



SAUDI BOARD GENERAL SURGERY CURRICULUM

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Preparation

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INTRODUCTION

General surgery is a five-year structured training program, upon completion of which the trainee will have developed basic knowledge, clinical skills, and professionalism. The key focus of the program is to develop a broad base of knowledge in general surgery. Trainees progressively acquire in-depth knowledge of the diverse field of general surgery specialty during their training.

Residents also develop clinical skills by utilizing appropriate diagnostic, investigative, and therapeutic judgment. Trainees acquire and sharpen their surgical skills in all general surgery specialties through training in safe practices, become competent in the management of common and serious diseases, and learn to effectively manage emergency cases.

The program focuses on professional behavior and medical ethics, as well as quality management and cost effectiveness. It also implements the seven principles of the CanMEDS roles, which will be the standard for the general surgery program accredited by the Saudi Commission for Health Specialties (SCFHS)

The foremost objective of the residency program is to graduate competent and well-trained residents, who are capable of functioning independently and able to provide optimal patient care in the field of general surgery.

FORWARD

The Canadian Medical Education Directives for Specialists (CanMEDS) framework, which is applied in postgraduate training programs in many countries, offers a model of physician competence that emphasizes not only biomedical expertise, but also multiple additional non-medical expert roles that aim to better serve societal needs. Therefore, the Saudi commission for health specialties (SCFHS) is adopting the CanMEDS frameworks in developing the core curriculum of all training programs, including the Saudi Board Certification in general surgery. Hence, the trainee will function within the seven Roles of CanMEDS: Medical expert, Communicator, Collaborator, Manager, Health advocate, Scholar, and Professional.

Curriculum development involved a systematic process including the selection of the curriculum development committee members and a series of meetings with the curriculum advisory members. Then, the curriculum template recommended by SCFHS was used to integrate the CanMEDS framework, the content was refined, and a short version of the curriculum was developed before submission for scientific committee approval.

The purpose of the curriculum is to provide a comprehensive unified reference for the Saudi Board residency training program in general surgery, which includes details concerning the learning process, training, assessment, and certification.

In order for the curriculum to be implemented, collaborative support is needed from SCFHS, the training centers, program supervisors, and clinical tutors.

There shall be a five-year periodic review of the curriculum, during which the Scientific Board of General Surgery will make decisions regarding further refinements and continuous quality improvement.

DEFINITIONS USED IN THE DOCUMENT

Assumed knowledge: Knowledge that each resident is expected to have before the start of a level or rotation.

Attitudes and behaviors: Expressions, actions, or reactions (favorable or unfavorable) toward others.

Competency: The ability of a resident to do a job or task properly.

Core skills, knowledge, and professional behavior: Specific skills, knowledge, or professional behaviors that are specific to the given specialty.

Knowledge: A familiarity, awareness, and understanding of subjects, which is acquired through the program.

Mastery: Knowledge and skills that are needed to allow a resident to practice independently.

Portfolio: A purposeful collection of work that exhibits a resident's efforts, progress, and achievements while in the training program. A portfolio allows residents to define who and where they are on the journey to becoming fully trained surgeons.

Skills: The learned ability to carry out a task with pre-determined results.

Universal: Knowledge, skills, or professional behaviors that are not specific to the given specialty but universal for the practice of clinical medicine.

CONTEXT OF PRACTICE

Historical background

The Saudi Board of General Surgery started in 1995 as one of the core training programs of the Saudi Commission for Health Specialties (SCFHS). The Saudi Board of General Surgery also facilitates training of several other surgical specialties, either as prerequisites for training or as part of training requirements; some of these specialties are subsequently completely separate.

Nature and scope of the practice

The curriculum is a five-year structured program for training in general surgery. It encompasses education in basic sciences, training in cognitive and technical skills, development of clinical knowledge and maturity, and acquisition of surgical judgment.

The program provides an opportunity for in-depth learning of the fundamentals of basic sciences as applied to clinical surgery.

Training hospitals

The Saudi Commission requires hospitals to meet certain criteria before granting accreditation for training and requires the maintenance of these standards throughout the training period. Regular program evaluation visits are conducted by the commission for all accredited programs.

Profile of practice

A graduate of the Saudi Board in general surgery is expected to work as a competent specialist in the general surgical field.

The graduate is expected to meet the following criteria with respect to capabilities and skills:

- Have sound knowledge of the principles of surgery.
- Formulate reasonable and comprehensive differential diagnoses for common surgical disorders.
- Recognize emergency surgical situations and manage them effectively.
- Select relevant investigations logically and conservatively, and interpret their results accurately.
- Manage common problems in general surgery and have knowledge of management alternatives.
- Perform specified surgical, diagnostic, and therapeutic procedures and operations; especially those used in the management of emergencies and common surgical problems.
- Communicate well with patients, their relatives, and colleagues.

- Keep orderly and informative medical records.
- Stay educated and updated, and inform others in the field.
- Advise colleagues from other specialties with regard to problems related to surgery.
- Possess high ethical and moral standards.

Subsequently, the Saudi Board certified specialist is expected to complete a 2–3 year fellowship (local or overseas) in one of the general surgery subspecialties including acute care, bariatric, breast, colorectal, endocrine, hepatobiliary, minimal invasive, oncology, pediatric, transplant, trauma, upper GIT, and vascular surgery.

Career paths

- Currently, the SCFHS is conducting a fellowship program in breast and endocrine, colorectal, pediatric, and vascular surgery. Many overseas fellowship programs recognize the Saudi Board in general surgery and most graduates obtain further training abroad.
- A board-certified specialist will be appointed as a senior registrar for three years before becoming a consultant. He/she can choose between an academic and non-academic career.

Future directions

- The general surgery training program will continue as the main surgical training program in the near future; however, there will be more integration of evidence-based training and more research activities.

PROGRAM FRAMEWORK

General training requirements

- a. Applicants should fulfil all admission requirements set by the Saudi Commission rules and regulations for admission into Saudi Board programs.
- b. Trainees shall abide by the training regulations and obligations as set by the Saudi Commission for Health Specialties.
- c. Training is a full-time commitment. Residents shall be enrolled in full-time, continuous training for the entire program period.
- d. Training is to be conducted in institutions accredited for training by the Saudi Commission for general surgery.
- e. Trainees shall be actively involved in patient care with gradual progression of responsibility.

Structure of the training program

The Saudi Board residency program in general surgery is a five-year structured program. The first three years are at the junior residency level and the last two years are at the senior residency level. During the junior level, the resident will spend 24 months in general surgery and rotate in other specialties for 12 months; however, residents should not be absent from general surgery for more than six months at a time. Trainees are required to attend and participate in the academic and clinical activities of the department, such as ward rounds, journal clubs, surgical pathology, radiology, immunology, and other activities. Attendance and participation shall not be less than 75% of the number of activities within any training rotation/period.

Clinical rotations

Junior level (R1, R2, and R3)

Rotation in general surgery (24 months)

Rotation outside general surgery (12 months)

Intensive care unit (12 weeks)

Emergency department (12 weeks)

Vascular surgery (6 weeks)

Pediatric surgery (6 weeks)

Plastic surgery (6 weeks)

Elective rotation (6 weeks)

Vacation (4 weeks)

Junior residents must spend no more than six months outside of general surgery.

Senior level (R4 and R5)

Rotation in general surgery (24 months)

Candidates shall spend the final two years of training (R4, R5) as senior residents in general surgery units, where they will be responsible for managing emergency and elective admissions, organizing educational activities, and supervision of junior colleagues. Senior residents shall acquire gradual independence during this period of training.

Research activity

The trainee shall be encouraged to participate in research activities during the training program under the guidance and supervision of the trainers. At least one research project should be published before taking the final examination.

Continuum learning

R1 – 3 (JUNIOR LEVEL)	R4 – 5 (SENIOR LEVEL)	BOARD-CERTIFIED
Obtain fundamental knowledge related to core clinical problems of general surgery.	Apply knowledge to provide appropriate clinical care related to core clinical problems of general surgery.	Acquire advanced and up-to-date knowledge related to core clinical problems of the specialty.
Develop clinical skills such as physical examination and practical procedures related to general surgery.	Analyze and interpret findings using clinical skills to develop appropriate differential diagnoses and management plans for patients.	Compare and evaluate challenging and contradictory findings and develop expanded differential diagnoses and management plans.

LEARNING OUTCOMES AND CLINICAL COMPETENCIES

The program learning outcome is based on fulfilling the CanMed competencies as listed below.

Communicator

- Demonstrate the communication skills necessary to obtain a thorough and focused history.
- Convey pertinent information from the history and physical examination in diverse circumstances.
- Communicate effectively with patients and their families with respect to their medical conditions, in the ER, clinic, and ward.
- Demonstrate sympathy to the family and patient. Discuss individual patients with the appropriate attending staff on a daily basis.
- Cohesively and concisely discuss patients at weekly service rounds.
- Present and discuss complications at the morbidity and mortality rounds.
- Document the patient's admission and progress accurately while in the hospital, with emphasis on the relevant issues.
- Interact effectively with other healthcare professionals.
- Participate in social service rounds and meetings with family members to discuss the smooth transition from hospital to home.
- Demonstrate good communication skills with patients in the emergency room and clinic.
- Discuss the diagnosis and treatment plan in a way that fosters patient satisfaction and compliance.
- Demonstrate good communication skills with the supervising surgeon and other members of the healthcare team, including nurses, physiotherapists, and occupational therapists (and social workers, for senior and chief residents in particular).

- Deliver information in a humane manner that is understandable and encourages discussion.
- Establish a trusting relationship with patients.
- Understand the importance of working in a healthcare team.
- Understand the impact of the community on the patient.

Collaborator

- Demonstrate effective and thoughtful use of consultants in the management of the surgical patient.
- Identify the need to and benefit of consulting other healthcare professionals and be able to discuss patient management in a collegial way.
- Demonstrate a willingness to be consulted by other healthcare professionals and discuss patient management in a collegial way.
- Participate in the Tumor Board conference and discuss newly diagnosed cancer cases in terms of radiation and medical oncology.
- Consult other healthcare professionals, demonstrate respect for their opinions, and develop a care plan in collaboration with these professionals.
- Demonstrate a willingness to consult other physicians (such as hepatologists and microbiologists) when managing their patients.
- Effectively present cancer cases to a Tumor Board and discuss the results with the patients and their families.
- Understand that in a community hospital, collaboration with family physicians both inside and outside the operating room (OR) is crucial.
- Understand limitations in terms of the ability to consult other services in a hospital.

Health Advocate

- Identify determinants of health unique to a hospital serving a multi-ethnic community (i.e.: genetic diseases such as breast and colorectal cancer).
- Advise patients and their families regarding prevention of disease, screening, and health maintenance.
- Demonstrate the ability to organize ancillary tests in a timely fashion
- Disseminate the population screening guidelines for breast and colorectal cancer.
- Disseminate the complications of excess body weight and identify those that can be reversed with significant weight loss.
- Respond to the particular community's health needs.

Manager

- Demonstrate judicious use of expensive radiologic tests and interventions. As a senior or chief resident, demonstrate skill at running the team.
- As a junior resident, demonstrate the ability to manage time appropriately between the ward, emergency room, and OR responsibilities.

- Demonstrate an ability to manage patients on the ward and in the emergency room with appropriate and efficient use of ancillary tests.
- For senior residents, be able to build a cohesive team that is punctual, and respects the personal life of all its members.
- Demonstrate the ability to use information technology, whether it is a hospital clinical information system (CIS) or the Internet, to optimize patient management.
- Be able to prioritize problems appropriately.
- Be able to work efficiently and effectively.
- Make clinical decisions in the emergency room based on an efficient and effective use of healthcare resources.
- Understand how to utilize information technology to optimize patient care and continued self-learning.
- Demonstrate an understanding of the importance of properly utilizing finite healthcare resources in the management of diseases such as gallstone pancreatitis.
- Learn to manage patients within the limited resources of a community hospital. Learn when and how to transfer patients to tertiary faculties for care.

Scholar

- Participate in the Journal Club.
- Demonstrate a willingness to teach others during rotations.
- Demonstrate the ability to use evidence-based medicine to address clinical dilemmas.
- Offer critical analysis and discussion of current literature at Surgical Grand Rounds.

1. Clinical

- a. Recognize areas of weakness in knowledge or skills.
- b. Formulate a plan to correct the weakness (e.g., spend more time in the Laparoscopic Skills Lab; perform structured literature searches about a specific clinical question encountered during service).
- c. Recognize and identify gaps in knowledge and expertise surrounding clinical questions. Formulate a plan to fill gaps and present newly acquired knowledge at General Surgery Rounds.
- d. Critically appraise sources of medical information.

2. Research

Based on their clinical exposure, residents will have the opportunity to start generating a research question (basic science, clinical, population health, or a combination).

They will develop a proposal to answer the research question through the following steps:

- a. Conduct an appropriate literature search.
- b. Assimilate and critically evaluate the literature.
- c. Propose appropriate methods for conducting the research.
- d. Conduct the research and present the results.

3. Education

- a. Demonstrate a desire and ability to teach others, including junior residents, non-general surgery residents, and medical students.
- b. Understand the principles of adult learning when teaching others.
- c. Demonstrate self-directed learning in the preparation of cases for Rounds or for the OR.
- d. Help community hospital surgeons discuss recent research literature and bring evidence-based surgery into the community hospital.
- e. Encourage evidence-based review (Journal Club) presentations and appropriate use of information technologies.

Professional

- Demonstrate professionalism (honesty, altruism, integrity, and compassion) in one's attitudes towards patients and other healthcare professionals.
- Demonstrate a balance between personal and professional roles and responsibilities and identify methods to resolve conflicts and role strain.
- Know and understand the professional, legal, and ethical codes to which physicians are bound. Demonstrate humility in one's approach to clinical practice.
- Demonstrate a level of professionalism consistent with the practice of surgery, particularly in the areas of:
 - i. Punctuality
 - ii. Politeness
 - iii. Availability
 - iv. Empathy
 - v. Appropriate dress
 - vi. Respect for patients' privacy
- Demonstrate a sense of responsibility by ensuring continuity of care for patients.

- Demonstrate an understanding of one’s own limitations and know when to call for help in difficult situations.
- Recognize and resolve ethical issues as they arise in surgical care, including issues of informed consent, level of intervention discussions, and advance directives.
- Demonstrate an ability to interact with patients, nurses, pharmacists, etc. with integrity, honesty, and compassion.
- Demonstrate self-evaluation and continued receptiveness to criticism.
- Practice medicine with integrity and honesty.
- Respect the particular needs of the community physicians and patients.
- Continually assess one's medical practice in order to improve:
 - a. Commitment to lifelong learning by reading textbooks and journals, discussing difficult/complex cases at rounds, and participating in teaching and research.
 - b. Emphasis on honesty, including full disclosure of iatrogenic complications, taking responsibility, and having collegial/collaborative relationships with all healthcare workers.
 - c. Sensitivity to the impact of age, gender, socio-economic status, and cultural differences on the perception of illness, outcome, and treatment by patients and their families.
 - d. Appreciation for the medico-legal aspects of detailed legible documentation, informed consent, and complications, occurring in the context of training.
 - e. An understanding of the importance of cost-effective management of available resources in the current healthcare industry.

Medical Expert

1. Knowledge of Principles of Surgery

- a. Knowledge of the anatomy of the anterior abdominal wall, breast, neck, oral cavity, esophagus, stomach, duodenum, small intestine, appendix, large intestine, rectum and anal region, gallbladder, extrahepatic biliary tree, liver, pancreas and spleen,.
- b. Knowledge of the physiology of the cardiac, respiratory, renal, gastrointestinal, hepatobiliary, pancreatic, immune, and vascular systems.
- c. Knowledge of the pathology of common inflammatory and malignant conditions.
- d. Ability to perform a concise history of present illness and physical exam.
- e. Ability to interpret common laboratory & radiologic tests.
- f. Ability to provide a legible, clear, and concise written record of consultation reports, pre-op and postop notes, progress notes, and discharge prescriptions.

2. Knowledge of Clinical Surgery

Ability to diagnose and understand the pathophysiology, history, investigation, and management of different systems in relation to general surgery, including the following:

- The breast and endocrine system
- Hernias, abdominal wall, and soft tissue tumors
- Upper GIT (esophagus, stomach, and small intestine)
- Lower GIT (appendix, colon, rectum, and anus)
- Gastrointestinal bleeding
- Hepatobiliary (liver, pancreas, and spleen)
- Acute abdomen
- Surgical management of obesity
- Subspecialty surgery (vascular/pediatric/plastic)

3. Technical skills

Junior Resident (R1–R2–R3)

- Demonstrate aseptic technique in performing operative and bedside procedures. Recognize the appearance of normal and abnormal tissues in the operating room.
- Gain proficiency in a variety of psychomotor skills (e.g., reduction of incarcerated inguinal hernia, wound closure, knot tying).
- Understand the principles of laparoscopy.
- Perform an umbilical, inguinal, and femoral hernia repair using tension-free techniques.
- Perform an open incisional hernia repair with or without mesh.
- Perform a complete examination of the anorectal region, including anoscopy.
- Perform lateral internal sphincterotomy for anal fissure under anesthesia.
- Perform breast biopsy and breast lump excision.
- Perform soft tissue lump excision and lymph node biopsy.

Senior Resident (R4–R5)

- Perform basic laparoscopic techniques:
 - Perform trocar insertion using the open technique in different locations of the abdomen, including with patients who have had extensive previous abdominal surgery.
 - Troubleshoot equipment.
 - Perform simple suturing using laparoscopic instruments.
 - Perform laparoscopic cholecystectomy, both electively and for acute cholecystitis.
 - Mobilize the right and left colon laparoscopically.
 - Mobilize the esophagus laparoscopically.
 - Perform lysis of adhesions and run the small bowel by laparoscopy.
 - Perform laparoscopic appendectomy.
 - Perform laparoscopic incisional hernia repair.

- Perform thyroidectomy and parathyroidectomy.

- Be familiar with the techniques and use of a harmonic scalpel, bipolar sealing device, and monopolar cautery, including the pitfalls and potential risks.
 - Colonic and rectal resections and reconstructions, using sutured and stapled techniques, for malignant disease and inflammatory bowel disease
 - Gastric resection and reconstruction (gastro-jejunostomy, Roux-en-Y)
 - Small bowel and large bowel resection; low anterior resection
 - Standard ileostomy and colostomy formation and closure
 - Biliary tract disease: common bile duct exploration; biliary-enteric anastomosis
 - Distal pancreatectomy
 - Splenectomy

4. Generic Competencies

4.1. Anatomy

Unit Objectives

- Demonstrate knowledge of anatomy that is pertinent to the practice of surgery.
- Apply knowledge of anatomy to the diagnosis and treatment of surgical patients.

Competency-Based Knowledge Objectives

1. Outline the general concepts of anatomy and its subdivisions:
 - a. Gross and cellular anatomy
 - b. Molecular biology
2. Compare the characteristics and functions of tissues and their components:
 - a. Skin
 - b. Digestive system
 - c. Circulatory system
 - d. Urinary system
 - e. Nervous system
 - f. Reproductive system
 - g. Musculoskeletal system
 - h. Respiratory system
3. Review, identify, and delineate the vulnerable structures encountered in surgical operations:
 - a. Cricothyroidotomy
 - b. Mastectomy
 - c. Inguinal hernia repair
 - d. Cholecystectomy
 - e. Insertion of chest tubes
 - f. Appendectomy
 - g. Colectomy
 - h. Thyroidectomy
 - i. Resection of the liver
4. Discuss visualization differences in organ structures by various technologies:
 - a. Routine radiograms
 - b. Contrast studies
 - c. Computed tomography (CT) scans
 - d. Ultrasound
 - e. Magnetic resonance imaging (MRI) scan
 - f. Angiograms
 - g. Positron emission tomography (PET)
5. Define and describe anatomical aspects of complex general surgical operations:
 - a. Bowel exposure maneuvers
 - b. Whipple procedure
 - c. Abdominoperineal resection
 - d. Bowel resection
 - e. Radical neck dissection
 - f. Trauma laparotomy
6. Interpret various imaging technologies to derive anatomic information.

Competency-Based Performance Objectives

Integrate knowledge of anatomy into the following:

- a. The diagnosis of general surgical diseases
- b. Explanations to patients and their families regarding:
 - Planning of surgical procedures
 - Progress of disease
 - Explanation of complications
- c. The performance of surgical procedures appropriate for the level of training
- d. Postoperative management of the patient, including long-term follow-up

4.2. Physiology

Unit Objectives:

- Demonstrate knowledge of normal and abnormal physiology causing surgical diseases.
- Demonstrate knowledge of the effects of age on the physiologic functions of the organs.
- Apply physiological knowledge to the clinical and operative management of surgical diseases.
- Demonstrate an understanding of normal fluid and electrolyte homeostasis.
- Demonstrate the ability to maintain homeostasis by recognizing and correcting fluid and electrolyte derangements.

