





## SAUDI BOARD

Critical Care Medicine Curriculum  
2015

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## **Introduction**

## INTRODUCTION

The Critical Care Residency Program is a unique structural postgraduate training program that will help fulfill the current critical national need for trained physicians in this field.

This program is designed to prepare physicians for practicing competently and independently in Critical Care Medicine. Specifically, using the CanMEDS framework, it teaches the fundamental skills, knowledge, and humanistic qualities inherent to Critical Care Medicine practice and provides progressive responsibility for and experience in the application of these principles to enable effective management of clinical problems.

Equal opportunity must be provided to Residents, under the guidance and supervision of qualified faculty, to develop a satisfactory level of clinical maturity, judgment, and technical skill. Upon completion of this program, Residents should be capable of practicing Critical Care Medicine, learning new skills and knowledge during their careers, and monitoring both their own physical and mental well-being and that of others.

### Mission Statement

- To set the educational standards for training and certification in the field of adult Critical Care Medicine.
- To evaluate and accredit training centers in adult Critical Care Medicine.

## Program Structure

## PROGRAM STRUCTURE

### Admission Requirements

In accordance with and without contradiction to the SCFHS training rules and regulations, the following requirements must be fulfilled by any candidate accepted into the training program:

1. All candidates must hold a medical degree such as an M.B.B.S. or its equivalent from a university recognized by the commission.
2. All candidates must have completed a 12-month rotating internship.
3. All candidates must have passed the Saudi Medical Licensing Exam (SMLE).
4. All candidates must provide a comprehensive CV with references from two (2) consultants, preferably from the field of critical care medicine, who should provide recommendation letters stating the suitability of the candidate for training in critical care medicine.
5. All candidates must provide a letter from a sponsoring organization, approving and pledging support for the candidate's total period of training, i.e., 5 years, and for sponsored positions.
6. All candidates must be registered as training critical care medicine at the Saudi Commission for Health Specialties (SCHS).
7. All candidates must have basic life support certification and malpractice insurance.

### General Training Requirements

1. Trainees shall abide by the training regulations and obligations set by the **SCFHS**.
2. Training is a full-time commitment. Residents will be enrolled in full-time, continuous training for the program's duration.
3. Training is to be conducted in institutions accredited for training by the Saudi Board of Critical Care Medicine.
4. The training will comprehensively cover the specialties related to Critical Care Medicine.
5. Trainees should be actively involved in patient care with gradual progression of responsibility.

### Structure of the Training Program

1. This is a 5-year (60-month) postgraduate structured training program in Critical Care Medicine and is divided into two parts: junior residency (the first 3 years) and senior residency (the last 2 years).
2. The junior residency period (R1, R2, and R3) is designed to provide training in Critical Care Medicine practice and provides rotations in selected specialties important for Critical Care Medicine practice.
3. The senior residency period (R4 and R5), which begins after the Resident passes the Part 1 exam, is designed to give the Resident a chance to gain progressive responsibility in functioning as a junior Critical Care Medicine staff member under supervision. In the fifth year, the Resident is expected to conduct Critical Care Medicine rounds and make decisions regarding patient management.

## PROGRAM STRUCTURE

4. Residents are required to satisfactorily complete the allocated rotations for each year and pass the end-of-year evaluation exam before proceeding from one year to the next.
5. The sequence of rotations will be determined by the regional training committee.
6. After successfully completing all 5 years of training and obtaining the Final In-Training Evaluation Report (FITER) as well as achieving the designated passing mark on the End-of-Year Promotion Exam, candidates will receive a **Training Completion Certificate** issued by the training center's regional committee. The candidate will then be eligible to sit the **Final Certification Examination** of the Saudi Commission of Critical Care Medicine.
7. Successful candidates in the Final Certification Examination will receive the Saudi Commission Specialty Certification in Critical Care Medicine.

### General Framework of Required Rotations

#### Required rotations for the junior residency period (1<sup>st</sup> to 3<sup>rd</sup> year)

- Each rotation will be 4–12 weeks
- The exact sequence of rotations shall be designated by each regional residency program committee.
- It should be noted that every Resident must complete 24 weeks in general Critical Care Medicine during the first year of training.
- Residents are required to perform on-call duties every rotation, including off-service rotations, where they are required to take 1 of every 4 critical care calls.
- Residents are expected to perform 4–7 on-call duties per month.
- Annual leave follows the SCFHS rules and regulations (4 weeks + 1 public holiday + 1 academic week with approval of the program coordinator) and is provided each year.
- Residents are not recommended to take more than 2 weeks of leave during any given rotation.
- Four weeks of elective rotation will be offered during the 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> years of training in the administration/quality improvement, educational, or clinical fields. Electives must be approved by the program director. The following criteria will be used to guide the program director in determining whether an elective is considered acceptable:
  1. Electives must meet the defined learning objectives for the practice of adult Critical Care Medicine.
  2. A supervisor must be identified.
  3. Residents must be properly evaluated during their electives.
  4. Electives should be performed at hospitals accredited by the **SCFHS**, with the following exceptions and conditions:
    - a. The elective is not offered in Saudi Arabia.
    - b. The elective is offered in another center that will allow the Resident to develop expertise in Critical Care Medicine that could not otherwise be attained in Saudi Arabia.

PROGRAM STRUCTURE

No.	Rotation Name	Total Duration in weeks	General Principle and Remarks
1	General ICU	64	Exposes Residents to medical surgical Critical Care Medicine and includes a 4 weeks' rotation in the maternity and neuro ICUs
2	Coronary Care	8	Residents are assigned to a center providing adequate exposure to common cardiac emergencies
3	Cardiac Surgery ICU	8	Residents are assigned to a center that performs various cardiac surgeries and utilizes hemodynamic invasive monitoring and support
4	Emergency Medicine	8	Resident are exposed to common medical and surgical emergencies
5	Anesthesia	8	Residents are exposed to core specialties
6	Surgery	8	Residents are exposed to common surgical problems in general surgery (8 weeks)
7	Trauma service	8	Residents are assigned to a center with a reasonable volume of common trauma cases
8	Medicine	32	Residents are exposed to various aspects of medical care in: General medicine (8 weeks) Pulmonary medicine (8 weeks) Nephrology (8 weeks) Infectious diseases (8 weeks)

## PROGRAM STRUCTURE

### Required rotations for the senior residency period (4<sup>th</sup> and 5<sup>th</sup> year)

- Each rotation will be 4–12 weeks.
- The exact sequence of rotations shall be designated by each regional residency program committee.
- Residents are required to perform on-call duties every rotation, including off-service rotations, where they are required to do 1 in 4 critical care on-calls.
- Residents are expected to perform 4–7 on-call duties per month.
- Annual leave follows the SCFHS rules and regulations (4 weeks + 1 public holiday + 1 academic week with the approval of the program coordinator) and is provided each year.
- Residents are not recommended to take more than 2 weeks of leave during any given rotation.
- Four weeks of elective rotation will be offered during the 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> years of training in the administration/quality improvement, educational, or clinical fields. Electives must be approved by the program director. The following criteria will be used to guide the program director in determining whether an elective is considered acceptable:
  5. Electives must meet the defined learning objectives for the practice of adult Critical Care Medicine.
  6. A supervisor must be identified.
  7. Residents must be properly evaluated during their electives.
  8. Electives should be performed at hospitals accredited by the **SCFHS**, with the following exceptions and conditions:
    - c. The elective is not offered in Saudi Arabia.
    - d. The elective is offered that will allow the Resident to develop expertise in Critical Care Medicine that could not otherwise be attained in Saudi Arabia.

## PROGRAM STRUCTURE

No.	Rotation Name	Total Duration in weeks	General Principle and Remarks
1	General ICU	40	Exposes Resident to medical surgical Critical Care Medicine in addition to 4 weeks' rotation in a burn ICU
2	Anesthesia	16	Regional (4 weeks) Cardiac (4 weeks) Neuro (4 weeks) Pain control (4 weeks)
3	Surgery	12	Residents are exposed to common surgical problems in Thoracic Surgery (8 weeks) Vascular Surgery (4 weeks)
4	Research	8	Residents are introduced to research methodologies and learn how to write a proposal and perform a short-term study.
5	Echocardiography	4	Residents learn to interpret basic echocardiograms
6	Radiology	4	Residents are learn how to read radiological tests commonly used in Critical Care Medicine.
7	Elective	12	Residents are given a chance to work in an area of interest or need.

### **Institutions**

The institution(s) involved in the program must provide evidence of their commitment to graduate medical education, including Critical Care Medicine. While it is recognized that the practice of Critical Care Medicine occurs within a variety of organizational structures, the administrative and academic structure of the institution must be organized in such a way that it facilitates the provision of an adequate educational experience.

### **Affiliation Agreements**

When there is a cooperative educational effort involving multiple institutions, the commitment of each institution to the program must be made explicit in an affiliation agreement that conforms to the standards of the **SCFHS**.

In addition, there must be a current letter of understanding between the Program Director and the individual responsible for each Resident rotation in the program that describes the educational objectives and the means by which they will be accomplished and

## PROGRAM STRUCTURE

evaluated; the resources and facilities in the institution(s) that will be available to each Resident, such as the library and medical records; the Resident's duties and responsibilities for each rotation; the relationship that will exist between Critical Care Medicine Residents and faculty in other programs; and the supervision Critical Care Medicine Residents will receive for each rotation.

For Critical Care Medicine rotations, the physician responsible for the teaching and supervision of Critical Care Medicine Residents (under the authority of the Program Director) must be identified.

### **Participating Institutions**

The program should be based at a primary hospital (hereafter referred to as the "primary clinical site"). The majority of the didactic and clinical experiences should take place at the primary clinical site. Educationally justified exceptions to this requirement will be considered.

Each affiliated institution must offer significant educational opportunities to the overall program. The reasons for including each institution must be stated. Affiliations that simply duplicate experiences already available within the program are not desirable.

Any hospital to be considered for training must meet the following requirements:

1. The intensive care unit (ICU) has a minimum of twenty (20) beds with a minimum of two isolation beds and a ratio of 1 consultant for every 10 beds.
2. The hospital provides multidisciplinary services including the following at a consultant level:
  - Pulmonary
  - Cardiology/coronary care unit (CCU)
  - Nephrology
  - Infectious disease
  - Neurology/neurosurgery
  - General surgery/urology/orthopedic
  - Obstetric/gynecology
3. The minimum annual patient admission to the ICU is 300 patients.
4. The ICU must provide Level 1 patient care in mechanical ventilation and noninvasive and invasive hemodynamic monitoring.
5. A suitable (1:1 or 1:1.5) nurse-to-patient ratio must be maintained.
6. Dedicated medical staff must be available 24 hours per day, 7 days per week to provide necessary patient care.
7. The ICU must adopt a closed or concurrent care system.
8. The ICU must have a dedicated director who will ensure the development and application of relevant medical policies and who may serve as the Program Director if he/she has the suitable qualifications.

### **Facilities and Resources**

In every hospital in which the Critical Care Medicine department is used as a training site, the following must be provided:

1. Adequate space for patient care.

## PROGRAM STRUCTURE

2. Adequate space for clinical support services.
3. Timely return of laboratory and diagnostic imaging results, especially those required on a STAT basis.
4. Adequate program support space, including office space for faculty and Residents.
5. Up-to-date medical library resources, including access to appropriate informational resources and medical databases in the Critical Care Medicine department. In addition, Residents must have ready access to a major medical library either at the institution where they are located or through arrangements with nearby institutions. Services available should include the electronic retrieval of information from medical databases.
6. An adequate and readily accessible instructional space.
7. On-call facility (beds/bath).

### Personnel

The program leadership and faculty are responsible for the general administration of the program, including those activities related to the recruitment, selection, instruction, supervision, counseling, evaluation, and advancement of Residents and the maintenance of records related to program accreditation.

Specific responsibilities are defined below. Frequent changes in leadership or long periods of temporary leadership may adversely affect the accreditation status of the program.

#### Program Director

There must be a single Program Director who is responsible for the program. The Program Director must function within a sound administrative organizational framework and have an effective program faculty in order for the residency program to be approved. The Program Director must be a member of the program's core teaching faculty. The Program Director must:

1. Be licensed to practice medicine in Saudi Arabia, where the institution that sponsors the program is located;
2. Be qualified and have at least 3 years of experience as a clinician, administrator, and educator in Critical Care Medicine;
3. Be certified in Critical Care Medicine by the American, Canadian or Saudi Board of Medical Specialties (recognized) or have appropriate educational qualifications in Critical Care Medicine;
4. Be active in the field of Critical Care Medicine, be clinically active, devote sufficient time and effort to the program to provide day-to-day continuity of leadership, and fulfill all of the responsibilities inherent to meeting the educational goals of the program;
5. Maintain his/her appointment in good standing, including clinical privileges, and provide clinical supervision at the primary clinical site; he/she should also be based at the primary clinical site;
6. Demonstrate leadership qualities and the capability to mentor Critical Care Medicine Residents;
7. Demonstrate active involvement in:
  - a) Critical Care Medicine continuing education

## PROGRAM STRUCTURE

- b) Regional or national scientific societies
- c) Presentations, publications, and other scholarly activities
- 8. Have at least 25% of his/her time protected from clinical service; and
- 9. Have appropriate authority to oversee and organize the activities of the educational program, including but not limited to:
  - a) Resident appointments and assignments
  - b) Supervision, direction, and administration of the educational activities
  - c) Evaluation of the Residents, faculty, and residency program

### **Responsibilities and Requirements of the Program Director**

Program directors must prepare a written statement outlining the educational goals of the program with respect to knowledge, skills, and other attributes of Residents at each level of training and for each major rotation or other program assignment. This statement must be distributed to Residents and members of the program faculty. It should be readily available for review.

1. Selection of Residents for appointment to the program in accordance with institutional and departmental policies and procedures.
2. Participation in the evaluation of the program faculty and other program personnel at each institution participating in the program.
3. The supervision of Residents through explicit written descriptions of supervisory lines of responsibility for patient care. Such guidelines must be communicated to all program staff members. Residents must be provided with prompt and reliable means of communication and interaction with supervisory physicians.
4. Regular evaluation of Residents' knowledge, skills, and overall performance based on the competency standards listed in this document.
5. Provision of a written final evaluation for each Resident who completes the program. The evaluation must include a review of the Resident's performance during the final period of training and should verify that the Resident has demonstrated sufficient professional ability to practice competently and independently. This final evaluation should be part of the Resident's permanent record maintained by the institution.
6. Implementation of fair procedures devised by the sponsoring institution regarding academic discipline and Resident complaints or grievances.
7. Monitoring Resident stress, including mental or emotional conditions that inhibit performance or learning. Program directors and faculty should be sensitive to Residents' need for timely confidential counseling and psychological support services. Training situations that consistently produce undesirable stress in Residents must be evaluated and modified.
8. Preparation of an accurate statistical and narrative description of the program as requested by a review committee.

### **Program Faculty**

There must be a sufficient number of program faculty (at least 1 consultant for every 10 beds) with documented qualifications to adequately instruct and supervise all program Residents. Members of the program faculty must be able to devote sufficient time to meet their supervisory and teaching responsibilities. To ensure a sufficient number of faculty members for provision of adequate on-line 24-hour supervision of Critical Care Medicine

## PROGRAM STRUCTURE

department attending staff and participation in ongoing scholarly activity and research in support of the Critical Care Medicine Residents, there must be a minimum of 1 core physician faculty member for every Resident in the program.

1. A core physician faculty member is a member of the program faculty who provides clinical services and teaching, devotes the majority of his/her professional efforts to the program, and has sufficient time outside of direct service responsibilities to meet the educational requirements of the program. The majority of the core faculty must:
  - a) Be certified by the American, Canadian, or Saudi Board of Medical Specialties (recognized)
  - b) Show evidence of participation in a range of professional activities within the institution as well as within local, regional, and national associations
  - c) Be engaged in research and have adequate support services to accomplish these tasks
2. All core faculty members should be involved in continuing scholarly activity such as publication in peer-reviewed journals, textbooks, local publications, formal lectures, and visiting professorships.
3. All program faculty members must demonstrate a strong interest in the education of Residents, sound clinical and teaching abilities, support for the goals and objectives of the program, a commitment to their own continuing medical education, and participation in scholarly activities.
4. One member of the program faculty at each participating institution must be designated as responsible for the day-to-day activities of the program at that institution, with overall coordination by the Program Director.
5. The program faculty must be organized and have regular documented meetings to review program goals and objectives as well as the effectiveness of the program in achieving them. At least one Resident representative should participate in these reviews.
6. Program faculty members should periodically evaluate the utilization of the program's available resources, the contributions of each institution participating in the program, the financial and administrative support for the program, the volume and variety of patients available to the program for educational purposes, the performance of the members of the teaching staff, and the quality of the supervision of Residents.

### **Core Faculty Development**

Each program should encourage the academic growth of its core faculty. Faculty development opportunities should be made available to each core faculty member. A written plan for each member of the core faculty should be prepared in consultation with that core faculty member. At the time of program review, an example of a core faculty development plan must be included in the Program Information Forms.

### **Other Program Personnel**

Programs must be provided adequate professional, technical, and secretarial personnel needed to support the administration and educational conduct of the program. Clinical support services must be provided on a 24-hour basis. The services must meet reasonable and expected demands and must include the following services: nursing, secretarial,

## PROGRAM STRUCTURE

intravenous, electrocardiograms (ECGs), respiratory therapy, messenger/transporter, and phlebotomy.

### **Educational Program**

The director and teaching staff of a program must prepare and comply with the written educational goals for the program. All educational components of a Resident's program should be related to the program goals. The program design and structure must be approved by the Education Committee for Critical Care Medicine as part of the regular review process.

