ordering and interpreting appropriate laboratory and radiographic studies.
 - Assessing the severity of presentation based on the history, host factors, physical exam and laboratory results and recognizing presentations that need immediate attention.
 - Developing an appropriate treatment plan for patients with fever including the selection of an initial, empiric treatment regimen for neutropenic patients with fever and/or patients with life threatening sepsis.
 - Determining when to obtain consultation from an appropriate specialist.)

G. Fluid and Electrolyte Disorders

a) Knowledge: Students should be able to define, describe and discuss:

- i. The pathophysiology, presenting symptoms and signs and differential diagnosis of:
 - Hypo- and hypervolemia.
 - Hypo- and hypernatremia.
 - Hypo- and hyperkalemia.

- Hypo- and hypercalcemia.
 - Simple and mixed acid-base disorders.
 - Respiratory acidosis and alkalosis.
 - Metabolic acidosis and alkalosis.
- ii. The importance of total body water and its distribution.
 - iii. The differential diagnosis of hypo- and hypernatremia in the setting of volume depletion, euvoolemia, and hypervolemia.
 - iv. How to distinguish hyponatremia from pseudohyponatremia.
 - v. How to identify spurious hyperkalemia or acidosis-related hyperkalemia.
 - vi. Risks of too rapid or delayed therapy for hyponatremia.
 - vii. The most common causes of respiratory acidosis, respiratory alkalosis, metabolic acidosis and metabolic alkalosis.
 - viii. How to calculate the anion gap and explain its relevance to determining the cause of a metabolic acidosis.
 - ix. Changes in total body water distribution that occurs with aging.
 - x. How altered mental status can contribute to electrolyte disorders.
 - xi. Tests to use in the evaluation of fluid, electrolyte, and acid-base disorders.
 - xii. Indications for obtaining an arterial blood gas.
 - xiii. The types of fluid preparations to use in the treatment of fluid and electrolyte disorders.

b) Skills: Students should demonstrate specific skills, including:

- i. History-taking skills: Students should be able to obtain, document, and present an age-appropriate medical history that differentiates among etiologies of disease, including:
 - Eliciting appropriate information from patients with volume overload, including recent weight gain, edema or ascites, symptoms of heart failure, dietary sodium intake, changes in medications, noncompliance and intravenous fluid regimens.
 - Eliciting appropriate information from patients with volume depletion, including recent weight loss, thirst, gastrointestinal losses, urinary losses, oral intake, insensible losses, and intravenous fluid regimens.
 - Eliciting appropriate information from patients with electrolyte problems, including use of diuretics and other medications, gastrointestinal losses, and history of relevant medical conditions (e.g., heart failure, liver disease, renal disease, pulmonary disease, central nervous system disease, and malignancy).
- ii. Physical exam skills: Students should be able to perform a physical exam to establish the diagnosis and severity of disease, including:
 - Measurement of orthostatic vital signs.
 - Identification of signs of volume overload including peripheral edema, pulmonary edema, ascites, edema.
 - Identification of signs of volume depletion including tachycardia, orthostatic hypotension, dry mucous membranes, poor skin turgor.
 - Identification of signs of sodium disorders including lethargy, weakness, encephalopathy, delirium, seizures.
 - Identification of signs of potassium disorders including weakness, fatigue, constipation, ileus, cramping, tetany, hypo- or hyperreflexia.
 - Identification of signs of calcium disorders including cramping, tetany, Chvostek's and Trousseau's sign, seizures, anorexia, constipation, polyuria, hypo- or hyperreflexia, stupor, coma.
- iii. Laboratory interpretation: Students should be able to recommend when to order diagnostic and laboratory tests as listed below and be able to interpret results
 - Serum electrolytes, urea, creatinine.

- Anion gap.
 - Arterial blood gases.
 - Serum and urine osmolality.
 - Urinary sodium.
 - Fractional excretion of sodium.
 - ECG findings in hyper- and hypokalemia.
 - Serum urea to creatinine ratio.
 - CBC, ferritin.
 - Performing and interpreting a urinalysis, including microscopic examination for casts, red blood cells, white blood cells, and crystals.
 - Calculating creatinine clearance using the Cockcroft-Gault or MDRD (“modification of diet in renal disease study”) equations.
 - Serum parathyroid hormone level.
 - Renal ultrasonography.
- iv. Management skills: Students should be able to develop an appropriate evaluation and treatment plan for patients that includes:
- Writing appropriate fluid orders for the treatment of hypo- and hypervolemia, hypo- and hypernatremia, hypo- and hyperkalemia, hypo- and hypercalcemia.
 - Writing appropriate orders for replacing sodium, potassium, calcium, phosphates, and magnesium.
 - Writing appropriate orders for correcting hyperkalemia, hypercalcemia, hyperphosphatemia and hypermagnesemia.
 - Calculating the water deficit that needs to be corrected to treat hypernatremia.
 - Identifying indications for administration of bicarbonate.
 - Designing an appropriate management plan for initial management of ARF, including volume management, dietary recommendations, drug dosage alterations, electrolyte monitoring, and indications for dialysis.
 - Developing a management plan to effectively treat HTN and DM.
 - Recommending treatment with phosphate binders, calcium replacement, and vitamin D replacement.
 - Recommending treatment for anemia secondary to CKD.
 - Recommending acute treatment for hyperkalemia.
 - Determining when to obtain consultation from a nephrologist.
 - Using a cost-effective approach based on the differential diagnosis.
 - Accessing and utilizing appropriate information systems and resources to help delineate issues related to renal failure.
 - Incorporating patient preferences.

H. Acute Kidney Injury and Chronic Kidney Disease

a) Knowledge: Students should be able to define, describe and discuss:

- i. The distinction between the three major pathophysiologic etiologies for acute renal failure (ARF):
 - Decreased renal perfusion (prerenal).
 - Intrinsic renal disease (renal).
 - Acute renal obstruction (postrenal).
- ii. The pathophysiology of the major etiologies of “prerenal” ARF, including:
 - Hypovolemia.
 - Decreased cardiac output.
 - Systemic vasodilation.
 - Renal vasoconstriction.
- iii. The pathophysiology of the major etiologies of intrinsic “renal” ARF, including:

- Vascular lesions.
 - Glomerular lesions.
 - Interstitial nephritis.
 - Intra-tubule déposition/obstruction.
 - Acute tubular necrosis (ATN).
- iv. The pathophysiology of the major etiologies of “postrenal” ARF, including:
 - Urethral (e.g., tumors, calculi, clot, sloughed papillae, retroperitoneal fibrosis, lymphadenopathy).
 - Bladder neck (e.g., tumors, calculi, prostatic hypertrophy or carcinoma, eurogenic).
 - Urethral (e.g., stricture, tumors, obstructed indwelling catheters).
 - v. The pathophysiology and clinical findings of uremia.
 - vi. The natural history, initial evaluation and treatment, and complications of ARF.
 - vii. The most common etiologies of chronic kidney disease (CKD):
 - DM.
 - Hypertension.
 - Glomerulonephritis.
 - Polycystic kidney disease.
 - Autoimmune diseases (e.g., systemic lupus erythematosus).
 - viii. The staging scheme for CKD.
 - ix. The significance for proteinuria in CKD.
 - x. The use of ACE-Is and ARBs in the management of CKD.
 - xi. The importance of secondary hyperparathyroidism in CKD.
 - xii. The pathophysiology of anemia in CKD.
 - xiii. The value of glycemic and hypertension control in limiting the progression of CKD.
 - xiv. The value of CAD risk factor modification in patients with CKD, particularly those treated with dialysis.
 - xv. The basic principles of renal replacement therapy (e.g., hemodialysis and peritoneal dialysis) as well as the complications.

b) Skills: Students should demonstrate specific skills, including:

- i. History-taking skills: Students should be able to obtain, document, and present an age-appropriate medical history that differentiates among etiologies of disease, including:
 - Eliciting an age-appropriate history that distinguishes among the three major reasons for ARF (pre-renal, renal, post-renal), including the predisposing conditions, nephrotoxic drugs or agents, and systemic disease and the major causes of CKD.
 - Eliciting appropriate information from patients with volume overload, including recent weight gain, edema or ascites, symptoms of heart failure, dietary sodium intake, changes in medications, noncompliance and intravenous fluid regimens.
 - Eliciting appropriate information from patients with volume depletion, including recent weight loss, thirst, gastrointestinal losses, urinary losses, oral intake, insensible losses, and intravenous fluid regimens.
- ii. Physical exam skills: Students should be able to perform a physical exam to establish the diagnosis and severity of disease, including:
 - The determination of a patient’s volume status through estimation of the central venous pressure using the height of jugular venous distention and measurement of pulse and blood pressure in the lying/standing position.
 - Palpation and percussion of the bladder to recognize bladder distention.
 - Palpation of the prostate.
 - Determination of the presence of pulmonary edema, peripheral edema, ascites, and signs of heart failure.