Competency-Based Knowledge Objectives:

1. Describe concepts of normal physiology:

- | | |
|--|--|
| a. Fundamentals of cell differentiation | g. Regulatory renal function |
| b. Endocrine control of development | h. Wound healing and inflammatory response |
| c. Homeostasis and cellular mediators | i. Oncogenesis |
| d. Normal respiration and gaseous exchange | j. Neurophysiology of pain |
| e. Fluid mechanics and dynamics | k. Response to sepsis |
| f. Coagulation and fibrinolysis | l. Immune response |

2. Identify physiological variations in geriatric, immunosuppressed, and pregnant patients.

3. Indicate the normal values of commonly applied clinical tests.

4. Describe the application of physiological principles to surgical monitoring and therapy, including the following approaches:

- a. Ventilator management
- b. Renal function studies
- c. Noninvasive vascular testing

- d. Interpretation of results of common metabolic panel blood tests
 - e. Interpretation of electrocardiogram (EKG), cardiac echoes, and other cardiac function studies
 - f. Interpretation of a nutritional profile
 - g. Endocrine function studies
5. Describe the abnormal physiology of complex diseases or entities:
- a. Cardiac failure
 - b. Renal failure
 - c. Pulmonary failure
 - d. Immunosuppression and malignancy
 - f. Intestinal obstruction
 - g. Malnutrition
 - h. Cardiopulmonary bypass
 - i. Advanced age
6. Describe body water volumes and distribution.
7. Indicate the normal electrolyte distribution of cell water and extracellular fluid to include the following:
- a. Sodium
 - b. Potassium
 - c. Chloride
 - d. Bicarbonate
 - e. Calcium
 - f. Magnesium
 - g. Phosphate
8. Outline the normal electrolyte content of body fluids such as blood, extracellular fluid (ECF), urine, saliva, gastric juice, bile, and pancreatic fluid.
9. Identify water and electrolyte changes in response to various stress situations:
- a. Diseases, including trauma and burns
 - b. Operative and non-operative therapy
10. Apply the physiology of water and sodium imbalance to the following:
- a. Extracellular fluid volume (ECFV) depletion
 - b. ECFV expansion
 - c. Hyponatremia (hypo-osmolarity)
 - d. Hypernatremia (hyperosmolarity)
11. Explain the treatment of water and sodium imbalances, and complications of diuretic use and fluid restrictions.
12. Summarize normal potassium physiology, causes, and consequences of depletion and excess, and treatment for potassium imbalance.
13. Discuss complexities of calcium, phosphorus, and magnesium excesses and deficiencies in the following:
- a. Metastatic breast cancer
 - b. Hepatic failure
 - c. Hyperparathyroidism
 - d. Milk-alkali syndrome
14. Illustrate treatments for high and low calcium, phosphorus, and magnesium.
15. Outline the pathophysiology of fluid and electrolyte problems in cardiac and peripheral revascularization, including reperfusion injury.

Competency-Based Performance Objectives:

1. Interpret laboratory tests and clinical findings based on physiological concepts.
2. Manage patients with surgical illnesses and/or major physiological disruptions:
 - a. Liver failure
 - b. Malnutrition
 - c. Renal failure
 - d. Bowel obstruction
 - e. Hemorrhage
 - f. Cardiopulmonary failure
 - g. Electrolyte imbalance
 - h. Endocrine disorders)
 - i. Sepsis
 - j. Shock
 - k. Immunosuppression
 - l. Diabetes
 - m. Advanced age
3. Adapt treatment plans to reflect physiological variations in pediatric, geriatric, and pregnant patients.
4. Utilize clinical findings, laboratory tests, and hemodynamic measurements to alter patient physiology.
5. Interpret hemodynamic monitoring and adjust treatment to restore homeostasis. Insert, maintain, and monitor arterial, venous, and central line catheters.
6. Solve problems interfering with normal hemostasis.
7. Analyze pulmonary function tests, solve problems of abnormal respiration, and delineate weaning parameters.
8. Use patient fluid balance data as a general measure of fluid homeostasis.
9. Estimate the patient's state of sodium and water balance by history and physical examination, in the following locations/situations:
 - a. Emergency department
 - b. Preoperative and postoperative patients
 - c. In conjunction with nutritional considerations, in patients on long-term total parenteral nutrition (TPN)
10. Coordinate orders involving nutrition, acid-base, and electrolyte problems.
11. Apply fluid and electrolyte principles.
12. Manage outpatients and inpatients with hypo- and hyper-kalemia.
13. Manage patients with hypo- and hyper-calcemia.

4.3.Surgical Infections

Unit Objectives:

- Demonstrate an understanding of the principles of infection, diagnosis, and treatment.
- Demonstrate an understanding of the presentation and treatment of common surgical infections.
- Demonstrate an understanding of methods used to minimize infectious complications.
- Demonstrate an understanding of techniques to minimize risk of viral infection (e.g., hepatitis, HIV/AIDS)

Competency-Based Knowledge Objectives:

Section One: Mechanisms of Infection, Surgical Hazards, and Epidemiology

1. Discuss the mechanisms of infection acquisition in surgical patients, such as:
 - a. Mode of transmission (Community-acquired, nosocomial, or procedure-related)
 - b. Patient risk factors
 - c. Methods of prevention
2. Explain the role of bacterial inoculum and virulence, as well as local and systemic adjuvant factors that contribute to infection and abscess formation.
3. Discuss how the host defenses of dissemination, inflammation, and loculation participate in the coordinated inflammatory response to infection and subsequent abscess formation.
4. Demonstrate an understanding of and correct technique for hand washing (the most important method for preventing infectious disease transmission).
5. Analyze the infectious disease risks to which patients and surgeons are exposed. Consider the most common infections and the use of universal precautions to minimize disease transmission.
6. Understand the operating room wound classification system as it applies to infection rate surveillance.
7. Understand the impact of “surgeon-related” factors to surgical infections such as length of operation, handling of tissues, electrocautery, choice of suture, and hair clippings.
8. Summarize related factors and frequency of occurrence of the following in a febrile patient:

a. Altered mental status	d. Respiratory rate
b. Leukocytosis	e. Serum glucose
c. Rapid change in functional status	f. Serum sodium
9. Discuss the significance of the following organisms to patients:
 - a. Gram-positive cocci (coagulase-negative staphylococci, Staph. aureus, enterococci)
 - b. Gram-negative bacilli (E. coli, Klebsiella species)

Section Two: Surgical Infections

1. Describe the mode of transmission, diagnosis, and treatment of surgical infections for the following:
 - a. Those common to all patients (pneumonia, urinary tract infections, skin infections)
 - b. Those cared for by surgeons (e.g., diabetic foot ulcers, postop abdominal abscesses)
2. Describe sources of postoperative fever; outline a diagnostic approach and plan for intervention.
3. Differentiate between types of postop pneumonia (non-ventilatory-associated, aspiration-acquired, ventilatory-associated), and their risk factors, diagnostic clues, and treatment
4. Demonstrate an understanding of intra-abdominal abscesses, paying attention to:
 - a. Etiology
 - b. Bacterial participation
 - c. Surgical management
 - d. Therapy failure
5. Differentiate between cellulitis, lymphangitis, lymphadenitis, fasciitis, and abscess, and their management.
6. Discuss the pathophysiology, diagnosis, and treatment of necrotizing fasciitis, with special attention to risk factors and physical examination findings.
7. Outline the advanced trauma life support (ATLS) guidelines for tetanus prophylaxis and treatment for *Clostridium tetani* infection.
8. Summarize characteristics of those fungal infections of surgical significance, differentiating between community-acquired, nosocomial, and opportunistic infections.
9. Describe viruses of surgical significance, indicating their prevalence and modes of transmission.
10. Outline management strategies for the diagnosis and treatment of infected catheters, implantable devices, and surgical hardware.

Section Three: Use of Antibiotics in Surgery

1. Summarize indications for prescribing prophylactic antibiotics associated with:
 - a. Clean procedures (hernia, vascular, thyroid)
 - b. Clean-contaminated procedures (gastrointestinal (GI), genitourinary (GU), oropharyngeal)
 - c. Contaminated procedures
 - d. Implantable devices:
 - Vascular grafts
 - Soft tissue implants and synthetic reinforcements (breast, hernia)
2. Analyze situations where prophylactic antibiotics are discouraged:
 - a. Burns
 - b. Post-splenectomy patient
 - c. Early aspiration
3. Discuss the importance of timing and dosing for prophylactic antibiotic use; analyze antibiotic use in older patients and analyze potentially adverse consequences of their use.

4. Justify the empirical first-line approach to antibiotic use in the treatment of surgical infections and early intra-abdominal infection.
5. Summarize the method by which microbiologic data are gathered, interpreted, and applied to altering antibiotic choice, dose, and duration.
6. Discuss the mechanism of action, mechanism of resistance, applications, side effect profile, and costs of the following antimicrobials:

a. Penicillins	e. Metronidazole	i. Anti-virals
b. Cephalosporins	f. Quinolones	j. Anti-fungal
c. Vancomycin	g. Aztreonam	k. Aminoglycosides
d. Erythromycin	h. Sulfonamides	

Competency-Based Performance Objectives

1. Appropriately diagnose and treat common infections seen in surgical patients.
2. Make appropriate and timely diagnoses for infections in postoperative patients; alter therapy as dictated by clinical, radiologic, and microbiologic response.
3. Diagnose and treat necrotizing fasciitis and Clostridium perfringens infections.
4. Prepare patients for elective surgery by providing prophylactic antibiotics when indicated.
5. Coordinate the treatment of aggressive soft tissue infections to include:
 - a. Early operative debridement and re-debridement as necessary
 - b. Urinary and fecal diversion when necessary
 - c. Antibiotic management
 - d. Postoperative critical care, including fluid and nutrition management
6. Identify sources of implantable device infection; confirm diagnosis and treat such infections.
7. Practice the effective use of universal precautions, including meticulous hand washing to minimize infection transmission risk from health care professional (HCP) to patient, and vice versa.
8. Work with members of infectious disease teams in the management of complex surgical wounds.

4.4. Wound Healing

Unit Objectives:

- Demonstrate an understanding of the physiology of wound healing.
- Demonstrate the ability to manage complex wound care in a variety of settings.

Competency-Based Knowledge Objectives:

1. Describe the physiological process of normal wound healing.
2. Explain the factors that affect wound healing.
3. Describe the steps of normal wound healing, including
 - a. Inflammation
 - b. Proliferation
 - c. Remodeling
 - d. Epithelialization
 - e. Contracture/contraction
4. Discuss the pathophysiology of delayed wound healing.
5. Discuss the principles of aseptic technique in uncomplicated cases related to the following:
 - a. Incision making
 - b. Debridement
 - c. Wound closures
 - d. Dressings, splints, and casts
6. Describe the common chemical agents that are used in relation to burns, and their antidotes.
7. Explain the principles of wound care as they relate to the following:
 - a. Debridement
 - b. Traumatic wounds
 - c. Burn wounds
 - d. Chronic wounds
 - e. High-pressure injection injuries
 - f. Medication infiltration
8. Summarize the principles of wound protection and subsequent healing using:
 - a. Dressings
 - i. Occlusive & non-occlusive
 - ii. Alginates
 - b. Other wound dressing materials
 - i. Iodine, Bacitracin
 - ii. Dakin's solution
 - iii. Petroleum gauze
 - iv. Acetic acid solution
 - v. Xeroform
 - vi. Silvadene, sulfamylon
 - c. The concept of "moist wound healing"
 - d. Adjunctive therapies: hyperbaric oxygen and vacuum-assisted wound management
9. Discuss potential problems in complicated wound healing.
10. Define and describe the causes of postoperative wound complications such as
 - a. Dehiscence
 - b. Evisceration
 - c. Fasciitis
 - d. Abscess formation
11. Discuss the concept of the reconstructive ladder.
12. Describe the microbiology of gangrene and necrotizing fasciitis.
13. Explain principles associated with the selection of appropriate incisions (applying surgical anatomy) with respect to the following:
 - a. Blood supply
 - b. Lines of tension
 - d. Strength
 - e. Cosmesis/aesthetics

14. Describe the rationale in selecting appropriate wound closure and reconstruction, related to wound healing in the following:
 - a. Primary and delayed primary closure
 - b. Secondary healing
 - c. Skin graft, split, and full thickness
 - d. Local and regional flaps
 - e. Microvascular flaps
 - f. Composite grafts
15. Assess the properties and uses of different suture material (absorbable/non-absorbable).
16. Analyze therapeutic options for treatment of delayed wound healing due to the following:
 - a. Host resistance
 - b. Infection
 - c. Diabetes mellitus
 - d. Radiation
 - e. Ischemia
17. Discuss treatment choices for the following wound healing problems:
 - a. Infection
 - b. Hernia
 - c. Dehiscence

Competency-Based Performance Objectives:

1. Provide basic care to wounds from abrasions and small lacerations, including acute debridement, closure, and dressing placement.
2. Provide care for complex traumatic injuries, considering the following:
 - a. Management of hemorrhage
 - b. Acute pain control
 - c. When to explore operatively
 - d. Debridement
 - e. Acute closure or coverage
 - f. Secondary reconstruction
3. Evaluate the progress of wound healing.
4. Apply all types of complex dressings, including body casts.
5. Debride complex wounds and provide post-debridement care of such wounds.
6. Manage wounds of various complexities, and alter therapy as indicated.
7. Manage wound complications: dehiscence, infections, and incisional hernias.
8. Explain the effect of the following factors on wound healing in older patients:
 - a. Nutrition
 - b. Metabolic state (including diabetes mellitus)
 - c. Pharmacologic manipulation
 - d. Physical activity/mobility

4.5. Trauma / Shock / Acute surgical care

Unit Objectives:

- Demonstrate an understanding of the mechanism and pathophysiology of shock.
- Demonstrate the ability to manage the treatment of shock and cardiopulmonary arrest.
- Demonstrate an understanding of the pathophysiologic effect of blunt and penetrating trauma.
- Demonstrate the ability to effectively manage the surgical care of a patient with complex multisystem injuries.

Competency-Based Knowledge Objectives:

Junior Level:

1. Analyze and explain factors involved in blood pressure overestimation in the older patient (pseudohypertension, arteriosclerosis, arm size cuff discrepancies).
2. Describe the anatomy and physiology of all body systems affected by trauma.
3. Obtain ATLS certification.
4. Review the anatomy, physiology, and pathology applicable to the general management of trauma patients, including the following:
 - a. Central nervous system
 - b. Musculoskeletal system
 - c. Hand/forearm
 - d. Ear, nose, and throat
 - e. Ophthalmology
5. Outline basic techniques of evaluation and resuscitation of trauma patients using the ATLS protocol.
6. Specify the trauma services needed for initial evaluation and resuscitation.
7. Discuss wound care management in the emergency department and other settings.
8. Explain the characteristics of basic surgical skill, including the following:
 - a. Sterile technique
 - b. Incisions
 - c. Wound closures
 - d. Knot tying
 - e. Handling of tissues
 - f. Operating instruments
 - g. Universal precautions
9. Discuss the management of trauma involving the musculoskeletal system.
10. Summarize basic critical care management principles.

11. Analyze pharmacological support for trauma resuscitation patients.
12. Identify management principles for a trauma patient in the intensive care unit.
13. Discuss indications for nutritional support for patients sustaining trauma.
14. Outline indications for basic surgical procedures such as
 - a. Laparotomy
 - b. Debridement of injured tissues
 - c. Ultrasound
 - d. Diagnostic peritoneal lavage (DPL)
 - e. Thoracotomy/thoracostomy
 - f. Hemorrhage control
15. Discuss the primary causes/mechanisms of injury in the following:
 - a. Falls
 - b. Motor vehicle crashes
 - c. Pedestrian injuries
 - d. Burns
 - e. Domestic abuse
16. Define shock, categorize it based upon type, and explain the etiology and pathophysiology of each type of shock:
 - a. Cardiogenic
 - b. Hypovolemic
 - c. Distributive (septic, anaphylactic, neurogenic, and adrenal insufficiency mediated)
 - d. Obstructive (cardiac tamponade, tension pneumothorax, pulmonary embolus)
17. Summarize the clinical presentation and hemodynamic parameters associated with each type of shock using clinical terms (e.g., heart rate, respiratory rate, and blood pressure).
18. Propose an algorithm for diagnosing and initiating treatment for each shock type:
 - a. Cardiogenic
 - b. Hypovolemic
 - c. Distributive (septic, anaphylactic, neurogenic, and adrenal insufficiency mediated)
 - d. Obstructive (cardiac tamponade, tension pneumothorax, pulmonary embolus)
19. Discuss the pathophysiology, including the mechanism of arrest, for the following situations:
 - a. Acute myocardial infarction and dysrhythmia
 - b. Congestive heart failure
 - c. Hypovolemic shock (blood loss, dehydration)
 - d. Hemorrhagic shock (non-traumatic)
 - e. Burns and electrical injury
 - f. Septic shock
 - g. Anaphylactic shock (envenomation, drug-related)
 - h. Acute adrenal insufficiency
 - i. Hypothermia
 - j. Penetrating or blunt trauma
 1. Tension pneumothorax
 2. Pericardial tamponade
 3. Hemorrhagic shock

20. Outline the signs and symptoms of acute airway obstruction and define appropriate interventions in adult and pediatric patients.
21. Explain the physiological impact of mechanically assisted ventilation on the cardiovascular/respiratory system.
22. Analyze methods for initiating and maintaining ventilator/weaning support.
23. Describe the indications and potential complications for the following surgical interventions:

a. Bag mask ventilation	h. DPL
b. Endotracheal intubation (oral and nasal)	i. Resuscitative thoracotomy
c. Cricothyrotomy	j. Pericardiocentesis
d. Thoracostomy tube	k. Thoracentesis
e. Central venous catheter	l. Ultrasound
f. Peripheral vein cutdown	m. Wound exploration
g. Arterial line	
24. Review the importance of serial physical exams, hemodynamic monitoring, and serial lab evaluations.
25. Describe the role and indications (if any) of the following products in acute resuscitation:

a. Recombinant activated Protein C	c. Albumin
b. Hespan and similar products	
26. Assess the indications, guidelines, and complications of the following cardiovascular drugs:

a. Dopamine	e. Epinephrine	i. Diltiazem
b. Dobutamine	f. Norepinephrine	j. Esmolol
c. Phenylephrine	g. Amrinone	k. Nipride
d. Vasopressin	h. Nitroglycerine	
27. Outline the management of the following drains and tubes: nasogastric tube (NGT), urinary bladder catheter, chest tube, central venous line (CVL), and arterial line.

Senior Level:

1. Explain trauma preventive measures (e.g., use of helmets, seat belts).
2. Describe and explain the mechanics/ballistics associated with various wounding agents.
3. Discuss the management of associated medical conditions seen in the trauma patient, such as diabetes, chronic obstructive pulmonary disease, hypertension, and HIV.
4. Identify indications for emergency operative procedures, such as cricothyrotomy and resuscitative thoracotomy.
5. Formulate a plan for rehabilitation to return the trauma patient to full functional life.
6. Define abdominal compartment syndrome. Describe how to measure intra-abdominal pressures and develop a treatment plan to treat abdominal compartment syndrome.
7. Define “damage control surgery.” Describe the sequence of damage control surgery in the treatment of the traumatized patient.

8. Analyze the transfer of a patient to an appropriate facility utilizing air medical services.
9. Discuss the availability and use of institutional and community support services for trauma patients (e.g., social worker, home health care, and rehabilitation).
10. Define and describe the Le Fort maxillary fracture classification system.
11. Identify and delineate Zones I, II, and III of penetrating injuries to the neck, and their management.
12. Identify and delineate Retroperitoneal Zones I, II, and III, and the management of blunt and penetrating retroperitoneal injuries.

Competency-Based Performance Objectives:

Junior Level:

1. Manage the unconscious patient.
2. Recognize and manage airway obstruction.
3. Perform endotracheal and nasotracheal intubation.
4. Perform cricothyrotomy and tracheostomy.
5. Manage flail chest (pneumothorax, hemothorax, and obstructive shock states).
6. Diagnose cardiac arrest and rhythm disturbances.
7. Apply closed-chest cardiac massage (CPR).
8. Perform closed-chest defibrillation.
9. Perform venous access procedures: subclavian, jugular, and femoral vein catheterizations, and saphenous vein cutdown.
10. Determine the indication, dosage, contraindications, and method of administration of the following:

a. Morphine	i. Adenosine (Adenocard)
b. Lidocaine and procainamide	j. Cardiac glycosides
c. Propranolol	k. Nitroglycerin and nitroprusside
d. Atropine	l. Furosemide, mannitol, and Diamox
e. Diltiazem	m. Sodium bicarbonate
f. Epinephrine and norepinephrine	n. Calcium
g. Dopamine and dobutamine	o. Amiodarone
h. Amrinone	p. Labetalol
11. Estimate volume requirements in acute trauma and burns, and initiate replacement.
12. Control external blood loss.
13. Manage cardiogenic and septic shock.
14. Complete an ATLS course as a provider.
15. Participate in trauma evaluation, resuscitation, operative management, and intensive care unit (ICU) supervision of a multiply injured patient.
16. Insert a variety of tubes (e.g., endotracheal, DPL, urinary catheter, NGT)
17. Apply and remove all types of dressings and splints, including vacuum pack dressing.

18. Make and close a variety of incisions and tie knots using the sterile technique.
19. Evaluate critical care parameters and make decisions, under direct supervision, regarding changes in care.
20. Direct the evaluation of an acutely injured patient to include resuscitation and the decision regarding operation.
21. Assess nutritional needs and institute necessary nutritional support.
22. Formulate rehabilitation plans for trauma patients.
23. Monitor the trauma patient in the intensive care unit and suggest changes in management as indicated.
24. Manage pharmacologic treatment plans for patients during resuscitation and in the critical care unit.
25. Function as a surgical consultant, by assessing and developing differential diagnoses and discussing recommendations with senior residents or attending instructor.
26. Ascertain the severity of injuries and identify patients requiring operative interventions.
27. Perform emergency diagnostic and therapeutic procedures such as
 - a. Insertion of chest tubes
 - b. Central line insertion
 - c. Pericardiocentesis
28. Explain the patient's condition and proposed therapy to family; obtain appropriate informed consent.
29. Discuss management options with the patient and family.
30. Recommend further diagnostic and/or radiographic studies to clarify the diagnosis and focus on patient management.
31. Communicate the importance of injury prevention to patients, patient families, and staff, in the quest to control trauma as a disease of modern society.

Senior Level:

1. Manage penetrating wounds through an understanding of the injury potential of wounding mechanisms.
2. Provide management for pre-existing disease states in injured patients with appropriate consultation.
3. Perform all operative and management procedures for trauma to the chest, abdomen, extremities, and head, with direct supervision.
4. Supervise the placement central lines, cricothyroidotomy, chest tubes, and DPL by juniors.
5. Triage multiple trauma victims.
6. Practice the principles of damage control surgery in severely injured patients.
7. Manage trauma to the upper airway.