### **Organization and Structure**

#### *Patient Population*

There must be an adequate number of adult patients of both sexes with a wide variety of clinical problems to provide a patient population sufficient to meet the educational needs of Critical Care Medicine Residents and other Residents assigned for training in the Critical Care Medicine department. Except under unusual circumstances, the primary clinical site and other Critical Care Medicine departments to which Residents rotate for 3 months or longer should have at least 300 admissions annually.

Consultations from other clinical services in the hospital must be available in a timely manner. All consultations must be provided by or under the supervision of a qualified specialist.

#### *Supervision*

All Critical Care Medicine Residents must be under the supervision of Critical Care Medicine faculty at all times in the Critical Care Medicine department. The exception to this is when Residents from other services provide supervised care to patients in the Critical Care Medicine department; in such circumstances, the Residents from these other services must be supervised by Critical Care Medicine faculty or by faculty from their services. Sufficient faculty must be present to provide appropriate supervision in the care of each patient.

All Residents assigned to the Critical Care Medicine department must have supervision that matches their level of training.

Allied health care professionals, such as physician assistants and nurse practitioners, and Residents from other specialties who rotate through the Critical Care Medicine department, must not compromise the educational objectives of the Critical Care Medicine program by diluting the training experience or preventing appropriate progressive responsibility for the Critical Care Medicine Residents.

The Program Director should ensure that all Critical Care Medicine Residents, while on rotation in other services, are appropriately supervised and are provided with an educational experience equivalent to that of a Saudi-Board-approved Residency in that specialty.

## PROGRAM STRUCTURE

### *Progressive Responsibility*

The Program Director must ensure that the degree of professional responsibility accorded to a Resident is progressively increased throughout the course of training commensurate with skill and experience. Included should be opportunities to improve clinical and administrative judgment in the areas of patient care, teaching, administration, and leadership.

In general, the Residents should perform the following duties:

1. Perform daily rounds.
2. Join the consultant rounds.
3. Attend the handover rounds.
4. Be responsible for the care of all patients under the supervision of the consultant.
5. Be responsible for all admissions and available to receive reports from referring doctors.
6. Supervise rotating Residents joining the unit (senior).
7. Perform on-call duties as they appear on the monthly schedule.
8. Provide consultation to other services in the hospital.
9. Participate in educational activities in the department or unit.
10. Perform other duties as required.

### **Number of Residents**

There should be a maximum of four Residents per year of training to achieve a major impact in the Critical Care Medicine department, ensure meaningful attendance at Critical Care Medicine conferences, provide progressive responsibility, and foster a sense of training-program and departmental identity. Exceptions to these standards will require justification based on sound educational principles and must demonstrate substantial compliance with the intent of this requirement, 2 Residents per year for every 14 beds.

### **Presence of Other Residencies and Other Educational Resources**

The sponsoring institution for Critical Care Medicine education must have a major educational commitment, as evidenced by training programs in other major specialties. The program must also demonstrate the availability of Residencies in other specialties or other educational resources for the education of Critical Care Medicine Residents. A lack of such resources will adversely affect the accreditation status of the program.

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### **Extracurricular Activities**

Activities that fall outside the educational program may have a major impact on Residents' educational and clinical performances; therefore, participation in such activities is recommended. Some examples of these activities are as follows:

1. **Journal Clubs:** these are normally held on a specific day of each month. Critical Care Medicine Residents are partnered with an ICU consultant and assigned to at least one Journal Club a year wherein they review and present article(s). Journal Club Rounds are attended by ICU attending consultants, Critical Care Medicine Fellows, and Residents.
2. **Mortality and Morbidity Rounds.**
3. **Educational assignments.**
4. **Preparing for research projects other than the designated research rotation.**

## **Training Rules and Regulations**

## TRAINING RULES AND REGULATIONS

### Evaluation

There must be effective, ongoing evaluation of all components of the Residency program. This evaluation process must relate to the educational objectives of the program and provide a mechanism to effect change.

### Evaluation of Residents

Either quarterly or semiannually, there must be a rotation-specific evaluation of each Resident's knowledge, skills, and professional growth in Critical Care Medicine using appropriate criteria and procedures. Documentation of the management of patients with critical care conditions, including major trauma, medical and pediatric resuscitations, and performance of critical care procedures by each Resident in the program, must be kept and reviewed periodically by the Program Director.

1. Within the first two years, Residents must successfully complete the certification tests for basic and advanced cardiac life support (BCLS and ACLS, respectively) and advanced trauma life support (ATLS), and the Fundamentals of Critical Care Support (FCCS). By the completion of the program, FCCS instructor status must be achieved.
2. Residents should complete the Critical Care Ultrasound Training Course.
3. Formal evaluation of each Resident during training is required and must include oral and written examinations. In addition, there must be a mechanism for formal evaluation of the Resident in each rotation. A summary of the evaluations must be communicated in writing to and should be signed by the Resident. Discussions of these results between the Resident and the Program Director or his/her designee must be held on at least a semiannual basis.
4. Residents should be advanced to positions of higher responsibility according to evidence of their satisfactory progressive scholarship and professional growth.
5. A plan to correct Residents' deficiencies must be in writing and on file. Progress and improvement must be monitored at a minimum of every 3 months if a Resident has been identified as needing a remediation plan.
6. A permanent record of evaluations for each Resident must be maintained and accessible to the Resident and other authorized personnel. End-of-year evaluations should be part of the Resident's permanent record maintained by the institution.
7. Annual promotion in the program from one year to another is conducted in accordance to the Saudi Commission exam rules and regulations (see assessment section).

### Remediation Process

Remediation is a defined period wherein training objectives and learning components are structured to address area(s) of weakness or deficit in Residents' performance or conduct identified during Residents' training. Remediation is performed when it is anticipated that those weaknesses can be successfully addressed such that the Resident meets the standards of the training. Remediation is best suited for correcting discrete performance issues such as deficits in the knowledge base, inadequate clinical skills, or minor breaches of professional conduct.

Remediation may include special evaluation methods, which can be of multiple types and can be performed by multiple internal or external evaluators. At the completion of remediation, the Resident is expected to demonstrate satisfactory improvement in his/her conduct or performance in the identified area(s) of weakness or deficit.

A Resident may be placed on remediation if:

1. The Resident has failed a rotation as documented in an In-Training Evaluation Report (ITER);
2. Residents are noted to have poor or borderline performance, or a pattern of poor or borderline performance, as documented in ITERs, written formative feedback, or discussions with the Resident, in one or more of the domains in the CanMEDS roles, even though the Resident has not failed a rotation as documented in an ITER; or
3. In competency-based programs, the program director identifies that the Resident requires more time to meet the competencies required to progress in the program.

The Program Director will normally consult with the Resident Training Committee (RTC) before making a final decision on whether to place a resident on remediation. The Program Director will notify the associate dean of any decision to place a Resident on remediation.

The Program Director will set the terms of the remediation with input from the RTC as required. The Program Director must designate a member of the faculty as the Remediation Supervisor, who will assume responsibility for implementing the terms of the remediation. Before the commencement of the remediation, the Program Director must provide the Resident with a letter (i.e., the Remediation Letter) describing the identified deficits and areas of weakness in performance or conduct and the remediation plan, which will include a specified time to remedy the identified deficits. The Remediation Letter must be signed by the Remediation Supervisor, Program Director, and Dean. At the conclusion of the remediation, the Program Director or Remediation Supervisor will meet the Resident to discuss a summative evaluation of the Resident's performance during remediation.

The Program Director will then call a meeting of the RTC to discuss the outcome of the Remediation. Material related to the Resident's performance used by the Remediation Supervisor and Program Director to evaluate the Resident's performance will be presented to the RTC by the Program Director or Remediation Supervisor, as appropriate. The summative evaluation of the Resident's performance will be reviewed by the RTC. In turn, the RTC will issue a recommendation to the Program Director regarding the outcome of the remediation. In normal circumstances, the Resident will not attend this RTC meeting.

The Program Director will consider the RTC's recommendation and will make a final decision regarding the outcome of the remediation. The Program Director may meet with the Resident before making a final decision if the Program Director determines that additional information from the Resident is required; however, the Program Director may also make a decision solely on the basis of the summative evaluation and RTC's recommendation.

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The Program Director will record the final decision in the Final Outcome of Remediation Letter (hereinafter, "Outcome Letter") and will contact the Resident to discuss the outcome. A copy of the Outcome Letter must be provided to the Resident. The Program Director may make one of the following determinations regarding the outcome of the remediation:

1. The weakness or deficit has been corrected within the specified period and the Resident may continue progressing through the postgraduate training program with a training extension to account for the time lost due to the remediation.
2. The Resident has made some progress but the weakness or deficit in performance or conduct has not been corrected; thus, the remediation is extended for a specified period on the same terms.
3. The goals of the remediation have not been met and the Resident will be placed on probation.
4. During the remediation, the Resident demonstrated that the deficits or weaknesses in performance or conduct are not remediable or that on some other basis the Resident is not trainable; as such, the Resident should be dismissed from the Program.

The question of a Resident's unsuitability for continued training may be referred by the Program Director to the RTC for discussion and recommendation. Before referring the question to the RTC, the Program Director will meet with the Resident to advise him/her of the Program Director's decision to refer the question to the RTC. The Resident will be invited to provide in writing any relevant information the Resident wishes the Program Director and RTC to consider. The Program Director will forward the information provided by the Resident to the RTC. The final decision of whether the Resident will be dismissed for unsuitability will be made by the Program Director. Any decision to dismiss a Resident from the program due to their unsuitability must be approved by the RTC. The Program Director will then notify the Dean, in writing, of the decision and their reasons for the decision. The Dean will, in turn, confirm the dismissal in writing to the Resident. The Resident will be informed of his or her right to appeal the dismissal and will be provided a copy of the Resident Appeal Policy.

Neither the decision to place a Resident on remediation nor that on the outcome of remediation may be appealed except in circumstances in which a failure to successfully complete remediation leads to a decision to dismiss on the basis of unsuitability, as noted above. Decisions to dismiss a Resident on the basis of unsuitability may be appealed.

### **Evaluation of Faculty**

At least annually, individual faculty members must be formally evaluated by the chair/chief of the Critical Care Medicine department. This evaluation should include information from the Program Director and the Critical Care Medicine Residents. A mechanism for preserving Resident confidentiality in the evaluation process must be implemented.

Faculty evaluations should include documentation of teaching ability, clinical knowledge, administrative and interpersonal skills, participation and contributions to Resident conferences, and scholarly contributions. A summary of the evaluations should be communicated in writing to each faculty member.

**Program Evaluation**

At least annually, the educational effectiveness of the entire program, including the quality of the curriculum and the clinical rotations, must be evaluated by the Residents and faculty in a systematic manner. Furthermore, the extent to which the educational goals have been met by Residents must be assessed. Written evaluations by Residents should be used in this process, and the results of these evaluations must be kept on file. Below are the program evaluation forms:

**Evaluation form for R1, R2, and R3:**

Sr. No	Domain	Unsatisfactory	Satisfactory	Outstanding	NA
		1-3	4-6	7-9	
I	Medical Expert:				
	➤ Patient assessment				
	➤ Taking of relevant history and performance of appropriate physical examination				
	➤ Investigation and management of patients with undifferentiated problems				
	➤ Use of evidence-based diagnostic testing/management strategies				
	➤ Management of common diseases				
	➤ Performance of procedures				
II	Communicator				
	➤ Obtaining a thorough and relevant medical history.				
	➤ Bedside presentation of patient problems				
	➤ Communication with patients and their families				

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	➤ Obtaining of informed consent for medical procedures and treatments				
	➤ Communication with members of the health care team				
	➤ Communication with referring physicians and consultation of notes, medical evaluations, and discharge summaries				
	➤ Presentation and discussion at teaching and patient care rounds				
III	Collaborator				
	➤ Working effectively within the health care team				
	➤ Demonstrating appropriate use of consultative services				
	➤ Recognizing or respecting roles of team members				
IV	Manager				
	➤ Supervision or implementation of patient care decisions				
	➤ Effective delegation as appropriate				
	➤ Effective and ethical utilization of health care resources				
	➤ Effective time management				
V	Health Advocate				
	➤ Understanding health determinants				
	➤ Role of economic/social factors in disease				

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	➤ Prevention counseling/use of preventive strategies				
	➤ Advocating for patients and/or profession				
VI	Scholar				
	➤ Personal learning				
	Critical review of literature				
	➤ Knowledge of relevant basic science				
	➤ Biochemistry, pathology, physiology/pathophysiology, and pharmacology				
	➤ Teaching of other health care team members				
VII	Professional				
	➤ Personal and interpersonal professional behavior				
	➤ Integrity, honesty, and compassion				
	➤ Recognizing and dealing with ethical issues				
Total Score: _____ x 10 = _____					

<b>Comments:</b>					
<b>Evaluator:</b>		<b>Signature:</b>		<b>Date:</b>	
<b>Director:</b>		<b>Signature:</b>		<b>Date:</b>	

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	<b>Fellowship Training Program</b>				
<b>Fellow:</b>		<b>Signature:</b>		<b>Date:</b>	

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Evaluation form for R4 and R5:

Number	Criteria	Unsatisfactory	Satisfactory	Outstanding
		1–3	4–6	7–9
I	Knowledge and Academic Activity:			
	<p>➤ <u>Unsatisfactory</u>: Limited knowledge, cannot explain the mechanism of disease, not aware of landmark studies, and has no interest in learning or doing research</p> <p>➤ <u>Satisfactory</u>: Exceptional knowledge of basic and clinical sciences, highly resourceful development of knowledge, immediate recognition of complex relationships, and development of unifying diagnoses</p>			
	1. Basic Science			
	2. Clinical Science			
	3. Current Literature			
	4. Participation in Scientific Activities			
II	Clinical and Technical Skills			
	1. Organization of Work			

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	<p>➤ <u>Unsatisfactory</u>: Unable to perform tasks in order</p>			
	<p>➤ <u>Outstanding</u>: Can organize complex tasks exceptionally well and utilize time efficiently</p>			
	<p>2. Records and Reports</p>			
	<p>➤ <u>Unsatisfactory</u>: Incomplete or inaccurate medical interviews, physical examinations, and summaries of other data sources; incomplete reviews</p>			
	<p>➤ <u>Outstanding</u>: Always gathers accurate and appropriate information from interviews, examinations, and other data sources.</p>			
	<p>3. Interpretation and Utilization of Information</p>			
	<p>➤ <u>Unsatisfactory</u>: Fails to analyze clinical data to make accurate medical decisions</p>			

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	<p>➤ <u>Outstanding:</u> Always analyzes available information to make diagnostic or therapeutic decisions based on sound clinical judgment, the best available evidence, and patient preferences</p>			
	<p>4. Clinical Judgment and Decision-Making</p>			
	<p>➤ <u>Unsatisfactory:</u> Poor clinical judgment; ignores valid medical evidence and patient preferences in medical decisions</p>			
	<p>➤ <u>Outstanding:</u> Always analyzes available information to make diagnostic or therapeutic decisions based on sound clinical judgment, the best available evidence, and patient preferences</p>			
	<p>5. Indication of Procedures</p>			
	<p>➤ <u>Unsatisfactory:</u> Unable to define appropriate indications of procedures</p>			

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	<p>➤ <u>Outstanding:</u> Identify indications at an appropriate time</p>			
	<p>6. Procedures and Operative Skills</p>			
	<p>➤ <u>Unsatisfactory:</u> Inept or careless; frequent disregard for patient's anxiety and comfort</p>			
	<p>➤ <u>Outstanding:</u> Always proficient and careful; minimizes risk and discomfort to patients; provides proper explanation of purpose and risks of procedure</p>			
	<p>7. Performance in Emergencies</p>			
	<p>➤ <u>Unsatisfactory:</u> Poor judgment and management</p>			
	<p>➤ <u>Outstanding:</u> Handles emergencies in a systematic way and provides rapid evaluation and management</p>			
	<p>8. Supervision and Consultations</p>			

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	<p>➤ <u>Unsatisfactory</u>: Unable to supervise; cannot give opinion on consults</p>			
	<p>➤ <u>Outstanding</u>: Direct; teaches and guides junior Residents; performs constructive, informative consultations with appropriate decision making</p>			
<b>III</b>	<b>Attitudes and Ethics</b>			
	<p>1. Discipline and Reliability</p>			
	<p>➤ <u>Unsatisfactory</u>: Unreliable; frequently not around</p>			
	<p>➤ <u>Outstanding</u>: Dependable; always available and ready to help</p>			
	<p>2. Patient Relations</p>			
	<p>➤ <u>Unsatisfactory</u>: Shows a lack of respect, compassion, and honesty</p>			
	<p>➤ <u>Outstanding</u>: Always demonstrates respect, compassion, and integrity</p>			
	<p>3. Interprofessional Relations</p>			
	<p>➤ <u>Unsatisfactory</u>: Poor communication with and respect for colleagues</p>			

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	<p>➤ <u>Outstanding:</u> Respectful; a team player</p>			
	4. Ethical Standards			
	<p>➤ <u>Unsatisfactory:</u> Poor handling of ethical basics</p>			
	<p>➤ <u>Outstanding:</u> Excellent knowledge of ethic principles and applies high ethical standards, taking into consideration cultural and religious factors</p>			
<p><b>Total Score:</b> _____ x 10 = _____</p>				
<p><b>Comments:</b></p>				
<p> </p>				
<p> </p>				
<b>Evaluator:</b>		<b>Signature:</b>		
<b>Director:</b>		<b>Signature:</b>		
	<b>Fellowship Training Program</b>			
<b>Fellow:</b>		<b>Signature:</b>		

## Others

### Vacation & Conference Leave

All Critical Care Medicine Residents are granted 30 vacation days per year, as per **SCFHS** rules and regulations. Requests for vacation time must be approved by the Program Director. Requests for vacation time must be given at least four weeks in advance. In addition, Residents are granted 5 working days for conference leave per year. The conference must be approved by the Program Director ; however, Residents must have attended at least 75% of Journal Clubs and other academic activities during the year in order to be eligible.

