This study guide is designed to be very comprehensive. It is highly recommended that the student apply the following learning objectives to the clinical conditions identified within this surgical clerkship. The completion of this study guide will provide a substantial foundation in this clinical discipline as well as prepare the student for the end of rotation examination.

This document is subdivided into clinical pertinent sections based upon the currently practiced subspecialties in the field of surgery. Included in this document is the summary of the NBOME’s defined distribution of areas of concentration. *(Surgery Examination Blueprint)*

<table>
<thead>
<tr>
<th>Topic</th>
<th>Percent</th>
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<tbody>
<tr>
<td>Anesthesia</td>
<td>4 – 8 %</td>
</tr>
<tr>
<td>Endocrine/Breast</td>
<td>5 – 13 %</td>
</tr>
<tr>
<td>Fluids</td>
<td>5 – 12 %</td>
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<tr>
<td>Gastrointestinal</td>
<td>26 – 35 %</td>
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<tr>
<td>Hepato/Biliary</td>
<td>13 – 20 %</td>
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<tr>
<td>Hernias</td>
<td>5 – 13 %</td>
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<tr>
<td>Infections</td>
<td>4 – 8 %</td>
</tr>
<tr>
<td>Skin and Subcutaneous Tissues</td>
<td>4 – 8 %</td>
</tr>
<tr>
<td>Trauma</td>
<td>5 – 12 %</td>
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**Learning Objectives for Surgery**

1. Describe the clinical presentation (both subjective and objective findings) of the conditions outlined below

2. Identify the diagnostic evaluation (laboratory and imaging) used to establish the diagnosis of each condition

3. Identify the appropriate treatment plan (Medical, Surgical) for each of the clinical conditions

4. Describe the potential complications associated with each of the conditions if surgical intervention is performed

5. Explain the pathophysiology related to each of the conditions
INTRODUCTION TO SURGICAL CARE

FLUIDS, ELECTROLYTES AND NUTRITION

Fluid and electrolytes

• Maintenance requirements

• Replacement of ongoing losses

• Replacement of previous losses

• Etiology, clinical findings and treatment of acid-base disturbance including:
  - Hypokalemia
  - Hyperkalemia
  - Hyponatremia
  - Hypernatremia
  - Hypocalcemia
  - Hypercalcemia
  - Metabolic acidosis
  - Metabolic alkalosis
  - Osmolar disturbance, inappropriate ADH reaction

Surgical nutrition

• Nutritional requirements: starvation, stress, post-operative

• Total parenteral nutrition: indications, requirements, method, complications

SHOCK AND TRAUMA

Shock

• Definition

• Mechanism: septic, hypovolemic, cardiogenic, neurogenic

• Clinical findings

• Etiologies

• Treatment

• Complications: pulmonary, oxygen transport, adult respiratory distress syndrome, multisystem organ failure

• Hemodynamic monitoring
OPERATIVE COMPLICATIONS, IN GENERAL

- Postoperative fever
- Cardiac: tachycardia, arrhythmia
- Respiratory: hypoxia, tachypnea, respiratory care, pulmonary embolism
- Renal: oliguria, urinary retention
- Other: paralytic ileus, shock, psychosis, transfusion reaction

ENDOCRINE SURGERY

THYROID

- Anatomy: gross anatomy, blood supply, innervation of larynx
- Physiology: thyroid hormone synthesis, feedback control, metabolic effects
- Hyperthyroidism: clinical findings, laboratory diagnosis
- Thyroid masses: workup, pathology, characteristics of types of malignancy
- Therapy: solitary nodule, multinodular goiter
- Complications of thyroidectomy
- Thyroiditis: types, therapy

PARATHYROID

- Anatomy: embryologic origin, histology
- Physiology: metabolic actions of PTH
- Hyperparathyroidism: etiology primary, secondary, clinical findings, diagnosis, associated conditions, differential diagnosis of hypercalcemia
- Medical therapy of hyperparathyroidism
- Surgical therapy of hyperparathyroidism: indications, extent of procedure