- Findings consistent with uremia.
 - Examination for evidence of systemic disease, including but not limited to: skin, joints, and nails.
- iii. Differential diagnosis: Students should be able to generate a prioritized differential diagnosis recognizing specific history, physical exam, and laboratory findings that distinguish between:
- Acute Renal Failure and Chronic Kidney Disease
- iv. Laboratory interpretation: Students should be able to recommend when to order diagnostic and laboratory tests and be able to interpret them when appropriate.
- Serum electrolytes, urea, creatinine.
 - Anion gap.
 - Arterial blood gases.
 - Serum and urine osmolality.
 - Urinary sodium.
 - Fractional excretion of sodium.
 - ECG findings in hyper- and hypokalemia.
 - Serum urea to creatinine ratio.
 - CBC, ferritin.
 - Performing and interpreting a urinalysis, including microscopic examination for casts, red blood cells, white blood cells, and crystals.
 - Calculating creatinine clearance using the Cockcroft-Gault or MDRD (“modification of diet in renal disease study”) equations.
 - Serum parathyroid hormone level.
 - Renal ultrasonography.
- v. Management skills: Students should be able to develop an appropriate evaluation and treatment plan for patients that includes:
- hypercalcemia, hyperphosphatemia.
 - Identifying indications for administration of bicarbonate.
 - Designing an appropriate management plan for initial management of ARF, including volume management, dietary recommendations, drug dosage alterations, electrolyte monitoring, and indications for dialysis.
 - Developing a management plan to effectively treat HTN and DM.
 - Recommending treatment with phosphate binders, calcium replacement, and vitamin D replacement.
 - Recommending treatment for anemia secondary to CKD.
 - Recommending acute treatment for hyperkalemia.
 - Determining when to obtain consultation from a nephrologist.

I. Gastrointestinal Bleeding

a) Knowledge: Students should be able to define, describe, and discuss:

- i. The common causes for and symptoms of upper and lower gastrointestinal blood loss, including:
- Esophagitis/esophageal erosions.
 - Mallory Weiss tear.
 - Peptic and duodenal ulcer disease.
 - Esophageal/gastric varices.
 - Erosive gastritis.
 - Arteriovenous malformations.
 - Gastrointestinal tumors, benign and malignant.
 - Diverticulosis.
 - Ischemic colitis.

- Hemorrhoids.
 - Anal fissures.
- ii. The distinguishing features of upper versus lower GI bleeding.
 - iii. The indications for inpatient versus outpatient evaluation and treatment.
 - iv. The principles of stabilization and treatment of acute massive GI blood loss.
 - v. The role of contributing factors in GI bleeding such as H. pylori infection; NSAIDs, alcohol, cigarette use, coagulopathies; and chronic liver disease.
- b) Skills: Students should demonstrate specific skills, including:
- i. History-taking skills: Students should be able to obtain, document, and present an age-appropriate history that differentiates among etiologies of disease, including:
 - Features that distinguish upper from lower GI bleeding.
 - Quantification of degree of blood loss.
 - Chronology and duration of bleeding.)
 - Associated symptoms.
 - Relevant past medical history.
 - Medication history, including use of tobacco and alcohol.
 - ii. Physical exam skills: Students should be able to perform a physical examination to establish the diagnosis and severity of disease, including:
 - Postural blood pressure and pulse.
 - Abdominal palpation for organomegaly, masses, and tenderness.
 - Search for stigmata of chronic liver disease.
 - Anal and rectal examination.
 - iii. Differential diagnosis: Students should be able to generate a differential diagnosis recognizing specific history and physical examination findings that suggest a specific etiology for GI bleeding.
 - iv. Laboratory interpretation: Students should be able to recommend when to order diagnostic and laboratory tests and be able to interpret them, both prior to and after initiating treatment based on the differential diagnosis, including consideration of test cost and performance characteristics as well as patient preferences. Laboratory and diagnostic tests should include, when appropriate:
 - Stool and gastric fluid tests for occult blood.
 - CBC.
 - PT/PTT.
 - Hepatic function panel.
 - Tests for Helicobacter pylori.
 - Students should be able to define the indications for and interpret (with consultation) results of:
 - Esophagogastroduodenoscopy (EGD).
 - Colonoscopy.
 - Barium studies of the gastrointestinal tract.
 - v. Management skills: Students should be able to develop an appropriate evaluation and treatment plan for patients that includes:
 - Establishing adequate venous access.
 - Administering crystalloid fluid resuscitation).
 - Ordering blood and blood product transfusion.
 - Determining when to obtain consultation from a gastroenterologist or a general surgeon.
 - Accessing and utilizing appropriate information systems and resources to help delineate issues related to gastrointestinal bleeding.
 - Outlining long-term management when appropriate (e.g., Helicobacter pylori eradication, antacid, H-2 blocker or proton pump inhibitor therapy, smoking /alcohol

cessation, NSAID restriction, and dietary modification.

J. Upper Respiratory Complaints

a) **Knowledge:** Students should be able to define, describe, and discuss:

- i. A rational approach to the common URIs: nasal congestion, rhinorrhea, facial pain/tenderness, cough, sputum production, sore throat, and ear pain.
- ii. Common constitutional symptoms that accompany URIs: generalized weakness, fatigue, malaise, headache, mild myalgias, and modest fever.
- iii. The microbiology of URIs, highlighting the relative frequencies of viral and bacterial etiologies.
- iv. The most common microbiologic agents that cause the common URIs.
- v. The pathophysiology and typical clinical presentation of the common URIs:
 - Common cold.
 - Acute bronchitis.
 - Pharyngitis.
 - Acute sinusitis.
 - Otitis media.
- vi. The pathophysiologic similarities between the common cold and acute sinusitis.
- vii. The clinical features and microbiology of acute compared to chronic sinusitis.
- viii. The pathophysiology and symptomatology of allergic rhinitis and the clinical features that may help differentiate it from the common cold and acute sinusitis.
- ix. The clinical features that may help differentiate the common URIs from influenza.
- x. The pathophysiology and clinical features of acute compared to chronic bronchitis.
- xi. The pathophysiology and clinical features of acute bronchitis compared to pneumonia.
- xii. The pathophysiology and clinical features of otitis media and Eustachian tube malfunction.
- xiii. The signs and symptoms that may help distinguish viral from bacterial pharyngitis.
- xiv. Symptomatic treatment for URIs and the major side effects/contraindications for these treatments.
- xv. The general role of antibiotics in the treatment of URIs and specific evidence-based indications for them.
- xvi. The basic elements of the treatment of allergic rhinitis.
- xvii. The use of antiviral agents in the prophylaxis and treatment of influenza.

b) **Skills:** Students should be able to demonstrate specific skills, including:

- History-taking skills: Students should be able to obtain, document, and present an age-appropriate medical history, that differentiates among etiologies of disease, including:
 - The predominant symptom (nasal congestion/rhinorrhea, purulent nasal discharge with facial pain/tenderness, sore throat, cough with or without sputum, sore throat or ear pain).
 - Constitutional symptoms.
 - Symptoms of potential pneumonia.
 - History of or symptoms of serious cardiopulmonary diseases (e.g., asthma, chronic obstructive pulmonary disease, congestive heart failure) that may alter the treatment plan.
- i. Physical exam skills: Students should be able to perform a physical exam to establish the diagnosis and severity of disease, including:
 - Examination of the nasal cavity, pharynx, and sinuses.
 - Otoscopic examination.
 - Evaluation of the head and neck for lymphadenopathy.
 - Auscultation of the lungs to distinguish pulmonary consolidation, pleural effusion, pulmonary congestion, and chronic obstructive pulmonary disease.
 - ii. Differential diagnosis: Students should be able to generate a prioritized differential diagnosis recognizing

specific history and physical exam findings that suggest a specific etiology of upper respiratory complaints:

- Common cold.
 - Acute sinusitis.
 - Chronic sinusitis.
 - Allergic rhinitis.
 - Pharyngitis.
 - Otitis media.
 - Otitis external.
 - Acute bronchitis.
 - Chronic bronchitis.
 - Influenza.
 - Pneumonia.
 - Infectious mononucleosis.
- iii. Laboratory interpretation: Students should be able to recommend when to order diagnostic and laboratory tests and be able to interpret them, both prior to and after initiating treatment based on the differential diagnosis, including consideration of test cost and performance characteristics as well as patient preferences. Laboratory and diagnostic tests should include, when appropriate:
- CBC with differential.
 - Rapid strep test.
 - Throat culture.
 - Chest radiograph.
 - PFTs.
 - Monospot/heterophile antibody.
- iv. Management skills: Students should be able to develop an appropriate evaluation and treatment plan for patients that includes:
- Determining when to obtain a chest radiograph.
 - Determining when to prescribe antibiotics.
 - Selecting the most appropriate antibiotic for acute bacterial sinusitis, streptococcal pharyngitis, and bacterial otitis media.
 - Prescribing symptomatic treatments.
 - Determining when to obtain consultation from an allergist, otolaryngologist, or pulmonologist.
 - Using a cost-effective approach based on the differential diagnosis.
 - Accessing and utilizing appropriate information systems and resources to help delineate issues related to URIs.