Residents are encouraged to attend Critical Care Symposiums and conferences held globally. The following courses are mandatory for all Junior Residents (1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> year) for Provider Course Certification:

1. Ultrasonography (US)
2. Epidemiology
3. Fundamental Critical Care Support (FCCS)
4. Mechanical Ventilation
5. Advanced Cardiovascular Life Support (ACLS)
6. Advanced Trauma Life Support (ATLS)
7. Post-hospitalization Trauma Life Support
8. Fundamental Disaster Management

### Notice of Changes in the Program

The program leadership is responsible for notifying the Executive Director of the Educational Committee within 30 days, in writing, of any major changes in the program that may significantly alter Residents' educational experience, including the following:

1. Changes in the leadership of the department or program.
2. Changes in administrative structure, such as an alteration in the hierarchical status of the program/department within the institution.
3. A drop in the core faculty complement below the required minimum number or if one-third or more of the core faculty leave within 1 year.
4. A drop in program Residents below the minimum approved number of over 1 year.

Note: Should the Educational Committee determine that a significant alteration of educational resources has occurred, an immediate resurvey of the program may be performed.

The Program Director must obtain prior approval for the following changes in the program, as the Educational Committee must determine if an adequate educational environment exists to support the changes:

1. The addition or deletion of any participating institution to which a Resident will rotate for 2 months or longer.
2. The addition or deletion of any rotation of 2 months or longer.
3. Any change in the length or educational format of the program. On review of a proposal for a major change in the program, the Educational Committee may determine that a site visit is necessary.

## Rotation Objectives

## ROTATION OBJECTIVES

### General Critical Care Rotation

**Duration:** 64 weeks during junior residency

**Description:** The Resident should demonstrate the ability to integrate medical knowledge and skills to provide patient-centered, safe, and high-quality care. The Resident should develop skills in providing advice to and planning care for critically ill patients with consideration for the patients' clinical status, surrounding environment, cultural preferences, and available resources. Timely decision making with the ability to organize and participate in teamwork are essential skills that must be developed.

The Resident should be able to conduct comprehensive and multidisciplinary rounds independently to assess patients, synthesize differential diagnoses, and create problem lists and plans of action.

Residency programs in Critical Care Medicine should produce Critical Care Medicine physicians with the following basic competencies:

#### Medical Expert

1. Describe the natural history and clinical expression of critical care illnesses encountered in the inpatient, ICU, and ER settings.
2. Understand the pathophysiology of commonly observed diseases in critically ill patients.
3. Demonstrate a working knowledge of Critical Care Medicine by actively participating in the management of critically ill patients.
4. Demonstrate an understanding of the integrative nature of disease in critically ill patients and the interdisciplinary approach to the management of such patients.
5. Identify at-risk patients, perform appropriate physical examinations, formulate a problem list, and institute a course of therapy under the direction of senior personnel.
6. Prioritize and summarize approaches to the evaluation of common presentations in Critical Care Medicine patients.
7. Triage interventions, taking into account clinical urgency, the potential for unexpected outcomes, and available alternatives.
8. Triage interventions, taking into account clinical urgency, the potential for unexpected outcomes, and available alternatives.
9. Become comfortable in the management of cardiac arrest and the acute resuscitation of a traumatized or acutely ill patient.
10. Effectively obtain a relevant history and perform a pertinent physical examination of critically ill patients.
11. Demonstrate competence in performing common procedures performed in the medical and surgical ICU, including central and arterial line insertions, orotracheal intubation, paracentesis, thoracentesis, and lumbar puncture.
12. Appropriately select and interpret laboratory, imaging, and pathologic studies used in the evaluation of pulmonary diseases.

## ROTATION OBJECTIVES

13. Construct a comprehensive treatment plan and assess patient response to therapy.
14. Effectively interpret diagnostic tests used in the evaluation of ICU patients such as interpretation of arterial blood gases, chest x-rays, abdominal films, and computerized tomography (CT) scans.
15. Demonstrate an ability to critically appraise and cite pertinent literature.
16. Determine indicated interventions for assessment or management.
17. Obtain and document informed consent from patients and explain the risks, benefits, and rationale for the options discussed.
18. Counsel patients concerning their diagnosis, planned diagnostic testing, and recommended therapies.
19. Utilize validated instruments effectively in the assessment of functioning and quality of life to monitor and adjust therapy.
20. Establish the roles of the patient and all team members for follow-up investigations of treatment response and consultations and ensure that the agreed-upon follow-up takes place; this is especially necessary after a change of service such as on-call or transfer of the patient within the hospital or to an outside facility.

### **Communicator**

1. Communicate effectively using a patient-centered approach and demonstrate empathy and respect in all patient encounters.
2. Optimize the physical environment for patient comfort, dignity, privacy, and safety.
3. Communicate well with patients, families, and admitting services about daily patient progress.
4. Communicate well with an ICU team (nurses, other Residents, or attending staff) about patient care issues.
5. Engage patients in a way that is respectful and non-judgmental with regard to their religious values, cultural values, and biases.
6. Recognize and respond appropriately to patients' non-verbal communication behaviors.
7. Demonstrate counseling skills and decision aids to help patients or patients' decision makers make informed choices or give informed consent.
8. Demonstrate effective skills in listening and speaking with patients, families, and other members of the health care team.
9. Reliably and accurately communicate the patient's and his/her family's views and concerns to the attending physician.
10. Demonstrate competency in documentation including histories and physical, progress, and discharge notes.
11. Disclose adverse events and procedural complications to patients and their families accurately and appropriately.
12. Document clinical encounters accurately and in a timely manner in compliance with the legal and regulatory requirements.
13. Share information with patients and appropriate others in a manner that respects patients' privacy and confidentiality.
14. Participate in end-of-life discussions with the ICU team and family members.

## ROTATION OBJECTIVES

### **Collaborator**

1. Participate in effective teamwork and demonstrate a respectful attitude toward other colleagues and staff members of inter- and intraprofessional teams.
2. Demonstrate teamwork to prevent conflict and is able to identify and negotiate overlapping and shared responsibilities.
3. Recognize own differences, misunderstandings, and limitations with respect to others' point of views and opinions.
4. Discuss how the health care system affects the management of inpatient ICU care.
5. Demonstrate effective collaboration with other health care providers
6. Demonstrate awareness of the impact of diagnostic and therapeutic recommendations on the health care system.
7. Demonstrate effective and safe handover during sign-out or transition of responsibility of care, either within the institution or to a different setting or stage of care.

### **Leader**

1. Promote a culture of teamwork that recognizes, supports, and responds effectively to colleagues in need during patient care.
2. Efficiently carry out patient care tasks allocated during ward rounds.
3. Recognize personal limitations and seek help when appropriate.
4. Recognize and professionally respond to unprofessional and unethical behaviors in other staff.
5. Utilize resources effectively to balance patient care, continuing education, and personal activities.
6. Understand and judiciously allocate health care resources.
7. Work efficiently and effectively within a health care system.
8. Utilize information technology for optimal patient care and personal scholarship.
9. Use information technology appropriately.
10. Demonstrate knowledge of the physical requirements of the design of an ICU.

### **Health Advocate**

1. Identify the important determinants of health affecting patients.
2. Contribute effectively to improving the health of patients and communities.
3. Recognize and respond to issues where health advocacy is appropriate.
4. Educate patients and families about and promote the importance of long-term healthy behaviors and preventive health care (e.g., smoking cessation, screening tests, vaccinations, exercise, and nutrition).
5. Respect and empower patient autonomy.
6. Promote fair health care.
7. Apply the principles of quality improvement and quality assurance.
8. Appreciate the existence of global health advocacy and initiatives for the elimination of diseases (e.g., tuberculosis (TB), malaria, and HIV) and the roles of advocacy groups and funding agencies.

## ROTATION OBJECTIVES

### Scholar

1. Develop, monitor, and revise a personal learning plan by utilizing meaningful feedback and evaluations to promote goal-directed learning.
2. Set, assess, and prioritize individualized learning goals.
3. Use assessment tools and practices in a given learning context.
4. Recognize own knowledge gaps in clinical and other professional encounters.
5. Integrate evidence into decision making.
6. Promote patient safety and a safe learning environment.
7. Effectively use technology to manage information, support patient care decisions, and promote both patient and physician education.
8. Demonstrate a teamwork attitude and promote collaborative learning.
9. Integrate and apply knowledge obtained from multiple study sources to the care of critically ill patients.
10. Analyze clinical experience and employ a systematic methodology for improvement.
11. Develop and maintain a willingness to learn from errors and use errors to improve the system or processes of care.
12. Pose medically and scientifically relevant questions that are amenable to scholarly investigation and address the critique of a given scholarly question.

### Professional

1. Exhibit professional commitment to rounds.
2. Demonstrate a commitment to maintaining and enhancing competence, quality improvement, and patient safety.
3. Recognize the importance of patient primacy, privacy, and autonomy; informed consent; and equitable respect and care to all.
4. Respect patients, patients' families, staff, and colleagues.
5. Model ethical behavior by reporting back any key clinical findings to the attending and referring providers; following through on clinical questions, laboratory testing, and other patient care issues; and recognizing potential conflicts of interest.
6. Demonstrate integrity, honesty, and openness in discussion of therapeutic options with patients and respect for patient's preferences and cultural differences.
7. Respond to phone calls, pages, and messages in a timely manner.
8. Recognize and professionally respond to unprofessional and unethical behaviors in other staff.
9. Promote a teamwork culture that recognizes, supports, and responds effectively to colleagues in need during patient care.
10. Demonstrate commitment to the disclosure of error and or adverse events and their impact.
11. Demonstrate self-responsibility, including personal care, to best serve others.

### Required Domains

#### Medical Expert

By the end of the training in this rotation, the Resident should develop competency in the management of the following domains:

1. Shock
  - a) Hypovolemic

## ROTATION OBJECTIVES

- b) Cardiogenic
- c) Distributive
- d) Obstructive
- 2. Myocardial infarction and its complications
- 3. Cardiac arrhythmia, conduction disturbances, and indications for pacemakers
- 4. Pulmonary embolism
- 5. Pulmonary edema (cardiogenic and non-cardiogenic)
- 6. Cardiac tamponade and other acute pericardial diseases
- 7. Acute valvular disorders
- 8. Acute aortic and peripheral vascular disorders including arteriovenous fistulae (optional)
- 9. Acute complications of cardiomyopathies and myocarditis
- 10. Vasoactive and inotropic therapy
- 11. Complications of devices and artificial hearts (optional)
- 12. Complications of angioplasty (optional)
- 13. Current concepts of the Frank–Starling law of the heart and perfusion to calculate and interpret hemodynamic parameters
- 14. Hemodynamic effects caused by ventilator assist devices
- 15. Thrombolytic therapy
- 16. Perioperative management of patient undergoing cardiovascular surgery (optional)
- 17. Recognition, evaluation, and management of hypertensive emergencies

### **A. Respiratory, Physiology, Pathology, and Therapy**

- 1. Acute respiratory failure:
  - a. Acute respiratory distress syndrome (ARDS)
  - b. Hypercapnic
  - c. Hypoxemic
- 2. Status asthmaticus
- 3. Smoke inhalation and airway burns
- 4. Aspiration and chemical pneumonitis
- 5. Flail chest and chest trauma
- 6. Bronchopulmonary infections
- 7. Upper airway obstructions
- 8. Drowning
- 9. Pulmonary function tests:
  - a. Pulmonary mechanics
  - b. Respiratory adequacy (arterial and venous blood gas interpretation)
- 10. Oxygen therapy
- 11. Hyperbaric oxygenation
- 12. Mechanical ventilation:
  - a. Pressure and volume modes
  - b. Positive end-expiration pressure, intermittent mandatory ventilation, continuous positive airway pressure, high frequency ventilation, inverse ratio ventilation, pressure support ventilation, negative pressure ventilation
  - c. Extracorporeal membrane oxygenation (ECMO)

## ROTATION OBJECTIVES

- d. Indications for and hazards of mechanical ventilation
  - e. Barotrauma
  - f. Criteria for weaning and weaning techniques
  - g. Extracorporeal membrane oxygenations (desirable for pediatrics)
  13. Airway maintenance
    - a. Emergency airway management
    - b. Endotracheal intubation
    - c. Tracheostomy
    - d. Long-term intubations versus tracheostomy
  14. Ventilatory muscle physiology, pathophysiology, and therapy
- B. Renal Physiology, Pathology, Pathophysiology, and Therapy**
1. Renal regulation of fluid balance and electrolytes
  2. Renal failure (prerenal, renal, and postrenal)
  3. Derangement secondary to alterations in osmolality and electrolytes
  4. Acute acid-base disorders and their management
  5. Principles of hemodialysis, peritoneal dialysis, ultrafiltration, continuous arteriovenous hemofiltration (CAVH), and continuous veno-venous hemofiltration (CVVH)
  6. Interpret urine electrolytes
  7. Evaluate oliguria
  8. Drug dosing in renal failure
- C. Central Nervous System Physiology, Pathology, Pathophysiology, and Therapy**
1. Coma
    - a. Metabolic
    - b. Traumatic
    - c. Infectious
    - d. Mass lesions
    - e. Vascular anoxic-ischemic
    - f. Drug-overdose-induced
      - i. Barbiturates
      - ii. Narcotics
      - iii. Tranquilizers
      - iv. Organophosphates
      - v.  $\beta$ -blockers
      - vi. Controlled drugs
      - vii. Paracetamol
      - viii. Tricyclic antidepressants
      - ix. "Street" drugs
      - x. Salicylate or acetaminophen
      - xi. Petroleum distillates
      - xii. Heavy metals
      - xiii. Industrial products
      - xiv. Alcohol
      - xv. Cocaine

## ROTATION OBJECTIVES

2. Hydrocephalus
3. Psychiatric emergencies
4. Preoperative management of patient undergoing neurological Surgery
5. Brain death evaluation and certification
6. Diagnosis and management of persistent vegetative states

### **D. Infectious Disease Physiology, Pathology, Pathophysiology, and Therapy**

1. Antimicrobial agents:
  - a. Aminoglycosides
  - b. Antifungal agents
  - c. Antituberculosis agents
  - d. Penicillin and other antibiotics
  - e. Antiviral agents
  - f. Agents for parasitic infections
2. Infection control for special care units
3. Anaerobic infections
4. Systemic sepsis
5. Tetanus
6. Hospital-acquired and opportunistic infections in critically ill patients
7. Adverse reactions to antimicrobial agents
8. AIDS
9. Infectious risks to health care workers

### **E. Hematological Disorders Secondary to Acute Illness**

1. Acute defects in hemostasis:
  - a. Thrombocytopenia
  - b. Disseminated intravascular coagulation
  - c. Primary fibrinolytic therapy
2. Anticoagulation and fibrinolytic therapy
3. Principles of blood component therapy
  - a. Platelet transfusion
  - b. Packed red cells, including frozen red cells
  - c. Fresh frozen plasma
  - d. Specific coagulation factor concentrates
  - e. Albumin and plasma protein fraction
  - f. Stroma-free hemoglobin
  - g. White blood cell transfusion
  - h. Cryoprecipitate
4. Acute hemolytic disorders
5. Acute syndromes associated with neoplastic disease and anti-neoplastic therapy
6. Acute disorders of immunosuppressed patients
7. Neonatal bleeding disorders (optional)
8. Sickle cell crisis
9. Plasmapheresis

## ROTATION OBJECTIVES

### **F. Gastrointestinal (GI), Genitourinary (GU), Obstetric/Gynecological (Ob/Gyn)**

#### Acute Disorders

1. Acute pancreatitis with shock
2. Upper GI bleeding including variceal bleeding
3. Lower GI bleeding
4. Acute and fulminant hepatic failure
5. Toxic megacolon
6. Acute perforations of the GI tract
7. Ruptured esophagus
8. Acute inflammatory diseases of the intestine
9. Acute vascular disorders of the intestine including mesenteric infarction
10. Obstructive uropathy and acute urinary retention
11. Urinary tract bleeding
12. Toxemia of pregnancy and amniotic fluid embolism (optional for pediatrics)
13. Hydatidiform mole
14. Perioperative management of patients undergoing GI, GU, or Ob/Gyn surgery
15. Stress ulcer prophylaxis
16. Drug dosing in hepatic failure

### **G. Immunology and Transplantation**

1. Principles of transplantation (organ donation, procurement, preservation, transportation, allocation, implantation, and national organization of transplantation activities)
2. Immunosuppression
3. Transplantation of different organs (indications and post-operative care)

### **H. Trauma and Burns**

1. Initial approaches to the management of multisystem trauma
2. central nervous system trauma (brain and spinal cord)
3. Skeletal trauma including the spine
4. Chest trauma:
  - a. Blunt
  - b. Penetrating
  - c. Cardiac
5. Abdominal trauma (blunt and penetrating)
6. Crush injury

### **I. Monitoring, Bioengineering, and Biostatistics**

1. Prognostic indices and severity and therapeutic intervention scores
2. Principles of electrocardiographic monitoring, measurement of skin temperature and resistance, and transcutaneous measurements.
3. Invasive hemodynamic monitoring
  - a. Principles of strain gauge transducers
  - b. Signal conditioners, calibration, and gain adjustment
  - c. Display techniques

## ROTATION OBJECTIVES

- d. Principles of PiCCO and arterial, central venous, and pulmonary artery pressure catheterization and monitoring
- e. Assessment of cardiac function and derived hemodynamic parameters
4. Noninvasive hemodynamic monitoring (Vigileo and LiDCO)
5. Electrical safety
6. Thermoregulation
7. Brain monitoring (intracranial pressure, cerebral blood flow, cerebral metabolic rate, and electroencephalograms).
8. Respiratory monitoring (airway pressure, intrathoracic pressure, tidal volume, pulse oximetry, dead-space to tidal volume ratio, compliance, resistance, and capnography).
9. Metabolic monitoring (oxygen consumption, carbon dioxide production, and respiratory quotient).
10. Use of computers in critical care units (optional)

### **J. Administrative and Management Principles and Techniques:**

1. Recommendations for training physicians in Critical Care Medicine
2. Organization and staffing of critical care units
3. Standards for special care units and the Joint Commission on Accreditation of Health Care Organizations
4. Medical record keeping in special care units:
  - a. Problem-oriented record approach
  - b. System-structure record approach
  - c. Manual versus mechanical (computerized) record generation
- d. Organization for physician, nursing, technical, and laboratory records within special care units
5. Prioritize the care of critically ill or injured patients
6. Collaborative practice principles
7. Emergency medical systems in pre-hospital care
8. Quality improvement principles and practices
9. Principles of triage and resource allocation

### **K. Pharmacokinetics and Dynamics: Drug Metabolism and Excretion in Critical Illness:**

1. Uptake
2. Metabolism
3. Excretion

### **L. Ethical and Legal Aspects of Critical Care Medicine:**

1. Death and dying
2. Foregoing life-sustaining treatment and orders not to resuscitate
3. Standards of treatment for patients with disabilities and mental retardation
4. Rights of patients and the right to refuse treatment
5. Living wills, advance directives, durable power of attorney (options)

## ROTATION OBJECTIVES

### **M. Psychosocial Aspects:**

Awareness of the physiological and social effects of life-threatening illness on patients and families (optional).