ADRENAL AND ENDOCRINE TUMORS

- Adrenal lesion: incidence, classification, diagnosis, localization, prognosis
- Adrenalectomy: indications, approaches, complications
- Hypercortisolism: etiology, differential diagnosis, treatment
• Pheochromocytomas: etiology, incidence, diagnosis, medical treatment, surgical treatment (especially perioperative preparation), prognosis

• Primary hyperaldosteronism: etiology, diagnosis, treatment

• Endocrine tumors (‘APUDomas’): definition, sites, physiology, classification:
  a. Insulinoma: clinical findings, differential diagnosis, localization, management
  b. Gastrinoma: presentation, diagnosis and treatment
  c. Glucagonoma: presentation, diagnosis and treatment
  d. Somatostatinoma: presentation, diagnosis and treatment

HEAD AND NECK SURGERY (INCLUDING EYE AND ENT)

HEAD & NECK

• Neck masses: classification, diagnosis

• Etiology of head and neck malignancies

• Diagnosis of head and neck lesions

• Treatment: multidisciplinary

• Radical neck dissection: what is removed?

• Specific sites: lip, buccal mucosa, oral tongue, floor of mouth, base of tongue, tonsil, nasopharynx, salivary glands

• Solitary neck nodes with unknown primary: implications, workup

THE EYE

• Anatomy, globe, muscles, lids, orbital contents, bony orbit

• Visual testing

• Glaucoma: evaluation and treatment of open angle, narrow angle, congenital, secondary glaucoma

• Proptosis: thyroid disease versus space-occupying lesion

• Cranial nerve palsies: III, IV, and VI

• Pupillary abnormalities: signs and significance of III nerve palsy, Horner’s syndrome, Argyll Robertson pupil, and Aide’s pupil afferent pupil defects

• Visual field defects: significance of unilateral, bitemporal homonymous
• Red eye: differential diagnosis: acute conjunctivitis, acute iritis, acute glaucoma, corneal trauma or infection

• Diseases of the lens: subluxation, cataracts

• Diseases of the retina: vascular occlusion, muscular degeneration, retinal detachment, mass lesion

• Retinal diseases associated with systemic disorders: hypertension, arteriosclerosis, diabetes, sickle cell disease, drug retinopathy, collagen disease, metabolic defects

• Blurred disk: differential diagnosis

• Optic atrophy: etiologies

**EAR, NOSE AND THROAT**

*Ear*

• Recognition and management of:
  - Otitis externa
  - Bullous myringitis
  - Herpes zoster otitis
  - Malignant external otitis
  - Foreign body
  - Impacted cerumen
  - Traumatic perforation
  - Acute otitis media
  - Acute necrotizing otitis media
  - Chronic suppurative otitis media
  - Tuberculous otitis media
  - Serous otitis media
  - Cholesteotoma
  - Otosclerosis
  - Meniere’s disease
  - Glomus jugulare
Acoustic neuroma

Nose

- Recognition and management of:
  - Fracture
  - Septal hematoma
  - CSF rhinorrhea
  - Epistaxis: management in detail
  - Foreign body
  - Allergic rhinitis
  - Sinusitis
  - Nasopharyngeal angiofibroma

- Recognition and management of:

Throat

- Tonsillitis: indications for tonsillectomy, adenoidectomy
  - Peritonsillar abscess
  - Carcinoma of the tongue
  - Cancer of the nasopharynx
  - Cancer of the pyriform sinus
  - Sialadenitis
  - Acute epiglottitis: recognition and management
  - Laryngeal stenosis
  - Vocal cord paralysis
  - Singer’s nodule
  - Ludwig’s angina

- Tracheostomy: indications, Complications, alternatives
THORACIC SURGERY

LUNG
• Anatomy: segmental, lymphatic drainage, blood supply
• Differential diagnosis of lung masses
• Lung cancer: etiology, clinical findings, classification, diagnosis, TNM staging and prognosis
• Surgery for lung cancer: extent of procedure, contraindications, complications
• Adjuvant therapy for lung cancer