K. Acute Myocardial Infarction

a) **Knowledge:** Students should be able to define, describe, and discuss:

- i. The primary and secondary prevention of ischemic heart disease through the reduction of cardiovascular risk factors (e.g., controlling hypertension and dyslipidemia, aggressive diabetes management, avoiding tobacco, and aspirin prophylaxis).
- ii. The basic principles of the role of genetics in CAD.
- iii. Pathogenesis, signs, and symptoms of the acute coronary syndromes:
 - Unstable angina.
 - Non-ST-elevation myocardial infarction (NSTEMI).
 - ST-elevation myocardial infarction (STEMI).
- iv. Atypical presentations of cardiac ischemia/infarction.
- v. The typical clinical course of the acute coronary syndromes.
- vi. ECG findings and macromolecular markers (myoglobin, CK-MB, Troponin-I, Troponin-T) of acute

- ischemia/MI.
- vii. The utility of echocardiography in acute MI.
 - viii. The importance of monitoring for and immediate treatment of ventricular fibrillation in acute MI.
 - ix. Therapeutic options for acute MI and how they may differ for NSTEMI and STEMI, including:
 - Aspirin.
 - Morphine.
 - Nitroglycerine.
 - Oxygen.
 - Heparin.
 - Antiplatelet agents (glycoprotein IIb/IIIa inhibitors).
 - Beta-blockers.
 - ACE-I/ARB.
 - HMG-CoA reductase inhibitors.
 - Thrombolytic agents.
 - Emergent cardiac catheterization with percutaneous coronary intervention.
 - x. Pathogenesis, signs, and symptoms of the complications of acute MI, including arrhythmias, reduced ventricular function, cardiogenic shock, pericarditis, papillary muscle dysfunction/rupture, acute valvular dysfunction, and cardiac free wall rupture.
 - xi. The general approach to the evaluation and treatment of ventricular tachycardia and fibrillation.
 - xii. The importance of post-MI risk stratification, including the burden of residual coronary disease and assessment of left ventricular function.
 - xiii. Basic principles of cardiac rehabilitation.
 - xiv. Indications for coronary artery bypass grafting (CABG).

b) Skills: Students should be able to demonstrate specific skills, including:

- i. History-taking skills: Students should be able to obtain, document, and present an age-appropriate medical history that differentiates among etiologies of disease, including:
 - Cardiac risk factors.
 - Location, duration, intensity, exacerbating/ameliorating factors, radiation of chest pain.
 - Symptoms associated with chest pain (e.g., nausea, emesis, dyspnea, diaphoresis, palpitations, dizziness, syncope, heartburn belching, etc.).
- ii. Physical exam skills: Students should be able to perform a physical exam to establish the diagnosis and severity of disease including:
 - Recognition of dyspnea and anxiety.
 - Accurate measurement of vital signs.
 - Examination of the heart and vascular system.
 - Examination of the lungs.
- iii. Differential diagnosis: Students should be able to generate a prioritized differential diagnosis recognizing specific history and physical exam findings that suggest a specific etiology of chest pain:
 - Stable angina.
 - Coronary vasospasm.
 - Unstable angina.
 - Acute MI.
 - Pericarditis.
 - Aortic dissection.
 - Pulmonary embolism.)
 - Other noncardiac causes of chest pain.
- iv. Laboratory interpretation: Students should be able to recommend when to order diagnostic and laboratory tests and be able to interpret them, when appropriate:

- ECG.
 - Chest radiograph.
 - Macromolecular markers (myoglobin, CK-MB, Troponin-I, Troponin-T).
 - Students should be able to define the indications for and interpret (with consultation) the results of:
 - Echocardiogram.
 - Cardiac stress testing.
 - Coronary angiography.
- v. Communication skills: Students should be able to:
- Communicate the diagnosis, treatment plan, and subsequent follow-up to patients.
 - Elicit questions from the patient and his or her family about the diagnostic and management plan.
 - Educate patients about modifying cardiac risk factors
- vi. Management skills: Students should be able to develop an appropriate evaluation and treatment plan for patients that includes:
- Medical management of acute MI.
 - CCU monitoring.
 - Indications for and complications of thrombolytic therapy, cardiac catheterization with percutaneous coronary intervention, and CABG.
 - Proper pre-discharge risk stratification.
 - Secondary risk factor modification.
 - Determining when to obtain consultation from a cardiologist and cardiothoracic surgeon.
 - Using a cost-effective approach based on the differential diagnosis.
 - Accessing and utilizing appropriate information systems and resources to help delineate issues related to acute MI.
 - Incorporating patient preferences.

L. Common Cancers

- a) Knowledge: Students should be able to define, describe, and discuss:
- i. Primary prevention measures for common cancers.
 - ii. Current screening recommendations for skin, colorectal, lung, breast, cervical, and prostate cancer.
 - iii. Principle clinical presentations, clinical courses, complications, and causes of death for the most common cancers (e.g., skin, colorectal, lung, breast, cervical, and prostate).
 - iv. Basic methods of initial evaluation, including the sensitivity and specificity of basic diagnostic studies and indication for their use, including:
 - Indications for skin biopsy in a patient with a suspicious skin lesion.
 - Indications for colonoscopy in individuals at risk for colon cancer.
 - Indications for breast biopsy in a patient with a breast nodule or abnormal screening mammogram.
 - Indications for a lymph node biopsy in a patient with suspicious lymphadenopathy.
 - Initial cost-effective workups for: isolated pleural effusion, pulmonary nodule, liver nodule, prostate nodule, elevated prostate-specific antigen, testicular nodule, stool test positive for occult blood, abnormal Pap smear, and other findings suggestive of gastrointestinal and urogenital cancers.
 - v. Genetic considerations of selected cancers (e.g., hereditary nonpolyposis colon cancer, familial adenomatous polyposis, BRCA1/BRCA2, HER2, Philadelphia chromosome/BRC-ABL).
 - vi. The role of human papilloma virus in cervical cancer.
 - vii. The similarities and differences between curative and palliative cancer care.
 - viii. The principles of palliative care and hospice care.

ix. Symptoms sometimes seen during end-of-life care and the basic principles of their management (e.g., pain, dyspnea, nausea and vomiting, anorexia, fatigue, depression, delirium, constipation).

b) Skills: Students should be able to demonstrate specific skills, including:

i. History-taking skills: Students should be able to obtain, document, and present an age-appropriate medical history, that differentiates among etiologies of disease, including:

- Unintentional weight loss, fever, bone pain.
- Sun exposure history, abnormal skin lesions.
- Blood in the stool, alterations in bowel movements, abdominal pain, abdominal mass.
- Smoking, cough, hemoptysis, chest pain, dyspnea.
- Breast nodules and secondary signs of breast cancer.
- Abnormal vaginal bleeding.
- Abnormal urinary symptoms.
- Lymphadenopathy.

ii. Physical exam skills: Students should be able to perform a physical exam to establish the diagnosis and severity of disease, including:

- Skin examination.
- Digital rectal examination.
- Breast examination.
- Lymph node examination.
- Male genital examination and prostate examination.
- Pelvic examination and Pap smear.

iii. Differential diagnosis: Students should be able to generate a prioritized differential diagnosis recognizing specific history and physical exam findings that suggest a specific etiology for:

- Unintentional weight loss.
- Fever.
- Abnormal skin lesions.
- Occult blood positive stool.
- Colorectal mass.
- Chronic cough, hemoptysis, pulmonary nodule, and pleural effusion.
- Breast mass.
- Abnormal Pap smear.
- Abdominal or pelvic mass.
- Prostate nodule and elevated prostate specific antigen.
- Lymphadenopathy.

iv. Laboratory interpretation: Students should be able to recommend when to order diagnostic and laboratory tests and be able to interpret them, both prior to and after initiating treatment based on the differential diagnosis, including consideration of test cost and performance characteristics as well as patient preferences. Laboratory and diagnostic tests should include, when appropriate:

- CBC.
- Electrolytes, BUN/Cr, Ca, hepatic function panel.
- Stool occult blood testing.
- PSA. Students should be able to define the indications for and interpret (with consultation) the significance of the results of:
 - Skin biopsy.
 - Mammogram.
 - Breast biopsy.
 - Colon/rectal biopsy.
 - Lung biopsy.
 - Prostate biopsy.

- Lymph node biopsy.
- v. Management skills: Students should be able to develop an appropriate evaluation and treatment plan for patients that includes:
 - Initial work-up of the symptom, sign, or abnormal laboratory value suspected to be due to cancer.
 - Provision of support and information for the patient.
 - Coordination of care for workup.
 - Determining when to obtain consultation from appropriate specialists.
 - Appropriately assessing and treating pain when necessary with non-narcotic and narcotic analgesics.
 - Anticipating and treating narcotic side effects if necessary.
 - Adjusting the therapeutic plan when goals of care change (e.g., a shift toward palliative care).
 - Alleviation of symptoms sometimes seen during end of life care (e.g., pain, dyspnea, nausea and vomiting, anorexia, fatigue, depression, delirium, constipation).
 - Utilizing supportive care or hospice service when appropriate.

M. COPD/Obstructive Airways Disease

- a) Knowledge: Students should be able to define, describe, and discuss:
- i. The epidemiology, risk factors, symptoms, signs, and typical clinical course of the common forms of COPD, including chronic bronchitis and emphysema.
 - ii. Common causes of acute exacerbations of COPD (AECOPD), including:
 - Acute infectious bronchitis.
 - Pneumonia.
 - Pulmonary edema.
 - Poor air quality (e.g., ozone, pollutants, tobacco smoke).
 - Occupational exposures.
 - Medical noncompliance.
 - iii. The etiology, pathogenesis, evaluation, and management of hypoxemia and hypercapnia.
 - iv. The genetics and role of alpha-1 antitrypsin deficiency in some patients with emphysema.
 - v. The epidemiology, risk factors, symptoms, signs, and typical clinical course of asthma.
 - vi. Allergic and non-allergic factors that may precipitate bronchospasm and exacerbate asthma, including:
 - Grass and tree pollen.
 - Animal dander.
 - Cockroaches.
 - Dust mites.
 - Allergic rhinitis/post-nasal drip.
 - Acute/chronic infectious sinusitis.
 - Acute infectious bronchitis.
 - Pneumonia.
 - Pulmonary edema.
 - Exercise.
 - Anxiety/stress.
 - Poor air quality (e.g., ozone, pollutants, tobacco smoke).
 - Occupational exposures.
 - Medical noncompliance.
 - vii. Therapies for COPD and asthma, including:
 - Beta-agonist bronchodilators.
 - Anticholinergic bronchodilators.
 - Leukotriene inhibitors.