### **N. Medical Economics:**

Essential principles of hospital financial reimbursement.

### ***Procedural Skills***

The Resident must be proficient in the following procedural skills as well as understand the indications, contraindications, complications, and pitfalls of these interventions:

#### **A. Airway Management:**

1. Open airway maintenance in non-intubated, unconscious, paralyzed patients
2. Intubation (oral and nasotracheal)
3. Cricothyrotomy, transtracheal catheterization and tracheostomy

#### **B. Breathing and Ventilation**

1. Ventilation of bag and mask
2. Indications, applications, techniques, criteria, and physiological effects of positive end-expiratory pressure; intermittent positive pressure breathing; intermittent mandatory ventilation; continuous positive airway pressure; pressure support ventilation; and (optionally) noninvasive ventilation.
3. Airway pressure release ventilation
4. Suction techniques
5. Chest physiotherapy and incentive spirometry (optional)
6. Fiber optic laryngotracheobronchoscopy
7. Weaning techniques
8. Management of pneumothorax (needle and chest tube insertion drainage systems)
9. Monitoring of airway pressures
10. Operation of mechanical ventilators
11. Measurement of endotracheal tube cuff pressures
12. Interpretation of sputum cultures by smear
13. Performance of bedside pulmonary functions tests
14. Application of appropriate oxygen therapy

#### **C. Circulation**

1. Arterial puncture and blood sampling
2. Insertion of monitoring lines
  - a. Central venous
  - b. Arterial
  - c. Pulmonary artery catheters
3. Pericardiocentesis
4. Management of arterial and venous air embolism
5. Transvenous pacemaker insertion
6. Cardiac output estimates by thermodilution techniques

## ROTATION OBJECTIVES

7. Use of computers and calculators to determine derived parameters including systemic and pulmonary vascular resistance
8. Obtain 12-lead ECGs.
9. Dynamic ECG interpretation
10. Infusion of epinephrine, dopamine, norepinephrine, nitroglycerine, dobutamine, isoproterenol, nitroprusside, and other vasoactive drugs
11. Use of infusion pumps for vasoactive drugs
12. Cardioversion
13. Application and regulation of intra-aortic assist devices
14. Application of noninvasive cardiovascular monitoring
15. Transcutaneous pacing/defibrillation

### **D. Central Nervous System**

1. Lumbar puncture
2. Management of intracranial pressure monitors and intracranial hypertension (optional)
3. Monitoring of modified EEG
4. Application of hypothermia

### **E. Renal**

1. Management of peritoneal dialysis
2. Management of CAVH and CAVHD
3. Insertion of hemodialysis catheters

### **F. GI Tract**

1. Insertion of transesophageal devices
2. Prevention and management of upper GI bleeding

### **G. Hematology**

1. Insertion of transesophageal devices
2. Management of massive transfusions
3. Autotransfusion
4. Proper ordering and interpretation of coagulation studies

### **H. Infection**

1. ICU sterility techniques and precautions
2. Sampling, staining, and interpretation of blood, sputum, urine, drainage, and other body fluids.
3. Interpretation of antibiotic levels and sensitivities

### **I. Metabolism and Nutrition**

1. Tube feeding
2. Parental nutrition
3. Monitoring and assessment of metabolism and nutrition
4. Maintenance of temperature homeostasis

## ROTATION OBJECTIVES

### **J. Monitoring of Bioengineering**

1. Utilization, zeroing, and calibration of transducers
2. Use of amplifiers and recorders
3. Troubleshooting equipment
4. Correcting basic electrical safety hazards

### **K. Trauma**

1. Temporary immobilization of fractures
2. G-suit applications
3. Use of special beds (e.g., circle electrical bed, roto bed, Flexicare bed)
4. Peritoneal lavage

### **L. ICU Laboratory**

1. Blood gas analysis
2. Calculation of oxygen content, intrapulmonary shunt, Alveolar-arterial gradients, systemic and pulmonary vascular resistance, oxygen transport, oxygen consumption

## Senior Critical Care Medicine Rotation

**Duration:** 40 weeks during senior residency

**Goals:** For Residents to gain experience in inpatient evaluation and management of patients with adult Critical Care diseases.

### **Medical Expert**

1. Describe the natural history and clinical expression of critical care illnesses encountered in the inpatient, ICU, and ER settings.
2. Understand the pathophysiology of commonly observed diseases in critically ill patients.
3. Demonstrate a working knowledge of Critical Care Medicine by actively participating in the management of critically ill patients.
4. Demonstrate an understanding of the integrative nature of disease in critically ill patients and the interdisciplinary approach to the management of such patients.
5. Identify at-risk patients, perform appropriate physical examinations, formulate a problem list, and institute a course of therapy under the direction of senior personnel.
6. Prioritize and summarize approaches to the evaluation of common presentations in critical care patients.
7. Triage interventions, taking into account clinical urgency, the potential for unexpected outcomes, and available alternatives.
8. Become comfortable in the management of cardiac arrest and the acute resuscitation of a traumatized or acutely ill patient.
9. Effectively obtain a relevant history and perform a pertinent physical examination of critically ill patients.
10. Demonstrate competence in performing common procedures performed in the medical and surgical ICU, including central and arterial line insertions, orotracheal intubation, paracentesis, thoracentesis, and lumbar puncture.

## ROTATION OBJECTIVES

11. Appropriately select and interpret laboratory, imaging, and pathologic studies used in the evaluation of pulmonary diseases.
12. Construct a comprehensive treatment plan and assess patient response to therapy.
13. Effectively interpret diagnostic tests used in the evaluation of ICU patients such as interpretation of arterial blood gases, chest x-rays, abdominal films, and CT scans.
14. Demonstrate an ability to critically appraise and cite pertinent literature.
15. Perform an appropriately timed consultation and present well-documented assessments and recommendations in written, electronic, or oral formats.
16. Determine indicated interventions for assessment or management.
17. Obtain and document informed consent from patients and explain the risks, benefits, and rationale for the options discussed.
18. Execute interventions in a skillful and safe manner and adapt to new findings or changing clinical circumstances.
19. Counsel patients concerning their diagnosis, planned diagnostic testing, and recommended therapies.
20. Utilize validated instruments effectively in the assessment of functioning and quality of life to monitor and adjust therapy.
21. Establish the roles of the patient and all team members for follow-up investigations of treatment response and consultations and ensure that the agreed-upon follow-up takes place; this is especially necessary after a change of service such as on-call or transfer of the patient within the hospital or to an outside facility.
22. Recognize when care should be transferred to another physician or health care provider.

### **Communicator**

1. Communicate effectively using a patient-centered approach and demonstrate empathy and respect in all patient encounters.
2. Optimize the physical environment for patient comfort, dignity, privacy, and safety.
3. Communicate well with patients, families, and admitting services about daily patient progress.
4. Communicate well with an ICU team (nurses, other Residents, or attending staff) about patient care issues.
5. Engage patients in a way that is respectful and non-judgmental with regard to their religious values, cultural values, and biases.
6. Recognize and respond appropriately to patients' non-verbal communication behaviors.
7. Demonstrate counseling skills and decision aids to help patients or patients' decision makers make informed choices or give informed consent.
8. Demonstrate effective skills in listening and speaking with patients, families, and other members of the health care team.
9. Reliably and accurately communicate the patient's and his/her family's views and concerns to the attending physician.
10. Demonstrate competency in documentation including histories and physical, progress, and discharge notes.
11. Disclose adverse events and procedural complications to patients and their families accurately and appropriately.

## ROTATION OBJECTIVES

12. Document clinical encounters accurately and in a timely manner in compliance with the legal and regulatory requirements.
13. Share information with patients and appropriate others in a manner that respects patients' privacy and confidentiality.
14. Use counseling skills to effectively communicate end-of-life care issues to patients or patients' families.
15. Participate in end-of-life discussions with the ICU team and family members.

### **Collaborator**

1. Participate in effective teamwork and demonstrate a respectful attitude toward other colleagues and staff members of inter- and intraprofessional teams.
2. Demonstrate teamwork to prevent conflict and be able to identify and negotiate overlapping and shared responsibilities.
3. Recognize own differences, misunderstandings, and limitations with respect to others' point of views and opinions.
4. Discuss how the health care system affects the management of inpatient ICU care.
5. Demonstrate effective collaboration with other health care providers
6. Demonstrate awareness of the impact of diagnostic and therapeutic recommendations on the health care system.
7. Demonstrate effective and safe handover during sign-out or transition of responsibility of care, either within the institution or to a different setting or stage of care.

### **Leader**

1. Promote a culture of teamwork that recognizes, supports, and responds effectively to colleagues in need during patient care.
2. Efficiently carry out patient care tasks allocated during ward rounds.
3. Recognize personal limitations and seek help when appropriate.
4. Recognize and professionally respond to unprofessional and unethical behaviors in other staff.
5. Utilize resources effectively to balance patient care, continuing education, and personal activities.
6. Understand and judiciously allocate health care resources.
7. Work efficiently and effectively within a health care system.
8. Utilize information technology for optimal patient care and personal scholarship.
9. Use information technology appropriately.
10. Demonstrate a knowledge of the physical requirements of the design of an ICU.

### **Health Advocate**

1. Identify the important determinants of health affecting patients.
2. Contribute effectively to improving the health of patients and communities.
3. Recognize and respond to issues where health advocacy is appropriate.
4. Educate patients and families about and promote the importance of long-term healthy behaviors and preventive health care (e.g., smoking cessation, screening tests, vaccinations, exercise, nutrition).
5. Respect and empower patient autonomy.

## ROTATION OBJECTIVES

6. Promote fair health care.
7. Apply the principles of quality improvement and quality assurance.
8. Appreciate the existence of global health advocacy and initiatives for the elimination of diseases (e.g., TB, malaria, HIV) and the roles of advocacy groups and funding agencies.

### Scholar

1. Develop, monitor, and revise a personal learning plan by utilizing meaningful feedback and evaluations to promote goal-directed learning.
2. Set, assess, and prioritize individualized learning goals.
3. Use assessment tools and practices in a given learning context.
4. Recognize own knowledge gaps in clinical and other professional encounters.
5. Integrate evidence into decision making.
6. Promote patient safety and a safe learning environment.
7. Effectively use technology to manage information, support patient care decisions, and enhance both patient and physician education.
8. Demonstrate a teamwork attitude and promote collaborative learning.
9. Integrate and apply knowledge obtained from multiple study sources to the care of critically ill patients.
10. Analyze own clinical experience and employ a systematic methodology for improvement.
11. Develop and maintain a willingness to learn from errors and use errors to improve the system or processes of care.
12. Pose medically and scientifically relevant questions that are amenable to scholarly investigation and address the critique of a given scholarly question.

### Professional

1. Exhibit professional commitment to rounds.
2. Demonstrate a commitment to maintaining and enhancing competence, quality improvement, and patient safety.
3. Recognize the importance of patient primacy, privacy, and autonomy; informed consent; and equitable respect and care to all.
4. Respect patients, patients' families, staff, and colleagues.
5. Model ethical behavior by reporting back any key clinical findings to the attending and referring providers; following through on clinical questions, laboratory testing, and other patient care issues; and recognizing potential conflicts of interest.
6. Demonstrate integrity, honesty, and openness in discussion of therapeutic options with patients and respect for patient's preferences and cultural differences.
7. Respond to phone calls, pages, and messages in a timely manner.
8. Recognize and professionally respond to unprofessional and unethical behaviors in other staff.
9. Promote a teamwork culture that recognizes, supports, and responds effectively to colleagues in need during patient care.
10. Demonstrate commitment to the disclosure of error and or adverse events and their impact.
11. Demonstrate self-responsibility, including personal care, to best serve others.

## ROTATION OBJECTIVES

### Coronary Care Unit Rotation

**Duration:** 8 weeks during junior residency

**Objectives:** To develop knowledge and experience in the following domains:

#### Medical Expert

1. Assessment and management of a wide variety of acute cardiac problems in the CCU including acute coronary syndrome, arrhythmias, syncope, cardiogenic shock, and congestive heart failure.
2. The hemodynamic complications of acute valvular (native and prosthetic) disease.
3. The basic principles of applying an intra-aortic balloon pump as well as its indication and contraindication.
4. Describing the common pathophysiology and management of patients admitted to a cardiac critical care setting who present with:
  - a) Coronary artery disease, acute myocardial ischemia and infarction, and complications of myocardial infarction and thrombolytic therapy.
  - b) Valvular heart disease with familiarity of the pathophysiological alterations induced by chronic valvular disease in critically ill patients.
  - c) Shock and the use of volume resuscitation, venodilators/constrictors, inotropes, and lusitropes.
  - d) Cardiac tamponade or constrictive pericarditis.
  - e) Dilated, restrictive, and obstructive cardiomyopathy; congestive heart failure; and diastolic dysfunction.
  - f) Aberrant conduction, dysrhythmia, and sudden acute and sub-acute ventricular and supra-ventricular arrhythmia.
  - g) Pacemakers and the indications for and applications of the various modes of temporary pacing.
  - h) Aortic dissection, thoracic and thoracoabdominal aortic aneurysm.
  - i) Pulmonary edema.
  - j) Commonly used cardiac drugs, heparin, thrombolytics, and antiplatelet agents and their appropriate dosages.
  - k) Anti-fibrinolytic agents and their mechanism of action.
  - l) Commonly used vasodilators, vasoconstrictors, and inotropic and lusitropic agents and their dosages and effects.
  - m) Commonly used anti-arrhythmic agents.
  - n) Interpret ECGs for ischemia, infarction, arrhythmias, and paced rhythms. Residents should know the relevance of special leads placement and recognize the limitations, sensitivity, and specificity of ECGs for monitoring ischemia.
  - o) Gain procedural skills for complicated procedures such as pacemaker insertion, invasive and noninvasive hemodynamic and cardiac output monitoring, cardioversion, arterial line insertion, and pericardiocentesis under the supervision of the cardiologist.
  - p) Describe current indications and recommendations for SBE prophylaxis.

## ROTATION OBJECTIVES

### **Communicator**

1. When a patient presents with a cardiac problem, the Resident should be able to:
  - a. Obtain a complete and thorough history with emphasis on the present problem.
  - b. Perform a general physical examination including a detailed examination of the cardiovascular system.
  - c. Identify and interpret the significance of any abnormal physical findings related to diseases of the cardiovascular system.
2. Document the basic essential components of all clinical encounters clearly utilizing progress, procedural, and consultation notes. The synthesis and management plans should be recorded at a level that accords with the level of training.
3. Be aware of the importance of clear and effective communication with patients as well as the involved family members and other members of the health care team.
4. Refer problem issues or problem cases appropriately.

### **Collaborator**

1. Recognize and integrate the roles of other health care providers into patient management.
2. Effectively consult with other physicians and health care professionals.
3. Work effectively as part of a multidisciplinary team.
4. Act as a leader of a multidisciplinary team.
5. Contribute to the education of medical, nursing, and paramedical staff.
6. Continue to develop respect and appreciation for the importance of communication with allied health care workers and referring physicians in patient care.

### **Leader**

1. Describe the duties of an intensive care specialist and CCU director.
2. Utilize resources to effectively balance patient care and health care economics.
3. Work to develop effective and efficient patient management strategies by:
  - a) Avoiding duplication of services
  - b) Involving other caregivers
  - c) Using information technology appropriately
  - d) Knowing the physical requirements of a CCU design
  - e) Contributing to unit activities and encouraging others to do so by instilling enthusiasm amongst workplace colleagues
  - f) Obtaining an in-depth experience in acute cardiac care by being responsible for the management of patients in the CCU.

### **Health Advocate**

1. Recognize the role played by physicians in the care of patients with cardiac disease in the health care system.
2. Apply knowledge of patient autonomy and the religious, ethnic, and psychosocial factors which influence the physician–patient relationship, and consider these factors when solving problems and understanding decisions made by patients and their families.

## ROTATION OBJECTIVES

### Scholar

1. Accumulate the necessary knowledge to be a competent Critical Care Medicine physician.
2. Learn how to apply basic and clinical science to patient care.
3. Develop an appreciation of the role of critical appraisal in the assessment of current scientific developments.
4. Develop an understanding of evidence-based medicine and incorporate the appropriate references to the literature in complex cases.
5. Recognize the on-going need for self-assessment and the role of self-directed learning.