MEDIASTINUM
• Anatomy: Contents of anterior, middle and posterior
• Clinical findings, diagnosis and prognosis of mediastinal masses: including thymoma, teratomas, neurogenic tumors, pericardial cysts, bronchogenic cysts, enteric cysts, neuromeric cysts

ESOPHAGUS

Hiatal Hernia
• Anatomy and physiology: how is esophagus protected from acid?
• Sliding versus paraesophageal: pathology, incidence and treatment
• Clinical findings of reflux
• Medical therapy
• Indications for and complications of surgery
• Anatomy: blood supply, lymphatic drainage, histology

Esophageal cancer
• Pathology: classification, prognosis
• Clinical findings
• Diagnosis
• Complications
• Treatment: contraindications to resection, approaches for palliation
**BREAST SURGERY**

**BREAST**

- Breast cancer: incidence, risk factors, and protective factors
- Clinical findings and diagnosis
- Benign lesions: pathology, incidence, findings including mammary dysplasia, fibroadenoma, duct ectasia, intraductal papilloma, fat necrosis, mastitis, cystosarcoma phylloides, abscess
- TNM staging and prognosis
- Surgical procedures available: what is removed?
- Contraindications of mastectomy
- Complications of mastectomy: postoperative and long term
- Adjuvant and metastatic therapy: methods and indications

**GASTROINTESTINAL SURGERY**

**ACUTE ABDOMEN**

- Definition of acute abdomen: findings
- Differential diagnosis: pain patterns associated with common etiologies
- Laboratory and radiological studies: when indicated and interpretation
- Operative preparation and timing

**STOMACH AND DUODENUM**

*Peptic ulcer disease*

- Anatomy: blood supply, vagal innervation
- Physiology: gastric juice composition, regulation of secretion, mucosal barrier
- Etiology
- Diagnosis: clinical findings, laboratory and radiologic studies, endoscopy
- Non-operative therapy

Operative therapy: indications, procedures available, complications
Gastric neoplasma

- Incidence, classification, pathology, prognosis, risk factors
- Diagnosis
- Treatment based on location, palliation
- Gastric ulcer: management, indications for operation
- Gastric polyps: findings, treatment
- Menetrier’s disease: definition

GASTROINTESTINAL BLEEDING

- Etiology: most common cause in adult/infant, upper/lower gastrointestinal bleeding
- Other factors: systemic and synergistic factors
- Diagnosis: implications and workup of hematemesis, hematochezia, melena, guiac positive stool
- Treatment: non-operative management and pre-operative preparation
  - Operation: indications, methods, timing

GALLBLADDER

- Anatomy: anomalies
- Physiology: bile, mucosa, hormonal regulation
- Gallstones: composition, etiology
- Clinical findings in cholecystitis, cholangitis, choledocholithiasis, gallstone ileus
- Diagnosis: utility of plain Xray, oral cholecystograms, intravenous cholangiogram, percutaneous transhepatic cholangiogram, endoscopic retrograde cholangiopancreatography, sonography, Hidia scan, blood studies
- Pharmacotherapy
- Surgical therapy: indications for cholecystectomy, choledochotomy, cholecystostomy, choledochoduodenostomy, sphincteroplasty
- Complications

Malignancies

- Gallbladder cancer: diagnosis, treatment, prognosis
- Porcelain gallbladder: definition, treatment
- Cancer of the bile ducts: pathology, clinical findings, diagnosis, treatment, prognosis
- Sclerosing cholangitis: pathology and treatment
LIVER

• Anatomy: gross, blood supply
• Hepatic tumors: pathology, clinical findings, diagnosis, treatment, prognosis
• Complications of major hepatic resection
• Hepatic abscess: pathology, etiology, findings, diagnosis, treatment, prognosis, amebic versus bacterial