- Mast cell stabilizers.
- Theophylline.
- Inhaled corticosteroids.
- Systemic corticosteroids.
- Antimicrobial agents.
- Supplemental oxygen.
- Immunotherapy.

viii. The indications for and the efficacy of influenza and pneumococcal vaccines.

b) **Skills:** Students should be able to demonstrate specific skills, including:

i. **History-taking skills:** Students should be able to obtain, document, and present an age-appropriate medical history, that differentiates among etiologies of disease including:

- Existence, duration, and severity of dyspnea, orthopnea, paroxysmal nocturnal dyspnea, cough, sputum production, wheezing, fever, chills, sweats, chest pain, hemoptysis.
- Smoking history and passive exposure to tobacco smoke.
- Occupational history.
- Family history of pulmonary problems.

ii. **Physical exam skills:** Students should be able to perform a physical exam to establish the diagnosis and severity of disease including:

- Accurately determining respiratory rate and level of respiratory distress.
- Assessing the use of accessory muscles for breathing.
- Identifying bronchial breath sounds, rales, rhonchi, and wheezes.
- Identifying signs of pulmonary consolidation, pleural effusion, and pneumothorax.
- Identifying the signs of pulmonary hyperresonance/hyperexpansion.

iii. **Differential diagnosis:** Students should be able to generate a prioritized differential diagnosis recognizing specific history and physical exam findings that suggest a diagnosis of chronic bronchitis, emphysema, asthma, or other conditions with similar findings.

iv. **Laboratory interpretation:** Students should be able to recommend when to order diagnostic and laboratory tests and be able to interpret them, both prior to and after initiating treatment based on the differential diagnosis, including consideration of test cost and performance characteristics as well as patient preferences. Laboratory and diagnostic tests should include, when appropriate:

- Pulse oximetry.
- ABG.
- Chest radiograph.
- Pulmonary function tests.

v. **Management skills:** Students should be able to develop an appropriate evaluation and treatment plan for patients that includes:

- The use of bronchodilators and inhaled corticosteroids.
- The key components of the care of patients admitted with acute exacerbations of COPD and asthma.
- Using systemic corticosteroids appropriately.
- Judicious use of antimicrobial agents.
- The principles of oxygen therapy.
- Determining when to obtain consultation from a pulmonologist or allergist/immunologist.
- Smoking cessation strategies.

N. Diabetes Mellitus

a) **Knowledge:** Students should be able to define, describe, and discuss:

i. Diagnostic criteria for impaired fasting glucose and impaired glucose tolerance.

ii. Diagnostic criteria for type I and type II diabetes mellitus, based on a history, physical examination, and

- laboratory testing.
- iii. Pathophysiology, risk factors, and epidemiology of type I and type II diabetes mellitus.
 - iv. The basic principles of the role of genetics in diabetes mellitus.
 - v. Presenting symptoms and signs of type I and type II diabetes mellitus.
 - vi. Presenting symptoms and signs of diabetic ketoacidosis (DKA) and nonketotic hyperglycemic (NKH).
 - vii. Pathophysiology for the abnormal laboratory values in DKA and NKH including plasma sodium, potassium, and bicarbonate.
 - viii. Precipitants of DKA and NKH.
 - ix. Major causes of morbidity and mortality in diabetes mellitus (coronary artery disease, peripheral vascular disease, hypoglycemia, DKA, NKH coma, retinopathy, neuropathy—peripheral and autonomic, nephropathy, foot disorders, infections).
 - x. Laboratory tests needed to screen, diagnose, and follow diabetic patients including: glucose, electrolytes, blood urea nitrogen/creatinine, fasting lipid profile, HgA1c, urine microalbumin/creatinine ratio, urine dipstick for protein
 - xi. Non-pharmacologic and pharmacologic (drugs and side effects) treatment of diabetes mellitus to maintain acceptable levels of glycemic control, prevent target organ disease, and other associated complications.
 - xii. The specific components of the American Diabetes Association (ADA) dietary recommendations for type I and type II diabetes mellitus.
 - xiii. Basic management of diabetic ketoacidosis and nonketotic hyperglycemic states, including the similarities and differences in fluid and electrolyte replacement.
 - xiv. Basic management of blood glucoses in the hospitalized patient.
 - xv. The Somogyi effect and the Dawn phenomenon and the implications of each in diabetes pharmacologic management.
 - xvi. Basic management of hypertension and hyperlipidemia in the diabetic patient.

b) Skills: Students should be able to demonstrate specific skills including:

- i. History-taking skills: Students should be able to obtain, document, and present an age-appropriate medical history, that differentiates among etiologies of disease, including:
 - Weight changes.
 - Hypo- or hyperglycemic symptoms.
 - Medication history (adherence, side effects, other medications).
 - Home glucose monitoring results.
 - Target organ disease complications (cardiovascular, foot, gastrointestinal, infectious, neurological, sexual, skin, urinary, or vision symptoms).
 - Diet history (total caloric intake, intake of sugar-containing foods, intake of saturated fat and cholesterol, physical activity level, timing of meals).
- ii. Physical exam skills: Students should be able to perform a physical exam to establish the diagnosis and severity of disease, including:
 - Skin examination for diabetic dermopathy, furuncles/carbuncles, candidiasis, necrobiosis lipoidica diabetorum, dermatophytosis, and acanthosis nigricans.
 - Fundoscopic exam.
 - Arterial pulses.
 - Peripheral nerves (e.g., monofilament testing).
 - Examination of the feet for corns, calluses, and ulcerations.
 - In patients with DKA or NKH evaluate for mental status alterations, Kussmaul's respirations, fruity breath, and signs of volume depletion.
- iii. Differential diagnosis: Students should be able to generate a prioritized differential diagnosis recognizing specific history and physical exam findings that suggest a specific etiology for:
 - Hyperglycemia.

- Hypoglycemia.
 - Anion gap acidosis.
 - Ketosis.
 - Hyperosmolality.
- iv. Laboratory interpretation: Students should be able to recommend when to order diagnostic and laboratory tests and be able to interpret them, both prior to and after initiating treatment based on the differential diagnosis, including consideration of test cost and performance characteristics as well as patient preferences. Laboratory and diagnostic tests should include, when appropriate:
- Fasting serum GLC.
 - Electrolytes, BUN/Cr.
 - Serum and urine ketones.
 - Serum and urine osmolality.
 - HbA1c.
 - Fasting lipid profile.
 - UA.
 - Urine microalbumin/creatinine ratio.
 - 24-hour urine for protein and creatinine clearance.
- v. Management skills: Students should be able to develop an appropriate evaluation and treatment plan for patients that includes:
- Writing appropriate fluid and insulin orders and outline critical steps for the treatment of DKA and DKH.
 - Counseling patients regarding basic features of ADA diabetic diet recommendations.
 - Instructing patients in home blood glucose monitoring.
 - Counseling patients on behavior changes (smoking cessation, medication adherence, poor glycemic control, obesity, hypertension, dyslipidemia, and infection) to avoid the complications of diabetes.
 - Counseling patients regarding basic foot care.
 - Determining when to institute diet therapy, oral hypoglycemic agents, and insulin therapy.
 - Calculating an appropriate insulin dose for a diabetic patient.
 - Using community resources (ADA, hospital and community-based education programs) to aid the patient in understanding and managing his or her illness.
 - Determining when to obtain consultation from an endocrinologist, nephrologist, ophthalmologist, podiatrist, and dietician.

O. Heart Failure

- a) **Knowledge:** Students should be able to define, describe, and discuss:
- i. Types of processes and most common disease entities that cause HF (i.e., ischemic, valvular, hypertrophic, infiltrative, inflammatory, etc.).
 - ii. The basic role of genetics in certain forms of cardiomyopathy.
 - iii. Staging system for heart failure:
 - Stage A: high risk for HF but no structural heart disease is present.
 - Stage B: structural heart disease is present but never any symptoms.
 - Stage C: past or current symptoms associated with structural heart disease.
 - Stage D: end-stage disease with requirements for specialized treatment.
 - iv. Types of processes that cause systolic vs. diastolic dysfunction.
 - v. Symptoms and signs of left-sided vs. right-sided heart failure.
 - vi. Compensatory mechanisms of heart failure including cardiac remodeling and activation of endogenous neurohormonal systems.
 - vii. Factors leading to symptomatic exacerbation of HF, including ischemia, arrhythmias, hypoxemia, anemia, fever, hypertension, thyroid disorders, non-compliance with medications and dietary restrictions and

- use of nonsteroidal anti-inflammatory drugs.
- viii. Importance of age, gender and ethnicity on the prevalence and prognosis of HF.
 - ix. Physiological basis and scientific evidence supporting each type of treatment, intervention, or procedure commonly used in the management of patients who present with HF.
 - x. The general approach to the evaluation and treatment of atrial fibrillation .
 - xi. Role of critical pathways or practice guidelines in delivering high-quality, cost effective care for patients presenting with new or recurrent heart failure.
 - xii. The Centers for Medicare & Medicaid Services (CMS) and the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO) quality measures for HF treatment.

b) Skills: Students should be able to demonstrate specific skills, including:

i. History-taking skills: Students should be able to obtain, document, and present an age-appropriate medical history, including:

- Differentiating between various etiologies of heart failure (answers the question: Why is the patient in heart failure?).
- Identifying clinical factors responsible for symptomatic exacerbation (answers the question: Why is the patient worse now?).
- Exercise intolerance (fatigue, dyspnea on exertion).
- Fluid retention (peripheral edema, dyspnea).
- Changes in sleep pattern (orthopnea, paroxysmal nocturnal dyspnea [PND], nocturia).
- Assessing the functional capacity of patients with HF (walking distance, New York Heart classification).
- Cardiac risk factors.

ii. Physical exam skills: Students should be able to perform a focused physical exam to help establish the diagnosis of HF and estimate its severity:

- Measurement of vital signs including weight and respiratory rate/pattern.
- Accurate measurement of arterial blood pressure and recognition of the typical blood pressure findings that occur in patients with aortic stenosis, aortic insufficiency and pulsus paradoxus.
- Assessment of major arterial pulses for abnormalities, including bruits.
- Assessment of the neck veins for jugular venous distention and, when necessary, evaluation for abdominal jugular reflux.
- Assessment of the conjunctiva and optic fundus.
- Assessment of the extremities to ascertain for skin conditions, including color, temperature and the presence of edema, cyanosis or clubbing.
- Assessment of the lungs for crackles, rhonchi and decreased breath sounds.
- Inspection and palpation of the anterior chest to identify right and left sided heaves, lifts and thrills.
- Auscultation of the heart to determine rhythm, intensity of heart sounds, splitting of S2 and the presence of rubs, gallops (S3, S4, summation) or extra heart sounds (e.g., clicks).
- Auscultation of the heart to detect the presence of heart murmurs; when a murmur is present, students should be able to:
 - Identify timing (systolic vs. diastolic, holosystolic vs. ejection).
 - Describe pitch, location and pattern of radiation.
 - Gauge significance (innocent vs. pathologic, sclerosis vs. stenosis).
 - Assessment of the abdomen to determine the presence of hepatomegaly, ascites, abnormal pulsations and bruits.

iii. Differential diagnosis: Students should be able to generate a prioritized differential diagnosis and recognize specific history, physical exam and/or laboratory findings that:

- Help support or refute a clinical diagnosis of heart failure.

- Distinguish between various underlying etiologies of HF, including disease processes that primarily affect:
 - Pericardium (constrictive pericarditis, pericardial tamponade).
 - Endocardium (valvular [congenital, acquired], endocarditis).
 - Myocardium (hypertrophic, restrictive, congestive).
- iv. Laboratory interpretation: Students should be able interpret specific diagnostic tests and procedures that are commonly ordered to evaluate patients who present with heart failure. Test interpretation should take into account: Laboratory and diagnostic tests should include, when appropriate:
- 12-lead ECG.
 - Chest radiograph.
 - Students should be able to define the indications for, and interpret (with consultation) the results of the following diagnostic tests and procedures:
 - Echocardiography.
 - Treadmill and nuclear exercise testing.
 - Radionuclide ventriculogram.
 - Cardiac.
 - Coronary angiography.
- v. Management skills: Students should be able to develop an appropriate evaluation and treatment plan for patients that includes:
- Recognize the importance of early detection and treatment of risk factors that may lead to the development of heart failure.
 - Identifying the indications, contraindications, mechanisms of action, adverse reactions, significant interactions, and relative costs of the following treatments/interventions:
 - Non-pharmacological management.
 - Sodium restriction.
 - Physical activity and limitations.
 - Pharmacological management (recommended for routine use).
 - Diuretics.
 - ACE-I/ARB.
 - Beta-blockers.
 - Aldosterone antagonists (spironolactone, eplerenone).
 - Digoxin.
 - Developing a timely and appropriate evaluation and treatment plan for patients with heart failure due to diastolic dysfunction, including:
 - Control of physiologic factors (blood pressure, heart rate).
 - Reduction in central blood volume by judicious use of diuretics.
 - Alleviation of myocardial ischemia.
 - Use of calcium channel blockers.
 - Describing use of other agents and interventions that may be useful in treating patients with refractory, end-stage heart failure:
 - Intravenous vasodilators.
 - Intravenous positive inotropic agents.
 - Infusion of B-type natriuretic peptide (nesiritide).
 - Ventricular assist devices.
 - Heart transplantation.
 - Defining and describing how the diagnosis and treatment of HF in special populations may differ (e.g., very elderly, associated co-morbidities).
 - Determining when to consult a cardiologist.
 - Identifying when palliative care may be appropriate for patients with refractory symptoms associated with end-stage disease.

P. Hypertension

a) Knowledge: Students should be able to define, describe and discuss:

- i. The etiologies and relative prevalence of primary and secondary hypertension.
- ii. The basic principles of the role of genetics in hypertension.
- iii. The definition of hypertensive urgency and emergency, citing examples of both.
- iv. The difference between essential (primary) and secondary hypertension.
- v. Symptoms and signs of the following disorders associated with secondary hypertension:
 - Renovascular hypertension.
 - Renal failure.
 - Polycystic kidney disease.
 - Cushing's disease or syndrome.
 - Hyperaldosteronism.
 - Hyperthyroidism.
 - Hypercalcemia.
 - Medication, alcohol, and illicit drug use.
 - Coarctation of the aorta.
 - Sleep apnea.
- vi. The manifestations of target-organ disease due to hypertension.
- vii. Classification of blood pressure (SBP and DBP for all age 18 or older).
- viii. Basic approaches to the pharmacological management of acute and chronic hypertension, including the physiologic basis and scientific evidence supporting these approaches, and causes for lack of responsiveness to therapy.
- ix. Prevention strategies for reducing hypertension (including lifestyle factors, such as dietary intake of sodium, weight, and exercise level), and explain the physiologic basis and/or scientific evidence supporting each strategy.
- x. Steps in management of patients with a hypertensive emergency.
- xi. Factors that contribute to non-adherence with antihypertensive medications.

b) Skills: Students should demonstrate specific skills including:

- i. History-taking skills: Students should be able to obtain, document, and present an age-appropriate medical history that differentiates among etiologies of disease, including:
 - Duration and levels of elevated blood pressure.
 - History of symptoms of cardiovascular, cerebrovascular, peripheral vascular or renal disease; diabetes; dyslipidemia; or gout.
 - History of symptoms suggesting secondary hypertension.
 - History of weight gain, leisure-time physical activities, and smoking or other tobacco use.
 - Family history of high blood pressure, premature CHD, stroke, CVD, diabetes mellitus and dyslipidemia.
 - Psychosocial and environmental factors that may elevate blood pressure (family situation, employment status, working conditions, education level).
 - Dietary assessment, including sodium intake and intake of saturated fat and cholesterol.
 - Results and side effects of previous antihypertensive therapy.
 - Use of commonly prescribed, over-the-counter, and illicit medications that may raise blood pressure or interfere with the effectiveness of antihypertensive medications.
 - Alcohol intake.
- ii. Physical exam skills: Students should be able to perform a physical exam to establish the diagnosis and severity of disease, including:
 - Blood pressure measurements to detect and confirm the presence of high blood pressure.

- Examination of the fundus for arteriolar narrowing, arteriovenous nicking, hemorrhages, exudates, or papilledema.
 - Neck for carotid bruits, distended veins, or an enlarged thyroid gland.
 - Heart for increased rate, increased size, precordial heave, clicks, murmurs, arrhythmias, and third (S3) and fourth (S4) sounds.
 - Abdomen for bruits, enlarged kidneys, masses, and abnormal aortic pulsation.
- Extremities for diminished, delayed, or absent peripheral arterial pulsations, bruits, and edema.
 - Peripheral pulses specifically femoral arterial pulses.
 - Body habitus, looking for changes associated with secondary hypertension.
 - Peripheral and central nervous system for ischemic changes.
- iii. Differential diagnosis: Students should be able to generate a prioritized differential diagnosis recognizing specific history, physical exam, and laboratory findings that suggest a specific etiology of hypertension.
- iv. Laboratory interpretation: Students should be able to recommend and interpret diagnostic and laboratory tests, when appropriate:
- UA.
 - CBC.
 - Blood glucose (fasting if possible).
 - Electrolytes, BUN/Cr.
 - Uric acid.
 - Fasting lipid profile.
 - ECG.
- v. Management skills: Students should be able to develop an appropriate evaluation and treatment plan for patients that includes:
- Treating acute and chronic hypertension.
 - Treating primary (essential) hypertension versus secondary hypertension.
 - Prescribing preventative strategies to diminish hypertension, including:
 - Accessing and utilizing appropriate information systems and resources

Q. Liver Disease

a) Knowledge: Students should be able to define, describe, and discuss:

- i. The biochemical/physiologic/mechanistic approach to hyperbilirubinemia, including:
 - Increased production.
 - Decreased hepatocyte uptake.
 - Decreased conjugation.
 - Decreased excretion from the hepatocyte.
 - Decreased small duct transport (intrahepatic cholestasis).
 - Decreased large duct transport (extrahepatic cholestasis, obstructive jaundice).
- ii. The biochemistry and common causes of unconjugated and conjugated hyperbilirubinemia.
- iii. The use of serum markers of liver injury (e.g., AST, ALT, GGT, Alk Phos) and function (e.g., bilirubin, ALB, PT/INR) in the diagnostic evaluation of hepatobiliary disease.
- iv. The clinical significance of asymptomatic, isolated elevation of AST, ALT, GGT, and/or Alk Phos.
- v. The common pathologic patterns of liver disease and their common causes, including:
 - Steatosis (fatty liver).
 - Hepatitis.
 - Cirrhosis.
 - Infiltrative.
 - Intrahepatic cholestasis.