4.6. Emergency

Unit Objectives:

- Manage a variety of surgical conditions in an emergency setting.
- Demonstrate knowledge of patient stabilization, transport, and physician-to-physician communication in an emergency.
- Demonstrate the ability to evaluate and effectively manage all acute or life-threatening conditions, including major trauma in an emergency setting.
- Demonstrate knowledge of disaster management, including the role of triage, and display the ability to apply this knowledge in an emergency setting.

Competency-Based Knowledge Objectives:

Junior Level:

1. Complete the coursework and testing to obtain basic life support (BLS) and ATLS certification.
2. Describe the initial management of the injured patient(s) in the following stages of care:
 - a. Provide care in pre-hospital settings, including BLS
 - b. Conduct triage in emergency departments
 - c. Serve as team leader and member during ATLS
 - d. Coordinate patient transport to tertiary facilities
3. Outline the basic principles of triage in the emergency department, including
 - a. Immediate treatment
 - b. Ambulatory treatment
 - c. Delayed treatment
 - d. Expectant treatment
 - e. Psychiatric considerations
4. Explain priorities for the diagnosis and/or assessment of illness/injury for patients presenting to the emergency department
5. Explain ATLS protocol for the resuscitation and stabilization of a seriously ill or injured patient:
 - a. Cite working knowledge of the ABC's of resuscitation.
 - b. Define the essentials of AMPLE history (allergies, medications, past illnesses, last meal, events of illness/injury)
 - c. Define the essentials of the primary and secondary surveys
6. Describe the considerations for establishing an airway appropriate to the patient's condition, including
 - a. Nasal trumpets/nasopharyngeal airway
 - b. Bag-mask assistance
 - c. Endotracheal tube
 - d. Surgically created airways (cricothyroidotomy-needle or tube)

7. Describe the typical case scenarios for the following life-threatening problems requiring appropriate urgent/emergent action:
 - a. Multiple system trauma
 - b. Shock
 - c. Traumatic neurological injuries
 - d. Chest injuries (penetrating and blunt)
 - e. Abdominal injuries
 - f. Vascular injuries
 - g. Myocardial infarction
 - h. Pulmonary embolus
 - i. Diabetic ketoacidosis
 - j. Gastrointestinal bleeding
 - k. Pancreatitis
 - l. Burns, including inhalation injury
 - m. Poisoning
 - n. Hypothermia

8. Discuss the principles of evaluation and management for the following common minor problems:
 - a. Laceration evaluation
 - b. Tetanus prophylaxis
 - c. Wound infection and treatment
 - d. Surgical repair of wounds

9. Explain the indications and appropriate methods for the following:
 - a. Peritoneal lavage
 - b. Insertion of chest tubes
 - c. Pericardiocentesis
 - d. Suprapubic catheter insertion
 - e. Central line insertion
 - f. Cricothyroidotomy

10. Recommend ways in which the emergency department (ED) physical environment can be adapted to better meet the needs of patients. Discuss these issues:
 - a. Confidentiality
 - b. Poor lighting
 - c. High ambient noise level
 - d. Lack of adequate communication and/or reassuring dialogue

11. Define the requirements for informed consent in the emergency setting:
 - a. Life-threatening conditions
 - b. Minor surgery
 - c. Patients who are minors
 - d. Patients unable to provide informed consent (non compos mentis)

12. Summarize significant steps in the examination and treatment of dental/oral emergencies with which a general surgeon should be familiar:
 - a. Cellulitis, including Ludwig's angina
 - b. Peritonsillar abscess (Quinsy)

Senior Level:

1. Describe indications for emergency thoracotomy and the appropriate operative approach.
2. Analyze the decision process in evaluating the need for emergency operative intervention in trauma or disease.

Competency-Based Performance Objectives:

Junior Level:

Under the guidance and supervision of residents that are more senior, attending surgeons, or emergency department attending physicians:

1. Perform triage of emergency trauma patients.
2. Establish emergency stabilization of the traumatized patient via the following precautions:
 - a. Cervical spine protection
 - b. Prevention of hypothermia
3. Assess patients presenting emergency conditions using the appropriate diagnostic protocol.
4. Prioritize requests for diagnostic studies based on need and time required to obtain results.
5. Establish the following airways:
 - a. Perform bag-mask ventilation
 - b. Insert nasopharyngeal or oropharyngeal airways
 - c. Perform endotracheal intubation (oro- and naso-pharyngeal)
 - d. Perform a cricothyroidotomy
6. Establish access to the central venous system.
7. Assist with acute resuscitation procedures as indicated.
8. Discuss the patient's condition and future care with the family.
9. Perform minor surgical procedures such as the following:
 - a. Drainage of abscesses
 - b. Wound closure
 - c. Removal of foreign bodies
 - d. Wound debridement
 - e. Bladder catheterization
10. Perform basic surgical procedures such as the following:
 - a. Laparotomy
 - b. Wound debridement

Senior Level:

Under the guidance and supervision of attending surgeons or emergency attending physicians, do the following:

1. Perform triage of several sets of multiply traumatized patients (single victims) requiring in-hospital resuscitation or operative intervention.
2. Perform triage of several sets of multiply traumatized patients (multiple victims) in the emergency care center.
3. Perform resuscitative thoracotomies as necessary.

4. Treat traumatized patients and perform needed operative repair.
5. Demonstrate the ability to perform as senior trauma leader in coordinating the patient's care, delegating duties to junior team members, and conferring with subspecialty consultants as needed.
6. Function as the multi-specialty team leader by coordinating timing and sequencing of operative interventions of the chest, abdomen, head, and musculoskeletal considerations.
7. Demonstrate technical capability in advanced trauma care in the emergency department, intensive care units, and operating rooms.

4.7.Surgical Critical Care

Unit Objectives:

- Demonstrate knowledge of the principles associated with the diagnosis and management of critically ill patients, including knowledge of multiple organ system normalities and abnormalities.
- Demonstrate the ability to diagnose and treat patients with interrelated system disorders.

Competency-Based Knowledge Objectives:

Junior Level:

Complete the coursework and testing to obtain Basic and Advanced Cardiac Life Support (BLS and ACLS) and ATLS certification.

Section One: Administration

1. Define and describe the role of the surgeon in the critical care setting to include these aspects:
 - a. Unit administration/management (surgeon as unit director)
 - i. Triage of patients
 - ii. Data collection and computer usage
 - iii. Infection control and total quality management (TQM) issues
 - iv. Ethical concerns
 - b. Management/consultation of specific surgical conditions
2. Identify and outline criteria for admitting patients to the intensive care unit (ICU), including the following:
 - a. Medical indications (related to specific diseases, e.g., pulmonary, cardiac, renal)
 - b. Surgical indications directly related to specific surgical illnesses

3. Identify and outline criteria for discharging patients from the ICU, including the following:
 - a. Medical indications
 - b. Surgical indications
 - c. Patients unacceptable for the ICU

Section Two: General Pathophysiology—Body as a Whole

1. Describe the normal physiological response to a variety of insults, such as sepsis, trauma, or surgery, by associating the adaptation of the following systems from pre-stress to post-stress states:
 - a. Respiratory
 - b. Hemodynamic
 - c. Renal
 - d. Metabolic
 - e. Endocrine
2. Describe the concept of systemic inflammatory response syndrome (SIRS).
3. Describe prophylactic measures routinely used in critical care such as the following:
 - a. GI bleeding prophylaxis, including neutralizing, inhibitory compounds, and surface agents
 - b. Prophylactic antibiotics (differences between prophylactic, empiric, and therapeutic uses)
 - c. Pulmonary morbidity prophylaxis (incentive spirometry)
 - d. Prophylaxis against venous thromboembolic events
 - e. Aseptic technique
 - f. Universal precautions
 - g. Skin care protocols
 - h. Guide-wire catheter changes for work-up of fever or change in clinical status
4. Discuss the pharmacotherapeutics of drugs used for support and treatment of the critically ill patient with emphasis on 1) mode of action, 2) physiological effects, 3) spectrum of effects, 4) duration of action, 5) appropriate doses, 6) means of metabolism or excretion, 7) complications, and 8) cost:
 - a. Vasopressors
 - b. Vasodilators
 - c. Inotropic agents
 - d. Bronchodilators
 - e. Diuretics
 - f. Antidysrhythmics
 - g. Antihypertensives
 - h. Antibiotics/antifungal agents
5. Outline indications and methods for providing nutritional support:
 - a. Discuss indications, selection of formulations, and route of administration of parenteral versus enteral forms of nutrition.
 - b. Explain complications of parenteral and enteral routes of feeding, as well as select methods to avoid the complications.
 - c. Interpret findings associated with abnormalities in levels of glucose, potassium, sodium, phosphate, magnesium, and vitamins in the critically ill receiving enteral or parenteral feeding.

- d. Estimate protein calorie requirements for patients of varying degrees of illness, and be able to analyze adequacy of nutritional support using commonly obtainable laboratory values.
6. Describe, apply, and revise appropriate treatment interventions based upon an analysis of changes in the patient's clinical and laboratory parameters:
 - a. Adjustment of intravenous fluids with respect to expected stress, including metabolic, hormonal, cardiovascular, and renal responses to replacement of fluid losses
 - b. Efficacy of prophylactic measures for pulmonary embolism, stress ulceration, and infection
 - c. Adequacy of nutritional support in a patient with multiple sites of protein losses (e.g., fistulas, drain sites, or metabolic stressors [infection, acute lung injury {ALI}])
 - d. Analysis and methods of treatment of postoperative fever
 - e. Events leading to and responsible for initiation of ventilatory support
 - f. Differences in low cardiac output, hypotensive/hypertensive states in terms of preload, pump, or afterload.
 - g. Analysis and treatment of seizures or acute changes in mental status, including the role of the following:
 - ABC's (airway, breathing, circulation)
 - Intravenous glucose/thiamine
 - h. Analysis and treatment of acute respiratory failure from changes in airway, pump, and lung
 7. Review the management of and create a diagram of a plan for the care of the critically ill surgical patient with multiple medical problems, such as the following:
 - a. Cardiac dysrhythmias
 - b. Pulmonary insufficiency from airway, bellows (pump), or parenchymal problems
 - c. Acute/chronic renal failure with hemodynamic instability or need for specific fluid therapy (TPN), renal replacement therapy, or high output GI fistulas
 - d. Diabetes mellitus and its special problems in the realm of nutritional support
 - e. Hemodynamic instability in the face of acute/chronic renal or pulmonary insufficiency

Section Three: Airway Respiration

1. Describe the commonly used indications for initiation of ventilation support, including the following:
 - a. Indications and commonly acceptable values for initiation of mechanical ventilation
 - b. Evaluation of airway
 - c. Evaluation of adequacy of thoracic pump (muscle strength)
 - d. Evaluation of lung parenchymal characteristics (arterial blood gases and chest x-ray)
 - e. Analysis of commonly used pulmonary values (e.g., tidal volume [Vt], positive end-expiratory pressure (PEEP), auto PEEP, airway pressure)
 - f. Indications and commonly acceptable values for weaning from mechanical ventilation

2. Review respiratory physiology and describe the pathology involved in ventilation/perfusion deficits.
3. Discuss the association of airway obstruction with age, considering each of the following:
 - a. Repeated disruption of the balance of inflammatory mediators and humoral protection (elastase and anti-elastase, oxidant and antioxidant)
 - b. Neutrophil recruitment
 - c. Impaired tissue repair culminating in inflammatory lung destruction
 - d. Accumulated environmental oxidant injuries
4. Analyze and compare the principles of ventilator mechanics and modes of ventilation.
5. Describe the pathophysiology of acute lung injury (ALI, also known as ARDS) and the management of ventilator-dependent patients, including the following:
 - a. Pneumonias (aspiration or nosocomial)
 - b. Acute renal failure
 - c. Cardiac failure
 - d. Prevention of malnutrition or restitution of body stores
 - e. SIRS, multiple organ dysfunction syndrome (MODS)
 - f. Sepsis
 - g. Skin care problems
 - h. Physical therapy (maintenance of muscle function, prevention of contractions)
 - i. Psychological support for both patient and family
6. Review management of the mechanically ventilated patient with the following problems:
 - a. Areas of differing compliance
 - b. Borderline cardiac reserve
7. Analyze the pros and cons of the use of the following drugs to improve respiratory function:

a. Bronchodilators	d. Venodilators
b. Membrane stabilizing agents (e.g., steroids)	e. Analgesics and sedatives
c. Diuretics	f. Mucolytics

Section Four: Circulation

1. Describe and compare the following cardiac function parameters:

a. Preload	b. Afterload	c. Myocardial contractility
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2. Define the information obtained from the use of the following invasive/non-invasive monitoring devices. Specify: 1) which information is directly/indirectly measured or calculated, 2) accuracy of the device, 3) cost of obtaining the information, and 4) hemodynamic principles associated with the use of each device:

a. Arterial catheters	d. Pulse oximetry
b. Central venous catheters	e. Foley catheters
c. End tidal carbon dioxide monitors	f. Intestinal pH monitors

3. Outline the protocol for defining patterns and managing hemodynamically unstable patients, and analyze the selection of appropriate therapy by completing these activities:
 - a. Predict improvements in hemodynamic status.
 - b. Detect and revise therapies based on the use of invasive/noninvasive monitoring devices.
4. Review cardiac function and hemodynamic monitoring from the following standpoints, and interpret changes in the accuracy of values from hemodynamic monitoring devices:
 - a. Patients with severe pulmonary insufficiency who have low compliances or high PEEP
 - b. Patients with severe valvular insufficiency/stenosis
 - c. Various shock states (hypovolemic, septic, spinal, or cardiogenic)
 - d. High dose vasopressors
5. Summarize the effects of appropriate volume and drug therapies to manipulate the cardiovascular system in the following patients:

a. Hypovolemic hypotensive patient	e. Hypotensive, hypervolemic oliguric patient
b. Hypotensive euvolemic patient	f. Hypovolemic oliguric patient
c. Hypotensive hypervolemic patient	g. Hypotensive, oliguric hypoxic patient
d. Hypotensive oliguric patient	
6. Discuss significant patient characteristics in a geriatric population associated with increased risk of thromboembolic disease, including the following:
 - a. Underlying congestive heart failure
 - b. Prolonged immobility before surgery
 - c. Paralysis
 - d. Previous deep vein thrombosis (DVT)
 - e. Hypercoagulable states

Section Five: Renal

1. Review acid-base and electrolyte abnormalities common in critically ill patients.
2. Identify, define, and classify the major categories of acid-base disturbance in the context of the patient's altered physiology. Cite common clinical scenarios for their appearance:
 - a. Metabolic acidosis (hypovolemic shock, chloride excess resuscitation, ischemia)
 - b. Metabolic alkalosis (contraction alkalosis due to excessive diuretic use)
 - c. Respiratory acidosis
 - d. Respiratory alkalosis (early sign of sepsis vs. ventilator complication)
3. Discuss the identification and correction of complex acid-base problems, such as choice of intravenous fluids for electrolyte replacement, in the following:
 - a. Hyperchloremic, metabolic-acidotic patient
 - b. Hypochloremic, metabolic-alkalotic patient
 - c. Stuporous, dehydrated, hyponatremic patient
 - d. Stuporous, dehydrated, hypernatremic patient

Section Six: Neurologic

Describe the initial evaluation, ongoing, acute monitoring, and long-term management of possible neurological or behavioral abnormalities occurring in the ICU setting:

- a. Seizures
- b. Coma
- c. Stroke
- d. Multifactorial effects of “post-op confusion”
- e. Delirium
- f. Brain death

Section Seven: Gastrointestinal/Hepatic

Discuss specific fluid compositions and the effect of the losses of such fluids as gastric, pancreatic, biliary, and succus entericus from intestinal fistulas of various levels.

Senior Level:

Section One: Administration

1. Describe the criteria for preoperatively predicting the patient's need for critical care, including the following:
 - a. Pre-existing disease states (cardiac, pulmonary, or renal)
 - b. Operation-specific requirements for postoperative intensive care management
2. Identify new modes of intensive care therapeutics by completing the following activities:
 - a. Predict and analyze the need for a new technology.
 - b. Formulate a plan for the institution of new technologies or therapeutics.
3. Summarize the following moral and ethical problems encountered in the ICU:
 - a. The need for organ donation and the identification of potential donors
 - b. Decisions about whom to resuscitate and to what degree
 - c. Care for the mentally incapacitated or incompetent patient
 - d. Dealing with a difficult family and futility of care
 - e. Identifying and interacting with alternate religious/cultural beliefs

Section Two: General Pathophysiology—Body as a Whole

1. Discuss the use of sepsis severity scores.
2. Distinguish between the major characteristics of septic shock and hypovolemic shock:
 - a. Summarize the initial evaluation and presentation.
 - b. Analyze therapeutic options.
 - c. Revise therapeutic options based on clinical parameters obtained from monitoring.

3. Explain tissue oxygen supply and demand; demonstrate the ability to perform the following:
 - a. Calculate oxygen delivery
 - b. Calculate oxygen consumption
 - c. Analyze the effect of cardiac output, preload, and afterload to oxygen delivery
 - d. Analyze the contribution of hemoglobin and percent of saturation on oxygen delivery
 - e. Explain changes in tissue O₂ delivery and uptake related to pH, temperature, and 2,3-diphosphoglycerate (2,3-DPG)

4. Discuss the evaluation and treatment of the following bleeding disorders:
 - a. The role of blood vessels, platelets, fibrin cascade, and degeneration in normal hemostasis
 - b. Disseminated intravascular coagulopathy (DIC), defining common causes and therapy
 - c. Thrombocytopenia as a failure of production, accelerated destruction, or dilution
 - d. Hemophilia A
 - e. Idiopathic thrombocytopenic purpura (ITP) and thrombotic thrombocytopenic purpura (TTP) as causes of thrombocytopenia (compare and contrast)
 - f. Heparin and Coumadin therapy and misapplication
 - g. Advanced liver disease
 - h. The roles of Protein C and S, in coagulation and bleeding disorders

5. Discuss management of the overall hospital course for patients with altered physiological states:
 - a. Preoperative considerations specific to their disease
 - b. Operative considerations specific to their disease
 - c. Postoperative considerations specific to their disease

6. Outline the nutritional and metabolic components for a patient with specific disease states.

Section Three: Renal

Discuss the physiological principles and define specific management aspects associated with the following complex acid-base problems:

- a. Renal tubular acidosis (differentiate between Type I and II)
- b. Management of high output loss states from the GI tract in patients with poor cardiac function
- c. Management of volume excess states associated with eunatremia or hyponatremia

Section Four: Gastrointestinal/Hepatic

Review and summarize the management of hepatic and renal failure, including the following:

- a. Utility/disutility of disease-specific nutritional formulations
- b. Adjustment or elimination of toxic substances (antibiotics, contrast material, narcotics)
- c. Current means for support of renal failure, high-dose diuretics, continuous veno-venous hemofiltration (CVVH), continuous veno-venous hemodialysis (CVVHD), dialysis

Section Five: Endocrine

Describe and specify therapy for the following, in association with critical care:

- a. Hypothyroidism/hyperthyroidism
- b. Hyperparathyroidism/hypoparathyroidism (changes in calcium and magnesium)
- c. Adrenal cortical excess (Cushing's disease and syndrome)
- d. Adrenal cortical deficiency states (Addison's disease)

Competency-Based Performance Objectives:

Junior Level:

1. Provide initial evaluation and management of the critically ill postoperative patient.
2. Institute the following therapeutic interventions:
 - a. Manage fluid orders.
 - b. Determine ventilator settings.
 - c. Order supportive drugs.
 - d. Determine the need for and duration of antibiotic therapy.
3. Perform the following procedures:
 - a. Orotracheal and nasotracheal intubation; nasogastric and bladder intubation
 - b. Arterial catheter insertion
 - c. Central venous and pulmonary artery catheter insertion
 - d. Placement of tube thoracotomy
 - e. Cricothyrotomy
 - f. Pericardiocentesis

4. Manage critically ill patients in the intensive care unit:

- a. Determine need for ventilation and select initial ventilator settings.
- b. Compute initial and ongoing fluid requirements.
- c. Analyze need for operative intervention.
- d. Establish IV access and maintain appropriate sterile techniques for evaluation of fever.
- e. Determine need for ongoing ICU management.

Senior Level:

1. Direct all surgical management of patients in the ICU, including taking direct responsibility for admission and discharge.
2. Manage invasive monitoring catheters, interpret the data obtained, and manipulate the hemodynamic variables toward calculated goals.
3. Manage the following situations:
 - a. Multiple organ system failure; providing support for failing, failed, or normal organs
 - b. Life threatening surgical infections (e.g., ascending cholangitis, gangrene)
 - c. Hypovolemic shock
 - d. Renal failure
 - e. Nutritional failure
 - f. Liver failure

4.8.Surgical Immunology

Unit Objectives:

- Demonstrate an understanding of general immunological principles in relation to surgical practice.
- Demonstrate an understanding of the principles of care for patients with abnormal immune function who are undergoing general surgery procedures.
- Demonstrate an understanding of the emerging field of molecular biology and novel immune therapies having potential applications in clinical surgery.

Competency-Based Knowledge Objectives:

Section One: General Immunological Principles

1. Describe the basic concepts of the human immune system, including the following:
 - a. Cells involved in host defense
 - b. Central roles of lymphocytes and macrophages
 - c. The derivation of pluripotent stem cells

2. Summarize the major activities of macrophages, their products of secretion, and their role as antigen-presenting cells (APCs).
3. Summarize the events in T-cell activation, including the roles of CD4+ and CD8+ cells and the release of involved interleukins.
4. Explain the development, differentiation, and function of B-lymphocytes in the formation of antibodies; outline and describe the functional anatomy of an immunoglobulin molecule.
5. Describe the immune functions of the spleen, liver, thymus, and bone marrow; summarize the impact of their manipulation on the immune system.
6. Describe immunological changes that occur in the elderly compared to younger patients.