PORTAL HYPERTENSION

• Anatomy: portal system and collaterals
• Etiology: presinusoidal, sinusoidal, and postsinusoidal portal hypertension
• Consequences of portal hypertension
• Variceal bleeding: diagnosis, emergency therapy, surgical therapy including indications, methods, prognosis
• Childs’ classification

PANCREAS

Pancreatitis

• Anatomy: ducts, blood supply
• Physiology: exocrine, endocrine
• Etiology, pathogenesis, pathophysiology
• Complications
• Clinical findings and diagnosis: laboratory and radiologic, differential diagnosis
• Medical therapy for acute pancreatitis
• Surgery: indications, techniques available
• Recognition and management of pancreatic pseudocyst, abscess, pancreatic ascites

Pancreatic neoplasms

• Incidence, pathology
• Clinical findings
• Diagnosis: laboratory, radiological, methods for obtaining tissue
• Treatment: curative versus palliative
• Complications
SPLEEN AND LYMPHOPROLIFERATIVE DISEASES

• Anatomy and physiology: functions
• Splenomegaly: diagnosis and workup
• Disease states which sometimes benefits from splenectomy: findings, etiology, and therapy
  • *Hodgkin’s disease*: classification, clinical presentation, methods for clinical staging, indications for and performance of staging laparotomy
  • *Non-Hodgkin’s lymphomas*: differences from Hodgkin’s
• Splenectomy: post-operative and long-term complications

HERNIA

• Anatomy: layers of abdominal wall, important structures in inguinal area
• Classification: reducible, incarcerated, strangulated, sliding, Richter’s
• Types: indirect versus direct inguinal, femoral, umbilical, incisional definitions of rare types of hernia
• Incidence and etiology of common types
• Diagnosis
• Treatment: methods (in general)
• Reasons for recurrences
• Hydrocele, undescended testis, torsion testis: recognition and management

SMALL INTESTINE

• Classification
  
  *Intestinal obstruction*
    • Etiology: adhesion, hernia, tumors, inflammatory disease, volvulus, intussusception, obturator obstruction, vascular obstruction
    • Clinical manifestations: small bowel versus paralytic ileus
    • Complications
    • Therapy: pre-operative preparation, timing of operation
    • Determination of bowel viability
  
  *Neoplasma*
• Incidence, pathology
• Clinical findings
• Diagnosis, treatment
• Peutz-Jeghers syndrome: definition, management

_Radiation injury_
• Etiology, pathology
• Therapy, complications

_Meckel’s diverticulum_
• Definition, location, pathology
• Diagnosis, therapy

_Mesenteric ischemia_
• Anatomy: blood supply, histology
• Clinical findings
• Diagnosis
• Therapy: venous versus arterial

**APPENDIX**
• Anatomy: clinical correlates
• Etiology and incidence of appendicitis
• Clinical findings, confirmatory signs
• Laboratory diagnosis: blood, urine, Xray
• Differential diagnosis
• Therapy: appendectomy versus expectant therapy
• Complications
• Prognosis: ruptured versus unruptured
• Appendiceal tumors: incidence and classification
COLON, RECTUM AND ANUS

Cancer

- Incidence and etiology
- Routes and spread
- Clinical findings: right colon versus left colon versus rectum
- Diagnosis: rectal examination, sigmoidoscopy, X-ray, colonoscopy, carcinoembryonic antigen
- Therapy: extent resection determined by location of tumor
- Treatment in the face of complications: obstruction, perforation, bleeding, extension
- Classification and prognosis

Polyps

- Clinical findings
- Diagnosis
- Treatment
- Pathology
  - Syndromes associated with colonic polyps: familial polyposis, Gardner’s syndrome, juvenile polyps, Peutz-Jeghers syndrome, and pseudo polyposis