- Extrahepatic cholestasis (obstructive jaundice).
- vi. The epidemiology, symptoms, signs, typical clinical course, and prevention of viral hepatitis.
- vii. The distinctions between acute and chronic hepatitis.
- viii. The indications for and efficacy of hepatitis A and B vaccinations.
- ix. The common causes and clinical significance of hepatic steatosis and steatohepatitis.
- x. The epidemiology, symptoms, signs, and typical clinical course of autoimmune liver diseases such as autoimmune hepatitis, primary biliary cirrhosis, and primary sclerosing cholangitis.
- xi. The epidemiology, symptoms, signs, and typical clinical course of cirrhosis.
- xii. The pathophysiologic manifestations, symptoms, signs, and complications of alcohol-induced liver disease.)
- xiii. The symptoms, signs, and complications of portal hypertension.
- xiv. The pathophysiology and common causes of ascites.
- xv. The pathophysiologic manifestations, symptoms, and signs of spontaneous bacterial peritonitis.
- xvi. The basic pathophysiology, symptoms, signs, typical clinical course, and precipitants of hepatic encephalopathy.
- xvii. The basic pathophysiology, symptoms, signs, and typical clinical course of the hepatorenal syndrome.
- xviii. The analysis of ascitic fluid and its use in the diagnostic evaluation of liver disease.
- xix. Common causes of drug-induced liver injury.
- xx. Genetic considerations in liver disease (i.e., hemochromatosis, Wilson’s disease, alpha-1 antitrypsin deficiency, Gilbert’s syndrome).
- xxi. The epidemiology, pathophysiology, symptoms, signs, and typical clinical course of cholelithiasis and cholecystitis.
- xxii. The clinical syndrome of “ascending cholangitis” including its common causes and typical clinical course.
- xxiii. The indications for and risks of paracentesis and liver biopsy.
- xxiv. The indications for and utility of hepatobiliary imaging studies, including:
 - Ultrasound.
 - Nuclear medicine studies.
 - CT.
 - MRI.
 - Magnetic resonance cholangiopancreatography (MRCP).
 - Endoscopic retrograde cholangiopancreatography (ERCP).

b) Skills: Students should be able to demonstrate specific skills, including:

i. History-taking skills: Students should be able to obtain, document, and present an age-appropriate medical history, that differentiates among etiologies of disease, including:

- Jaundice, discolored urine, pruritis, light-colored stool, unintentional weight loss, fever, nausea, emesis, diarrhea, altered mental status, abdominal pain, increased abdominal girth, edema, rectal bleeding, hematemesis.
- DM.
- Alcohol use.
- Prescription, over-the-counter, and illicit drug use.
- Transfusions and other sources of potential blood-borne pathogen exposure.
- Consumption of uncooked shellfish and other food items potentially contaminated with fecal matter.
- Sexual history.
- Vaccination history.
- Family history of liver diseases.

ii. Physical exam skills: Students should be able to perform a physical exam to establish the diagnosis and severity of disease, including:

- Jaundice.

- Complete abdominal examination including findings consistent with ascites (e.g., bulging flanks, shifting dullness, fluid wave).
 - Findings compatible with chronic alcohol use and portal hypertension (e.g., palmar erythema, spider angiomas, gynecomastia, testicular atrophy, Dupuytren's contracture, muscle wasting, splenomegaly, ascites, edema, caput medusa, hemorrhoids).
 - Findings compatible with hepatic (portosystemic) encephalopathy (e.g., disturbances of consciousness and behavior, fluctuating neurologic signs, asterixis).
- iii. Differential diagnosis: Students should be able to generate a prioritized differential diagnosis recognizing specific history and physical exam findings that suggest a specific etiology of liver disease.
- iv. Laboratory interpretation: Students should be able to recommend when to order diagnostic and laboratory tests and be able to interpret them, when appropriate:
- CBC.
 - Electrolytes, BUN/Cr, GLC.
 - ALB, TP, total bilirubin, direct bilirubin, PT/INR, AST, ALT, Alk Phos.)
 - Hepatitis serology.
 - Ascitic fluid ALB, amylase, cell counts, staining, cultures, and the serum-ascites albumin gradient (SAAG).
 - Students should be able to define the indications for and interpret (with consultation) the results of:
 - Ultrasound.
 - Nuclear medicine studies.
 - CT.
- v. Communication skills: Students should be able to:
- Communicate the diagnosis, treatment plan, and subsequent follow-up to the patient and his or her family.
 - Elicit input and questions from the patient and his or her family about the management plan.
 - Discuss the avoidance of known hepatotoxins.
 - Counsel patients regarding alcohol abstinence.
 - Discuss the importance of hepatitis A and B vaccinations for nonimmune patients.
- vi. Management skills: Students should be able to develop an appropriate evaluation and treatment plan for patients that includes:
- The diagnostic evaluation of asymptomatic, isolated elevation of the transaminases and/or Alk Phos.
 - The diagnostic evaluation of patients with jaundice and unconjugated or conjugated hyperbilirubinemia.
 - The basic management of steatosis, hepatitis, cirrhosis, intra- and extra hepatic cholestasis, acute cholecystitis, ascites, portal hypertension, spontaneous bacterial peritonitis, and hepatic encephalopathy.
 - Determining when to obtain consultation from a gastroenterologist, hepatologist, or biliary surgeon.

R. Nosocomial Infections

a) Knowledge: Students should be able to define, describe, and discuss:

- i. The epidemiology and significance of nosocomial infections in the Canada.
- ii. The general clinical risk factors for nosocomial infection. including:
 - Immunocompromise.
 - Immunosuppressive drugs.
 - Extremes of age.
 - Compromise of the skin and mucosal surfaces secondary to:

- Drugs.
 - Irradiation.
 - Trauma.
 - Invasive diagnostic and therapeutic procedures.
 - Invasive indwelling devices (e.g., intravenous catheter, bladder catheter, endotracheal tube, etc.).
- iii. The major routes of nosocomial infection transmission, including:
- Contact.
 - Droplet.
 - Airborne.
 - Common vehicle.
- iv. The epidemiology, pathophysiology, microbiology, symptoms, signs, typical clinical course, and preventive strategies for the most common nosocomial infections, including:
- Urinary tract infection.
 - Pneumonia.
 - Surgical site infection.
 - Intravascular device-related bloodstream infections.
 - Skin infections.
 - Health care associated diarrhea.
- v. Empiric antibiotic therapy for the most common nosocomial infections.
- vi. The epidemiology, pathophysiology, microbiology, symptoms, signs, typical clinical course, and preventive strategies for colonization or infection with the following organisms:
- Vancomycin-resistant enterococci.
 - Clostridium difficile.
 - Methicillin-resistant Staphylococcus aureus. (MRSA)
 - Multidrug-resistant Gram-negative bacteria.
- vii. The crucial importance of judicious antibiotic use.
- viii. The effect of widespread use of broad spectrum anti-microbial agents on endogenous body flora and the hospital microbial flora.
- ix. The types of isolation procedures and their indications:
- Standard.
 - Airborne.
 - Contact.
 - Droplet.
- x. The Centers for Disease Control and Prevention (CDC) guidelines for hand hygiene.
- xi. Preventive strategies for needlestick and sharps injuries intended to reduce the transmission of blood-borne pathogens (hepatitis B, hepatitis C, and HIV).
- xii. Local hospital post-exposure (i.e., after an eye/mucous membrane splash, needlestick or other sharps injury) protocols for prompt reporting, evaluation, counseling, treatment, and follow-up.
- xiii. The indications, efficacy, and side effects of post-exposure prophylaxis for hepatitis B and HIV/AIDS.
- xiv. Negative-pressure ventilation isolation for known or suspected tuberculosis patients.
- xv. National Institute for Occupational Safety and Health (NIOSH) approved personal respiratory protective equipment (i.e., N95 respirator) use for the prevention of transmission of Mycobacterium tuberculosis to health care workers.
- b) Skills: Students should be able to demonstrate specific skills, including:
- i. History-taking skills: Students should be able to obtain, document, and present an age-appropriate medical history, that differentiates among etiologies of disease in the organ systems likely to be involved with nosocomial infection.

- ii. Physical exam skills: Students should be able to perform a physical examination of skin, vascular access sites, lungs, abdomen, wounds, and catheter and drain sites and recognize signs of local or systemic infection.
- iii. Differential diagnosis: Students should be able to generate a prioritized differential diagnosis of the likely sites and organisms involved, recognizing specific history and physical exam findings that suggest a specific etiology.
- iv. Laboratory interpretation: Students should be able to recommend when to order diagnostic and laboratory tests and be able to interpret them, both prior to and after initiating treatment based on the differential diagnosis, including consideration of test cost and performance characteristics as well as patient preferences. Laboratory and diagnostic tests should include, when appropriate:
 - Urinalysis and culture and sensitivities.
 - Sputum Gram stain and culture and sensitivities.
 - Chest radiograph.
 - Wound cultures and sensitivities.
 - Clostridium difficile toxin assay.
 - Hepatitis serologies.
 - HIV ELISA and western blot.
 - Sputum AFB staining and culture.
- v. Management skills: Students should be able to develop an appropriate evaluation and treatment plan for patients that includes:
 - Assessing a hospitalized patient who develops a new fever 48 or more hours after admission.
 - Developing a plan for the evaluation and treatment of hospital acquired infection.
 - Demonstrating appropriate choice of antimicrobial drugs which considers mechanisms of action, spectrum of activity, pharmacokinetics, drug interactions, and adverse reactions.
 - Recognizing when indwelling intravascular and urinary collection devices should be removed.
 - Requesting appropriate isolation measures to protect other patients and health care workers.
 - Determining when to obtain consultation from an infectious diseases specialist.
 - Contacting hospital infection control experts when appropriate.