Section Two: Defenses against Infection

1. Describe the resident flora, mechanical barriers, local hormones, and chemicals of the epithelium in the following tracts involved in the body's defenses against infection:
 - a. Gastrointestinal
 - b. Respiratory
 - c. Genitourinary
2. Describe the body's response to infection when:
 - a. There has been no prior antigenic contact
 - b. There has been prior contact
 - c. There has been passive and active immunization
 - d. There has been T-cell memory activation
3. Explain therapeutic and prophylactic roles of intravenous immunoglobulin and viral vaccines.
4. Distinguish between congenital and acquired immunodeficiency states.

Section Three: Clinical Immunology

1. Describe the mechanism of action and side effects of current immunosuppressive agents. State the rationale for their use and timing in their medical applications:

a. Prednisone	c. Azathioprine
b. Cyclosporine	d. Tacrolimus (FK506)
2. Differentiate between agents used to treat acute transplant rejection:

a. Steroids	b. Poly- and mono-clonal antibodies
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3. Summarize the role of monoclonal antibodies in the treatment of neoplastic lesions.
4. Describe their application to clinical pathology, and diagnostic and therapeutic oncology.
5. Describe side effects and their treatment.

Competency-Based Performance Objectives:

1. Participate in the perioperative management of immunosuppressive agents in chronically-medicated patients undergoing general surgery.
2. Plan and perform elective surgery in immunosuppressed patients with minimizing infectious risks. Perform emergent surgical intervention in similar high-risk patients.
3. Recognize and treat wound infections and other complex disorders in chronically immunosuppressed patients undergoing elective and emergent surgery.
4. Describe differences in survival rates in elderly patients compared to younger patients. Consider the following factors:
 - a. Differences in work-ups that occur in elderly patients.
 - b. Complications in elderly versus younger patients
5. Explain the HLA-complex, its genetic location and composition, pattern of inheritance, and the difference between Class I and II antigens of the major histocompatibility complex (MHC). Consider these aspects:
 - a. Serological determination HLA
 - b. Molecular methods of HLA
 - c. Cross-matching
6. Define the criteria for organ and tissue donation; apply these criteria to critically ill patients.
7. Explain the clinical definition of brain death, including a discussion of the available laboratory and radiologic studies to support the clinical criteria.
8. Analyze and formulate a plan for management of the organ donor.
9. Describe the mechanism of action, dosing schedule, and side effects of the following immunosuppressive drugs:
 - a. Azathioprine
 - b. Prednisone
 - c. Anti-lymphocyte globulin
 - d. Cyclosporine
 - f. Tacrolimus (FK506)

4.9. Surgical Oncology

Unit Objectives:

- Demonstrate an understanding of biology, pathology, diagnosis, treatment, and prognosis of neoplastic diseases.
- Demonstrate proficiency in diagnosis, preparation, operative treatment, and total management of the cancer patient, including long-term follow-up care.
- Understand surgical options of curative and palliative care for cancer patients.

Competency-Based Knowledge Objectives:

Junior Level:

1. Discuss frequency/death rates of the top five benign and malignant neoplasms.
2. Describe increasing, decreasing, and high incidence trends for certain solid neoplasms.
3. Explain the implications of the heterogeneous cellular makeup of most solid neoplasms, with reference to clinical behavior and response to adjuvant treatment.
4. Discuss the mechanisms of cellular apoptosis and feasibility for therapeutic applications.
5. Identify genetic factors associated with neoplastic disease regarding known proto-oncogenes.
6. Define current theories of carcinogenesis.
7. Summarize the tenets of tumor biology, including the biochemical events of invasion and metastasis; describe the natural history of these lesions.
8. Identify and differentiate diagnostic features of benign versus malignant neoplasms (gross and microscopic).
9. Predict patterns of presentation of malignant neoplasms.
10. Describe characteristics of various staging systems and explain their use in evaluating neoplasms.
11. Outline appropriate usage of tumor markers, tumor metabolites, and diagnostic cytologic techniques.
12. Describe surgical techniques and operative procedures designed to treat malignant diseases and their application to endoscopic operative techniques.
13. Summarize the nutritional requirements for cancer patients, and describe how they differ from those recommended for a healthy patient.
14. Describe indications for curative versus palliative treatment, and formulate therapeutic plans for each approach.
15. Summarize current techniques of genetic screening for cancer.
16. Describe the enzymatic determinants of prognosis for epithelial derived cancers.
17. Discuss the economic and psychosocial issues associated with malignant disease, and analyze how these affect the management of patients with cancer, including the following:
 - a. Ethics of cancer management
 - b. Rehabilitation
 - c. Enterostomal therapy
 - d. Pre-admission procedures
 - e. Conservation of in-patient resources
 - f. Special problems of the elderly

Senior Level:

1. Apply clinical screening for common malignancies.
2. Recognize typical presentations and clinical manifestations for different types of neoplasms.

3. Discuss the known facts relative to tumor suppressive genes and implications of mutations.
4. Stage specific neoplasms both clinically and pathologically, including the tumor, nodes, and metastases (TNM) system.
5. Relate tumor staging to prognosis.
6. Describe differences in presentation, treatment, and outcomes for malignancy in older patients.
7. Compare applicable treatment modalities to the prognosis for tumors within the scope of general surgery.
8. Apply post-treatment screening/surveillance for common malignancies.
9. Discuss known facts relative to tumor recurrence and survival after local resection of a primary lesion of the breast and colon.
10. Identify margins of resection and their relation to local recurrence.

11. Describe the indications for and actions of pharmacological support in the postoperative state.
12. Describe the indications and means for implementing nutritional support in the pre- and post- operative cancer patient.
13. Summarize the indications and appropriate modalities for adjuvant therapy within the scope of general surgery, including chemotherapy, radiation therapy, immunotherapy, and gene therapy.
14. Explain the rationale and methodology employed in lymphatic mapping and sentinel node biopsies, along with the expected level of positive findings.
15. Describe the criteria and necessary procedures for intraoperative monitoring of cardiovascular and pulmonary functions of the cancer patient.
16. Analyze and explain a holistic approach to the treatment of patients with cancer.
17. Analyze the medical preparation of patients for cancer surgery, including the correction of metabolic and nutritional deficits.
18. Indicate potential alterations in pulmonary function in the elderly patient, which may affect preoperative preparation and postoperative management.
19. Define and apply the criteria for palliative versus curative treatment plans.
20. Analyze and explain the rationale for combined adjuvant modalities in the prevention and treatment of cancer recurrence.
21. Outline indications and initiate requests for appropriate consultation.

Competency-Based Performance Objectives:

Junior Level:

1. Perform complete histories and physical examinations of patients with cancer.
2. Formulate an appropriate differential cancer diagnosis, and record an independent, written diagnosis for each cancer patient assigned.

3. Excise benign lesions of skin, dermal appendages, and breast.
4. Demonstrate proper wound care and follow-up management.
5. Close wounds following major resections.
6. Manage colostomies and ileostomies.
7. Assist with colostomies, ileostomies, and wedge resections of lung and liver.
8. Perform lymph node biopsies, breast biopsies, and procedures of similar magnitude.
9. Perform feeding gastrostomies and tube jejunostomies.
10. Record clinical and pathological correlations by presenting the clinical picture and operative findings for each assigned cancer patient.

Senior Level:

1. Demonstrate the ability to function independently in all aspects of cancer patient management, including palliative care planning.
2. Prepare the preoperative assessment plan for the elderly patient in preparation for the following:
 - a. Gastric resection
 - b. Colon resection
 - c. Pancreatic resection (Whipple Procedure)
 - d. Mastectomy
3. Stage specific neoplasms clinically and pathologically using the TNM system.
4. Prepare patients medically for cancer surgery, with correction of nutritional and metabolic deficits.
5. Specify and prepare management plans for nutritional support in the cancer patient.
6. Assess need and institute appropriate monitoring both preoperatively and postoperatively.
7. Use appropriate support from pharmacological agents.
8. Prepare an operative plan for treatment of malignant disease.
9. Perform colostomies, colostomy closures, and bowel anastomoses of all types.
10. Perform, with appropriate supervision, major resections in the neck, chest, abdomen, breast, and extremities, including complex operative procedures (e.g., Whipple procedure, major neck dissection).
11. Assume teaching responsibilities for junior residents as assigned.
12. Participate in a multidisciplinary tumor board.

4.10. Endocrine Surgery

Unit Objectives:

- Demonstrate knowledge of endocrine anatomy and physiology (both normal and pathological).
- Demonstrate the ability to apply this knowledge to the surgical care of patients.

Competency-Based Knowledge Objectives:

Junior Level:

1. Describe the anatomy, histology, physiology, and pertinent biochemistry of the following organs:
 - a. Thyroid gland
 - b. Parathyroid gland
 - c. Endocrine pancreas
 - d. Adrenal glands
 - e. GI Tract as an endocrine organ

2. Fully discuss the secretion and control of the following:
 - a. Thyroid stimulating hormone
 - b. Parathyroid hormone
 - c. Adrenocorticotrophic hormone (ACTH)/cortisol
 - d. Insulin/glucagon
 - e. Catecholamines
 - f. Gastrin/secretin/cholecystokinin
 - g. Serotonin/histamine
 - h. Estrogen/progesterone/testosterone
 - i. Oxytocin/vasopressin
 - j. Growth hormone
 - k. Melanocyte stimulating hormone
 - l. Prolactin
 - m. Motilin/Gastric inhibitory peptide (GIP)/enteroglucagon/vasoactive intestinal peptide (VIP)
 - n. Somatostatin

3. Summarize the following aspects of endocrine pathology:
 - a. The criteria for the diagnosis of malignancy
 - b. Chromosomal abnormalities as a screening/diagnostic tool
 - c. The characteristics of patients with sporadic versus familial disease
 - d. Definitions of and differences between MEN Type I and II, and non-MEN syndromes
 - e. Fine-needle aspiration biopsy
 - f. DNA ploidy

4. Explain the integrated concept of clinical neuroendocrinology, the cells and organs of the amine precursor uptake decarboxylase (APUD) system, and the known clinical endocrine syndromes.

5. Outline the approach to the surgical management of diseases of the endocrine system:
 - a. Is the treatment of each disease primarily surgical or medical?
 - b. Is surgical treatment different for benign versus malignant disease?
 - c. Is surgical treatment curative or palliative?
 - d. Is surgical treatment directed at the target organ or primary organ?
 - e. What role does lesion localization play in endocrine disorders?

6. Outline the differential diagnosis of the following:
- a. Hypercalcemia
 - b. Hypoglycemia
 - c. Hypergastrinemia
 - d. Endogenous hypercortisolism
 - e. Insulinoma/gastrinoma
 - f. Carcinoid syndrome
 - g. Adrenal insufficiency crisis
 - h. Elevated serum thyroxin level
 - i. A decreased thyroid-stimulating hormone (TSH) level
 - j. Elevated ACTH levels
7. Explain the following disease entities as they relate to problems in the surgical patient:
- a. Cushing's syndrome
 - b. Exogenous hypercortisolism
8. Summarize key physiological alterations of the neuroendocrine system that occur with normal aging. Include explanation of these alterations that can occur with advancing age:
- a. Increase in plasma noradrenaline concentrations
 - b. Steady decrease in aldosterone secretion
 - c. Decline in plasma renin activity
 - d. Significant increase in plasma cortisol levels

Senior Level:

1. Discuss the pathophysiology, clinical presentation, work-up, and treatment of the following diseases:
- a. A solitary thyroid nodule
 - b. A multinodular thyroid gland
 - c. Thyrotoxicosis
 - d. Insulinoma/glucagonoma/vipom
 - e. Zollinger-Ellison syndrome
 - f. Gastrointestinal carcinoid tumors
 - g. Endogenous hypercortisolism
 - h. Pheochromocytoma
 - i. Primary hyperaldosteronism
 - j. Incidental adrenal mass
 - k. Primary, secondary, and tertiary hyperparathyroidism
2. Discuss preoperative preparation/management of the following:
- a. Hypercalcemic crisis
 - b. Thyroid "storm"
 - c. Grave's and Hashimoto's disease
 - d. Pheochromocytoma
 - e. Hyperaldosteronism

3. Discuss surgical approaches to the following:
 - a. Left/right adrenal gland
 - b. Head of the pancreas
 - c. Body/tail of the pancreas
 - d. Inferior/superior parathyroid glands
 - e. Parathyroid glands
 - f. A retrosternal goiter
4. Summarize significant issues in the management of anesthesia in endocrine surgery, including the following:
 - a. Airway management during neck surgery
 - b. Cardiovascular manipulation during thyroid and pheochromocytoma operations
 - c. Special attention to electrolyte management
5. Critique the role of the following developments in the surgical management of endocrine problems:
 - a. Localizing modalities (e.g., metaiodobenzylguanidine [MIBG], sestamibi, selective venous sampling, parathyroid hormone [PTH] assays)
 - b. Diagnostic assays (e.g., sensitive TSH, C-peptide, fine needle aspiration)

Competency-Based Performance Objectives:

Junior Level:

1. Complete a preliminary evaluation of patients suspected of having endocrine disease to include:
 - a. Focused history
 - b. Family history
 - c. Physical examination
 - d. Appropriate relevant diagnostic studies
2. Participate in the preoperative and postoperative care of patients undergoing endocrine surgery.
3. Observe endocrine surgery cases.
4. Perform a detailed evaluation of patients with suspected endocrine disease.
5. Manage the preoperative and postoperative care of patients with endocrine disease, under supervision.
6. Observe and assist in surgery of the thyroid, parathyroid, adrenal glands, and pancreas.

Senior Level:

1. Develop a comprehensive plan for the surgical management of endocrine disease.
2. Perform or assist in the performance of adrenal, thyroid, and parathyroid surgery.

3. Evaluate patients with complex endocrine disease and present a differential diagnosis.
4. Perform surgery on the adrenals, pancreas, thyroid, and parathyroids.
5. Manage the diagnosis, and preoperative, intraoperative, and postoperative care of a variety of endocrine surgery cases.

4.11. Breast Surgery

Unit Objectives:

- Demonstrate knowledge of the anatomy, physiology, and pathophysiology of the breast.
- Demonstrate the ability to surgically manage diseases of the breast.
- Understand advancements in minimally invasive and conservative breast surgeries.

Competency-Based Knowledge Objectives:

Junior Level:

1. Describe the anatomy of the breast.
2. Explain the hormonal regulation of the breast.
3. Summarize the incidence, epidemiology, and risk factors associated with breast cancer.
4. Distinguish between these common entities in the differential diagnosis of breast masses:

a. Fibroadenomas	d. Fibrocystic disease
b. Cysts	e. Fat necrosis
c. Abscesses	f. Cancer
5. Explain the general indications, uses, and limitations of mammography.
6. Outline the genetic and environmental factors associated with carcinoma of the breast.
7. Describe the pathological types of breast cancer, including the history and prognosis of each of the following:

a. Infiltrating ductal carcinoma	c. Infiltrating lobular carcinoma
b. Ductal carcinoma in situ (DCIS)	d. Lobular carcinoma in situ
c. Malignant phyllodes tumor	
8. Describe the presentation, history, pathology, and treatment of the following benign breast diseases:

a. Lactational breast abscess	d. Atypical epithelial hyperplasia
b. Chronic recurring subareolar abscess	e. Fibroadenoma
c. Intraductal papilloma	

9. Explain the clinical decision-making steps for the work-up of a breast mass.
10. Discuss the role of mammography, fine-needle biopsy, needle core biopsy, open biopsy, and mammographic needle localization biopsy.
11. Explain the mechanics and potential value of the stereotactic needle biopsy.
12. Outline the diagnostic work-up and differential diagnosis of various forms of nipple discharge.
13. Explain the use of TNM staging in treatment of breast cancer.
14. Discuss principles for the treatment of breast cancer, such as the following:
 - a. Local control (surgery/radiation therapy)
 - b. Systemic control (chemotherapy/hormonal therapy/targeted therapy)
 - c. Palliative therapy
15. Discuss several causes of gynecomastia and outline an appropriate work-up.

Senior Level:

1. Describe the characteristics, diagnosis, and therapy of less common lesions of the breast:

a. Inflammatory carcinoma	d. Cystosarcoma phylloides
b. Paget's disease	e. Bilateral breast carcinoma
c. Mondor's disease	g. Male breast carcinoma
2. Define appropriate breast conservation therapies and their benefits and comparative outcomes. Compare them with modified radical mastectomy.
3. Summarize the role of adjuvant chemotherapy and radiation therapy for the treatment of primary breast carcinoma.
4. Outline the importance of estrogen and progesterone and other receptors in the prognosis and treatment of breast cancer.
5. Describe the basics of staging and treatment of metastatic breast cancer, including the role of the following:
 - a. Chemotherapy
 - b. Radiation therapy
 - c. Hormonal therapy
 - d. Targeted therapy
6. Summarize the physiological changes associated with pregnancy, including breast problems peculiar to pregnancy.
7. Formulate plans for basic patient care, including preoperative, intraoperative, and postoperative care.

8. Summarize the major considerations for post-mastectomy breast reconstruction.
9. Identify and analyze data addressing controversial areas of breast disease, such as the following:
 - a. Current concepts in the management of cancer
 - b. Cancer prevention techniques, such as tamoxifen
 - c. Role of various adjuvant therapy programs
 - d. Biological behavior of lesions such as lobular carcinoma in situ
 - e. Benefit and frequency of screening mammograms
 - f. Relationship of mammographic parenchymal patterns to the risk of malignancy
10. Explain the role of sentinel lymph node biopsy for breast cancer in terms of the following:
 - a. Sensitivity and specificity
 - b. Indication and contraindications
 - c. Technique
 - d. Treatment plan based on findings

Competency-Based Performance Objectives:

Junior Level:

1. Take an appropriate history to evaluate breast patients to include:
 - a. Pertinent risk factors
 - b. Previous history of breast problems
 - c. Current breast symptoms
2. Demonstrate an increasing level of skill in the physical examination of the breast, including recognition of the range of variation in the normal breast.
3. Perform simple procedures such as:
 - a. Diagnostic fine-needle aspiration of cysts
 - b. Drainage of simple breast abscesses
 - c. Core needle & Open biopsy of breast masses
4. Identify common lesions such as fibroadenomas, cysts, mastitis, and cancer.
5. Interpret signs suspicious for malignancy on mammogram; e.g., microcalcifications.

6. Perform open breast biopsies and other operative procedures such as simple mastectomy, lumpectomy, and excision of intraductal papillomas, under direct supervision.
7. Determine the indications for tissue processing for estrogen and progesterone receptors.
8. Educate patients to perform breast self-examination.
9. Demonstrate familiarity with male breast problems, e.g., gynecomastia and breast cancer.
 - a. Discuss risk factors
 - b. Outline appropriate work-up and management

Senior Level:

1. Independently evaluate a new breast patient through history & physical examination, ordering appropriate tests; e.g., mammogram, ultrasound, or MRI.
2. Formulate a diagnostic work-up and treatment plan for most common breast problems, including the common types of breast carcinomas.
3. Consult and interact with other members of the professional cancer team in explaining options to the newly diagnosed breast cancer patient.
4. Perform, under direct supervision, more advanced procedures on the breast such as:

a. Modified radical mastectomy	d. Sentinel lymph node biopsy
b. Simple mastectomy	e. Excision of lactiferous duct fistula
c. Lumpectomy & axillary dissection	f. Needle-localized breast biopsy
5. Manage unusual breast diseases such as:

a. Inflammatory carcinoma	d. Bilateral breast cancer
b. Paget's disease	e. Male breast cancer
c. Lactiferous duct fistula	f. Cystosarcoma phyllodes

4.12. Abdominal Surgery

Unit Objectives:

- Demonstrate an understanding of the anatomy, physiology, pathophysiology, and presentation of diseases of the abdominal cavity and pelvis.
- Demonstrate the ability to formulate and implement a diagnostic and treatment plan for diseases of the abdomen and pelvis that are amenable to surgical intervention.
- Demonstrate knowledge of the anatomy, physiology, and pathophysiology of the stomach, duodenum, small and large bowel, liver, biliary tract, spleen, and pancreas.
- Manage disease and injury of the stomach, duodenum, small and large bowel, liver, biliary tract, spleen and pancreas, that is amenable to surgical intervention.

- Demonstrate knowledge of surgical pathophysiology, with an emphasis on surgical management of surgical jaundice and mesenteric ischemia.
- Understand hepatobiliary, pancreatic, and gastrointestinal anatomy and physiology.
- Be conversant with neoadjuvant and adjuvant therapies for neoplasms of the GI tract.
- Demonstrate an understanding of endoscopic procedures such as upper endoscopy, colonoscopy, and flexible sigmoidoscopy.

Competency-Based Knowledge Objectives:

Junior Level:

1. Explain absorption and secretory functions of the peritoneal surfaces and the diaphragm.
2. Describe the anatomy of the omentum and its role in the inflammatory processes.
3. Assess the following signs associated with acute abdomen and their pathophysiology:

a. Referred pain	c. Guarding
b. Rebound tenderness	d. Rigidity
4. Specify characteristics of the history, physical examination findings, and mechanism of visceral and somatic pain for the following processes:

a. Acute appendicitis	g. Ureteral colic
b. Small and large bowel obstruction	h. Diffuse peritonitis
c. Perforated peptic ulcers	i. Biliary colic
d. Gastritis	j. Pancreatitis (acute and chronic)
e. Colonic diverticulosis	k. Cholecystitis (acute and chronic)
f. Acute mesenteric ischemia	l. Chronic mesenteric ischemia
5. Discuss differences in the physiological response to stress in the surgical patient.
6. Explain the mechanism of referred pain in:

a. Ruptured spleen	d. Renal colic	g. Gastritis
b. Biliary colic	e. Pancreatitis	h. Appendicitis
c. Basilar pneumonia	f. Inguinal hernia	i. Bowel obstruction
7. Discuss the following causes of paralytic ileus:
 - a. Postoperative electrolyte imbalance
 - b. Retroperitoneal pathology
 - c. Trauma
 - d. Extraperitoneal disease (central nervous system, lung)

8. When considering the possibility of wound complications:
- What are the risk factors for abdominal wound infection?
 - What are the contributing factors for abdominal wound dehiscence and evisceration?
 - What are the usual clinical presentations and timing?
 - What is the incidence of wound infection in surgeries of the biliary tree and GI tract?
 - What are the wound complications that are more problematic in the elderly patient?
 - What are the differences between the conditions favoring percutaneous drainage versus operative drainage for intra-abdominal collection?
 - What is the safest and most effective approach using each technique?
9. Explain the formation of fistulas in each of the following disease processes or factors:
- Operative complications
 - Inflammatory bowel disease
 - Pancreatitis
 - Malignancy
10. Describe the anatomy, presentation, and complications of non-operative management of different types of hernia.
11. Differentiate between incarceration, strangulation, and obstruction in relation to hernias.
12. Know the physiological basis for the preoperative and postoperative management, and indications for surgery of the following gastrointestinal diseases:
- Gastric cancer
 - Colorectal cancer
 - Inflammatory bowel disease
 - Hiatus hernia, reflux esophagitis, and achalasia
 - Gallstone disease, including choledocholithiasis and biliary pancreatitis
 - Acute and chronic pancreatitis
 - Small bowel obstruction
13. Understand the principal laparotomy incisions and techniques for closure of abdominal wall incisions, including the characteristics of common suture materials, and the rationale for choosing a given material and/or technique.
14. Understand the indications and appropriate selection of techniques of abdominal access for laparoscopy, including the physiological effects of pneumoperitoneum.
15. Be familiar with the indications for splenectomy and the perioperative preparation and management of patients undergoing splenectomy for hematologic disease.
16. Know the anatomy of the abdominal wall, inguinal area, esophagus and esophageal hiatus, stomach, biliary tree, small bowel, colon, rectum, pancreas, and spleen.
17. Know the clinical presentation, causes, diagnosis, and treatment of motility disorders of the esophagus, as well as management of paraesophageal hernias.