Diverticular disease of the colon

- Anatomy
- Etiology
- Clinical findings
- Diagnosis
- Complications
- Non-operative therapy
- Surgical therapy: indications, method
- Radiologic intervention for bleeding
- Diverticulosis versus diverticulitis
- Cecal diverticula: differences
Ulcerative colitis
• Pathology, incidence
• Patterns of involvement
• Clinical findings
• Diagnosis
• Complications: extracolonic, colonic
• Non-operative therapy
• Surgical therapy: indications, methods, complications
• Prognosis

Crohn’s disease
• Pathology
• Patterns of involvement
• Incidence
• Clinical findings
• Diagnosis: laboratory results, radiologic, differentiation from ulcerative colitis
• Non-operative therapy
• Operative therapy: indications, methods, complications
• Anatomy: muscular, venous drainage

Hemorrhoids
• Etiology
• Treatment (operative and non-operative), indications, complications

Anal fissure
• Pathology, etiology
• Clinical findings, diagnosis
• Therapy: non-operative, indications and methods for operative surgery
**Perirectal abscess and fistula**

- Pathology and treatment of perirectal, ischiorectal, perianal abscesses
- Significance and management of fistula

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**VASCULAR SURGERY**

**PERIPHERAL ARTERIES**

- Anatomy of arterial wall
- Atherosclerosis: stages, risk factors, pathogenesis
- Diagnosis of arterial occlusive disease: physical examination, non-invasive procedures, arteriography
- Non-operative management and control of risk factors
- Surgical treatment: endarterectomy, bypass, percutaneous transluminal angioplasty
- Clinical Findings of Acute Arterial Occlusion

**Arterial embolism**

- Diagnosis
- Treatment
- Post-operative complications

**Lower extremity ischemia**

- Anatomy: blood supply and collateral circulation
- Clinical findings
- Non-operative management, care of the diabetic foot
- Indications for operation
- Complications
- Etiology

**Abdominal aortic aneurysm**

- Diagnosis: clinical examination, sonography, aortography
- Operative method and complications
- Risk and treatment of rupture
Cerebrovascular occlusive disease

- Carotid disease: location of plaque, etiology of complications
- Definition of transient ischemia attack, cerebrovascular accident, amaurosis fugax, reversible ischemia neurologic deficit
- Diagnosis: examination, non-invasive, arteriography
- Non-operative therapy
- Operative therapy: indications, method, complications
- Vertebral disease: findings
- Subclavian steal syndrome: etiology, findings, treatment

VEINS AND THROMBOEMBOLISM

Veins

- Anatomy: superficial, deep, perforators
- Pathogenesis of venous thrombosis
- Clinical course and findings
- Diagnosis: clinical, laboratory, radiologic
- Special problems in the pregnant patient
- Therapy of deep venous thrombosis
- Varicose veins: non-operative management, indications for operation
- Superficial phlebitis: findings, management
- Swollen leg: differential diagnosis
- Incidence

CARDIAC SURGERY (ADULT)

HEART

Cardiopulmonary bypass

- Method
- Complications
Acquired heart disease

Valvular Heart Disease

- Etiology: findings, complications, management, indications for and method of operative treatment, prognosis for each of the following:
  - Mitral stenosis
  - Mitral insufficiency
  - Aortic stenosis
  - Aortic insufficiency
  - Tricuspid disease
  - Endocarditis

Coronary artery disease

- Etiology clinical findings, diagnosis, medical therapy, indications for surgical therapy, complications
- Cardiac transplantation: indications
- Aortic Dissection: ascending versus descending, findings, treatment, prognosis
- Classification of Aortic Dissection (Debakey versus Stanford)

Pulmonary embolism

- Diagnosis: clinical, bloods, EKG, radiologic scanning
- Risk factors
- Therapy
- Indications for vena caval interruption: plication versus umbrella
- Massive embolism: findings, thrombolytic therapy, pulmonary, embolectomy
- Prophylaxis of venous thromboembolism: indications and methods

Congenital heart disease

- Etiology
• Occurrence

• Classification, sequelae, treatment: left to right shunt, right to left shunt, obstructive lesions