S. Pneumonia

- a) Knowledge: Students should be able to define, describe, and discuss:
 - i. The epidemiology, pathophysiology, symptoms, signs, and typical clinical course of community-acquired, nosocomial, and aspiration pneumonia and pneumonia in the immunocompromised host.
 - ii. The conceptualization of “typical” and “atypical” pneumonia and its limitations.
 - iii. Common pneumonia pathogens (viral, bacterial, mycobacterial, and fungal) in immunocompetent and immunocompromised hosts).
 - iv. Identify patients who are at risk for impaired immunity.
 - v. Indications for hospitalization and ICU admission of patient with pneumonia.
 - vi. The radiographic findings of the various types of pneumonia.
 - vii. The antimicrobial treatments (e.g., antiviral, antibacterial, antimycobacterial, and antifungal) for community-acquired, nosocomial, and aspiration pneumonia, and pneumonia in the immunocompromised host.
 - viii. The implications of antimicrobial resistance.
 - ix. The pathogenesis, symptoms, and signs of the complications of acute bacterial pneumonia including: bacteremia, sepsis, parapneumonic effusion, empyema, meningitis, and metastatic microabscesses.
 - x. The indications for and complications of chest tube placement.
 - xi. The indications for and efficacy of influenza and pneumococcal vaccinations.

- xii. The indications and procedures for respiratory isolation.
- xiii. The Centers for Medicare & Medicaid Services (CMS) and the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO) quality measures for community-acquired pneumonia treatment.

b) Skills: Students should be able to demonstrate specific skills including:

- i. History-taking skills: Students should be able to obtain, document, and present an age-appropriate medical history that differentiates among etiologies of disease, including:
 - The presence and quantification of fever, chills, sweats, cough, sputum, hemoptysis, dyspnea, and chest pain.
 - Historical features consistent with potential immunocompromise.
 - Potential tuberculosis exposure.
- ii. Physical exam skills: Students should be able to perform a physical exam to establish the diagnosis and severity of disease, including:
 - Accurately determining respiratory rate and level of respiratory distress.
 - Identifying bronchial breath sounds, rales, rhonchi, and wheezes.
 - Identifying signs of pulmonary consolidation.
 - Identifying signs of pleural effusion.
 - Identifying signs of the complications of pneumonia.
- iii. Differential diagnosis: Students should be able to generate a prioritized differential diagnosis recognizing specific history and physical exam findings that suggest a specific etiology of pneumonia and other possible diagnoses, including:
 - Common cold.
 - Acute bronchitis.
 - Influenza.
 - Acute exacerbation of COPD.
 - Asthma exacerbation.
 - CHF.
 - Pulmonary embolism.
 - Aspiration.
- iv. Laboratory interpretation: Students should be able to recommend when to order diagnostic and laboratory tests and be able to interpret them when appropriate:
 - CBC.
 - Blood cultures.
 - ABG.
 - Pleural fluid chemistry, cell counts, staining, and culture.
 - Chest radiograph.
- Students should be able to define the indications for and interpret (with consultation) the results of:
 - Chest CT.
- v. Management skills: Students should be able to develop an appropriate evaluation and treatment plan for patients that includes:
 - Selecting an appropriate empiric antibiotic regimen for community-acquired, nosocomial, immunocompromised-host, and aspiration pneumonia, taking into account pertinent patient features.
 - Adjusting antimicrobial treatment according to the sputum staining and culture results.
 - Recognizing the complications of pneumonia.
 - Determining when to obtain consultation from a pulmonologist or infectious diseases specialist.

T. Rheumatologic Problems

a) Knowledge: Students should be able to define, describe, and discuss:

- i. The effect of the time course of symptoms on the potential causes of joint pain (acute vs. subacute vs. chronic).
- ii. The difference between and pathophysiology of arthralgia vs. arthritis and mechanical vs. inflammatory joint pain.
- iii. The distinguishing features of intra-articular and periarticular complaints (joint pain vs. bursitis and tendonitis).
- iv. The effect of the features of joint involvement on the potential causes of joint pain (monoarticular vs. oligoarticular vs. polyarticular, symmetric vs. asymmetric, axial and/or appendicular, small vs. large joints, additive vs. migratory vs. intermittent).
- v. Indications for performing an arthrocentesis and the results of synovial fluid analysis.
- vi. The pathophysiology and common signs and symptoms of:
 - Osteoarthritis.
 - Crystalline arthropathies.
 - Septic arthritis.
- vii. Indications for and effectiveness of intra-articular steroid injections.
- viii. Treatment options for gout (e.g., colchicine, NSAIDs, steroids, uricosurics, xanthine oxidase inhibitors).
- ix. The basic pathophysiology of autoimmunity and autoimmune diseases.
- x. The common signs and symptoms of and diagnostic approach to:
 - Rheumatoid arthritis.
 - Spondyloarthropathies (reactive arthritis/Reiter's syndrome, ankylosing spondylitis, psoriatic arthritis).
 - Systemic lupus erythematosus.
 - Systemic sclerosis.
 - Raynaud's syndrome/phenomenon.
 - Sjögren's syndrome.
 - Temporal arteritis and polymyalgia rheumatica.
 - Other systemic vasculitides.
 - Polymyositis and dermatomyositis.
 - Fibromyalgia.

b) Skills: Students should be able to demonstrate specific skills, including:

- i. History-taking skills: Students should be able to obtain, document, and present an age-appropriate medical history that differentiates among etiologies of disease, including:
 - Eliciting features of joint complaints:
 - Pain.
 - Stiffness.
 - Location.
 - Mode of onset.
 - Duration.
 - Severity.
 - Exacerbating and alleviating factors.
 - Warmth, redness, and tenderness.
 - Associated nonarticular symptoms.
 - Determining when in the course of acute arthritis it is necessary to obtain a sexual history.
- ii. Physical exam skills: Students should be able to perform a physical exam to establish the diagnosis and severity of disease, including:
 - A systematic examination of all joints identifying the following abnormal findings:

- Erythema, warmth, tenderness, and swelling.
 - Effusion.
 - Crepitus.
 - Altered range of motion.
 - Ulnar deviation.
 - Synovial thickening.
 - Joint alignment deformities (e.g., varus and valgus).
 - Muscular bulk, strength, and tenderness.
 - Examination of the skin identifying the following abnormal findings:
 - Rheumatoid and tophaceous nodules.
 - Alopecia.
 - Malar rash.
 - Sclerodactyly.
 - Telangiectasias.
 - Raynaud's phenomenon.
 - Psoriasis.
 - Cutaneous manifestations of vasculitis (e.g., palpable purpura).
- iii. Differential diagnosis: Students should be able to generate a prioritized differential diagnosis recognizing specific history and physical exam findings that suggest a specific etiology:
- Osteoarthritis.
 - Crystalline arthropathies.
 - Septic arthritis.
 - Rheumatoid arthritis.
 - Spondyloarthropathies (reactive arthritis/Reiter's syndrome, ankylosing spondylitis, psoriatic arthritis).
 - Systemic lupus erythematosus.
 - Systemic sclerosis.
 - Raynaud's syndrome/phenomenon.
 - Sjögren's syndrome.
 - Temporal arteritis and polymyalgia rheumatica.
 - Other systemic vasculitides.
 - Polymyositis and dermatomyositis.
 - Fibromyalgia.
- iv. Laboratory interpretation: Students should be able to recommend when to order diagnostic and laboratory tests and be able to interpret them when appropriate:
- CBC with differential.
 - Synovial fluid analysis (Gram stain, culture, crystal exam, cell count with differential, and glucose).
 - Uric acid.
 - ESR.
 - Rheumatoid factor (RF).
 - Antinuclear antibody test (ANA) and anti-DNA test.
- Students should be able to define the indications for and interpret (with consultation) the results of:
 - Plain radiographs of the shoulder, elbow, wrist, hand, hip, knee, ankle, and foot.
- v. Management skills: Students should be able to develop an appropriate evaluation and treatment plan for patients that includes:
- Selecting appropriate medications for the relief of joint pain.

- Prescribing acute and preventative treatment for crystalline arthropathies.
- Prescribing basic treatment options for septic arthritis.
- Prescribing basic treatment options for systemic rheumatologic conditions.
- Determining when to obtain consultation from a rheumatologist and orthopedic surgeon.