### Professional

1. Develop an ethical framework for delivery of the highest quality care
2. Embrace the attitudes conducive to effective relationships between physicians and patients/families; physicians and other physicians; and physicians and allied health care workers.
3. Understand professional obligations to patients and colleagues.
4. Exhibit appropriate personal and interpersonal professional behaviors.
5. Act with integrity, honesty, fairness, and compassion in the delivery of the highest quality health care.

### Cardiac Surgery ICU Rotation

**Duration:** 8 weeks during junior residency

**Objectives:** Residents completing an 8-week rotation in the Cardiac Surgery ICU should achieve competency in the management of routine postoperative cardiac surgery patients.

### Medical Expert

By the end of the rotation, the Critical Care Medicine Resident should achieve competency in the following:

1. Management of routine postoperative cardiac surgery patients, patients undergoing valve replacement or repair (aortic and mitral), and patients undergoing major vascular surgery such as abdominal and thoracic aortic aneurysm repair and aortobifemoral grafting procedures.
2. Recognizing postoperative complications, generating a differential diagnosis, and planning appropriate investigations and management.
3. Basic use of intra-aortic balloon pumps and extracorporeal membrane oxygenation.
4. Knowledge of the basic sciences as applied to the critical postoperative period after coronary artery bypass grafting, valve replacement or repair, and major vascular surgery.

## ROTATION OBJECTIVES

### *Physiology and Anatomy*

The Resident is expected to:

1. Describe the coronary anatomy and physiology in detail and their relevance to ischemia.
2. Describe the important aspects of the anatomy and physiology of the cardiac valves, left and right ventricles (e.g., determinants of cardiac output, autoregulation), circulatory system, aorta, and pulmonary circulation.
3. Describe the normal and abnormal conduction pathways and its clinical significance.

### *Pharmacology*

The Resident should understand:

1. Commonly used cardiac drugs, heparin, thrombolytics, antiplatelet agents, and their dosages.
2. The use of blood products (e.g., packed red blood cells [PRBC], fresh frozen plasma [FFP], platelets, cryoprecipitate) and blood alternatives (e.g., albumin, synthetic starches) as well as transfusion reactions and complications.
3. Currently available coagulation drugs (e.g., DDAVP, activated factor VII, protamine) and their indications, contraindications, and complications.
4. Commonly used vasodilators, vasoconstrictors, and inotropic and lusitropic agents, and their dosages and effects.
5. Commonly used anti-arrhythmic agents (e.g., procainamide, amiodarone, sotalol) for prophylaxis and treatment of post-operative atrial fibrillation, supraventricular tachycardia, and ventricular arrhythmias.
6. Neurological sequelae after cardiac surgery.
7. Gastrointestinal complications following major vascular surgery.

*Monitoring:* The Resident should be able to:

1. Acquire skills in performing arterial and central venous cannulation, peripheral venous cannulation, and pulmonary artery catheterization; be able to interpret central venous pressure (CVP) and data from pulmonary artery catheter (pulmonary artery pressure [PAP], pulmonary capillary wedge pressure [PAWP], cardiac output); and know the indications, complications, and management of these procedures.
2. Describe the basics of introductory transesophageal echocardiography (TEE) and its application to critical care patients.
3. Laboratory monitoring of the coagulation system in postoperative cardiac or vascular patients.
4. Recognize the parameters used for assessing postoperative blood loss.
5. Describe the significance of temperatures postoperatively in cardiac and vascular patients.

### **Communicator**

The Resident should be able to:

1. Obtain an accurate and relevant history and perform a detailed physical examination using effective listening skills.
2. Explain critical care patients' status and expected progress to their families.

## ROTATION OBJECTIVES

3. Communicate patient information to and outline a management plan for the attending physician in a professional and intelligent manner.
4. Communicate management plan effectively in routine and emergency situations.
5. Discuss the clinical parameters of possible surgical re-exploration in a calm and intelligent manner.

### **Collaborator**

1. Recognize and integrate the roles of other health care providers into patient management.
2. Differentiate the critical differences between medical and surgical postoperative bleeding and collaborate with surgeons.
3. Recognize the most common complications after cardiac surgery and facilitate interactions with cardiac surgeons and ICU staff.
4. Effectively consult with other physicians and health care professionals.
5. Work effectively as part of a multidisciplinary team.
6. Act as a leader of a multidisciplinary team.
7. Contribute to the education of medical, nursing, and paramedical staff.
8. Continue to develop respect and appreciation for the importance of communication with allied health care workers and referring physicians in the care of the patients.

### **Leader**

1. Understand the duties of the cardiac surgery intensive care specialist and unit director.
2. Utilize resources to effectively balance patient care and health care economics.
3. Work to develop effective and efficient patient management strategies by:
  - a) Collaborative care plans in resource optimization.
  - b) Appropriate time management in coordinating discharge with scheduled surgical admissions and the impact of surgery cancellations due to limit resources on patients and families; use of the waiting list; and effective human resource allocations.
  - c) Arranging the discharge of postoperative cardiac patients according to their needs (e.g., step-down or telemetry floors).

### **Health Advocate**

1. Recognize the impact of a collaborative care plan on facilitating patient care.
2. Recognize the importance of pain management, arrhythmia prophylaxis, etc. on hospital length of stay.

### **Scholar**

Residents must develop scholarship in several areas, as follows:

1. Identify important determinants of health and success of cardiac patients during cardiac surgery ICU admission.
2. Identify areas of controversy in the management of Critical Care Medicine patients using clinical observations and literature reviews, and seek to practice evidence-based medicine.

## ROTATION OBJECTIVES

3. Contribute to the medical education of other health professionals (e.g., clerks, novice nurses and respiratory therapists, etc.).
4. Learn how to apply basic and clinical science to patient care.
5. Recognize the ongoing need for self-assessment and the role of self-directed learning.

### Professional

1. Develop an ethical framework for the delivery of the highest quality care.
2. Embrace the attitudes conducive to effective relationships between physicians and patients/families; physicians and other physicians; and physicians and allied health care workers.
3. Understand professional obligations to patients and colleagues.
4. Exhibit appropriate personal and interpersonal professional behaviors.
5. Act with integrity, honesty, fairness, and compassion in the delivery of the highest quality health care.
6. Remain calm and organized in stressful or emergency situations.

### General Surgery Rotation

**Duration:** 8 weeks during junior residency

**Objectives:** Residents completing an 8-week rotation in a general surgery department should achieve competency in the management of common surgical diseases and their complications when the patient is critically ill.

### Medical Expert

The Resident should obtain the requisite knowledge and skills to recognize common surgical problems and identify surgical emergencies, and should continue developing their ability to diagnose and plan care. This includes performing appropriate diagnostic work-ups and timely decisions for surgical intervention.

The Resident is expected to:

1. Develop clinical assessment skills for acute abdomen, including relevant history and physical examination.
2. Develop differential diagnoses for sentinel general surgical presentations.
3. Be able to recognize acute surgical conditions.
4. Develop skills in managing victims of trauma (if at a trauma center)
5. Develop skills in identifying and managing common general surgical problems.

The Resident should gain knowledge of, and where applicable, experience in:

- The uses of and techniques related to diagnostic peritoneal lavage

The Resident should seek to gain experience in the following technical skills:

- Central venous access
- Tube thoracostomy
- Incision and drainage
- Suturing and hemostasis
- Knot-tying

## ROTATION OBJECTIVES

- Focused assessment with sonography in trauma (FAST)

### **Communicator**

The Resident should develop communication skills to:

1. Communicate effectively with patients and families.
2. Give formal presentations during rounds and lead discussions on patients' surgical condition.
3. Keep accurate and efficient records.
4. Communicate treatment plans to all members of the team.

### **Collaborator**

1. Participate in interdisciplinary rounds and other activities involving other health care professionals.
2. Recognize the roles and interact effectively with other physicians and health care workers.
3. Consult effectively with other physicians and health care professionals.

### **Leader**

The Resident is expected to:

1. Utilize resources effectively to balance patient care, continuing educational needs and other activities.
2. Complete surgical notes and dictations appropriately and in a timely fashion.
3. Order tests and procedures and book operating rooms (ORs) appropriately and efficiently.
4. Multitask appropriately and effectively, prioritize tasks appropriately, and understand the principles of effective delegation.
5. Delegate responsibilities appropriately or accept delegated tasks appropriately.
6. Develop team leadership skills.
7. Employ information technology appropriately for patient care.

### **Health Advocate**

The Resident should:

1. Understand when and how to appropriately advocate on behalf of patients.
2. Identify the important determinants of health affecting patients.
3. Demonstrate an understanding of injury prevention.
4. Promote and participate in patient safety efforts.
5. Understands the role of screening programs for general surgical disease (e.g., breast or colon cancer)

### **Scholar**

The Resident is expected to:

1. Critically appraise the general surgical literature and apply current literature into daily practice.
2. Demonstrate the ability for continuing self-learning.
3. Discuss the principles of surgery and the application of basic sciences to surgical treatment.

## ROTATION OBJECTIVES

4. Facilitate the learning of patients, staff, students, and other health care professionals through formal and informal teaching opportunities.
5. Integrate critical appraisal conclusions into clinical care.
6. Attend and participate in divisional academic activities.

### Professional

The Resident should:

1. Deliver the highest quality care with integrity, honesty, and compassion.
2. Exhibit appropriate personal and interpersonal professional behaviors.
3. Develop ethical relationships with colleagues, patients, and relatives.
4. Demonstrate sensitivity to age, gender, culture, and ethnicity in dealing with patients and their families.
5. Understand the legal issues related to surgical consent, confidentiality, and refusal of treatment.
6. Display teamwork and respect for all members of the health care team.
7. Maintain patient privacy and dignity and act with personal integrity.

### Core Anesthesia Rotation

Recommended Distribution of Rotations: 8 weeks during junior residency

**Description:** During this rotation, the Resident is assigned to theater lists in the fields of general surgery; orthopedics; gynecology; urology; Ear, Nose, and Throat; dental; vascular surgery; plastic surgery; ophthalmology; off-site anesthesia (e.g., radiology); and accidents and emergency anesthesia.

A minimum of 2 months of training must be spent in this practice during junior residency. Critical Care Medicine Residents are assigned to operating room lists on a daily or weekly basis.

### Objectives:

#### Medical Expert

By the end of this rotation, the Resident must be able to:

1. Explain the adult anatomy and physiology of the following systems and the pathophysiology of the disease states that affect them:
  - Cardiovascular
  - Upper airway and respiratory
  - Central and peripheral nervous
  - Hepatic
  - Renal
  - Endocrine
  - Hematologic
2. Perform basic and advanced airway management including:
  - Bag mask ventilation
  - Direct laryngoscopy
  - Use of different intubation techniques in case of difficult intubation (e.g., laryngeal mask airway, GlideScope)

## ROTATION OBJECTIVES

3. Perform awake fiberoptic intubation.
4. Appropriately select and administer a complete spectrum of anesthetic and analgesic agents for the induction and maintenance of anesthesia, considering the relative advantages and disadvantages of each approach and tailoring that approach to the specific anesthetic goals for each case.
5. Appropriately select and administer a complete spectrum of drugs for cardiovascular support and resuscitation during anesthesia and the perioperative period, considering the relative advantages and disadvantages of each approach and tailoring that approach to the specific anesthetic goals for each case.
6. Perform specific techniques (under supervision) for the administration of general, local, and regional anesthesia, with a sufficient range of choices to meet the anesthetic goals for all patients within the scope of practice defined above.
7. Identify and manage complications as they occur in the perioperative period.
8. Identify risk factors for postoperative complications and modify anesthetic plans to minimize those complications.
9. Assess the suitability for discharge to ICU, intermediate care, ward, and home settings.
10. Predict, identify, and contribute to the alleviation of impediments to recovery in the perioperative period such as:
  - Postoperative nausea/vomiting
  - Pain
  - Functional impairment
11. Explain the principles of the function of all anesthetic equipment, including the anesthetic machine, mechanical ventilator, safe delivery of anesthetic gases, and monitoring equipment.
12. Effectively use the anesthesia machine to provide anesthesia care, including being able to perform an appropriate safety inspection of the machine.
13. Identify and correct equipment malfunction before and during anesthesia care.
14. Select, apply, and interpret the information from appropriate monitors, including invasive and noninvasive blood pressure amplifiers, 5-lead ECGs, neuromuscular monitors, oximeters, end-tidal gas monitors, temperature, urine output, and invasive monitors of cardiac output and filling.
15. Identify and correct sources of error in the above monitoring equipment.
16. Select and administer appropriate fluids and blood products, taking into account the indications, contraindications, and correct procedures of said products.
17. Identify and manage complications of fluid and blood product administration throughout the entire perioperative period.
18. Appropriately assess the patient and his/her risks and then formulate and implement an appropriate individualized plan for perioperative management, considering the implications of the patient's underlying problem, surgical procedure, and coexisting patient factors such as other medical problems, anxiety, discomfort, culture, language, ethnicity, age, and gender.
19. Appropriately modify management in response to monitoring information and changes in patient, anesthetic, or surgical factors.
20. Provide specialized anesthetic care to pregnant patients undergoing obstetric and non-obstetric procedures, geriatric patients, and ambulatory patients.

## ROTATION OBJECTIVES

21. Initiate appropriate, individualized perioperative pain management strategies.
22. Manage adult patients in a variety of settings, including:
  - Elective, urgent, and emergency/trauma procedures
  - Sites distant from the operating room
  - Unforeseen emergencies (e.g., malignant hyperthermia, anaphylaxis)
23. Perform all technical skills (initially under supervision and then independently) necessary to manage adult patients in the perioperative period, including:
  - Routine and difficult airway management
  - Techniques of monitored anesthesia care (MAC)
  - Local and regional anesthesia
  - General anesthesia techniques including those related to induction, maintenance, and emergence
  - Peripheral and central venous access invasive monitoring
  - Resuscitation of critically ill adult patients (with reference to ACLS and ATLS procedures and protocols)

### **Communicator**

1. Establish a therapeutic relationship with patients and family members as appropriate, including:
  - a) Encouraging patient participation in decision-making in consultative, elective, and emergency situations as well as in more challenging situations such as patient anger or confusion, language or ethno-cultural differences, or extremes of age
  - b) Listening to patients, answering their questions, and attempting to alleviate their anxiety
  - c) Demonstrating respect and empathy in relationships with patients
2. Gather sufficient information from the patient, family members, and medical personnel to identify all issues that will have implications for perioperative management
  - a) The medical and surgical status of the patient
  - b) Patient expectations, beliefs, and concerns (in addition to medical problem information), while also considering the influence of age, gender, and background (ethno-cultural, spiritual, and socio-economic) on the medical problem.
3. Impart sufficient information to patients and appropriate family members or delegates to allow a complete understanding of the implications of the planned procedure, alternatives, risks, and benefits.
4. Obtain complete informed consent for anesthetic care.
5. Be able to break bad news to patients and family members.

### **Collaborator**

By the end of this rotation, the Resident should be able to:

1. Function well in the clinical environment using the full abilities of all team members.
2. Coordinate care of adult patients with other members of the OR team, post anesthesia care unit, ICU staff, and other physicians.

## ROTATION OBJECTIVES

3. Manage urgent and crisis situations such as cardiac arrest, trauma, anaphylaxis, and malignant hyperthermia as a team member or team leader.
4. Resolve conflicts or provide feedback where appropriate.
5. Consult other physicians and allied health professionals in order to provide optimal perioperative care.
6. Communicate effectively with other team members.

### **Leader**

By the end of this rotation, the Resident should be able to:

1. Demonstrate knowledge of the management of operating rooms.
2. Demonstrate knowledge of the contributors to anesthetic expenditures.
3. Demonstrate knowledge of the national guidelines concerning anesthetic practice and equipment.
4. Record appropriate information for the anesthetics and consultations provided.
5. Demonstrate knowledge of the principles of quality assurance and be able to conduct morbidity and mortality reviews.
6. Utilize personal and outside resources effectively to balance patient care, continuing education, practice, and personal activities.
7. Manage assigned room/slate in terms of maintaining the schedule or changing the schedule in response to emergencies, delays, additional cases, etc.
8. Manage after-hours scheduling of cases including prioritization and adapting to changes.
9. Schedule other Residents to various listed assignments when Senior Resident.
10. Use limited health resources appropriately, including:
  - a. Time for patient assessment, OR equipment preparation, anesthesia induction and emergence, OR change over
  - b. Expenses of anesthesia resources including cost-effective choices of drugs, techniques, equipment, and invasive monitoring
11. Participate in the assessment of patient care outcomes and practice including quality assurance. This will include:
  - a. Maintaining a personal record of experience and outcomes
  - b. Participating in any appropriate case reviews
12. Explain how an anesthetic department is structured and managed.

### **Health Advocate**

By the end of this rotation, the Resident should be able to:

1. Provide direction to health administrators regarding compliance with national practice guidelines and equipment standards for anesthesia.
2. Recognize the opportunities for anesthesiologists to advocate for resources for pain management, emerging medical technologies, and new health care practices in general.
3. Recognize individual and systemic issues that have an impact on anesthetic care and safety of adult patients.
4. Communicate identified concerns and risks to patients, other health care professionals, and administration as necessary.

## ROTATION OBJECTIVES

5. Intervene on behalf of individual patients and the system as a whole regarding quality of care and safety.
6. Identify and react to risks to health care providers such as:
  - a. Substance abuse among anesthesiologists and other health care providers
  - b. Hazards in the workplace environment
7. Implement standards and guidelines related to anesthetic practice and equipment.

### Scholar

By the end of this rotation, the Resident should be able to:

1. Develop and maintain a personal learning strategy that will be continued after acquiring certification.
2. Seek out and critically appraise literature to support clinical care decisions and apply new evidence-based knowledge.
3. Contribute to the appropriate application, dissemination, and development of new knowledge.
4. Teach medical students, other Residents, faculty members, other health professionals, and patients using the principles and methods of adult learning.