• Embryology, findings, complications, management, indications for and method of operative treatment, prognosis for each of the following:
  - Atrial septal defect: ostium primum
  - Atrial septal defect: ostium secundum
  - Ventricular septal defect
  - Patent ductus arteriosus
  - Complete atroventricular canal
  - Total anomalous pulmonary venous connection
  - Pulmonic stenosis
  - Aortic valvular stenosis
  - Coarctation of the aorta
  - Tetralogy of Fallot
  - Transposition of the great vessels
  - Vascular ring
  - Hypoplastic Left Heart Syndrome

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**PEDIATRIC SURGERY**

- Choanal atresia

Respiratory distress immediate management, diagnosis, therapy of:

- Diaphragmatic hernia
- Pneumothorax
- Congenital lobar emphysema
- Esophageal atresia, trachea-esophageal fistula
- Cervical teratomas
- Congenital goiter
- Pierre-Robin syndrome
- Massive pneumoperitoneum
- Aspiration of foreign body
- Other: vascular ring, mediastinal masses, retropharyngeal abscess

**Intestinal obstruction**: diagnosis and therapy of:
- Duodenal obstruction
- Small bowel atresia
- Imperforate anus
- Meconium ileus, meconium plug
- Hirschsprung’s disease
- Pyloric stenosis
- Intussusception
- Malrotation, volvulus

**Jaundice**: diagnosis and therapy of:
- Biliary atresia
- Choledochal cyst
- Cholelithiasis in children
- Hematological

**External anatomic defects**: complications and therapy of:
- Omphalocele
- Gastrochisis
- Meningocele
- Inguinal hernia, torsion testis, torsion appendix testis, undescended testis, hydrocele
- Umbilical hernia
- Sacrococcygeal teratoma

**Abdominal mass**: diagnosis, etiology, treatment, prognosis of:
- Multicystic kidney
- Polycystic kidney
- Neuroblastoma
- Wilm’s tumors
- Ovarian tumors
- Rhadomyosarcoma

**Peritonitis in the newborn:**
- Meconium peritonitis
- Gastric perforation
- Necrotizing enterocolitis

### ANESTHESIOLOGY

- Regional anesthesia: mechanism of action, adverse reactions, recognition and treatment of complications
- Spinal anesthesia: methods, complications
- General anesthesia: advantages and disadvantages of commonly used agents including: nitrous oxide, cyclopropane, diethyl ether, halothane, enflurane, methoxyflurane, ketamine, narcotics, barbiturates, neuromuscular blockers
- Systemic effects of inhalation agents: respiratory, circulation, renal, hepatic, central nervous system, ocular
- Airway management, recognition of malfunctioning equipment
- Malignant hyperthermia: mechanism, predisposing factors, findings, therapy, prognosis, prevention
- Anesthetic risk factors and classification of patients
- Monitoring

### PLASTIC SURGERY

- Basic principles of cosmetic skin incision and wound closure
- Skin grafting and flaps: advantages and disadvantages of common methods
- Management of pressure sores
WOUND HEALING AND INFECTION

• Wound healing
• Mechanisms and clinical correlates: first, second, third, intension
• Factors which inhibit wound healing

Surgical infections

• Antibiotics: bacterial sensitivities, complications
• Antibiotic prophylaxis: indications and methods
• Wound infection: etiology, prevention
• Intraabdominal abscess: etiology, clinical findings, radiologic diagnosis, therapy of subphrenic, sub hepatic, pelvic abscesses

SKIN AND SOFT TISSUES

Melanoma
• Etiology, location, appearance
• Clinical classification
• Histologic classification
• Clinical course and treatment
• Soft tissue sarcomas
• TNM Classification
• Prognosis
• Management: surgical, adjuvant

Burns

Thermal injuries
- Physiology: functions of intact skin
- Classification of burns: first, second and third degree
- Estimation of percent of body surface burned (Parkland Formula)
- Complications: fluid and electrolyte losses, red cell loss, catabolism, decrease in cardiac output, paralytic ileum, ulcer, pulmonary, infection, special problems in children
TRANSPLANT SURGERY