18. Know the clinical presentation, diagnosis, and management of esophageal perforation.
19. Discuss types of benign esophageal neoplasms, including their clinical presentation, diagnosis, and treatment.
20. Understand types of malignant esophageal neoplasms, including their presentation, diagnosis, histologic appearance, and treatment.
21. Review principles of nutritional management of patients with esophageal neoplasms.

22. Emergent Gastro-Intestinal Problems:

- Discuss alternative approaches to acute bowel obstruction.
- Understand the epidemiology and natural history of cecal/sigmoid volvulus.
- Recognize, diagnose, and treat colonic volvulus.
- Recognize and diagnose acute appendicitis.
- Recognize, diagnose, and understand treatment of acute and chronic cholecystitis.
- Recognize, diagnose, and treat acute diverticulitis.
- Recognize, diagnose, and treat GI bleeding of the upper and lower tract.
- Recognize, diagnose, and treat bowel perforation and peritonitis.
- Recognize, diagnose, and treat acute intestinal ischemia, including ischemic colitis.
- Understand decision-making for recurrent colorectal and anal cancer.
- Understand the epidemiology and natural history of lower GI bleeding.
- Recognize, diagnose, and understand the emergency surgical management of incarcerated, strangulated, and gangrenous abdominal intestinal herniae (e.g., inguinal, femoral, umbilicus).
- Recognize, diagnose, and treat Ogilvie's syndrome.

23. Acute Abdomen and Peritonitis:

- Develop a differential diagnosis through history and physical examination, order and interpret appropriate imaging and biochemical studies, and make a diagnosis of peritonitis.
- List possible distinctions in the presentation and examination of the patient with the following causes of acute abdomen:
 - a. Perforated viscus
 - b. Acute cholangitis
 - c. Cholecystitis
 - d. Bowel ischemia (acute and chronic)

- Recognize the clinical manifestations of non-surgical conditions such as pelvic inflammatory disease (PID) and acute pancreatitis, and differentiate from peritonitis requiring operation.
- Know the pathophysiology, supportive care, and surgical indications in a patient with bowel obstruction.
- Diagnose and acutely manage a patient with ileus and bowel obstruction, inflammatory bowel disease, GI bleeding, volvulus, diarrhea, appendicitis, and pancreatitis.
- Evaluate the patient with acute abdomen; direct a diagnostic workup and outline therapeutic options.

24. Inflammatory Bowel Disease and Nutrition

- Recognize acute and chronic diverticulitis.
- Understand the epidemiology and natural history of sigmoid diverticulitis.
- Recognize the complications of Crohn's disease and ulcerative colitis and understand the principles of management of inflammatory bowel disease.
- Understand the differences between Crohn's disease and ulcerative colitis.
- Discuss the indications for surgery in ulcerative colitis and Crohn's disease.
- Understand the pathophysiology of enterocutaneous fistulas.
- Differentiate between the following intestinal fistulas and understand that they may communicate with adjacent normal organs:
 - a. Esophageal
 - b. Gastric
 - c. Enteric (including duodenal)
 - d. Colonic
- Recognize indications for total parenteral nutrition.
- List the factors that prevent healing of a fistula.
- Summarize the conditions favoring operative versus non-operative treatment for fistulae.
- Understand nutritional alterations in short bowel syndrome.
- Know the definition and classification of obesity.
- Describe the medical and surgical treatment of morbid obesity.
- Understand the principles of surgical management of obesity.
- Prepare and manage obese patients perioperatively for bariatric and non-bariatric surgery.
- Recognize the physiological changes following bariatric surgery and the common complications.

25. Stomach and Upper GIT:

- Understand the anatomy of the stomach, duodenum, and small bowel.
- Understand the physiology of the stomach and small bowel including:
 - a. gastric function regulation
 - b. gastric peptides
 - c. gastric acid secretion
 - d. gastric motility
 - e. gastric barrier function
 - f. small bowel motility
 - g. small bowel endocrine function
 - h. small bowl immune function
- Understand the pathogenesis, diagnosis, and management of peptic ulcer disease.
- Describe the pathophysiology, diagnosis, treatment, and prophylaxis of stress gastritis.
- Understand the pathophysiology, diagnosis, and management of different types of post-gastrectomy syndromes including:
 - a. Dumping syndrome
 - b. Metabolic disturbances
 - c. Efferent loop syndrome
 - d. Alkaline reflux gastritis
 - e. Afferent loop syndrome
 - f. Gastric atony
- Understand the pathogenesis, diagnosis, and staging of different types of upper gastrointestinal neoplasm including:
 - a. Gastric cancer
 - b. Gastric lymphoma
 - c. Gastrointestinal stromal tumors
 - d. Small bowel tumors

26. Colo-Rectal Disease:

- Understand the anatomy, histology, and function of the anal canal, colon, and rectum.
- Recognize bleeding, obstruction, and perforation from colonic lesions, and be knowledgeable of the underlying pathology.
- Understand the principles of investigation in a patient with rectal bleeding.
- Understand the pathophysiology of Ogilvie's syndrome.
- Understand the pathogenesis and natural history of anal, rectal, and colon cancer.
- Classify colon and rectal cancer according to the Dukes and TNM classification.
- Follow a patient treated for colorectal carcinoma.
- Know how to manage benign and malignant polyps, including villous tumors of the rectum.
- Know when to plan investigations: carcinoembryonic antigen (CEA), colonoscopy, ultrasound, and chest x-ray (CXR), preoperatively and in long-term follow-up.
- Understand the principles of adjuvant therapy (chemotherapy and radiation) in colorectal carcinoma.
- Understand the progression of normal colonic epithelium to cancer.

- Learn indications for genetic screening of families for familial adenomatous polyposis (FAP)/hereditary nonpolyposis colorectal cancer (HNPCC)/MYH gene mutation.

27. Anal Condition

- Know how to work up and treat causes of anorectal bleeding, pain, soiling, and prolapse.
- Differentiate anal fissure from anal fistula and hemorrhoids.
- Recognize prolapsing hemorrhoids and offer alternative treatment.
- Recognize, differentiate, and treat thrombosed external hemorrhoids and prolapsed internal hemorrhoids.
- Recognize anorectal abscesses and know the treatment for perianal and ischioanal abscesses.
- Recognize the signs and symptoms of anal carcinoma (margin versus canal).
- Understand the pathogenesis of anal abscesses/fistulas/anal fissures.
- Understand the anatomy and pathogenesis of hemorrhoidal disease.
- Understand the anatomy and pathogenesis of pilonidal disease.
- Understand the pathogenesis and natural history of anal, rectal, and colon cancer.
- Diagnose and manage common anorectal problems, including hemorrhoids (internal and external), anal fissure, fistula/abscesses, pruritus ani, and pilonidal disease.

28. Liver & Biliary Tract

- Describe the anatomy of the liver and biliary system, including commonly found variations.
- Describe the physiology and function of the liver and biliary system including the following:

a. Glucose metabolism	d. Drug metabolism
b. Protein synthesis	e. Reticuloendothelial system
c. Coagulation	f. Function of bile in fat metabolism
- Explain the formation of bile, its composition, and its function in digestion.
- Describe the pathophysiology of gallstone formation.
- Correlate bile formation and composition with disease states affecting the biliary system, such as gallstone formation and biliary obstruction.
- Discuss the enterohepatic circulation of bile.
- Outline the workup and differential diagnosis of the jaundiced patient.
- Identify the most significant determinants of mortality in elderly patients following cholecystectomy.
- Discuss various types of liver cysts (parasitic and nonparasitic) and the appropriate management of each.

- Discuss the principal characteristics and treatment of the following:
 - a. Metastatic lesions to the liver
 - b. Primary malignancies of the liver and biliary tree
 - c. Benign tumors of the liver
- Summarize the etiology and management of pyogenic and amebic hepatic abscesses.
- Outline the pathophysiology, evaluation, and management of the following:

<ol style="list-style-type: none"> a. Choledochal cysts b. Caroli's disease c. Sclerosing cholangitis d. Primary biliary cirrhosis e. Secondary biliary cirrhosis f. Cholangitis g. Gallstone ileus 	<ol style="list-style-type: none"> h. Gallstone pancreatitis i. Benign biliary strictures j. Acute cholecystitis k. Symptomatic gallstones l. Acalculous cholecystitis m. Biliary dyskinesia n. Congenital biliary atresia
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29. Pancreas

- Describe the anatomy of the pancreas, including regional vascular anatomy.
- Discuss the physiology of the pancreas, including endocrine and exocrine function and hormonal regulation.
- Explain the pathophysiology of pancreatitis, including the following:
 - a. Common etiologies such as gallstones, postoperative, alcohol-related, post endoscopic retrograde cholangiopancreatography (ERCP), trauma, idiopathic, and medications
 - b. Diagnosis, evaluation, and management of the following in relation to pancreatitis: abscess, sterile pancreatic necrosis, and infected pancreatic necrosis
 - c. Complications of pancreatitis, such as ARDS, acute lung injury, hypovolemia, and pseudocyst
- Provide indications for operative management of pancreatitis.
- Manage gallstone pancreatitis with timing of surgery.
- Employ methods of prognostic assessment, including Ranson's criteria.
- Explain the pathophysiology of carcinoma of the pancreas, including the following:
 - a. Typical history and presentation
 - b. Diagnostic evaluation

- c. Indications for:
 - i. Operative versus nonoperative biliary drainage
 - ii. Percutaneous versus endoscopic stenting
 - iii. Resection
 - iv. Concomitant gastrojejunostomy with operative biliary bypass
- Discuss presentation, evaluation, and management of pancreatic pseudocysts with attention to the following:
 - a. Complications of pseudocysts (hemorrhage, infection, rupture)
 - b. Timing of drainage
 - c. Percutaneous versus surgical drainage
 - d. Indications for external versus internal drainage
 - e. Choice of internal drainage procedure
- Explain the diagnosis and management of pancreatic ascites.

Senior Level:

1. Outline the uses of prosthetic material and management of infection for incisional or recurrent hernias involving prosthetic material.
2. Outline the techniques for wound closure (including type of suture material).
3. Describe the use and method of placement of retention sutures.
4. Assess treatment of secondary peritoneal infections due to peritoneal dialysis catheters.
5. Describe the pathophysiology and treatment of ascites in the following:
 - a. Malignancy
 - b. Cirrhosis
 - c. Bile leak
 - d. Cardiac disease
 - e. Renal disease
6. Describe the etiology, manifestations, and treatment of the following:
 - a. Desmoid tumors
 - b. Retroperitoneal fibrosis
 - c. Rectus sheath hematoma
7. Describe the more common retroperitoneal tumors, sarcomas, and liposarcomas. (What are their clinical presentations, treatments, and prognoses?)

8. Describe the pathophysiology, diagnosis, and management of different types of post-gastrectomy syndromes, including the following:
 - a. Dumping syndrome
 - b. Metabolic disturbances
 - c. Efferent loop syndrome
 - d. Alkaline reflux gastritis
 - e. Afferent loop syndrome
 - f. Gastric atony
9. Describe the treatment, complications, and outcomes of different types of upper gastrointestinal neoplasm, including the following:
 - a. Gastric cancer
 - b. Gastric lymphoma
 - c. Gastrointestinal stromal tumors
 - d. Small bowel tumors
8. Analyze the pathophysiology, diagnosis, and management options in the treatment of short-gut syndrome.
9. Analyze alternatives to surgery in the management of gallstones, such as the following:
 - a. Oral dissolution with ursodeoxycholic acid
 - b. Endoscopic sphincterotomy
10. Compare laparoscopic versus open cholecystectomy.
11. Assess management alternatives for common bile duct stones:
 - a. Open versus laparoscopic common bile duct exploration
 - b. ERCP
12. Discuss the pathophysiology of hepatic cirrhosis and portal hypertension.
13. Describe the etiology, pathophysiology, and management of chronic pancreatitis.
14. Summarize the common sequelae of chronic pancreatitis including pain, fat malabsorption, and diabetes.
15. Discuss the diagnosis, evaluation, and surgical management of cystic neoplasms of the pancreas (mucinous and serous cystadenomas; cystadenocarcinoma).
16. Describe the diagnosis, evaluation, and surgical management of the following islet cell tumors of the pancreas:
 - a. Gastrinoma
 - b. Glucagonoma
 - c. VIPomas, WDHA Syndrome
 - d. Somatostatinoma
 - e. Insulinoma
17. Describe the diagnosis and management of pancreas divisum.

Competency-Based Performance Objectives:

Junior Level:

1. Perform, record, and report complete patient evaluations and assessments for different abdominal pathology.
2. Evaluate and diagnose acute abdomen and abdominal emergencies.
3. Evaluate and institute management of abdominal wound problems, including the following:
 - a. Infection
 - b. Evisceration
 - c. Fasciitis
 - d. Dehiscence
4. Coordinate preoperative and postoperative care for the patient with acute abdomen.
5. Assist in the management of the patient with acute abdomen and abdominal emergencies.
6. Request and interpret appropriate laboratory and radiological examinations to evaluate patients with the following:
 - a. Acute abdomen
 - b. Peritonitis
 - c. Jaundice
 - d. Intestinal obstruction
 - e. Abdominal wall hernia
 - f. Anorectal conditions
7. Interpret the following, in coordination with attending radiologists and staff:
 - a. Acute abdominal series (identify free air, bowel obstruction, volvulus, and atelectasis)
 - b. Upper GI series
 - c. Barium enema (identify neoplasms, signs of ischemia)
 - d. Abdominal ultrasound
 - e. Abdominal CT scans
 - f. Magnetic resonance cholangiopancreatography (MRCP)
 - g. ERCP
8. Assist in the perioperative management of patients undergoing abdominal surgery.
9. Assist with hernia repairs in the groin or umbilicus, demonstrating a basic understanding of the anatomy and surgical repair.
10. Assist in closure of abdominal incisions; exhibit competency in suture techniques.
11. Institute drainage for abdominal wall fistula and protection of surrounding skin.
12. Assist and properly perform surgical hemorrhoidectomy, perianal abscess drainage, and perianal fistulectomy.
13. Assist and properly perform surgical open and laparoscopic appendectomy.

14. Assist and properly perform surgical laparoscopic cholecystectomy.
15. Perform uncomplicated hepatobiliary surgery under supervision, such as cholecystectomy, both laparoscopic and open, with operative cholangiography.

Senior Level:

1. Open and close abdominal incisions of all varieties.
2. Treat wound complications such as infections and evisceration.
3. Assist with thoracoabdominal and retroperitoneal exposures.
4. Perform laparotomy for acute abdomen, demonstrating a systematic approach for determination of the etiology of the process. Use systematic abdominal exploration and appropriate measures for management (e.g., acute appendicitis, small bowel obstruction, perforated peptic ulcer [be able to guide the junior resident through the case]).
5. Perform more complex laparotomies, involving diffuse peritonitis in the septic patient (e.g., gangrenous or inflamed gallbladder or perforated diverticulitis requiring resection).
6. Supervise a junior resident through the repair of a simple hernia (inguinal or umbilical).
7. Perform colon resection, including hand-sewn anastomoses, with direction from the supervising attending surgeon.
8. Assist and supervise junior residents as they perform surgical hemorrhoidectomy.
9. Create bowel anastomoses (hand sewn and using a gastrointestinal anastomosis [GIA] stapler).
10. Divide bowel mesentery for mobilization; construct Roux-en-Y limb.
11. Assist in surgical laparoscopic colon and sigmoid resection.
12. Assist and properly perform laparoscopic and open cholecystectomy.
13. Assist in and properly perform laparoscopic and open bile duct exploration.
14. Assist and properly perform surgical open splenectomy.
15. Under supervision, perform more complex hepatobiliary surgery:
 - a. Biliary drainage procedures, such as Roux-en-Y and cholecystojejunostomy
 - b. Complicated cholecystectomy (acute, gangrenous)
16. Perform more complex abdominal surgeries such as:
 - a. Internal drainage of pseudocysts with Roux-en-Y cystojejunostomy
 - b. Longitudinal pancreaticojejunostomy (Puestow Procedure)
 - c. Distal pancreatectomy
 - d. Biliary bypass for carcinoma
 - e. Colostomies, for bowel obstructions

- f. Hartmans procedure
- g. Emergency laparotomy and damage control surgery, in cases of trauma
- h. Temporary Ileostomies
- i. Surgical colostomy/ileostomy closures

4.13. Minimal Access Surgery

Unit Objectives:

- Demonstrate an understanding of the applications and risks of minimal access surgery (MAS).
- Demonstrate an understanding of the technical and physiological principles of minimal access surgery.
- Develop specific technical skills and demonstrate proficiency in performance of basic laparoscopy, laparoscopic cholecystectomy, and other minimal access procedures.

Competency-Based Knowledge Objectives:

Section One: Overview

1. Differentiate between conventional open and scope-assisted surgery, including the following:
 - a. Anesthetic considerations
 - b. Effects of pneumoperitoneum
 - c. Cardiovascular stability
 - d. Need for team participation
 - e. Differences in patient outcome
2. Discuss the physical limitations imposed on the user participating in minimal access surgery:
 - a. Two-dimensional perspective
 - b. Visual limitations of scope and monitoring equipment
 - c. Crucial importance of patient position and trocars position for optimum exposure
3. Analyze factors affecting the decision to select a minimal access approach (as opposed to an open surgical approach) for a particular clinical problem.
4. Explain the mechanics and principles for safe and effective use of the following equipment/procedures:
 - a. Cautery (monopolar and bipolar)
 - b. Ultrasonic shears
 - c. Laser
 - d. Telescopic direction (straight/angled)
 - e. Insulation technique and hazards
 - f. Maintain visualization of operative field
 - g. Dissecting and knot tying

Section Two: Basic Laparoscopic Skills

1. Discuss techniques for gaining access to the abdomen, including the following:
 - a. Veress needle
 - b. Open (Hassan cannula)
 - c. Direct visualization trocars

2. Describe the sequence of steps involved in establishing a pneumoperitoneum, including the following:
 - a. Selection of first puncture site
 - b. Initial entry via Veress needle or Hassan
 - c. Tests to confirm entry into peritoneum
 - d. Initial insufflation
 - e. Initial exploration of abdomen
 - f. Placement of additional trocars
3. Discuss indications and limitations of diagnostic laparoscopy, as well as pros and cons of this diagnostic technique, compared to other diagnostic modalities such as CT scan.
4. Discuss recognition and management of complications, including major vascular injury, massive carbon dioxide embolus, or visceral injury.
5. List contraindications for laparoscopic surgery, and be able to explain why these conditions are considered relative or absolute contraindications.

Competency-Based Performance Objectives:

Junior Level:

1. Provide assistance in laparoscopic surgery (e.g., manage camera, first assist).
2. Demonstrate familiarity with laparoscopic equipment, including setup and trouble-shooting.
3. Demonstrate an understanding of basic principles of patient positioning and room setup for diagnostic laparoscopy and laparoscopic cholecystectomy.
4. Perform entry of body cavities using open (Hassan cannula) versus closed (Veress needle) access.
5. Recognize when satisfactory pneumoperitoneum has been achieved.
6. Perform procedures of increasing complexity under supervision, including the following:
 - a. Diagnostic laparoscopy
 - b. Laparoscopic cholecystectomy and appendectomy
7. Demonstrate the ability to convert from a minimal access to open approach.
8. Perform appropriate preoperative work-up, and supervise postoperative care of patients undergoing laparoscopic procedures.

Senior Level:

1. List equipment needed for complex procedures, set up room (including patient position) and equipment, and troubleshoot equipment when malfunction occurs.
2. Demonstrate facility in endoscopic knot tying, stapling, and suturing, either in a box-trainer, an animal model, or the operating room.

4.14. Vascular Surgery

Unit Objectives:

- Demonstrate knowledge of the anatomy, physiology, and pathophysiology of the vascular system, including congenital and acquired diseases.
- Demonstrate the ability to surgically manage the preoperative, operative, and postoperative care of patients with arterial, venous, and lymphatic disease.