### Professional

The Resident should be able to:

1. Deliver the highest quality patient care with integrity, honesty, and compassion.
2. Fulfill the ethical and legal aspects of patient care.
3. Maintain patient confidentiality.
4. Demonstrate appropriate interpersonal and professional behavior.
5. Recognize personal limitations through appropriate consultation (with staff supervisors, other physicians, and other health professionals) and show appropriate respect for those consulted.
6. Recognize conflict in patient care situations, professional relationships, and value systems, and demonstrate the ability to discuss and resolve differences of opinion.
7. Accept constructive feedback and criticism, and implement appropriate advice.
8. Continually review own personal and professional abilities and demonstrate continuing development of skills and knowledge through education.
9. Identify problems of physical and mental health in oneself and others including chemical dependence, stress, depression, and ways to deal with these problems.

## Emergency Medicine Rotation

**Duration:** 8 weeks during junior residency

**Objectives:** During this rotation, the Resident is expected to gain experience in the initial assessment and management of common medical and surgical emergencies.

### Medical Expert

The Critical Care Medicine Resident is expected to:

1. Obtain a concise and accurate history from and perform a physical examination on patients with undifferentiated acute emergencies.

## ROTATION OBJECTIVES

2. Formulate appropriate plans of management of patient present with acute emergency.
3. Develop an organized approach to resuscitation, ensuring maintenance of airways, breathing, and circulation.
4. Perform initial management of compromised airways, including intubation of the trachea and the use of various airway adjuncts.
5. Perform initial management of patients with cardiac arrhythmias and acute coronary syndrome.
6. Perform initial assessment and management of patient with shock.
7. Develop approaches to assessing patients with toxin exposure, substance abuse, and drug overdose.
8. Develop skills for assessing and managing a wide variety of acute medical conditions including:
  - a. Environmental exposure (heat stroke, hypothermia, carbon monoxide poisoning, burn, and drowning or near drowning)
  - b. Central nervous system disorders (acute stroke, seizure disorders, meningitis, and coma)
  - c. Cardiovascular diseases (hypertensive emergencies/urgencies, pulmonary edema, dissecting aortic aneurysm, and acute ischemic syndrome)
  - d. Respiratory disease (acute asthma exacerbation, chronic obstructive pulmonary disease [COPD] exacerbation, pneumonia, acute respiratory distress, and acute thromboembolic disorders)
  - e. Gastrointestinal (GI) disorder (upper GI hemorrhage, hepatic encephalopathy, acute liver failure)
9. Develop the ability to assess and initially manage acute abdomen, trauma, and fractures and interpret the related radiological imaging.

### **Communicator**

The Resident is expected to be able to:

1. Obtain a focused medical history from the patients or their families.
2. Discuss a wide variety of medical conditions and their treatments with patients and their families in a language that they can understand
3. Establish and maintain a therapeutic relationship with patients, their families, and the medical team while fostering an environment of understanding, trust, empathy, and confidentiality.
4. Accurately describe a patient's clinical condition to consultants using appropriate medical terminology.
5. Initiate appropriate telephone consultations with other specialists at local and remote locations
6. Keep thorough and accurate written medical records.

### **Collaborator**

The Resident should be able to:

1. Work collaboratively with allied healthcare professionals in the emergency room.

## ROTATION OBJECTIVES

2. Develop a care plan for a patient they have assessed, including investigation, treatment, and continuing care, in collaboration with the members of the interdisciplinary team.
3. Consult judiciously and effectively.
4. Collaborate with other health care professionals to ensure smooth transition of patient care within or outside the hospital.

### **Leader**

The Resident is expected to be able to:

1. Effectively manage the care of multiple patients while working in the emergency department.
2. Effectively triage patients and manage emergency department flow.
3. Improve the ability to obtain a focused history and perform a physical examination in the time-limited emergency room environment.
4. Make clinical decisions and judgments based on sound evidence for the benefit of individual patients and the population served.
5. Work effectively as a member of a team.
6. Understand the principles of managing disasters.

### **Health Advocate**

The Resident should be able to:

1. Identify and engage in opportunities for patient counseling and education regarding patients' disease.
2. Ensure timely access to relevant consultation and investigation.
3. Expedite patient transfer from the emergency department.
4. Ensure follow-up of care and enhance care continuity.

### **Scholar**

The Resident should be able to:

1. Identify his/her own learning needs and make use of available learning resources.
2. Demonstrate critical thinking and integrate critical appraisal of the literature into the bedside approach.
3. Apply appropriate clinical evidence to patient care.

### **Professional**

The Resident is expected to be able to:

1. Treat all patients with dignity and respect.
2. Be punctual for shifts, meetings, and educational events.
3. Follow through on assigned tasks.
4. Demonstrate integrity in all interactions with colleagues.
5. Be respectful, honest, and compassionate when dealing with patients, families, and other professionals.

## ROTATION OBJECTIVES

### Trauma Rotation

**Duration:** 8 weeks during junior residency.

**Objectives:** By the end of this rotation, the Critical Care Medicine Resident should have competency and confidence in dealing with trauma patients.

#### Medical Expert

The Resident should be able to:

1. Demonstrate knowledge and skill in the initial assessment and management of patients with multiple traumas.
2. Demonstrate proficiency in trauma resuscitation and wound care.
3. Demonstrate understanding of injury mechanisms and their possible impact on patients' presentation.
4. Perform primary and secondary surveys of trauma victim.
5. Under the principles of FAST ultrasound and the indications of peritoneal lavage.
6. Demonstrate knowledge of appropriate blood product transfusion

#### Communicator

The Resident is expected to be able to:

1. Demonstrate the ability to counsel patients and families in the setting of acute trauma.
2. Ensure appropriate patient disposition, referral, and follow-up.
3. Demonstrate knowledge of and appropriate conduct in dealing with issues of patient confidentiality and informed consent.
4. Communicate effectively with a multidisciplinary team involved in patient care.
5. Keep thorough and accurate written medical records.

#### Collaborator

The Resident is expected to be able to:

1. Work collaboratively with a multidisciplinary team caring for trauma patients.
2. Develop a care plan for patients they have assessed, including investigation, treatment, and continuing care, in collaboration with the members of the interdisciplinary team.
3. Consult judiciously and effectively
4. Collaborate with other healthcare professionals to ensure smooth transition of patient care within or outside the hospital.

#### Leader

The Resident is expected to be able to:

1. Utilize resources effectively to balance patient care and personal learning needs.
2. Multitask appropriately and effectively, prioritize tasks appropriately, and understand the principles of effective delegation.
3. Delegate responsibilities or accept delegated tasks appropriately.
4. Develop team leadership skills.
5. Improve the ability to obtain a focused history and perform a physical examination.

## ROTATION OBJECTIVES

6. Work effectively as a member of a team.
7. Understand the principles of managing disasters.

### Health Advocate

The Resident is expected to be able to:

1. Ensure timely access to relevant consultations and investigation.
2. Understand when and how to appropriately advocate on behalf of patients.
3. Demonstrate an understanding of injury prevention.
4. Promote and participate in patient safety.

### Scholar

The Resident is expected to be able to:

1. Critically appraise trauma-related literature and apply knowledge obtained from the current literature to daily practice.
2. Demonstrate the ability for continual self-learning.
3. Integrate critical appraisal conclusions into clinical care.
4. Attend and participate in divisional academic activities.

### Professional

The Resident should be able to:

1. Deliver the highest quality care with integrity, honesty, and compassion.
2. Exhibit appropriate personal and interpersonal professional behaviors.
3. Demonstrate sensitivity to age, gender, culture, and ethnicity in dealing with patients and their families.
4. Display teamwork and respect for all members of the health care team.
5. Maintain patient privacy and dignity and act with personal integrity.

## Thoracic Surgery Rotation

**Duration:** 8 weeks during senior residency

### Objectives:

#### Medical Expert

After completing this rotation, the Resident should be able to:

1. Obtain a history and perform a physical examination with an emphasis on aspects related to thoracic surgery.
2. Formulate a differential diagnosis for common thoracic surgical problems.
3. Formulate a plan of management for common surgical problems, including investigation and treatment.
4. Recognize acutely ill or injured patients and develop a systematic approach to assessment and management.
5. Develop familiarity with the conduct of common thoracic operations.
6. Participate in postoperative care of thoracic surgical patients.

During this rotation, the Resident will be exposed to most of the following:

1. The anatomy and physiology of the lungs, pleural space, and esophagus.

## ROTATION OBJECTIVES

2. Diagnostic imaging of the chest, including CT and chest x-ray interpretation.
3. Laboratory procedures used in diagnosis of diseases of the chest, including endoscopy and function studies of the lungs and esophagus.
4. Pharmacology of drugs commonly used in the management of thoracic diseases.
5. Principles of oncology, including radiation therapy and chemotherapy.

During this rotation, the Resident will have the opportunity to learn:

1. General conduct of a surgical procedure, including scrubbing and sterile technique
2. Chest tube placement
3. Thoracentesis
4. Simple suturing
5. Knot-tying

During this rotation, the Resident will see and obtain work-ups of some or most of these specific disease entities:

1. Carcinoma of the lung, including staging, pathology, and management.
2. Pneumothorax, hemothorax, and pleural effusions
3. End-stage lung disease, including lung transplantation
4. Infections of the thorax, including empyema, lung abscess, and mediastinitis
5. Penetrating and blunt chest trauma
6. Mediastinal neoplasms
7. Esophageal carcinoma

### **Communicator**

The Resident should develop communication skills in order to:

1. Elicit relevant information and perspectives from patients, families, and the health care team.
2. Communicate effectively with patients and families.
3. Give formal presentations at rounds and lead discussions on patients' surgical condition.
4. Keep accurate and efficient records.
5. Obtain informed consent.
6. Communicate treatment plans to all members of the team.

### **Collaborator**

1. The Resident should participate in interdisciplinary rounds and other activities involving other health care professionals.
2. Recognize the roles and interact effectively with other physicians and health care workers.
3. Consult effectively with other physicians and health care professionals
4. Demonstrate a team approach to health care.
5. Work with others to assess, plan, provide, and integrate care of the surgical patient.

## ROTATION OBJECTIVES

### **Leader**

The Resident is expected to be able to:

1. Utilize resources effectively to balance patient care, personal learning needs, and outside activities.
2. Complete surgical notes and dictations appropriately and in a timely fashion.
3. Order tests and procedures and book ORs appropriately and efficiently.
4. Multitask appropriately and effectively, prioritize tasks appropriately, and understand the principles of effective delegation.
5. Delegate responsibilities or accept delegated tasks appropriately.
6. Develop team leadership skills.
7. Employ information technology appropriately for patient care.

### **Health Advocate**

The Resident should be able to:

1. Understand when and how to appropriately advocate on behalf of patients.
2. Identify the important determinants of health affecting patients.
3. Demonstrate an understanding of injury prevention.
4. Promote and participate in patient safety.

### **Scholar**

The Resident is expected to be able to:

1. Critically appraise general surgical literature and apply current literature to daily practice.
2. Demonstrate the capacity for continual self-learning.
3. Discuss the principles of surgery and the application of basic sciences to surgical treatment.
4. Facilitate learning in patients, staff, students, and other health care professionals through formal and informal teaching opportunities.
5. Integrate critical appraisal conclusions into clinical care.
6. Attend and participate in divisional academic activities.

### **Professional**

The Resident should be able to:

1. Deliver the highest quality care with integrity, honesty, and compassion.
2. Exhibit appropriate personal and interpersonal professional behaviors.
3. Cultivate an ethical relationship with colleagues, patients, and relatives.
4. Demonstrate sensitivity to age, gender, culture, and ethnicity in dealing with patients and their families.
5. Understand the legal issues related to surgical consent, confidentiality, and refusal of treatment.
6. Display teamwork and respect for all members of the health care team.
7. Maintain patient privacy and dignity and act with personal integrity.

## ROTATION OBJECTIVES

### Vascular Surgery Rotation

**Duration:** 4 weeks during senior residency

#### **Objectives:**

##### Medical Expert

1. Understand the pathophysiology, clinical presentation, and management of common vascular problems including arterial and venous disorders.
2. Understand the management of and risk factor reduction for the following common conditions:
  - a) Abdominal aortic aneurysms
  - b) Carotid artery disease
  - c) Chronic critical limb ischemia
  - d) Chronic venous disease
  - e) Understand and manage associated complex medical problems in patients with peripheral vascular disease
3. Manage vascular access in patients with chronic renal failure.
4. Use and interpret the results obtained from a handheld Doppler
5. Interpret angiographic investigations of the carotid arteries and upper and lower limbs.
6. Interpret CT scans in patients with abdominal aortic aneurysms.

##### **Communicator**

The Resident should develop communication skills to be able to:

1. Elicit relevant information and perspectives from patients, families, and the health care team
2. Establish rapport, trust, and a therapeutic relationship with patients and families.
3. Communicate effectively with patients and families.
4. Give formal presentations at rounds and lead discussions on patients' surgical condition.
5. Keep accurate and efficient records.
6. Obtain informed consent.
7. Communicate treatment plans to all members of the team.

##### **Collaborator**

1. Participate in interdisciplinary rounds and other activities involving other health care professionals.
2. Recognize the roles of and interact effectively with other physicians and health care workers.
3. Consult effectively with other physicians and health care professionals.
4. Demonstrate a team approach to health care.
5. Work with others to assess, plan, provide, and integrate care of surgical patients.

##### **Leader**

The Resident is expected to be able to:

1. Utilize resources effectively to balance patient care, personal learning needs, and outside activities.

## ROTATION OBJECTIVES

2. Complete surgical notes and dictations appropriately and in a timely fashion.
3. Order tests and procedures and book ORs appropriately and efficiently.
4. Multitask appropriately and effectively, prioritize tasks appropriately, and understand the principles of effective delegation.
5. Delegate responsibilities or accept delegated tasks appropriately.
6. Develop team leadership skills.
7. Employ information technology appropriately for patient care.

### **Health Advocate**

The Resident should be able to:

1. Understand when and how to appropriately advocate on behalf of patients.
2. Identify the important determinants of health affecting patients.
3. Demonstrate an understanding of injury prevention.
4. Promote and participate in patient safety.

### **Scholar**

The Resident is expected to be able to:

1. Critically appraise the general surgical literature and apply current literature to daily practice.
2. Demonstrate the ability for continual self-learning.
3. Discuss the principles of surgery and the application of basic sciences to surgical treatment.
4. Facilitate learning of patients, staff, students, and other health care professionals through formal and informal teaching opportunities.
5. Integrate critical appraisal conclusions into clinical care.
6. Attend and participate in divisional academic activities.

### **Professional**

The Resident should be able to:

1. Deliver the highest quality care with integrity, honesty, and compassion.
2. Exhibit appropriate personal and interpersonal professional behaviors.
3. Cultivate an ethical relationship with colleagues, patients, and relatives.
4. Demonstrate sensitivity to age, gender, culture, and ethnicity in dealing with patients and their families.
5. Understand the legal issues related to surgical consent, confidentiality, and refusal of treatment.
6. Display teamwork and respect for all members of the health care team.
7. Maintain patient privacy and dignity and act with personal integrity.

## ROTATION OBJECTIVES

### Regional Anesthesia (Elective)

Recommended Distribution of Rotations: 4 weeks during senior residency

**Objectives:** The aim of this rotation is to provide the Resident with greater exposure to various regional anesthesia techniques to improve their competence in performing these techniques. This rotation is intended to ensure Residents' procedural mastery under the supervision of qualified regional anesthesiologists.

Upon completion of training, the Resident will have acquired the following competencies:

#### Medical Expert

The Resident will demonstrate knowledge acquisition in the following areas:

1. Anatomy related to specific regional anesthesia (RA) technique including surface landmarks, perineural structure, ultrasound anatomy, sensory innervation, motor innervation, and details of various regional blocks.
2. Physiology related to specific RA techniques and disease processes, including nerve transmission/blockade, physiologic response to acute pain, and chronic pain at surgery site.
3. Pharmacology of local anesthetics, adjuvants (e.g., epinephrine, opioids, HCO<sub>3</sub>), and chronic opioid use in patients presenting for surgery.
4. RA equipment including needles, peripheral nerve stimulator, ultrasound, catheters, and stimulating catheters.
5. Complications/side effects, including IV toxicity and management of local anesthetic overdose, neural injury, needle trauma to surrounding tissue, e.g., hematoma, pneumothorax, or dural puncture), and unintended neural blockade (i.e., phrenic nerve or epidural).
6. Contraindications related to specific RA techniques including infection, anticoagulation, pre-existing neural injury, increased intracranial pressure (ICP), and pulmonary disease.
7. The Resident must be able to do/assist with the following procedures:
  - a. IV regional anesthesia
  - b. Spinal anesthesia
  - c. Epidural anesthesia/analgesia
    - Thoracic
    - Lumbar
  - d. Cervical plexus block or brachial plexus block
    - Interscalene
    - Supraclavicular
    - Axillary
    - Infraclavicular
  - e. Intercostal or intrapleural block
  - f. Paravertebral block (thoracic or lumbar)
  - g. Lower limb blocks
    - Femoral
    - Sciatic

## ROTATION OBJECTIVES

- Obturator
- Lateral femoral cutaneous
- Ankle

A competent anesthesiologist shall demonstrate an understanding of the anatomy, physiology, pharmacology, and approaches to RA.

The Resident must be aware of the need to provide preoperative (i.e., ability to identify the appropriateness of conduction anesthesia by history, physical examination, and lab data) and postoperative care in an objective manner. The Resident assigned to this rotation must actively seek access to surgical procedures appropriate for conduction anesthesia. Assistance from the assigned anesthesiologist or a resource person should be obtained.