- Indications

Kidney transplantation
- Selection of donor: ABO blood grouping, mixed lymphocyte, ML-A typing
- Organ procurement: brain death, consent
- Post-operative therapy: azathioprine, cyclosporine, prednisone, antithymocyte globulin
- Rejection: etiology, timing, findings, and therapy of Hyperacute, accelerated, acute, chronic rejection
- Other complications: acute tubular necrosis, sepsis, technical, steroid-related, cancer, atherosclerosis
- Prognosis
- Renovascular hypertension
- Physiology: rennin, angiotension
- One kidney versus two kidney models

Etiology
- Diagnosis
- Treatment: medical versus surgical

Liver Transplantation
Indications (MELD Score)
Donor selection
Operative technique (including Partial Liver)
Survival Statistics
Lung Transplantation

Indications: Specific Disease Diagnoses

Donor selection

Operative technique (Single v. Double Lung Transplant)

Long Term Survival

TRAUMA SURGERY

- Management: pre-hospital, resuscitation, primary assessment, secondary assessment, ancillary diagnostic modalities

- Neck trauma: diagnosis and therapy of injuries of airway, esophagus, cervical spine or cord, vessels, nerves

- Chest trauma: diagnosis and therapy of: rib fractures, hemothorax, pneumothorax, ruptured bronchus, aortic tear, cardiac injury, diaphragmatic rupture, pulmonary contusion, adult respiratory distress syndrome, Thoracoabdominal injury esophageal injury

Abdominal trauma

- Evaluation and immediate treatment including indications for tap and lavage and for laparotomy (ceiotomy):

- Principles of management of injuries involving: kidney, ureter, bladder, urethra, spleen, gallbladder, common bile duct, pancreas, stomach, duodenum, small bowel, colon, rectum, major vessels

Extremity Trauma

- Evaluation of the injury extremity

- Principles of splinting fractures

- Definition of opened, closed, pathologic, stress compression, green stick, and torus fractures

- Delayed union and non-union: definitions and etiology

- Recognition and treatment of common fractures and dislocations: clavicle, humerus, distal forearms, wrist, hands, femur, knee joint, leg, ankle, foot, pelvis

- Principles of functioning, including anatomical relations

- Rehabilitation following trauma: assessment of disability, restoration of function

- Special problems in pediatric trauma
ORTHOPEDIC SURGERY

- Recognition and management of:
  - Pyogenic arthritis
  - Bone and joint tuberculosis
  - Rheumatoid arthritis
  - Osteoarthritis
  - Gout
  - Painful shoulder
  - Spinal deformities
  - Knee deformities
  - Contractures
  - Epiphyseal disorders
  - Metabolic diseases
  - True bone tumors

The hand
- Evaluation of hand injuries
- Principles of repair of tendon and osseous injuries
- Recognition and management of: entrapment syndromes, paronychia, terminal pulp infections, acute cellulites, tendon sheath infection, infective arthritis

UROLOGY

- Significance and differential diagnosis of:
  - Hematuria
  - Urinary retention
  - Incontinence
- Ureteral colic
- Frequency
- Nocturia
- Urgency
- Dysuria
- Changes in urinary stream
- Erectile and ejaculatory dysfunction
  • Recognition and management of:
  - Acute infections
  - Chronic infections
  - Urinary calculi
  - Urogenital neoplasms

**NEUROSURGERY**

• General principles of neurologic examination and diagnosis

• Recognition, diagnosis and management of:
  - Skull and spinal injuries and anomalies
  - Lesion of spinal cord and peripheral nerves:
    - Intracranial hemorrhage: epidural, subdural, subarachnoid, intracerebral
    - Brain tumors
    - Aneurysms and arteriovenous malformation
    - Central nervous system infections
    - Hydrocephalus
    - Increased intracranial pressure

• Methods and indications for surgical relief of pain