Competency-Based Knowledge Objectives:

Junior Level:

1. Describe arterial and venous anatomy and basic vascular hemodynamics.
2. Discuss the anatomy, pathology, and pathophysiology of the arterial wall.
3. Review and describe the basic clinical manifestations of the following vascular disorders:
 - a. Obstructive arterial disease
 - b. Aneurysmal arterial disease
 - c. Thromboembolic disease (arterial and venous)
 - d. Chronic venous insufficiency and lymphatic obstruction
 - e. Portal hypertension
 - f. Congenital vascular disease
4. Assess patients' vascular systems using appropriate skills in history-taking and clinical examination.
5. Describe the relationship of the following disorders/practices to atherosclerotic vascular disease:

a. Diabetes mellitus	d. Congestive heart failure
b. Hypertension	e. Hyperlipidemia
c. Renal failure	f. Smoking
6. Describe life-threatening signs of vascular disease and indicate when immediate intervention is required.
7. Differentiate between the following diagnostic tools available for assessing vascular disease, and explain the relative contribution of each:
 - a. Angiography
 - b. CAT scanning
 - c. MRI and magnetic resonance angiography (MRA)
 - d. Duplex scanning (ultrasonography)
8. Summarize the etiology and therapeutic options of specific categories of vascular disease:
 - a. Venous disease:
 - Varicose vein disease
 - Post-phlebitic syndrome
 - Thromboembolic disease
 - Pulmonary embolism
 - Portal hypertension

b. Arterial and peripheral vascular disease:

- Aortic and other vascular aneurysms
- Inflammatory vascular disease
- Atherosclerotic vascular disease
- Arterial embolic disease
- A/V fistulas or malformations
- Extracranial cerebrovascular disease
- Thoracic outlet syndrome
- Visceral ischemic syndromes
- Degenerative arterial disease
- Aneurysmal disease

9. Outline the principles of non-invasive laboratory diagnosis; include a description of the role and limitations of the vascular laboratory.
10. Outline the principles of care for ischemic limbs.
11. Describe the natural history of medically treated vascular disease in the following categories:
 - a. Carotid arterial stenosis
 - b. Abdominal aortic aneurysm
 - c. Chronic femoral artery occlusion
12. Summarize principles for the preoperative assessment and postoperative care of patients undergoing major vascular surgical procedures.
13. Outline the fundamental elements of nonoperative care of the vascular patient, including the role of risk assessment and preventive measures.
14. Indicate the role of anticoagulant agents, including antiplatelet agents, in the management of patients with vascular disease.
15. Differentiate between acute arterial and acute deep venous occlusion.
16. Discuss the principles of angiography to include the following considerations:
 - a. Indications and complications (including contrast-induced renal failure)
 - b. Principles and techniques of intraoperative angiography
 - c. Principles and techniques of emergency room angiography
17. Discuss the principles of and contraindications for anticoagulation and thrombolytic therapy.
18. Describe the surgically correctable causes of hypertension and their diagnostic modalities.
19. Explain the risk/reward ratio of surgical care for patients with vascular disease.

20. Illustrate the general principles of vascular surgical techniques, including the following:
- a. Vascular control and suturing
 - b. Endarterectomy
 - c. Angioplasty
 - d. Bypass grafting
22. Discuss clotting factors and how they interact (coagulation cascade).
23. Discuss the role of the following factors in maintaining homeostasis in the coagulation pathways:
- a. Protein S
 - b. Protein C
 - c. Platelets
 - d. Platelet granules
 - e. Endothelial cell
 - f. Antithrombin III
24. Demonstrate knowledge of the pathophysiology, screening and diagnostic tests, management, surgical approaches, and complications of abdominal aortic aneurysm (AAA).
25. Demonstrate knowledge of the manifestation and management of lower extremity occlusive disease in terms of the following:
- a. Ability to differentiate the symptoms of arterial claudication from neurogenic or venous claudication
 - b. Natural history of intermittent claudication; the effects of smoking, diabetes, hypertension, and degree of ischemia upon the future risk of amputation
 - c. Definition of rest pain and the risk of amputation, if untreated
 - d. Interpretation of noninvasive tests used for evaluating lower extremity ischemia: ankle brachial index (ABI)
 - e. ABI changes in patients with claudication, rest pain, and tissue loss
 - f. Limitations of the ABI in diabetic patients and the value of toe pressure measurements

Senior Level:

1. Identify and describe vascular anatomy and regional anatomy related to vascular disease.
2. Discuss the broad range of vascular illnesses, including congenital vascular disease and diseases of the venous and lymphatic systems.
3. Explain the physiological and organic manifestations of vascular disease, such as renovascular hypertension, portal hypertension, and renal failure.
4. Differentiate between the different operative approaches to the vascular system, including the following:
 - a. Incisions and exposure
 - b. Handling of vascular tissues
 - c. Principles of vascular bypass
 - d. grafting Emergency vascular
 - e. Reoperative vascular surgery
 - f. Principles of endarterectomy
 - g. Endovascular techniques

5. Illustrate the operative exposure of the major vessels, including the following:
 - a. Aortic arch
 - b. Proximal subclavian
 - c. Carotid artery
 - d. Descending thoracic aorta
 - e. Suprarenal aorta
 - f. Infrarenal aorta
 - g. Femoral artery
 - h. Popliteal artery
6. Outline the indications of surgery for claudication, abdominal aortic aneurysm, and amputation.
7. Describe the indications for angioplasty and vascular stent placement along with risks and complications.
8. Describe the pathogenesis and complications of aneurysmal disease.
9. Summarize the etiology, microbiology, and treatment of diabetic foot infection.
10. Categorize the prevention and management of operative and postoperative complications, including graft infections, ischemic bowel, graft thrombosis, and extremity ischemia.
11. Outline procedures for managing vascular surgical emergencies, such as acute tissue ischemia or major hemorrhage (traumatic or ruptured aneurysm).
12. Analyze the options for treatment of patients with chronic venous insufficiency and venous ulceration.
13. Demonstrate basic knowledge of the various types of graft and suture material available.
14. Summarize surgical techniques available for managing the following vascular disorders:
 - a. Abdominal aortic bypass or aneurysmectomy
 - b. Carotid stenosis
 - c. Femoral-popliteal occlusion

Competency-Based Performance Objectives:

Junior Level

1. Evaluate patients for vascular disease.
2. Demonstrate skill in basic surgical techniques, including the following:
 - a. Knot tying
 - b. Exposure and retraction
 - c. Knowledge of instrumentation
 - d. Incisions and closure
 - e. Handling of graft material
3. Participate in surgery for varicose vein disease, including the following:
 - a. Ligation and stripping
 - b. Management of venous stasis ulcers
 - c. Management of venous thrombosis

4. Participate in amputations with specific attention to:
 - a. Demarcation levels
 - b. Control of toxicity
5. Demonstrate proficiency in venous access procedures.
6. Obtain vascular control of diseased or traumatically occluded blood vessels using:
 - a. Vascular clamp
 - b. Vessel loop
 - c. Balloon occlusion
7. Participate in thromboendarterectomy and thrombectomy.
8. Demonstrate appropriate vascular suture techniques.
9. Evaluate and manage sympathectomy procedures.

Senior Level:

1. Demonstrate the appropriate incisions and exposure of the following:

a. Abdominal aorta and its branches	c. Peripheral arterial system
b. Portal venous system	d. Carotid arterial system
c. Arteriovenous fistula	
2. Obtain vascular control of major vessels

a. Aorta	b. Vena cava
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3. Participate in endarterectomy and bypass grafting.
4. Demonstrate ability to manage graft and suture materials.
5. Perform selected operative procedures or selected parts of the following operative procedures under supervision:

a. Aortic aneurysm repair	d. Femoral popliteal occlusive disease
b. Carotid endarterectomy	f. Peripheral vascular trauma
c. Aorto-iliac occlusive disease	
6. Use proper advanced techniques in managing patients with a variety of vascular disorders, such as the following:

a. Ruptured aortic aneurysm	c. Supra-renal aortic aneurysm
b. Central vascular trauma	d. Renovascular hypertension
7. Perform alternative methods of bypass grafting such as:
 - a. Bypass, principles and techniques
 - b. Indirect revascularization

- c. In situ techniques
 - d. Sequential and composite techniques
8. Manage prosthetic graft infections:
- a. Diagnosis
 - b. Selection of revascularization routes
 - c. Selection of appropriate graft materials
 - d. Timing
9. Manage complications of common major vascular procedures such as the following:
- a. Aortic reconstruction
 - b. Lower extremity vascular reconstruction

4.15. Pediatric Surgery

Unit Objectives:

- Understand the unique anatomical, pathophysiological, and genetic conditions that affect children.
- Learn the principles of stabilization, preoperative diagnosis, and preparation of the sick child.
- Understand the anatomical and physiological principles that guide successful operative repair.
- Learn principles of routine postoperative care and postoperative critical care management.

Competency-Based Knowledge Objectives:

1. Describe the development of children in terms of the following criteria:
 - a. Weight, length, and head size
 - b. Nutritional requirements
 - c. Renal function
 - d. Hormonal influences on development
 - e. Response to stress and infection
2. Classify congenital malformations of the newborn by type, origin, and the need for surgical intervention:
 - a. Head and neck: thyroglossal duct cyst, lymphadenopathy, cystic hygroma
 - b. Gastrointestinal: pyloric stenosis, appendicitis
 - c. Respiratory: tracheal lesions
 - d. Abdominal wall defects: omphalomesenteric and urachal malformations
3. Summarize the basic approach to the diagnosis and management of more common surgical problems of infancy and childhood, such as the following:
 - a. Pyloric stenosis
 - b. Perforated appendicitis
 - c. Intussusception

4. Identify the technical aspects of the following procedures:
 - a. Excision of skin and subcutaneous lesions
 - b. Incision and drainage of abscesses
 - c. Lymph node biopsy
 - d. Chest tube placement
 - e. Oral intubation
 - f. Herniorrhaphy in older children
5. Describe the fundamental considerations in the preoperative and postoperative care of infants and children.
6. Explain the principles of diagnosis and treatment of common causes of gastrointestinal hemorrhage in the neonate, infant, and child.
7. Explain the approach to surgical management, (i.e., diagnosis, perioperative care, surgical therapy, and postoperative follow-up) of complex surgical procedures for infants and children:
 - a. Antireflux procedure
 - b. Bowel resection
 - c. Repair of hepatic, biliary, and pancreatic injury
 - d. Splenectomy and splenorrhaphy
 - e. Management of the seriously injured patient

4.16. Plastic and Reconstructive Surgery

Unit Objectives:

- Demonstrate an understanding of the nature and principles of correction and reconstruction of congenital and acquired defects of the head, neck, trunk, and extremities.
- Demonstrate the ability to manage the treatment of acute, chronic, and neoplastic defects not requiring complex reconstruction.

Competency-Based Knowledge Objectives:

1. Outline the components of a focused history and physical examination pertinent to the evaluation and correction of congenital or acquired defects under the realm of plastic and reconstructive surgery.
2. Discuss and compare skin and connective tissue according to the following:
 - a. Anatomy
 - b. Normal physiology and biochemistry
 - c. Pathophysiology of benign and malignant skin disorders
 - d. Unique pathophysiology of connective tissue disorders
3. Explain basic techniques for surgical repair of superficial incisions and lacerations of the head, neck, trunk, and extremities to include the following considerations:
 - a. Skin
 - b. Subcutaneous tissue
 - c. Superficial muscle and fascia
 - d. Dressings
 - e. Suturing and knot tying

4. Describe the physiology of various techniques of skin and composite tissue transplantation with particular regard to component tissue circulation:
 - a. Skin grafts & flaps (split vs. full thickness)
 - b. Muscle flaps
 - c. Myocutaneous flaps
 - d. Vascularized versus nonvascularized flaps

5. Categorize the pathophysiology of thermal, chemical, and electrical burns, including consideration of the following:
 - a. Systemic pathophysiology
 - b. Local pathophysiology
 - c. Cardiac depression
 - d. Pulmonary compromise

6. Describe the “classical” chemical agents causing burns; list their antidotes.

7. Define the TNM classification system used for neoplasms of skin, soft tissue, and head and neck.

8. Discuss epidemiology, risk factors, treatment, and prevention of cutaneous malignancies in the geriatric patient, including the following:
 - a. Skin cancer rates (basal cell carcinoma [BCC], squamous cell carcinoma [SCC])
 - b. Average age of onset for BCC/SCC
 - c. Etiology of BCC/SCC
 - d. Usual modes of treatment for BCC/SCC (Mohs Technique, radiation, chemotherapy)
 - e. Prevention using medications (isotretinoin, beta-carotene)

9. Explain the methods for performing incisional and excisional biopsies of skin and oral cavity.

10. Demonstrate the systematic examination of the hand, to assess motor and sensory function, including the following:
 - a. Intrinsic tendon and muscle function
 - b. Extensive tendon and muscle function
 - c. Median nerve
 - d. Ulnar nerve
 - e. Radial nerve
 - f. Circulation

11. Discuss surgical treatment of the following:
 - a. Common hand injuries and tumors
 - b. Surgical repair of facial trauma, soft tissue, and bony defects
 - c. Resection of skin and soft tissue neoplasms requiring complex reconstruction
 - d. Reconstruction of the breast for congenital and acquired defects
 - e. Management of the burned hand and face
 - f. Reconstruction of congenital craniofacial defects

12. Analyze treatment options for comprehensive care of the burn patient, including the following:
 - a. Excision of burn
 - b. Homografting
 - c. Xenografting
 - d. Autografting

13. Summarize currently accepted surgical techniques for treating the following:

- a. Correction of congenital lesions of the head/neck and hand/trunk
- b. Craniofacial anomalies, including cleft lip and palate
- c. Breast reconstruction after mastectomy
- d. Reconstruction and ablative head and neck surgery
- e. Aesthetic rejuvenation of the face and body

Competency-Based Performance Objectives:

1. Complete a comprehensive physical examination and clinical data history, including pertinent diagnostic laboratory and radiographic findings.
2. Evaluate and treat simple and intermediate abrasions and burns of the face, trunk, and extremities.
4. Debride and suture major non-facial wounds and burns.
5. Participate in the acute resuscitation, evaluation, and initial treatment of a burned patient.
6. Participate in the evaluation and formulation of treatment plans for:
 - a. Hand injuries
 - b. Facial fractures
 - c. Head and neck cancer
 - d. Congenital anomalies
 - e. Breast deformities
 - f. Burn patients
7. Under the direction of a plastic surgeon, assist in the planning and performance of complex reconstructive operations.
8. Harvest and apply full-thickness skin grafts and local flaps.
9. Reconstruct defects with random flaps, composite flaps, and grafts.
10. Raise muscle and skin-muscle flaps under direct supervision.
11. Perform major excision of burns, escharotomy, and skin grafting.
12. Assess and act as first assistant and attending-supervised surgeon for the following:
 - a. Complex soft tissue injury
 - b. Nerve, tendon, and bone surgery of the hand
 - c. Vascular injuries
13. Act as first assistant or attending supervised surgeon for the following:
 - a. Reconstruction and reparative surgery of the hand
 - b. Surgical repair of facial trauma
 - c. Resection of neoplasms of the head and neck
 - d. Resection of major skin and soft tissue neoplasms requiring complex reconstruction
 - e. Reconstruction of the breast
 - f. Complex wound reconstruction using flap both local, regional, and free microvascular

4.17. Outpatient Care

Unit Objectives:

- Maintain continuity in terms of care for the patient with surgical diseases, from pre-hospital evaluation through post-surgical management and follow-up.
- Develop and hone skills in history taking, physical examination, interpersonal communication, critical appraisal, and self-directed learning.

Competency-Based Knowledge Objectives:

1. Delineate the components of and discuss the importance of a focused history and physical examination performed in an outpatient setting on a patient with a surgical disease.
2. Demonstrate a working knowledge of the natural history of surgical diseases:
 - a. If untreated
 - b. If treated surgically and non-surgically
3. Distinguish between different types of biopsy techniques in an outpatient setting.
4. Specify indications for common office procedures such as anoscopy.
5. Delineate hospital mechanisms for admitting patients.
6. Estimate costs of hospitalization and various surgeries.
7. Describe the expected appearance of wound sites at various postoperative intervals.
8. Delineate appropriate pain medications and dosages.

Competency-Based Performance Objectives:

1. Demonstrate the ability to obtain the essential elements of a focused preoperative history, including assessment of medications.
2. Perform a complete physical examination with cardiopulmonary assessment for surgery.
3. Order appropriate investigations, for screening, preoperative and postoperative evaluation.
4. Accurately interpret clinical laboratory results, pathology reports, and radiographic studies.
5. Develop appropriate plans for management and Order appropriate consultations.
6. Appropriately and sensitively counsel the patient and patient's family regarding:
 - a. Disease entity (prognosis, treatment options, additional treatment)
 - b. Surgical issues
 - i. Operative procedures and risks (possible complications, including mortality)
 - ii. Anesthesia
 - iii. Prognosis (curative vs. palliative)
 - c. Other treatment options (no treatment and non-surgical therapy)
 - d. Informed consent
7. Explain the prospective surgical approach to the patient.

8. Postoperatively, obtain appropriate follow-up history, including:
 - a. General well-being
 - b. Pain control
 - c. Nutritional state (ability to eat, nausea)
 - d. Level of activity
 - e. Compliance with instructions (medications, physical therapy)
9. Perform appropriate postoperative examination of the surgical site.
10. Provide appropriate wound care. Identify and manage wound problems, including the following:
 - a. Superficial wound separation; abdominal dehiscence
 - b. Seromas
 - c. Infections (cellulitis or abscess, determining the need for antibiotics, drainage)
 - d. Incisional hernia
11. Assess the patient's ability to maintain levels of activity (driving, work, exercise).
12. Communicate appropriately and sensitively with the patient and family.
13. Develop the ability to teach in clinic settings (for nurses, patients, and medical students).

Competency-Based Attitudinal Objectives:

1. Have a working understanding of the surgeon's role as primary care giver in clinical settings.
2. Demonstrate professionalism, empathy, and compassion by showing respect for a patient's privacy and self-esteem during aspects of the physical examination.
3. Demonstrate an awareness of, and respect for, patient autonomy.
4. Recognize patient or patient family responsibilities that may affect the timing of surgery.
5. Demonstrate an understanding of, and sensitivity to, patient socioeconomic concerns regarding issues such as possible loss of work time and wages.
6. Demonstrate sensitivity and flexibility regarding patient fears and concerns, including the following:
 - a. Preoperatively
 - i. Anxiety about pain and the procedure's findings
 - b. Intraoperatively
 - i. Pain and individual response to pain
 - c. Postoperatively
 - i. Ability to care for self
 - ii. Drugs
 - iii. Level of function
 - iv. Prognosis
8. Display a working knowledge of the management of the outpatient surgical setting.

TOP TEN MOST PREVALENT CONDITIONS AND PROCEDURES IN GENERAL SURGERY IN SAUDI ARABIA

Top Ten Surgical Emergency Conditions in Saudi Arabia

Disease/Condition	
1	Gall stone disease
2	Trauma
3	Acute appendicitis
4	Acute pancreatitis
5	Perforated viscus
6	Intestinal obstruction
7	Diabetic foot
8	Lower GIT bleeding
9	Surgical infections
10	Anal conditions

Top Ten Most Prevalent Cancers in Saudi Arabia

Organ/System	
1	Breast
2	Thyroid
3	Colon
4	Ano-rectum
5	Pancreas
6	Gastric
7	Liver
8	Soft tissue sarcoma
9	Biliary
10	Oesophageal

Top Ten Most Prevalent General Surgery Conditions in Out-Patient Clinics in Saudi Arabia

Disease/Condition	
1	Gall stone
2	Neck swelling
3	Hernias
4	Breast complaint
5	Soft tissue swelling
6	Haemorrhoids
7	Pilonidal sinus
8	Anal fissure
9	Diabetic foot
10	Obesity

Top Ten Most Prevalent General Surgery Conditions of In-Patient Admissions in Saudi Arabia

Disease/Condition	
1	Acute appendicitis
2	Soft tissue infections
3	Acute cholecystitis
4	Acute pancreatitis
5	Intestinal obstruction
6	Trauma
7	Cholelithiasis
8	Tumors
9	Hernias
10	Obesity

Top Ten Most Prevalent Procedures Performed in General Surgery in Saudi Arabia

Name of Procedure/Surgery	
1	Appendectomy
2	Diagnostic laparoscopy/laparotomy
3	Cholecystectomy
4	Breast surgery
5	Thyroid surgery
6	Hernia repair
7	Obesity surgery
8	Limb amputation
9	Bowel resection
10	Lump excision

CLINICAL REQUIREMENTS (PROCEDURES AND SKILLS)

Upon completion of the training program, the trainee should have performed, assisted, or attended in 450 essential surgical procedures as follows:

Name of Procedure	Assisted	Surgeon
Breast mass lumpectomy	10	5
Mastectomy (simple or modified radical)	10	5
Thyroidectomy (partial or total)	15	5
Parathyroidectomy	5	0
Chest tube insertion	2	3
Thoracoscopy	4	1
Thoracotomy	4	1
Diagnostic laparoscopy/laparotomy	15	5
Cholecystectomy (laparoscopic and open, with or without cholangiogram)	40	20
Liver resection(s)	5	0
Gastrectomy (total or partial)	15	2
Splenectomy (laparoscopic and open)	8	2
Obesity surgery (laparoscopic or open)	20	5
Bowel resection and anastomosis	8	2
Appendectomy (laparoscopic and open)	10	30
Stoma creation	8	2
Haemorrhoidectomy, fissurectomy, fistulotomy	10	20
Pilonidal sinus excision	5	10
Hernia repair (laparoscopic or open)	10	20
Limb amputations	5	10
Incision and drainage of abscess cavities	10	20
Soft tissue lumps excision	5	10
Lymph node biopsy or excision	5	10
Core needle biopsy of solid organs	5	5
Vascular surgery	6	2
Pediatric surgery	6	2
Plastic surgery	5	2

Method of clinical requirement documentation

The trainee shall be required to document all his/her clinical procedures throughout the program using an electronic logbook when available by the commission; otherwise, an ordinary logbook is to be used. Activities should be dated and categorized into the period/rotation of training and whether they were performed by the trainee or with the trainee as an assistant or participant. Each activity registered in the logbook should be countersigned by the Program Director when deemed complete. The logbook should include the operative procedures and technical skills acquired during the training.