The minimal learning objectives will include:

1. Anatomy: Comprehensive knowledge of anatomy for different blocks.
2. Physiology: A competent anesthesiologist must be able to describe the following physiological principles relevant to RA.
3. Nerve conduction:
  - a) Structural classification of nerve type and relevance to local anesthetics action.
  - b) The generation of action potentials, refractory periods, and recovery.
4. Effects of neuroaxial block:
  - a) The differences and similarities between spinal and epidural blockades with respect to mechanism of action, effects of adjuvants, and cardiorespiratory physiology.
  - b) Effects on cardiorespiratory system.
  - c) Effects on coagulation.
  - d) Neurohormonal stress response
  - e) Effects on intraoperative blood loss.
  - f) Effects on postoperative respiratory effects of surgery.
5. Neuroendocrine stress response: Describe the system affected by the stress response and the overall impact on those systems.
6. Pharmacology: A competent anesthesiologist should be able to demonstrate knowledge of pharmacodynamics and pharmacokinetics of local anesthetics with respect to:
  - a) The mechanism of action of local anesthetics.
  - b) The structure-activity relationship: the difference between amide and ester local anesthetics; physicochemical properties of potency and protein binding; and pKa and pH.
  - c) Kinetics: how drug, patient, and technical factors contribute to speeding up the effects and recovery from local anesthetics, as well as the determinants of serum local anesthetic concentration, its measurement, and the role of protein binding in it.

## ROTATION OBJECTIVES

- d) Adjuvants such as epinephrine, bicarbonate, opioids, and NMDA antagonists; also, the clinical indications, advantages, and disadvantages of inclusion of adjuvants in spinal, epidural, regional, and local infiltration.
7. Technology: An anesthesiologist must demonstrate an understanding of the technology available both for identification of nerves to use plexus blocks and peripheral nerve blocks and for epidural space detections.
- a) Nerve stimulation
- Rationale for using nerve stimulation.
  - Advantages, disadvantages, and limitations of nerve stimulators.
  - The different types of needles (insulated vs. non-insulated).
  - Use of a nerve stimulator.
- b) Ultrasound
- The basic physics of ultrasound and their clinical relevance in locating different anatomical structures.
  - Advantages, disadvantages, and limitations of ultrasound in locating nerves.
  - Selection of appropriate ultrasound probe and machine settings to properly identify the desired structures.
  - In-plane vs. out-of-plane techniques.
8. Clinical application: A competent anesthetist must demonstrate the ability to perform the following specific objectives for all regional anesthetic techniques.
- a) Anesthetic planning
- Development of an anesthetic plan including appropriate options, contingency plans, and expansions.
  - Selection of appropriate RA techniques for anesthetic care.
  - Discussion of advantages, disadvantages, and physiological implications of RA with patient
  - Discussion of combined RA and general anesthesia (GA) versus GA or RA only.
  - RA techniques in pediatrics.
- b) Nerve localization
- The anatomic landmarks for use with blocks.
  - Utilization of nerve stimulators or ultrasound for identification of plexuses and peripheral nerves.
9. Contraindication and Complications: A competent anesthetist should know about relative and absolute contraindications.
- a) Anesthesiologists should understand the guidelines for RA for patients with anticoagulation, and be able to interact with surgeons and administrators to create policies governing the interaction of anticoagulation and anesthetic/analgesic management

## ROTATION OBJECTIVES

10. Complications of Regional Anesthesia: Anesthesiologists should be able to describe the complications of RA and the risk factors, presentation, diagnosis, and treatment of:
  - a) Failed block
  - b) Intravascular injection of local anesthesia
  - c) Systemic toxicity
  - d) Total spinal block
  - e) Overdose
  - f) Epidural hematoma and abscess
  - g) Postdural puncture headache
  - h) Hypotension
11. Spectrum of Anesthesia: Anesthesiologists should demonstrate an understanding of the spectrum of RA techniques and ability to perform those relevant to their level of training. They must be able to describe site-specific equipment, contraindications, and appropriate drug selections for each block.

### **Communicator**

1. Residents must demonstrate effective communication skills in dealing with patient problems.
2. Residents must demonstrate respect and compassion, be able to communicate that patients' problems have been understood, and describe alternatives, side effects, and complications of various anesthetic drugs to enable patients to make an informed decision regarding their choices of anesthesia.
3. For patients' families, the Resident must be able to accurately provide information on each patient's condition and the treatment prognosis. The Resident must demonstrate an ability to make decisions when the family must be relied upon for substitute decision-making when patients are incapable of deciding for themselves.

### **Collaborator**

1. Residents must adopt a professional attitude and competent manner when acting as a consultant as well as be able to consult physicians of other disciplines when appropriate.
2. Residents must involve the attending anesthesiologist and surgeon in all decisions pertaining to a patient's postoperative analgesia management plans.

### **Leader**

1. The Resident should demonstrate responsibility in providing consultations and interventions in a timely manner.
2. The Resident should be aware of the monitoring requirements of various regional techniques according to the standard guidelines.
3. The Resident should be aware of the cost of various treatment modalities and the necessity of allocating resources appropriately.
4. The Resident should be aware of the value of quality assurance and morbidity and mortality review.

## ROTATION OBJECTIVES

### Health Advocate

The Resident should be able to demonstrate an ability to provide appropriate information to patients or their families so that they can make an informed decision (and obtain consent) regarding RA as:

1. A primary anesthetic technique.
2. A component of their intraoperative and postoperative analgesia.
3. A means of dealing with adverse outcomes.

### Scholar

By the end of this rotation, the Resident should be able to:

1. Develop and maintain a personal learning strategy that will be continued after acquiring certification.
2. Seek out and critically appraise literature to support clinical care decisions and apply new evidence-based knowledge.
3. Contribute to the appropriate application, dissemination, and development of new knowledge.
4. Teach medical students, other Residents, faculty members, other health professionals, and patients using the principles and methods of adult learning.

### Professional

The Resident should be able to:

1. Demonstrate appropriate behaviors and attitude towards patients, their families, and all personnel involved in the care of those patients, as well as the anesthesiology team, surgical team, and nursing staff.
2. Respond to calls from the post-anesthesia care unit when needed for acute pain issues.
3. Provide appropriate handover to on-call Residents at the end of their day.

### Pain Medicine

Recommended Distribution of Rotations: 4 weeks during senior residency

**Objectives:** During this rotation, the Resident will devote his/her time to understanding pain management (acute or chronic; nociceptive or neuropathic) in inpatient and outpatient sittings.

At the completion of training, the Resident will have acquired the following competencies:

### Medical Expert

General Requirements:

1. Demonstrate knowledge of anatomy and physiology of pain pathways in the peripheral and central nervous systems.
2. Understand the role of psychological factors, particularly anxiety and depression, on pain perception and disability.
3. Obtain a complete pain history and perform relevant physical examinations.
4. Formulate a differential diagnosis and treatment plan that incorporates pharmacologic and non-pharmacologic modalities of treatment.

## ROTATION OBJECTIVES

5. Demonstrate knowledge of specific diagnostic/treatment modalities (indications, contraindications, complications, and technique).
6. Demonstrate knowledge of chronic pain medication (opioids, anti-inflammatories, anticonvulsants, antidepressants).
7. Incorporate national practice guidelines for chronic pain management, especially in relation to controlled medications.
8. Demonstrate knowledge of basic interventional techniques commonly employed in chronic pain medicine, including peripheral nerve blocks, sympathetic blockade for the upper and lower extremities, trigger point injections, epidural steroid injections, blocks for diagnosis and treatment of facet joint syndrome, and sacroiliac joint injections.
9. Incorporate the effective use of consultation services in chronic pain management.
10. Demonstrate knowledge of basic legal, social, and bioethical issues encountered in chronic pain management, including informed consent.

### Specific Knowledge Requirements:

#### *Acute pain management*

1. Describe the physiological changes producing and induced by perioperative pain.
2. Assess pain in the perioperative period.
3. Describe the options available for perioperative analgesia, their advantages and disadvantages, and select appropriate therapies for individual patients.
4. Use a multimodal approach by utilizing both pharmacological and nonpharmacological modalities.

#### *Chronic pain management*

The Resident should be able to apply knowledge gained in the treatment of the following specific pain disorders:

1. Complex regional pain syndrome
2. Neuropathic pain syndromes, e.g., peripheral diabetic neuropathy or post-herpetic neuralgia)
3. Central pain syndromes
4. Intractable anginal pain
5. Visceral pain
6. Pelvic pain
7. Headaches
8. Pain related to peripheral vascular insufficiency
9. Role of personality disorders, anxiety states, depression, compensation, and disability

#### **Communicator**

1. Establish a professional relationship with patients and families.
2. Obtain and collate a relevant history from patients and families.
3. Listen effectively.
4. Demonstrate appropriate oral and written communication skills in inpatient, outpatient, and OR environments.

## ROTATION OBJECTIVES

5. Inform patients of the options available, the associated risks and benefits of those options, and the expectations and progress in a manner that is understandable to the patient.

### **Collaborator**

1. Consult effectively with other physicians and health care professionals.
2. Demonstrate an understanding of the respective abilities of all team members.
3. Act as a team player.

### **Leader**

1. Demonstrate basic knowledge of the management of an ambulatory care pain clinic.
2. Utilize information technology to optimize patient care and life-long learning.
3. Demonstrate knowledge of quality assurance to outcomes in a chronic pain clinic.
4. Demonstrate effective time management skills.
5. Demonstrate understanding of:
  - a) The structure of the pain medicine service and how it fits in the administrative structure of the institution.
  - b) Discuss the advantages and disadvantages of alternative models.
  - c) Explain the costs incurred by pain management strategies.

### **Health Advocate**

1. Identify the important determinants of health, particularly those relating to pain, that affect patients.
2. Recognize opportunities for anesthesiologists to advocate for resources for pain management.
3. Educate patients, families, and other members of the health care team about patients' pain conditions.

### **Scholar**

1. Critically appraise sources of information in the pain management literature.
2. Be able to judge whether a research project is properly designed using critical appraisal methods.

### **Professional**

1. Deliver the highest quality care with integrity, honesty, and compassion.
2. Exhibit appropriate personal and interpersonal professional behaviors.
3. Practice medicine ethically and consistent with the obligations of a physician.
4. Include the patient in discussions on appropriate diagnostic and management procedures.
5. Respect the opinions of fellow consultants and referring physicians in the management of patient problems and be willing to discuss and resolve differences of opinion.
6. Establish a pattern of continuing development of personal clinical skills and knowledge through medical education.
7. Recognize and adopt an approach to ethical and psychosocial issues in pain medicine.

## Neuroanesthesia

Recommended Distribution of Rotations: 4 weeks during Senior Residency

Rotations in neuroanesthesia will provide the Resident with a theoretical basis and clinical experience in the anesthetic management of patients undergoing central nervous system and spinal surgeries. This includes preoperative evaluation, intraoperative management, and postoperative care utilizing the most up-to-date medical/anesthetic knowledge. The clinical experience will provide exposure to a variety of basic and complex procedures for treating patients with neurological disease and will involve graded independence and responsibility.

**Objectives:** At the end of the neuroanesthesia rotation, the Resident should exhibit the following knowledge, skills, and attitudes:

### Medical Expert

The Resident should be able to:

1. Demonstrate knowledge of basic sciences applicable to neuroanesthesia, including neuroanatomy, neurophysiology, and neuropharmacology.
2. Understand the pathway and physiology of cerebrospinal fluid (CSF) circulation and factors affecting it, and demonstrate knowledge of the anatomy of cerebral circulation, the factors affecting it, and methods for controlling ICP.
3. Perform anesthesia techniques safely to avoid increases in ICP during induction, intubation, and emergence from anesthesia.
4. Demonstrate basic understanding of the impact of commonly performed neurosurgical procedures on anesthetic management.
5. Demonstrate clinical knowledge and skills necessary for the practice of neuroanesthesia including:
  - Preoperative neurological assessment (using Glasgow Coma Scale, classifications for subarachnoid hemorrhage, and basic neurological exam)
  - Intraoperative support (special positioning, i.e., sitting, prone, park-bench, lateral, and knee-chest).
  - Understanding basic principles of neurophysiologic monitoring (EEG, evoked potentials [somatosensory and brainstem auditory], transcranial Doppler).
6. Conduct cerebral oximetry and ICP monitoring methods
7. Demonstrate knowledge of specific interventions, including systemic arterial hypotension/hypertension, CSF drainage, ICP management, hypothermia, and precordial Doppler monitoring of air embolus.
8. Management of specific perioperative complications such as seizures, cerebral ischemia, intracranial hypertension, intraoperative aneurysm rupture, air embolism, cranial nerve dysfunction, and neuroendocrine disturbance (e.g., diabetes insipidus, syndrome of inappropriate antidiuretic hormone secretion).
9. Postoperative management of neurological patients in the post-anesthesia care unit, ICU, and neuro-observation unit.
  - Demonstrate competence in all technical procedures commonly employed in neuroanesthesia practice, including airway management (basic and advanced), cardiovascular resuscitation, neuro-resuscitation, and invasive monitoring (arterial line, central line, and lumbar puncture drain placement).

## ROTATION OBJECTIVES

- Develop and implement a rational anesthetic management plan for each of the following neurosurgical procedures:
  - Craniotomy for mass lesions (tumor, abscess, hematoma)
  - Cerebrovascular procedures (aneurysm, AVM, carotid vascular disease)
  - CSF shunting procedures
  - Transsphenoidal surgery
  - Stereotactic procedures
  - Awake craniotomy
  - Neuroradiological procedures (embolization, thrombolytic therapy, and MRI)
  - Spine surgery

### **Communicator**

By the end of this rotation, the Resident should be able to:

1. Establish a therapeutic relationship with patients and their families in the limited time available.
2. Obtain and collate a relevant history from patients and families.
3. Demonstrate empathy, consideration, and compassion in communicating with patients and families.
4. Communicate effectively with medical/surgical colleagues, nurses, and paramedical personnel regarding the anesthetic management of the patient.
5. Demonstrate appropriate written communication skills through accurate, legible, and complete documentation of the anesthetic record, patient chart, and notes during consultation.

### **Collaborator**

By the end of this rotation, the Resident should be able to:

1. Demonstrate the ability to function in the clinical environment using the full abilities of all team members (surgical, nursing, ICU, etc.).
2. Develop an anesthetic plan for their patients in consultation and in concert with surgery, nursing, and ICU staff for more complicated neurosurgical patients.
3. Understand and value the skills of other specialists and health care professionals.
4. Understand the limits of their knowledge and skills.
5. Be able to understand, accept, and respect the opinions of others on the neuro team.
6. Function in the OR as a member of the neuro team and work in a positive, constructive manner, respecting the importance of the roles of all team members.

### **Leader**

By the end of this rotation, the Resident should be able to:

1. Demonstrate the ability to manage their operating room:
2. Ensuring that the necessary equipment, monitoring, and medications are available for each case.
3. Prepare for anticipated complications.
4. Conduct all these activities in an effective, efficient, and timely manner in order to avoid OR delays.

## ROTATION OBJECTIVES

5. Utilize personal resources effectively in order to balance patient care, continuing education, and personal activities.
6. Utilize information technology to optimize patient care and lifelong learning.

### Health Advocate

By the end of this rotation, the Resident should be able to:

1. Recognize the opportunities for Critical Care Medicine Specialists to advocate for neurosurgical patients, particularly with regard to patient safety.
2. Adopt a leadership role in the postoperative care of their patients by anticipating and arranging for post-anesthesia unit, ICU, or neuro-observation unit care.

### Scholar

By the end of this rotation, the Resident should be able to:

1. Be responsible for developing, implementing, and regularly re-evaluating a personal continuing education strategy.
2. Contribute to the development of new knowledge through facilitation/participation in ongoing departmental research activities.
3. Prepare in advance for scheduled OR cases through additional reading and patient chart review/assessment.

### Professional

By the end of this rotation, the Resident should be able to:

1. Demonstrate a commitment to executing his/her professional responsibilities with integrity, honesty, and compassion.
2. Demonstrate appropriate personal and interpersonal professional behaviors and boundaries.
3. Recognize the limitations of his/her personal skill and knowledge by appropriately consulting other physicians when caring for the patient.

## Cardiac Anesthesia

Recommended Distribution of Rotations: 4 weeks during senior residency

**Objectives:** The cardiac anesthesia rotation is designed to help Residents understand all issues related to anesthesia management for patients undergoing cardiac surgery, such that they can participate in the perioperative care of these patients.

Residents are expected to become competent in the preoperative management of patients with cardiovascular diseases during this rotation. It is not intended to produce anesthesiologists capable of independently managing anesthesia for cardiac surgery.

### Medical Expert

The Resident should demonstrate knowledge of the basic sciences applied to the preoperative, intraoperative, and postoperative periods of cardiac surgery.

1. Demonstrate knowledge of the normal coronary anatomy and variants, normal cardiac physiology, and the effects of disease states on normal physiology.

## ROTATION OBJECTIVES

2. Demonstrate knowledge of the anatomy and physiology of cardiac valves, the left and right ventricles, atria, major cardiac vessels, and circulatory system in both normal and diseased states.
3. Demonstrate knowledge of the normal conduction pathways of the heart and their clinical significance to disease.
4. Demonstrate knowledge of embryologic circulation, development of the heart, and fetal physiology as they apply to adult congenital heart disease.
5. Demonstrate knowledge of the altered respiratory physiology of the immediately postoperative ventilated patient with significant surgical incisions and pain (e.g., sternotomy, large abdominal incisions).
6. Demonstrate knowledge of common physiological changes occurring in the postoperative period and the impact these have on end organ function (neurologic, renal, cardiac, hepatic, GI).