U. Substance Abuse

a) Knowledge: Students should be able to define, describe, and discuss:

i. Presenting signs and symptoms of abuse of the following substances:

- Alcohol.
- Opioids.
- Cocaine.
- Amphetamines.
- Hallucinogens.
- Barbiturates.
- Marijuana.
- Anabolic steroids.
- Benzodiazepines.

ii. Signs, symptoms, risk factors for, and major causes of morbidity and mortality secondary to alcohol and drug abuse, intoxication, overdose, and withdrawal.

iii. Diagnostic criteria for substance abuse, dependency and addiction.

iv. Questions in the CAGE questionnaire:

- Cut down.
- Annoyed/angry.
- Guilty.
- Eye opener.

v. Health benefits of substance abuse cessation.

vi. The potential role of genetics in substance abuse vulnerability.

b) Skills: Students should demonstrate specific skills, including:

i. History-taking skills: Students should be able to obtain, document, and present an age-appropriate medical history, that differentiates among etiologies of disease, including:

- Social history that is elicited in a nonjudgmental, supportive manner, using appropriate questioning (e.g., CAGE questions, etc.).
- Use of injection drugs and shared needles.
- Relevant medication history.
- Immune status.
- Family history of substance abuse.
- Lifestyle factors that will influence patient's access to illicit substances and interfere with ability to enable effective treatment.
- Screening for depression and other psychiatric disease.

ii. Physical exam skills: Students should be able to perform a physical exam to establish the diagnosis and severity of disease, including:

- Accurate recognition of signs that may indicate intoxication or withdrawal (e.g., behavioral or speech changes, changes in pupil size, conjunctival or nasal injection, tachycardia, sweating, piloerection, yawning, unsteady gait, etc.).
- Examination of the nose for septal perforation as complication of cocaine use.
- Examination of the skin for track marks or signs of needle use.
- Identification of stigmata of secondary disease states (e.g., cirrhosis – splenomegaly, gynecomastia, telangiectasias, caput medusa, etc.).
- Assessing for signs of endocarditis (e.g., fever, murmur, rash, etc).

- Obtaining full mental status examination.
- iii. Differential diagnosis: Students should be able to generate a differential diagnosis recognizing history, physical exam and/or laboratory findings to determine the diagnosis of abuse of drugs or alcohol and their sequelae.
- iv. Laboratory interpretation: Students should be able to recommend when to order diagnostic and laboratory tests and be able to interpret them, when appropriate:
 - Blood alcohol level.
 - Urine and serum toxicology screens.
 - Hepatic function panel.
 - Amylase and lipase levels.
 - Tests for HIV, hepatitis B and hepatitis C.
 - CBC.
 - Blood cultures.
- v. Management skills: Students should be able to develop an appropriate evaluation and treatment plan that includes:
 - Assessing the patient's motivation for achieving sobriety/abstinence.
 - Understanding the principles of acute management of drug/alcohol intoxication and withdrawal versus long-term treatment planning.
 - Using Clinical Institute Withdrawal Assessment for Alcohol. (CIWA-Ar) scale in acute alcohol withdrawal to prevent seizures or delirium tremens.
 - Recommending appropriate use of benzodiazepines for alcohol withdrawal.
 - Determining when to obtain consultation from a psychiatrist.

V. Venous Thromboembolism

- a) Knowledge: Students should be able to define, describe and discuss:
- i. Risk factors for developing DVT, including:
 - Prior history of DVT/PE.
 - Immobility/hospitalization.
 - Increasing age.
 - Obesity.
 - Trauma.
 - Smoking.
 - Surgery.
 - Cancer.
 - Acute MI.
 - Stroke and neurologic trauma.
 - Coagulopathy.
 - Pregnancy.
 - Oral estrogens.
 - ii. Genetic considerations predisposing to venous thrombosis.
 - iii. The symptoms and signs of DVT and PE.
 - iv. The differential diagnosis of DVT including the many causes of unilateral leg pain and swelling:
 - Venous stasis and the postphlebotic syndrome.
 - Lymphedema.
 - Cellulitis.
 - Superficial thrombophlebitis.
 - Ruptured popliteal cyst.
 - Musculoskeletal injury.
 - Arterial occlusive disorders.
 - v. The differential diagnosis of PE including the many causes of chest pain and dyspnea:

- MI/unstable angina.
 - Congestive heart failure.
 - Pericarditis.
 - Pneumonia/bronchitis/COPD exacerbation.
 - Asthma.
 - Pulmonary hypertension.
 - Pneumothorax.
 - Musculoskeletal pain (e.g., rib fracture, costochondritis).
- vi. Treatment modalities for DVT/PE, including:
- Unfractionated heparin.
 - Low-molecular-weight heparin.
 - Warfarin.
 - Thrombolytics.
- vii. The risks, benefits, and indications for inferior vena cava filters
- viii. The long-term sequelae of DVT and PE.
- ix. Methods of DVT/PE prophylaxis, their indications and efficacy, including:
- Ambulation.
 - Graded compression stockings.
 - Pneumatic compression devices.
 - Unfractionated heparin.
 - Low-molecular-weight heparin.
 - Warfarin.
- b) Skills: Students should demonstrate specific skills, including:
- i. History-taking skills: Students should be able to obtain, document and present an age-appropriate medical history that suggests the diagnosis of DVT or PE, including:
- The presence or absence of known risk factors.
 - Presence or absence of leg pain, swelling, warmth, discoloration, and palpable cord.
 - The presence or absence of dyspnea, chest pain, palpitations, cough, hemoptysis.
- ii. Physical exam skills: Students should be able to perform a physical examination to establish the diagnosis and severity of disease, including:
- Assessment of vital signs (i.e., hypotension, tachycardia, tachypnea, fever) and general appearance (i.e., degree of respiratory distress, anxiety).
 - Accurate identification of leg swelling, erythema, warmth, and tenderness. Inspection for signs of lower extremity trauma, arthritis, or joint effusion.
 - Identification of pleural friction rubs, wheezes, rales, rhonchi, and signs of pneumothorax.
- iii. Differential diagnosis: Students should be able to generate a differential diagnosis for a patient suspected of having DVT/PE, recognizing specific history, physical examination and laboratory findings which suggest DVT/PE, including the disease states noted above.
- iv. Laboratory interpretation: Students should be able to recommend when to order diagnostic and laboratory tests and be able to interpret them where appropriate:
- Pulse oximetry.
 - 12-lead ECG.
 - Chest radiograph.
 - ABG.
 - D-dimer.
- Students should be able to define the indications for and interpret (with consultation) the results of:
 - Duplex venous ultrasonography.
 - Ventilation perfusion (V/Q) scan.
 - CT angiography.

- Pulmonary angiography.
 - Echocardiography.
- v. Management skills: Students should be able to develop an appropriate evaluation and treatment plan for patients that includes:
- Outlining the acute and long-term treatment of isolated calf vein phlebitis, superficial thrombophlebitis, DVT, and thromboembolism, including appropriate use and monitoring of heparin and warfarin.
 - Understanding the indications for placement of inferior vena cava filter, indications and complications of thrombolytic therapy, as well as indications for performing a hypercoagulability work-up.
 - Determining when to obtain consultation from a pulmonologist or interventional radiologist.

(a) Basic Skills

Venipuncture, I.V. cannulation, Urinary catheter insertion, Nasogastric tube insertion, ECG recording

(b) Additional Skills

Arterial Puncture, Sigmoidoscopy, Thoracentesis, Lumbar puncture, Bone Marrow aspiration

These basic skills as listed are considered fundamental for the graduating student. The additional skills are those which are considered highly desirable for the student to have achieved but for which it is recognized that practical opportunities may be limited in the undergraduate curriculum. Students are urged to try to develop expertise in these procedures whenever the opportunity presents itself, recognizing that this opportunity is a function of the services to which they are assigned.

FUNCTIONAL PROGRAM

During an individual clinical elective, the Year 4 student will be assigned to a specific clinical service. At times, this may involve participation in an "on-call" schedule. The Academic Director/Primary Preceptor will act as the Year 4 student's mentor/advisor and will be responsible for his or her end-of-rotation evaluation.

In general terms, the student will be expected to apply and develop the skills acquired during the clinical clerkship. The clinical electives programme offers an opportunity for the student to strengthen those skills he/she feels may be weak and to enhance her/his knowledge in areas of interest. These objectives are best served by active participation in patient care, investigation and clinical decision making and an enthusiastic approach to the learning process.

EVALUATION

This will be based on observation of the student's performance. The primary purpose is to help students identify how much they have learned, and how much they have yet to learn. A secondary purpose is to determine whether the student, at the end of the clinical elective, has met minimum requirements of acceptable performance or achieved excellence.

Appraisal of personal-professional attributes in various aspects of clinical skills will be based on the student's performance during the clinical elective. The supervisor will discuss strengths or weaknesses with the student during the rotation. At the end of the rotation the supervisor will complete the standard assessment form (Clinical Elective Assessment Form).

There is also opportunity for the student to evaluate the clinical elective learning experience. The Undergraduate Office will be collecting information from you that can guide future students seeking clinical electives and provide important feedback to clinical elective supervisors about strengths and weaknesses of individual clinical electives.

GENERAL INTERNAL MEDICINE - CLINICAL TEACHING UNIT

This 4th year elective is an inpatient experience on the General Internal Medicine Clinical Teaching Unit. The fourth-year clinical clerk choosing this elective is expected to integrate with the team and assume responsibility for the initial work-up and continuing care for a proportion of the team's patients. This implies participation in morning report, team rounds and sharing in the call schedule. This elective is designed to develop clinical skills in history taking and physical examination, to facilitate clinical decision-making under supervision, and to allow time for independent reading and learning. Supervision will be through direct contact with Junior and Senior Residents as well as the Attending Consultant on the service. Evaluations are carried out by the Consultants and team Residents and are conveyed to the trainee at the end of the rotation. If more than one Consultant participated in the rotation, a composite evaluation will be prepared and may be administered by the Academic Director.

ON-CALL: Yes

EVALUATION:

Summative Clinical Elective Assessment evaluation completed by your Week 2 Preceptor

LOTTERY:

General Internal Medicine CTU Electives are **ONLY** available via the On-line Electives Lottery –
1 Student per Block