FORMAL TEACHING AND ACADEMIC ACTIVITIES

General Principles

1. A half day is reserved weekly as an academic day for surgical residents. All residents are free from their clinical duties to attend the academic activity, which is planned in terms of the assigned tutor, time slots, and venue.
2. A monthly regional academic activity is also planned in terms of an assigned tutor, time slots, and venue. Residents from all hospitals in the region will gather for this activity.
3. Other academic activities include:
 - a. Daily morning report
 - b. Weekly evidence-based review in surgical practice
 - c. Weekly morbidity and mortality meeting
 - d. Weekly radiology, pathology, or tumor board meeting
4. The Core Education Programme (CEP) includes the following three formal teaching and learning activities:
 - a. Universal topics: 20–30% delivered centrally by the SCFHS
 - b. Core specialty topics: 40–50%
 - c. Trainee selected topics: 20–30%
5. Every two weeks, at least one hour should be assigned to meeting with mentors, review of portfolio, mini clinical evaluation exercise (mini-CEX), etc.

Universal Topics

Universal topics are high value, interdisciplinary topics of utmost importance to the trainee, developed and delivered centrally to ensure that every trainee receives high quality teaching and develops essential core knowledge. These topics are common to all specialties with a suggested time of 1.5 hrs.

The topics will be delivered in a modular fashion. At the end of each Learning Unit, there will be an on-line formative assessment. After completion of all topics, there will be a combined summative assessment in the form of context-rich multiple-choice questions (MCQ). All trainees must attain minimum competency in the summative assessment. Alternatively, these topics can be assessed in a summative manner along with specialty examinations.

Selected modules per residency level

YEARS OF TRAINING	UNIVERSAL TOPIC
1 st year	Safe drug prescription Hospital acquired infection Sepsis; SIRS; DIVC Blood transfusion Abnormal ECG Management of acute chest pain Management of acute breathlessness Preoperative assessment
2 nd year	Principles of cancer management Side effects of chemotherapy and radiation therapy Oncological emergencies Cancer prevention Surveillance/follow-up of cancer patients Management of altered sensorium Management of hypotension and hypertension Acute pain management
3 rd year	Postoperative care Management of diabetic complications Comorbidities of obesity Management of fluid in the hospitalized patient Management of electrolyte imbalances Ethical issues: treatment refusal; patient autonomy
4 th year	Assessment of frail elderly Mini-mental state examination Prescribing drugs for the elderly Care of the elderly Occupational hazards of healthcare workers (HCW) Patient advocacy
5 th year	Evidence-based approach to smoking cessation Ethical issues: transplantation/organ harvesting; withdrawal of care Role of doctors in death and dying

Modules Description

Module 1: Introduction

Safe drug prescribing: At the end of the Learning Unit, you should be able to do the following:

- a. Recognize the importance of safe drug prescribing in healthcare.
- b. Describe various adverse drug reactions with examples of commonly prescribed drugs that can cause such reactions.
- c. Apply principles of drug-drug interactions, drug-disease interactions, and drug-food interactions in common situations.
- d. Apply principles of prescribing drugs in special situations such as renal failure and liver failure.
- e. Apply principles of prescribing drugs in the elderly, pediatric patients, and in pregnancy and lactation.
- f. Promote evidence-based, cost-effective prescribing.
- g. Discuss ethical and legal frameworks governing safe-drug prescribing in Saudi Arabia.

Hospital Acquired Infections (HAI): At the end of the Learning Unit, you should be able to do the following:

- a. Discuss the epidemiology of HAI with special reference to HAI in Saudi Arabia.
- b. Recognize HAI as one of the major emerging threats in healthcare.
- c. Identify the common sources and set-ups of HAI.
- d. Describe the risk factors of common HAIs, such as ventilator-associated pneumonia, methicillin-resistant staphylococcus aureus (MRSA), central line-associated bloodstream infections (CLABSI), and vancomycin resistant enterococcus (VRE).
- e. Identify the role of healthcare workers in the prevention of HAI.
- f. Determine appropriate pharmacological (e.g., selected antibiotic) and non-pharmacological (e.g., removal of indwelling catheter) measures in the treatment of HAI.
- g. Propose a plan to prevent HAI in the workplace .

Sepsis, SIRS, DIVC: At the end of the Learning Unit, you should be able to do the following:

- a. Explain the pathogenesis of sepsis, SIRS, and DIVC.
- b. Identify patient-related and non-patient related predisposing factors of sepsis, SIRS, and DIVC.
- c. Recognize a patient at risk of developing sepsis, SIRS, and DIVC.
- d. Describe the complications of sepsis, SIRS, and DIVC.
- e. Apply the principles of management of patients with sepsis, SIRS, and DIVC.
- f. Describe the prognosis of sepsis, SIRS, and DIVC.

Blood Transfusion: At the end of the Learning Unit, you should be able to do the following:

- a. Review the different components of blood products available for transfusion.
- b. Recognize the indications and contraindications of blood product transfusion.
- c. Discuss the benefits, risks, and alternatives to transfusion.

- d. Undertake consent for specific blood product transfusion.
- e. Perform steps necessary for safe transfusion.
- f. Develop an understanding of special precautions and procedures necessary during massive transfusions.
- g. Recognize transfusion-associated reactions and provide immediate management.

Module 2: Cancer

Principles of Management of Cancer: At the end of the Learning Unit, you should be able to do the following:

- a. Discuss the basic principles of staging and grading of cancers.
- b. Enumerate the basic principles (e.g., indications, mechanism, types) of the following:
 - i. Cancer surgery
 - ii. Chemotherapy
 - iii. Radiotherapy
 - iv. Immunotherapy
 - v. Hormone therapy

Side Effects of Chemotherapy and Radiation Therapy: At the end of the Learning Unit, you should be able to do the following:

- a. Describe important side effects of common chemotherapy drugs (e.g., frequent side effect, life or organ threatening side effect).
- b. Explain principles of monitoring side effects in a patient undergoing chemotherapy.
- c. Describe measures (pharmacological and non-pharmacological) available to ameliorate side effects of commonly prescribed chemotherapy drugs.
- d. Describe important (e.g., common and life threatening) side effects of radiation therapy.
- e. Describe measures (pharmacological and non-pharmacological) available to ameliorate side effects of radiotherapy.

Oncological Emergencies: At the end of the Learning Unit, you should be able to do the following:

- a. Enumerate important oncological emergencies encountered in both hospital and ambulatory settings.
- b. Discuss the pathogenesis of important oncological emergencies.
- c. Recognize oncological emergencies.
- d. Institute immediate measures when treating a patient with oncological emergencies.
- e. Counsel the patients in an anticipatory manner to recognize and prevent oncological emergencies

Cancer Prevention: At the end of Learning Unit, you should be able to do the following:

- a. Conclude that many major cancers are preventable.
- b. Identify smoking prevention and life-style modifications for prevention.
- c. Recognize preventable cancers.
- d. Discuss major cancer prevention strategies at the individual as well as national level.
- e. Counsel patients and families in a proactive manner regarding cancer prevention, including screenin.

Surveillance and Follow-Up of Cancer Patients: At the end of the Learning Unit, you should be able to do the following:

- a. Describe the principles of surveillance and follow-up of patients with cancers.
- b. Enumerate the surveillance and follow-up plan for common forms of cancer.
- c. Describe the role of primary care physicians, family physicians, and similar others in the surveillance and follow-up of cancer patients.
- d. Liaise with oncologists to provide surveillance and follow-up for patients with cancer.

Module 3: Diabetes and Metabolic Disorders

Management of Diabetic Complications: At the end of the Learning Unit, you should be able to do the following:

- a. Describe the pathogenesis of important complications of Type 2 diabetes mellitus.
- b. Screen patients for such complications.
- c. Provide preventive measures for such complications.
- d. Treat such complications.
- e. Counsel patients and families with special emphasis on prevention.

Comorbidities of Obesity: At the end of the Learning Unit, you should be able to do the following:

- a. Screen patients for the presence of common and important comorbidities of obesity.
- b. Manage obesity related comorbidities.
- c. Provide dietary and lifestyle advice for the prevention and management of obesity.

Abnormal ECG: At the end of the Learning Unit, you should be able to do the following:

- a. Recognize common and important ECG abnormalities.
- b. Institute immediate management, if necessary.

Module 4: Medical and Surgical Emergencies

At the end of the Learning Unit, you should be able to do the following:

- a. Triage and categorize patients.
- b. Identify patients who need prompt medical and surgical attention.
- c. Generate preliminary diagnoses based on a history and physical examination.
- d. Order and interpret urgent investigations.
- e. Provide appropriate immediate management to patients.
- f. Refer patients to the next level of care, if needed.

Module 5: Acute Care

Preoperative Assessment: At the end of the Learning Unit, you should be able to do the following:

- a. Describe the basic principles of preoperative assessment.
- b. Perform preoperative assessment in uncomplicated patients with special emphasis on the following:
 - i. General health assessment
 - ii. Cardiorespiratory assessment
 - iii. Medications and medical device assessment
 - iv. Drug allergy
 - v. Pain relief needs
- c. Categorize patients according to risks.

Postoperative Care: At the end of the Learning Unit, you should be able to do the following:

- a. Devise a postoperative care plan including monitoring of vitals, pain management, fluid management, medications, and laboratory investigations.
- b. Properly hand over the patients to appropriate facilities.
- c. Describe the process of postoperative recovery in a patient.
- d. Identify common postoperative complications.
- e. Monitor patients for possible postoperative complications.
- f. Institute immediate management for postoperative complications.

Acute Pain Management: At the end of the Learning Unit, you should be able to do the following:

- g. Review the physiological basis of pain perception.
- h. Proactively identify patients who might be in acute pain.
- i. Assess a patient with acute pain.
- j. Apply various pharmacological and non-pharmacological modalities available for acute pain management.
- k. Provide adequate pain relief for uncomplicated patients with acute pain.
- l. Identify and refer patients with acute pain who may benefit from specialized pain services.

Management of Fluid in Hospitalized Patients: At the end of the Learning Unit, you should be able to do the following:

- a. Review the physiological basis of water balance in the body.
- b. Assess a patient for his/her hydration status.
- c. Recognize a patient with over and under hydration.
- d. Order fluid therapy (oral as well as intravenous) for a hospitalized patient.
- e. Monitor fluid status and response to therapy through history, physical examination, and selected laboratory investigations.

Management of Acid-Base Electrolyte Imbalances: At the end of the Learning Unit, you should be able to do the following:

- a. Review the physiological basis of electrolyte and acid-base balance in the body.
- b. Identify diseases and conditions that are likely to cause or be associated with acid/base and electrolyte imbalances.
- c. Correct electrolyte and acid-base imbalances.
- d. Perform careful calculations, checks, and other safety measures while correcting acid-base and electrolyte imbalances.
- e. Monitor response to therapy through history, physical examination, and selected laboratory investigations.

Module 6: Frail Elderly

Assessment of Frail Elderly: At the end of the Learning Unit, you should be able to do the following:

- a. Enumerate the differences and similarities between comprehensive assessment of the elderly and assessment of other patients.
- b. Perform a comprehensive assessment, in conjunction with other members of the healthcare team, of a frail elderly person, with special emphasis on social factors, functional status, quality of life, diet and nutrition, and medication history.
- c. Develop a problem list based on the assessment of the elderly

Mini-Mental State Examination (Mini-MSE): At the end of the Learning Unit, you should be able to do the following:

- a. Review the appropriate usage, advantages, and potential pitfalls of the Mini-MSE.
- b. Identify patients suitable for the Mini-MSE.
- c. Screen patients for cognitive impairment through the Mini-MSE.

Prescribing Drugs in the Elderly: At the end of the Learning Unit, you should be able to do the following:

- a. Discuss the principles of prescribing in the elderly.
- b. Recognize poly-pharmacy, prescribing cascade, inappropriate dosages, inappropriate drugs, and deliberate drug exclusion as major causes of morbidity in the elderly.

- c. Describe the physiological and functional declines in the elderly that contribute to increased drug-related adverse events.
- d. Discuss drug-drug interactions and drug-disease interactions among the elderly.
- e. Be familiar with Beers criteria.
- f. Develop rational prescribing habits for the elderly.
- g. Counsel elderly patients and families on safe medication usage.

Care of the Elderly: At the end of the Learning Unit, you should be able to do the following:

- a. Describe factors that need to be considered while planning care for the elderly.
- b. Recognize the needs and importance of the well-being of caregivers.
- c. Identify the local and community resources available for the care of the elderly.
- d. With input from other healthcare professionals, develop an individualized care plan for an elderly patient.

Module 7: Ethics and Healthcare

Occupation Hazards of Health Care Workers (HCW): At the end of the Learning Unit, you should be able to do the following:

- a. Recognize common sources and risk factors of occupational hazards among HCW.
- b. Describe common occupational hazards in the workplace.
- c. Develop familiarity with legal and regulatory frameworks governing occupational hazards among HCW.
- d. Develop a proactive attitude to promote workplace safety.
- e. Protect yourself and colleagues against potential occupational hazards in the workplace.

Evidence-Based Approach to Smoking Cessation: At the end of the Learning Unit, you should be able to do the following:

- a. Describe the epidemiology of smoking and tobacco usage in Saudi Arabia.
- b. Review the effects of smoking on the smoker and family members.
- c. Effectively use pharmacological and non-pharmacological measures to treat tobacco usage and dependence.
- d. Effectively use pharmacological and non-pharmacological measures to treat tobacco usage and dependence among special population groups, such as pregnant women, adolescents, and patients with psychiatric disorders.

Patient Advocacy: At the end of the Learning Unit, you should be able to do the following:

- a. Define patient advocacy.
- b. Recognize patient advocacy as a core value governing medical practice.
- c. Describe the role of patient advocates in the care of the patients.
- d. Develop a positive attitude towards patient advocacy.
- e. Be a patient advocate in conflicting situations.
- f. Be familiar with local and national patient advocacy groups.

Ethical issues: Transplantation/organ harvesting, withdrawal of care: At the end of the Learning Unit, you should be able to do the following:

- a. Apply key ethical and religious principles governing organ transplantation and withdrawal of care.
- b. Be familiar with the legal and regulatory guidelines regarding organ transplantation and withdrawal of care.
- c. Counsel patients and families in light of applicable ethical and religious principles.
- d. Guide patients and families to make informed decisions.

Ethical issues: Treatment refusal/patient autonomy: At the end of the Learning Unit, you should be able to do the following:

- a. Predict situations in which a patient or family is likely to decline prescribed treatment.
- b. Describe the concept of “rational adult” in the context of patient autonomy and treatment refusal.
- c. Analyze key ethical, moral, and regulatory dilemmas in treatment refusal.
- d. Recognize the importance of patient autonomy in the decision-making process.
- e. Counsel patients and families declining medical treatment in light of the best interest of patients.

Role of Doctors in Death and Dying: At the end of the Learning Unit, you should be able to do the following:

- a. Recognize the important role a doctor can play during the dying process.
- b. Provide emotional as well as physical care to a dying patient and family.
- c. Provide appropriate pain management for a dying patient.
- d. Identify suitable patients and refer to palliative care services.

List of Core General Surgery Teaching Topics

	Topics	Level	Format
Basic Principles of Surgery	Fluid and electrolytes in surgical patients	R1–3	Interactive lecture
	Management of shock	R1–3	Interactive lecture
	Hemostasis in surgical practice	R1–3	Interactive lecture
	Surgical site infections; prevention and management	R1–3	Interactive lecture
	Surgical management—organ specific trauma	R1–3	Interactive lecture
	Surgical complications, prevention, and management	R1–3	Interactive lecture
	Nutrition in surgical patients	R1–3	Interactive lecture
	Acute and postoperative pain management	R1–3	Interactive lecture
	Preoperative assessment of surgical patients	R1–3	Interactive lecture
	Understanding the principles of wound healing	R1–3	Interactive lecture
	Approach to burns	R1–3	Interactive lecture
	Management of diabetic foot	R1–3	Case-based discussion
	Systemic/Clinical Surgery	Approach to thyroid goiter	R4–5
Approach to breast mass		R4–5	Seminar
Management of hyperparathyroidism		R4–5	Case-based discussion
Approach to adrenal mass		R4–5	Interactive lecture
Management of abdominal wall hernias		R4–5	Interactive lecture
Management of soft tissue tumors		R4–5	Seminar
Management of gastrointestinal bleeding		R4–5	Case-based discussion
Approach to gastroesophageal reflux disease (GERD)		R4–5	Interactive lecture
Approach to gastric cancer		R4–5	Seminar
Intestinal obstruction; understanding pathology and clinical management		R4–5	Seminar
Approach to appendicular pathology		R4–5	Case-based discussion
Management of patient with acute abdomen		R4–5	Case-based discussion
Approach to colorectal cancer		R4–5	Seminar
Management of common anal conditions		R4–5	Interactive lecture
Surgical management of obesity		R4–5	Seminar
Management of obstructive jaundice		R4–5	Case-based discussion
Approach to malignant liver tumors		R4–5	Seminar
Professional Development Topics	The art of presentation	R1–3	Interactive lecture
	Principles of research	R1–3	Interactive lecture
	Health advocacy	R4–5	Interactive lecture
Communication and Counselling	Communicating with patients and relatives	R4–5	Interactive lecture
	Documentation	R1–3	Interactive lecture
	Informed consent	R1–3	Interactive lecture

Description of Core General Surgery Teaching Topics

A. Basic Principles of Surgery

Fluid and Electrolytes in Surgical Patients

Background:

Surgical patients are highly sensitive to changes in their bodies' fluids and electrolytes compositions. These changes may occur preoperatively, intra-operatively, or postoperatively, as well as in response to trauma or sepsis.

Content

1. Normal body fluids and compartments
2. Common changes in bodily fluids (volume and concentration)
3. Electrolytes changes: etiology and diagnosis (sodium, potassium, calcium, magnesium, and phosphorus)
4. Acid-base homeostasis
5. Intravenous fluids: types, compositions, and clinical uses
6. Electrolytes abnormalities in specific surgical patients: neurological patients, malnourished patients, acute renal failure, and cancer patients

Management of Shock

Background:

Shock is considered one of the most critical conditions that must be understood by physicians. Surgical patients are more vulnerable to shock.

Content

- Identification of critically ill patients
- Pathophysiology of shock and systemic responses
- Metabolic response to shock
- Immune and inflammatory responses to shock
- Types of shock: diagnosis and treatment
- Assessment of endpoints in resuscitation

Hemostasis in Surgical Practice

Background:

Hemorrhage must be recognized and managed aggressively. It is treated initially by arresting the bleeding, and then by fluid resuscitation or blood transfusion. Recognition of underlying causes of bleeding is key to maintaining hemostasis.

Content

- Biology of hemostasis
- Coagulation disorders: congenital and acquired
- Principles of blood transfusion
- Indications and contraindications of transfusion
- Complications of transfusion
- Evaluation of hemostatic risks in surgical patients

Surgical Site Infections: Prevention and Management

Background:

Surgical infection, particularly surgical site infection (SSI), has always been a major complication of surgery and trauma. Microorganisms are normally prevented from causing infection in tissues because of intact epithelial surfaces. However, these are broken down in trauma and through surgery. In addition to these mechanical barriers, there are other protective mechanisms, which can be divided into the following:

- Chemical: low gastric pH
- Humoral: antibodies, complement activation, and opsonins
- Cellular: phagocytic cells, macrophages, polymorphonuclear cells, and killer lymphocytes

Content

- Pathogenesis of infection
- Microbiology of infectious agents
- Prevention and management of surgical infections
- Surgical site infections: approach, prevention, and management
- Nosocomial infections: diagnosis and treatment

Surgical Management of Organ-Specific Trauma

Background:

Trauma remains the most common cause of death for all individuals between the ages of 1 and 44 years, and is the third most common cause of death regardless of age. Thus, trauma should be considered a major worldwide public health issue. The organization of trauma systems has had a significantly favorable impact on patient outcomes.

Content

- Initial evaluation and resuscitation of the injured patient: primary and secondary surveys
- General principles of management in a trauma patient
- Evaluation of head injuries
- Approach to neck and cervical spine injuries
- Approach to chest trauma: wall and diaphragm, heart and great vessels, respiratory tract and esophagus
- Approach to abdominal solid organ injuries: liver, spleen
- Approach to abdominal hollow viscus injuries
- Approach to abdominal vessels injuries
- Intensive care management in trauma and postoperative considerations

Surgical Complications, Prevention, and Management

Background:

Surgical complications can be defined as any deviation from the ideal postoperative course that is not inherent in the procedure and does not comprise a failure to cure. The goal is to be familiar with complications, know how to prevent them, and know how to manage them in real surgical practice.

Content

- Common surgical complications
- Preventive measures
- Specific surgical complications: pain, fever, wound-related complications, and systemic complications
- Specific management of common surgical complications
- Health education: approach to a patient with surgical complications

Nutrition in Surgical Patient

Background:

The aim of nutritional support is to identify those patients at risk of malnutrition and to ensure that their nutritional requirements are met by the most appropriate route and in a way that minimizes complications.

Contents

- Causes and consequences of malnutrition in the surgical patient
- Fluid and electrolyte requirements in the preoperative and postoperative patient
- Nutritional requirements of surgical patients
- Nutritional consequences of intestinal resection
- Methods of providing nutritional support
- Complications of TPN

Acute and Postoperative Pain Management

Background:

Optimal management of acute postoperative pain requires planning, patient and staff education, and tailoring of the regimen to the type of surgery and the needs of the individual patient. Patients vary greatly (up to eightfold) in their requirement for analgesia, even after identical surgical procedures. Under-treatment results in unacceptable levels of pain with tachycardia, hypertension, vasoconstriction, and many undesired physiological changes. Painful abdominal and thoracic wounds restrict inspiration, leading to tachypnea, small tidal volumes, and inhibition of effective coughing. In turn, these effects predispose patients to chest infection, delayed ambulation, deep venous thrombosis, muscle wasting, and pressure sores.

Contents

- Principles of analgesia
- Anesthetic agents: local, regional, and general
- Postoperative pain management
- Complications of postoperative pain.

Preoperative Assessment of Surgical Patients

Background:

In the last 10 years, there has been a major shift from in-patient to outpatient surgery. Alongside this, many patients requiring major inpatient elective surgery now arrive in the hospital on the day of surgery. Preoperative assessment and optimization have therefore become an increasingly important part of modern surgical practice.

Content

- Tasks involved in preparing a patient for theatre
- Common problems affecting a patient's fitness for operation
- How to optimize a patient's medical state prior to anesthesia and surgery
- How to obtain informed consent
- The organization of an operating list

Understanding the Principles of Wound Healing

Background:

Wound healing is a mechanism whereby the body attempts to restore the integrity of the injured part. Understanding of this mechanism and its entire steps is important to facilitate healing and treat possible complications.

Content

- Normal healing and how it can be adversely affected
- How to manage wounds of different types, of different structures, and at different sites
- Aspects of disordered healing that lead to chronic wounds
- Types of scars and their treatment

Approach to Burns

Background:

The incidence of burn injury varies greatly between cultures. In the UK (population 65 million), each year around 175,000 people visit accident and emergency departments suffering burns, of whom about 13,000 need to be admitted. About 1000 have severe burns requiring fluid resuscitation, and half of the victims are under 16 years of age. The majority of burns in children are scalds caused by accidents with kettles, pans, hot drinks, and bath water. Among adolescent patients, burns are usually caused by young males experimenting with matches and flammable liquids. In adults, scalds are not uncommon, but are less frequent than flame burns. Most electrical and chemical injuries occur in adults.

Content

- Initial evaluation of a burn patient
- Resuscitation in burns
- Inhalation injuries and ventilator management
- Treatment of burn wounds
- Complications in burn care

Management of Diabetic Foot

Background:

Foot infection is one the most common problems in persons with diabetes. These individuals are predisposed to foot infections because of a compromised vascular supply secondary to diabetes. Local trauma and/or pressure (often in association with lack of sensation because of neuropathy), in addition to microvascular disease, may result in various diabetic foot infections that run the spectrum from simple, superficial cellulitis to chronic osteomyelitis.

Content

- Pathophysiology of diabetic foot
- Comprehensive clinical assessment of diabetic foot patients: history, physical examination, diagnostic images
- Short-term management of diabetic foot
- Long-term management of diabetic foot
- Patient education and continuity of care

B. Clinical/Systemic Surgical Topics

An Approach to Thyroid Goiter

Background:

The normal thyroid gland is impalpable. The term goiter (from the Latin guttur, or “the throat”) is used to describe generalized enlargement of the thyroid gland. A discrete swelling (nodule) in one lobe with no palpable abnormality elsewhere is termed an isolated (or solitary) swelling. Discrete swellings with evidence of abnormality elsewhere in the gland are termed dominant.

Content

- Development and anatomy of the thyroid gland
- Physiology and investigation of thyroid function
- Investigation of thyroid swelling
- Treatment of thyroid dysfunction
- Indications for and techniques of thyroid surgery
- Management of thyroid cancer
- Risks and complications of thyroid surgery

An Approach to Breast Mass

Background:

In Saudi Arabia, breast cancer has the highest incidence among all diagnosed cancers. About 50–60% of breast cancer patients are diagnosed at late stage.

Content

- Structure of a normal breast (anatomy and physiology)
- Triple assessment of breast complaint
- Surgical management of benign breast conditions
- Breast cancer screening and management overview

Management of Hyperparathyroidism

Background:

The main effect of parathyroid hormone is related to bone metabolism. Overproduction of parathyroid hormone results in elevated levels of plasma calcium. Hyperparathyroidism is usually subdivided into primary, secondary, and tertiary hyperparathyroidism.

Content

- Development and anatomy of the parathyroid glands
- Physiology and investigation of parathyroid function
- Investigation and management of hyperparathyroidism (primary, secondary, and tertiary)
- Indications for parathyroid gland surgery
- Risks and complications of parathyroid surgery
- Postoperative care of hypocalcaemia

Approach to Adrenal Mass

Background:

The prevalence of adrenal masses in autopsy studies ranges from 1.4% to 8.7% and increases with age. Incidentalomas may be detected in imaging studies in 4% of patients. More than 75% are non-functioning adenomas; however, Cushing's adenomas, pheochromocytomas, and even adrenocortical carcinomas may be present.

Content

- Normal adrenal glands (anatomy and physiology)
- Proper history taking and physical examination
- Approach to adrenal cortex disorders (diagnosis and surgical management)
- Approach to adrenal medulla disorders (diagnosis and surgical management)

Management of Abdominal Wall Hernias

Background:

A hernia is a protrusion of a viscus or part of a viscus through an abnormal opening in the walls of its containing cavity. The external abdominal hernia is the most common form, with the most frequent varieties being the inguinal, femoral, and umbilical, accounting for 75% of cases. The rarer forms constitute 1.5%, excluding incisional hernias.

Content

- Surgical anatomy of the abdominal wall
- Etiologies of abdominal wall hernias
- Proper abdominal examination including hernia orifices
- Classification of hernias
- Surgical techniques for hernia repair
- Patient education regarding post-hernia repair

Management of Soft Tissue Tumors

Background:

Skin can be divided into an outer layer (epidermis) and an inner layer (dermis). Deep in the dermis is the hypodermis, which is composed of subcutaneous fat and remnants of the panniculus carnosus. Human skin and subcutaneous tissue have several important functions: barrier to the environment (e.g., trauma, radiation, pathogens); temperature and water homeostasis; excretion (e.g., urea, sodium chloride, potassium, water); endocrine and metabolic functions; sensory organ for pain, pressure, and movement.

Content

- Structure and functional properties of skin
- Clinical approach to soft tissues tumors (benign and malignant)
- Classification of benign skin tumors
- Classification of malignant skin tumors and vascular skin lesions
- Indications of surgical interventions in soft tissue tumors
- Common cutaneous manifestations of generalized disease that are seen in surgical practice
- International Journals
- Electronic resources provided by SCFHS

Management of Gastrointestinal Bleeding

Background:

Acute gastrointestinal (GI) bleeding is a potentially life-threatening abdominal emergency that remains a common cause of hospitalization. Upper gastrointestinal bleeding (UGIB) is defined as bleeding derived from a source proximal to the ligament of Treitz.

Lower gastrointestinal bleeding (LGIB) accounts for approximately 20–33% of episodes of gastrointestinal (GI) hemorrhage, with an annual incidence of about 20–27 cases per 100,000 population in Western countries. However, although LGIB is statistically less common than upper GI bleeding (UGIB), it has been suggested that LGIB is underreported because a higher percentage of affected patients do not seek medical attention. Indeed, LGIB continues to be a frequent cause of hospital admission and is a factor in hospital morbidity and mortality. LGIB is distinct from UGIB in terms of epidemiology, management, and prognosis.

Content

- Proper history taking from a patient with gastrointestinal bleeding
- Proper physical examination for a patient with gastrointestinal bleeding
- Initial management of gastrointestinal bleeding
- Differential diagnosis of UGIB and LGIB
- Workup of UGIB
- Workup of LGIB

Approach to Gastroesophageal Reflux Disease (GERD)

Background:

Gastroesophageal reflux is a normal physiological phenomenon experienced intermittently by most people, particularly after a meal. Gastroesophageal reflux disease (GERD) occurs when the amount of gastric juice that refluxes into the esophagus exceeds the normal limit, causing symptoms with or without associated esophageal mucosal injury (i.e., esophagitis).

Content

- Proper history taking from a patient with reflux
- Differential diagnosis related to reflux
- Diagnostic measures in GERD
- Surgical management of GERD and techniques
- Complications of GERD and surgical management
- Patient education and follow-up

Approach to Gastric Cancer

Background:

Gastric carcinoma is the second leading cause of cancer deaths, surpassed only by lung cancer. There is substantial geographic variation in the incidence of gastric carcinoma internationally.

Content

- Awareness of risk factors
- Pathology of gastric cancer
- Classification and staging
- Treatment modalities

Intestinal Obstruction: Understanding the Pathology and Management

Background:

Patients with a bowel obstruction present some of the most difficult problems for surgeons with regard to correct diagnosis, optimal timing of therapy, and appropriate treatment. Ultimate clinical decisions regarding the management of these patients dictate a thorough history and workup and a heightened awareness of potential complications.

Content

- Knowledge of the etiology of small bowel obstruction
- Understanding the pathophysiology
- Identifying clinical manifestation and diagnosis
- Proper management of bowel obstruction

Approach to an Appendicular Pathology

Background:

Appendectomy for appendicitis is the most commonly performed emergency operation in the world. Despite the increased use of ultrasonography, computed tomographic scanning, and laparoscopy, the rate of misdiagnosis of appendicitis has remained constant (about 15%), as has the rate of appendicular rupture.

Content

- Related clinical anatomy
- Pathophysiology of appendicitis
- Other inflammatory conditions
- Neoplasms of the appendix

Management of a Patient with Acute Abdomen

Background:

The term acute abdomen refers to signs and symptoms of abdominal pain and tenderness that often require emergency surgical therapy. This challenging clinical scenario requires a thorough and expeditious workup to determine the need for operative intervention and to initiate appropriate therapy.

Content

- Proper work up for the patient with acute abdomen
- Appropriate laboratory and imaging tests
- Role of diagnostic laparoscopy
- Differential diagnosis
- Treatment algorithms

Approach to Colorectal Cancers

Background:

Colon cancer is the most common cancer among Saudi males, and third most common in Saudi females, with most cases presenting at a late stage. Screening, early detection, and proper management require special attention at a national level.

Content

- Knowledge of colorectal cancer genetics
- Understanding the adenoma-carcinoma sequence
- Awareness of different hereditary cancer syndromes
- Screening and diagnostic modalities
- Management of rectal cancer

Management of Common Anal Conditions

Background:

Most anal conditions are common and benign but may be incapacitating and interfere with the daily quality of life of patients. Moreover, these disorders are often misdiagnosed or maltreated, leading at times to disastrous consequences.

Content

- Knowledge and understanding of the anatomy and physiology of the anal canal and pelvic floor
- Clinical presentation and diagnostic evaluation
- Treatment modalities of common anal conditions

Surgical Management of Obesity

Background:

Bariatric operations resolve comorbid medical conditions associated with severe obesity.

Bariatric surgery is also metabolic surgery, treating the varied metabolic consequences of the comorbid diseases arising from severe obesity.

Content

- Recognize the various types of Bariatric surgical procedures
- Knowledge of the indications and contraindications for each procedure
- Patient selection and preoperative care
- Postoperative follow-up and long-term care
- Complications of Bariatric surgery

Management of Obstructive Jaundice

Background:

Calcular biliary conditions are very common surgical problems and often easy to manage; however, when causing bile duct obstruction, these conditions may result in serious consequences.

Content

- Understanding bile duct anatomy and physiology
- Recognizing benign and malignant causes of bile duct obstruction
- Diagnostic work up for obstructive jaundice
- Differential diagnosis
- Treatment modalities

Approach to Malignant Liver Tumors

Background:

Malignant tumors in the liver can be primary or metastatic. Primary cancers in the liver that originate from hepatocytes are known as hepatocellular carcinomas (HCCs or hepatomas), whereas cancers arising in the bile ducts are known as cholangiocarcinomas.

Content

- Recognize risk factors and predisposing conditions
- Appropriate diagnostic work-up
- Tumor staging and patient classification
- Management strategies

C. Professional Development Topics

The Art of Presentation

Content

- How to make a proper presentation
- Planning for a presentation
- Learn methods for presenting
- Learn the art of delivering information
- Awareness of common pitfalls

Principles of Research

Content

- Developing a research protocol (research question, background, design, subjects, variables, statistical analysis)
- The research process (design, implement, interpret, infer)

Health Advocacy

Content

- Recognizing the need for health advocacy
- Responding to individual patient health needs and issues as part of patient care
- Responding to health needs of the communities that they serve
- Promoting and participating in patient safety

Communication Skills Topics

Communicating with Patients and Relatives

Content

- Effectively facilitate the doctor-patient relationship, and the dynamic exchanges that occur before, during, and after the medical encounter.
- Convey relevant information and explanations accurately to patients and families, colleagues, and other professionals.
- Convey effective oral and written information about a medical encounter.

Documentation

Content

- Recognizing the importance of proper documentation
- Principles of medical documentation
- Maintain the standard of documentation

Informed consent

Content

- Principles of informed consent (autonomy, beneficence, and justice)
- The process of obtaining informed consent

List of Trainee-Selected Topics

Topics	Level	Format
Diagnostic Imaging	R1	Interactive lecture
Tissue Diagnosis	R2	Interactive lecture
Gastrointestinal Endoscopy	R2	Interactive lecture
Principles of Laparoscopic and Robotic Surgery	R3	Interactive lecture
Transplantation	R4	Interactive lecture
Surgery in the Tropics	R5	Interactive lecture

Description of Trainee-Selected Topics

Diagnostic Imaging:

- Describe how to interpret the most useful imaging studies (X-rays, ultrasounds, CT, and MRI).
- Know the hazards of imaging and ways of minimizing the risks.

Tissue Diagnosis:

- Know the types of tissue samples and their clinical utilizations (histology vs. cytology).
- Be familiar with specimen processing.
- Know principles of microscopic diagnosis.
- Be familiar with special stains and immunohistochemistry.

Gastrointestinal Endoscopy:

- Know indications and contraindications.
- Know the most common complications of endoscopy.
- Know how to prepare a patient for upper or lower gastrointestinal endoscopy.

Principles of Laparoscopic and Robotic Surgery:

- Identify the most common procedures and contraindications.
- Know common complications and their management.

Transplantation:

- Know the immunological basis of transplantation (types of graft rejection).
- Know immunosuppressive therapy and its complications.
- Know principles of organ transplantation surgeries (kidney, liver, and pancreas).

Surgery in the Tropics:

- Know the most common surgical conditions that occur in the tropics:
 - a. Amebiasis
 - b. Ascaris lumbricoides
 - c. Asiatic cholangiohepatitis
 - d. Filariasis
 - e. Hydatid disease
 - f. Tuberculosis
 - g. Typhoid
- Be familiar with their etiology, pathogenesis, clinical features, diagnosis, and surgical treatment.

Workshops/Simulation Courses

Topic	Level	Description	Remarks
Basic Operative Surgical Skills (BOSS) Course Or equivalent	R1–R2	Hands-on, 5-day workshop includes OR safety, sterility, instrument handling, knotting and suturing, principles of wound care, principles of laparoscopy	Mandatory
Basic laparoscopic workshop/Fundamentals of laparoscopic surgery	R2–3	Hands-on 3-day workshop on principles of laparoscopic surgery	Recommended
ATLS	R1–3	Interactive 3-day course addressing Advanced Trauma Life Support	Mandatory
Advanced laparoscopic workshop	R4–5	Hands-on 3-day workshop on advanced laparoscopic surgical techniques	Recommended
Anastomosis workshop	R4–5	Hands-on one day workshop on bowel, vascular, and other visceral anastomosis	Recommended
FAST course	R2–3	Hands-on 1/2 day course on focused abdominal sonography in trauma	Recommended
Central line course	R1–2	Hands-on one-day course on central lines placement	Recommended
Chest tube course	R1–2	Hands-on 1/2 day course on chest tube insertion	Recommended
Research methodology	R1–3	Workshop on research	Recommended
Applied anatomy course	R1–2	An interactive theoretical course	Recommended

Example of Weekly Schedules of Formal Educational Activities:

Time	Sunday	Monday	Tuesday	Wednesday	Thursday
8 am–9 am	Morning Report, Grand round presentation	Morning Report, Case Presentation	Morning Report, Evidence-Based Review	Morning Report, Radiology meeting	Morning Report
12 pm–3 pm					Core Topic presentation
3 pm–4 pm					Meeting with Mentor
4 pm–5 pm	Self-directed learning	Self-directed learning	Self-directed learning	Self-directed learning	Self-directed learning

ASSESSMENT

Residents' evaluation and assessment throughout the program is carried out in accordance with the Commission's training and examination rules and regulations. This includes the following:

A. Annual Assessment:

1. Continuous Appraisal

This assessment is conducted towards the end of each training rotation throughout the academic year, and at the end of each academic year, as a continuous assessment in the form of a formative and summative evaluation.

1.1 Formative Continuous Evaluation:

To fulfill the CanMEDS competencies based on the end-of-rotation evaluation, the resident's performance will be evaluated jointly by relevant staff for the following competencies:

1. Performance of the trainee during daily work.
2. Performance and participation in academic activities.
3. Performance in a 10–20 minute direct observation assessment of trainee-patient interactions. Trainers are encouraged to perform at least one assessment per clinical rotation, preferably near the end of the rotation. Trainers should provide timely and specific feedback to the trainee after each assessment of a trainee-patient encounter.
4. Performance of diagnostic and therapeutic procedural skills by the trainee. Timely and specific feedback for the trainee after each procedure is mandatory.
5. The CanMEDS-based competencies end of rotation evaluation form must be completed within two weeks following the end of each rotation (preferably in an electronic format) and signed by at least two consultants. The program director will discuss the evaluation with the resident, as necessary. The evaluation form will be submitted to the Regional Training Supervisory Committee of the SCFHS within four weeks following the end of the rotation.
6. The assessment tools, in the form of an educational portfolio (i.e., monthly evaluation, rotational Mini-CEX* and CBDs**, etc.).
7. Academic and clinical assignments should be documented on an annual basis using the electronic logbook (when applicable). Evaluations will be based on accomplishment of the minimum requirements of the procedures and clinical skills, as determined by the program.

*Mini-clinical Evaluation Exercise

** Case-based discussion

1.2 Summative Continuous Evaluation:

This is a summative continuous evaluation report prepared for each resident at the end of each academic year, which might also involve clinical examination, oral examination, objective structured practical examination (OSPE), and objective structured clinical examination (OSCE).

2. End-of-Year Examination

The end-of-year examination will be limited to R1, R2, R3, and R4. The number of exam items, eligibility, and passing score will be in accordance with the Commission's training and examination rules and regulations. Examination details and blueprints are published on the commission website: www.scfhs.org.sa

B. Principles of General Surgery Examination (Saudi Board Examination: Part I)

This written examination is conducted in an MCQ format and held at least once a year. The number of exam items, eligibility, and passing score will be in accordance with the Commission's training and examination rules and regulations. Examination details and blueprints are published on the commission website: www.scfhs.org.sa

C. Final In-training Evaluation Report (FITER)/Comprehensive Competency Report (CCR)

In addition to the approval of the completion of clinical requirements (resident's logbook) by the local supervising committee, FITER is also prepared by program directors for each resident at the end of his/her final year in residency (R5), which might also involve clinical exams, oral exams, and other academic assignment(s).

D. Final General Surgery Board Examination (Saudi Board Examination: Part II)

The final Saudi Board Examination comprises two parts:

1. Written Examination

This examination assesses the theoretical knowledge base (including recent advances) and problem-solving capabilities of candidates in the specialty of general surgery. It is delivered in an MCQ format and held at least once a year. The number of exam items, eligibility, and passing score will be in accordance with the Commission's training and examination rules and regulations. Examination details and blueprints are published on the commission website: www.scfhs.org.sa

2. Clinical Examination

This examination assesses a broad range of high-level clinical skills, including data gathering, patient management, communication, and counseling skills. The examination is held at least once a year, preferably in an OSCE format in the form of PMPs (Patient Management Problems). The exam eligibility and passing score will be in accordance with the Commission's training and examination rules and regulations. Examination details and blueprints are published on the commission website: www.scfhs.org.sa

E. Certification:

Certificates of training completion will only be issued upon the resident's successful completion of all program requirements. Candidates passing all components of the final specialty examination are awarded the "Saudi Board in General Surgery" certificate.

APPENDIX

Appendix 1

Differences between the old and new curriculum

Philosophical orientations

- Competency-based
- Graded responsibility for physicians
- Better supervisory frameworks
- Clearer demarcations of what should be achieved at each stage of training
- Core curriculum with elective options
- Independent learning within a formal structure

Expanded range of competencies

- Balanced representation of knowledge, skills, and professionalism
- Incorporation of new knowledge and skills

Evidence-based approach

- Demographic data (e.g., disease prevalence)
- Practice data (e.g., procedures performed)
- Patient profile (e.g., outpatient versus inpatient)
- Catered towards future needs

Holistic Assessment

- Higher emphasis on continuous assessment
- Balanced assessment methods
- Portfolio and logbook to support learning and individualized assessment
- Built-in formative assessment

Appendix 2

LIST OF SUGGESTED REFERENCES FOR GENERAL SURGERY PRACTICE

Textbooks

- 1. Schwartz Principles of Surgery, 10th Ed.**
F. Brunicaudi, Dana Andersen, Timothy Billiar, David Dunn, John Hunter, Jeffrey Matthews, Raphael E. Pollock
- 2. Sabiston Textbook of Surgery, 19th Ed.**
Courtney M. Townsend, R. Daniel Beauchamp, B. Mark Evers, Kenneth L. Mattox
- 3. Acute Care Surgery**
L. D. Britt, Phillip S. Barie, Andrew B. Peitzman, Gregory Jurkovich
- 4. Advanced Surgical Recall**
Lorne H. Blackbourne
- 5. General Surgery Board Review**
Larry A. Scher, Gerard Weinberg
- 6. Greenfield's Surgery Scientific Principles & Practice, 5th Ed.**
Michael W. Mulholland, Keith D. Lillemoe, Gerard M. Doherty, Ronald V. Maier, Diane M. Simeone, Gilbert R. Upchurch
- 7. Master Techniques in General Surgery**
A series of textbooks that present common and advanced procedures in the major subspecialties of general surgery. The series is overseen by Josef E. Fischer, MD.
- 8. Complications in Surgery**
Michael W. Mulholland, Gerard M. Doherty

Journals

1. Journal of Trauma and Acute Care Surgery
2. Archives of Surgery
3. The American Journal of Surgery
4. British Journal of Surgery
5. Canadian Journal of Surgery
6. Journal of Surgical Research
7. International Journal of Surgery
8. Saudi Surgical Journal
9. World Journal of Surgery



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