### 1. *Pharmacology*

The Resident should know of:

- a. Commonly prescribed medications for cardiac surgical patients and their effects on the disease and anesthetic management.
- b. Commonly used cardiac anesthetics and dosages.
- c. Effects of heparin, antiplatelet agents, and anesthetics.
- d. Use of protamine for heparin reversal, along with the side effects and complications.
- e. Antifibrinolytic agents and their mechanisms of action and indications.
- f. Blood products (e.g., PRBC, FFP, platelets, cryoprecipitate) and blood alternatives (e.g., albumin, starch) as well as transfusion reactions and complications.
- g. Coagulation drugs (e.g., DDAVP, activated factor VIIa) and their indications, contraindications, dosages, and complications.
- h. Commonly used vasodilators, vasoconstrictors, and inotropic agents and their indications, dosages, and side effects.
- i. Appropriate use of pain medications, non-steroidal anti-inflammatory drugs, and RA techniques in cardiac surgical patients.
- j. Pharmacology of perioperative risk reduction strategies (e.g., lipid lowering agents,  $\beta$ -blockers, aspirin).

### 2. *Monitoring*

The Resident should be able to:

- a. Interpret ECGs for ischemia, infarction, arrhythmias, and paced rhythms. They must be able to recognize the limitations and the sensitivity/specificity of ECGs as an ischemia monitor.
- b. Demonstrate knowledge of the principles of noninvasive and invasive blood pressure monitoring and their pitfalls.
- c. Perform arterial and central venous cannulation (with ultrasound), peripheral venous cannulation, and pulmonary artery catheterization; interpret CVP and data from pulmonary artery catheters (e.g., PAP, PCWP, cardiac output) and know its indications, complications, and management; and know basics of introductory TEE, including techniques of probe insertion and several basic views and its implications and application to critical care patients.

## ROTATION OBJECTIVES

- d. Understand laboratory monitoring of the coagulation system (e.g., partial thromboplastin time, international normalized ratio, fibrinogen), as applied to the cardiac patient.
- e. Assess the adequacy of mechanical ventilation using clinical parameters and laboratory arterial blood gas analysis.
- f. Recognize the parameters used to assess intraoperative blood loss and medical and surgical methods of treating blood loss.
- g. Demonstrate knowledge of the significance of temperature management in the intraoperative period, including hypothermic techniques and the importance of normothermia during beating heart procedures.
- h. Appreciate the indicators of volume status (especially during weaning from bypass), including findings from invasive monitors, TEE, and clinical indicators (e.g., urine volume).
- i. Utilize appropriate intraoperative blood work for the management of patient care, and learn of new monitoring devices (e.g., noninvasive cardiac output, bispectral index) and their potential applications during cardiac surgery.

### 3. *Clinical Assessment and Management*

The Resident should be able to:

- a. Complete a detailed history and physical exam, order appropriate laboratory and ancillary investigations, and provide a management plan for a cardiac surgical patient.
- b. Demonstrate knowledge of current indications and recommendations for SBE prophylaxis.
- c. Manage medical bleeding.
- d. Correct common metabolic and electrolyte disturbances in the intraoperative period.
- e. Apply the basic principles of cardiac support devices including intra-aortic balloon pumps and ECMO.
- f. Apply knowledge of the common pathophysiology and management of patients with complications of:
  - Coronary artery disease, acute myocardial ischemia and infarction, and complications of myocardial infarction and thrombolytic therapy
  - Valvular heart disease and valve replacement or repair
  - Aortic dissection and thoracic and thoracoabdominal aortic aneurysm
  - Shock and the use of volume resuscitation, venodilators/constrictors, inotropes, and lusitropes
  - Emergencies requiring ACLS
  - Cardiac tamponade and constrictive pericarditis
  - Dilated, restrictive, and obstructive cardiomyopathy, congestive heart failure, and diastolic dysfunction
  - Aberrant conduction, dysrhythmia, sudden acute and sub-acute ventricular and supraventricular arrhythmia
  - Pacemakers and the indications for and applications of the various modes of temporary pacing
  - Pneumothorax

## ROTATION OBJECTIVES

- Pulmonary edema and pneumonia
- COPD, asthma, and sleep apnea in ventilated patients
- Heparin-induced thrombocytopenia and heparin resistance
- Neurologic risk stratification during cardiopulmonary bypass procedures
- Renal failure and its management
- Diabetes and endocrine control, and the implications of hyperglycemia

### **Communicator**

By the end of this rotation, the Resident should be able to:

1. Demonstrate effective communication with patients and families (e.g., description of procedures, informed consent, anesthetic options, and risks).
2. Demonstrate effective communication with the OR (e.g., cardiac surgeons, nurses, perfusionists) and postoperative teams, particularly during the initiation, conduct, and removal of cardiopulmonary bypass.
3. Provide clear and concise written consultation and anesthetic records.

### **Collaborator**

By the end of this rotation, the Resident should be able to:

1. Recognize the need to utilize other specialists for the care and management of critical care patients.
2. Foster healthy team relationships.

### **Leader**

By the end of this rotation, the Resident should be able to

1. Manage OR time by efficiently conducting anesthetic, continuing education, and personal activities.
2. Make effective use of health care resources.

### **Health Advocate**

By the end of this rotation, the Resident should be able to demonstrate knowledge of risk reduction strategies, including use of ultrasound and sterile technique for invasive lines.

### **Scholar**

By the end of this rotation, the Resident should be able to:

1. Demonstrate a commitment to continual personal education including use of information technology.
2. Critically review cardiac anesthesia literature and describe the principles of research relevant to cardiac patients.
3. Assist in the education of other members of the OR team.

### **Professional**

By the end of this rotation, the Resident should be able to:

1. Always demonstrate respectful and compassionate behavior toward patients, their families, and other health care providers.
2. Demonstrate an appropriate sense of responsibility to themselves and their patients.
3. Remain calm and organized in stressful or emergency situations.

## ROTATION OBJECTIVES

4. Demonstrate appropriate interactions with colleagues and staff.

### Critical Care Radiology Rotation

Recommended Distribution of Rotations: 4 weeks during senior residency

**Objectives:** The purpose of this rotation is to familiarize the Resident with the applications, indications, and interpretation of various radiological examinations required in the management of critically ill patients.

#### Medical Expert

1. The Resident is required to develop the skills to interpret chest X-rays and CT scans of the thorax, with an emphasis on:
  - a) Interstitial vs. air space disease
  - b) Congestive heart failure
  - c) Pleural effusion
  - d) Lobar collapse
  - e) Hilar adenopathy
  - f) Pulmonary hypertension
  - g) Pulmonary fibrosis
  - h) Solitary lung nodule
  - i) Barotrauma
2. Understand the indications for and read abdominal X-rays and CT scans of the abdomen, with emphasis on:
  - a) Small bowel obstruction
  - b) Large bowel obstruction
  - c) Bowel edema/inflammation
  - d) Liver masses/cysts
  - e) Renal masses/cysts
3. Recognize the indications for and be able to interpret CT scans of the head, with emphasis on:
  - a) Masses/cysts
  - b) Hemorrhage
  - c) Ischemic infarcts
  - d) Brain edema
  - e) Hydrocephalus
4. Recognize the indications for and use of ultrasound of the abdomen and chest, and determine the presence of significant pleural effusion or ascites.
5. Understand the indications for:
  - a) MRI
  - b) Angiograms/interventional radiology procedures
  - c) Bone/gallium scans
  - d) Other nuclear medicine scans

## ROTATION OBJECTIVES

### **Focused Learning Objectives**

1. Demonstrate knowledge of the causes and ultrasound findings in respiratory failure due to various causes including:
  - a) Pleural effusion
  - b) Pneumothorax
  - c) Alveolar-interstitial syndrome (e.g., congestive heart failure, acute respiratory distress syndrome)
  - d) Normal aeration pattern (e.g., PE, obstructive lung disease)
  - e) Lobar collapse
2. Generate general critical care ultrasound images in the assessment of pneumothorax, pleural effusion, and ascites.
3. Demonstrate ability to perform ultrasound-guided procedures (e.g., pleurocentesis, paracentesis).
4. Demonstrate ability to perform FAST exam, which is a limited ultrasound examination directed solely at identifying the presence of free intraperitoneal and pericardial fluid and hemothorax in trauma patients.

### **Communicator**

The Resident should be able to:

1. Interact efficiently with other health care professionals and discuss the indications and results of various radiological tests.
2. Obtain important clinical information related to radiological studies.
3. Communicate important positive findings to the referring physician.

### **Collaborator**

The Resident is expected to be able to:

1. Identify the necessities and benefits of consulting other physicians and health-care professionals
2. Collaborate with health care providers to address patient needs and provide the most suitable radiological study.
3. Collaborate with radiology premedical staff to identify the optimal radiological study.

### **Leader**

The Resident should be able to:

1. Use technology to optimize patient care.
2. Use health care resources effectively.
3. Work effectively and efficiently.
4. Understand the dynamics and work flow of the radiology department.

### **Health Advocate**

The Resident is expected to be able to:

1. Educate and counsel patients and their families with regard to the factors that influence their health
2. Provide timely access for emergency cases.
3. Promote and understand radiation safety.

## ROTATION OBJECTIVES

### Scholar

The Resident should be able to:

1. Critically appraise sources of medical information
2. Engage in evidence-based clinical practice
3. Understand specificity, sensitivity, and limitations of each radiological study.

### Professional

The Resident is expected to be able to:

1. Deliver the highest quality care with integrity, honesty, and compassion.
2. Exhibit appropriate personal and interpersonal professional behaviors.
3. Maintain patient privacy and dignity and act with personal integrity.
4. Recognize and resolve ethical issues as they arise in clinical practice.
5. Recognize and address unprofessional behavior in clinical practice.

## Critical Care Echocardiography Rotation

Recommended Distribution of Rotations: 4 weeks during senior residency

**Objectives:** Echocardiography rotation is required to help the Resident in the assessment of critically ill patients by identifying and treating the underlying causes of hemodynamic instability in a timely manner, thereby preventing or decreasing mortality and morbidity.

Residents are expected to become competent in the assessment of critically ill patients using focused and goal-directed cardiac examinations via appropriate transthoracic echocardiography (TTE). It is not intended to replace a detailed TTE by a cardiologist.

### Medical Expert

The Resident is expected by the end of this rotation to be able to:

1. Understand the basic thoracic anatomy.
2. Understand the importance of proper positioning of the patient for optimal cardiac examination.
3. Understand the basic principles of cardiac transducer orientation and positioning.
4. Understand the anatomy and orientation of basic echocardiographic views.
5. Obtain a safe and optimal echocardiographic examination via the transthoracic approach in acutely ill patients.
6. Learn how to perform and interpret a “focused” and “goal-directed” echocardiographic examination.
7. Demonstrate an ability to answer focus questions through focused or goal-directed examination, which are usually related to:
  - a) Left ventricular size and function
  - b) Right ventricular size and function
  - c) Pericardial space for fluid and tamponade
  - d) Fluid status and responsiveness
8. Demonstrate ability to identify the causes of hemodynamic instability:
  - a) Cardiogenic
  - b) Distributive
  - c) Hypovolemic

## ROTATION OBJECTIVES

### **Communicator**

The Resident is expected to be able to:

1. Establish effective communication with patients and their families and obtain appropriate information relevant to the performance of a planned echocardiographic study.
2. Establish effective communication with medical and non-medical colleagues.
3. Refer problem issues or problem cases appropriately.
4. Learn to communicate effectively and efficiently with colleagues both verbally and through written records (e.g., medical records, discharge summaries, consultation reports, family conferences).

### **Collaborator**

The Resident is expected to be able to:

1. Work cooperatively with other health care professionals who are involved in the care of patients in the echocardiography laboratory.
2. Work effectively as part of multidisciplinary team.
3. Work collaboratively with paramedical staff.

### **Leader**

1. Triage multiple requests for echocardiographic studies.
2. Disinfect echocardiography equipment and demonstrate knowledge of the proper care/handling of this equipment.
3. Demonstrate knowledge of different equipment models, specifications, and use.

### **Health Advocate**

The Resident is expected to be able to:

1. Recognize the risk factors for a variety of common cardiac critical illnesses and counsel families and colleagues in such a way as to minimize said risk.
2. Understand that patients' welfare always takes precedence in the event of medical, political, or ethical conflicts.
3. Learn to identify and minimize the stresses placed upon the patients, their relatives, and hospital staff

### **Scholar**

The Resident is expected to be able to:

1. Apply basic and clinical science to patient care.
2. Establish a comprehensive self-directed learning and educational strategy.
3. Appreciate the role of critical appraisal in the assessment of current scientific developments.
4. Commit to forever pushing the boundaries of excellence in caring for critically ill patients.

### **Professional**

The Resident is expected to be able to:

1. Develop an ethical framework for the delivery of the highest quality care.

## ROTATION OBJECTIVES

2. Understand professional obligations to patients and colleagues.
3. Exhibit appropriate personal and interpersonal professional behaviors.
4. Act with integrity, honesty, fairness, and compassion in the delivery of the highest quality health care.

### Research Rotation

Recommended Distribution of Rotations: 8 weeks during senior residency

#### Medical Expert

The Resident should demonstrate an awareness of the basic principles of clinical and laboratory research and incorporate research into improving care of critically ill patients.

The Resident, after this rotation, is expected to be able to:

1. Understand the principles and process for development and implementation of clinical trials.
2. Understand common statistical principles and tests and their usefulness.
3. Understand the importance of good record keeping in research.
4. Understand the ethical considerations in research involving humans and animal subjects.
5. Demonstrate knowledge of how to prepare protocols involved in hypothesis and observational research.
6. Understand the process of organizing a laboratory research project.
7. Understand the principles of evidence-based medicine techniques.
8. Prepare and refine a workable research protocol, including a proposal for ethics committee review.
9. Prepare, organize, and analyze a data base.
10. Prepare a draft manuscript and abstract.

#### Communicator

The Resident is expected to be able to:

1. Recognize the need for effective communication with patients and their families as it pertains to research.
2. Recognize the need for effective communication with medical and non-medical colleagues.
3. Coordinate research with colleagues from different disciplines.

#### Collaborator

The Resident should be able to:

1. Effectively consult with other physicians and health care professionals.
2. Work effectively as part of multidisciplinary team.
3. Act as a leader of a multidisciplinary team.

#### Leader

1. Create a stimulating research environment.
2. Delegate responsibilities in a fair and non-threatening manner.
3. Instill enthusiasm amongst colleagues in the workplace.
4. Utilize resources to effectively balance patient care and health care economics.

## ROTATION OBJECTIVES

### Health Advocate

The Resident is expected to be able to:

1. Recognize the risk factors for a variety of common critical illnesses and counsel families and colleagues in such a way as to minimize said risk.
2. Understand that patients' welfare always takes precedence in the event of medical or ethical conflicts.
3. Appreciate the difficult and stressful situations associated with the environment of Critical Care Medicine and how that relates to research.

### Scholar

The Resident is expected to be able to:

1. Demonstrate knowledge of how to be a competent critical care physician.
2. Apply basic and clinical science to patient care.
3. Establish a comprehensive self-directed learning and educational strategy.
4. Impart a similar enthusiasm to their colleagues.
5. Develop an appreciation of the role of critical analysis in the assessment of current scientific developments.
6. Participate in the processes of clinical audit and quality improvement activities.

### Professional

The Resident is expected to be able to:

1. Develop an ethical framework for the delivery of the highest quality care.
2. Understand professional obligations to patients and colleagues.
3. Exhibit appropriate personal and interpersonal professional behaviors.
4. Act with integrity, honesty, and compassion in the delivery of the highest quality health care.

## Core Internal Medicine Rotation

**Duration:** 32 weeks

**Description of Rotation:** The Critical Care Medicine Resident will rotate within the Department of Internal Medicine for 32 weeks with 8-week rotations in the specialty services of infectious diseases, pulmonary medicine, nephrology, hematology/oncology, and gastroenterology.

### A: Rotation in Pulmonary Medicine

**Goals:** The goal of this rotation will be for the Residents to gain experience in evaluation and management of inpatients with a broad spectrum of pulmonary diseases.

### Medical Expert:

#### *Measurable Competencies*

1. Describe the epidemiology, genetics, natural history, and clinical expression of pulmonary disorders encountered in the inpatient and outpatient settings.
2. Demonstrate competence in performing common procedures used in a general medicine service, including paracentesis, thoracentesis, and lumbar puncture.

## ROTATION OBJECTIVES

3. Summarize approaches to the evaluation of common pulmonary disease presentations.
4. Interpret diagnostic tests used in the evaluation of inpatients with suspected pulmonary disease.
5. Demonstrate the ability to critically appraise and cite literature pertinent to the evaluation of inpatients (or outpatients during the clinic rotation) with pulmonary diseases.

### *Patient Care Competencies*

1. Effectively obtain a comprehensive history and perform a complete physical examination of patients with respiratory symptoms or known pulmonary diseases.
2. Appropriately select and interpret laboratory, imaging, and pathologic studies used in the evaluation of pulmonary diseases.
3. Construct a comprehensive treatment plan and assess patient response to therapy.
4. Counsel patients concerning their diagnosis, planned diagnostic testing, and recommended therapies.
5. Utilize validated instruments in the assessment of function and quality of life to monitor and adjust therapy.

### **Scholar**

1. Effectively use technology to manage information, support patient care decisions, and enhance both patient and physician education.
2. Integrate and apply knowledge obtained from multiple sources to the care of inpatients with pulmonary diseases.
3. Demonstrate an ability to critically assess the scientific literature.
4. Set and assess individualized learning goals.
5. Analyze clinical experience and employ a systematic methodology for improvement
6. Develop and maintain a willingness to learn from errors and use errors to improve the system or processes of care.

### **Collaborator**

1. Discuss how the health care system affects the management of inpatients with pulmonary diseases.
2. Demonstrate effective collaboration with other health care providers.
3. Determine cost-effectiveness of alternative proposed interventions.
4. Design cost-effective plans based on knowledge of best practices.
5. Demonstrate an awareness of the impact of diagnostic and therapeutic recommendations on the health care system, cost of a procedure, insurance coverage, and resources utilized.

### **Communicator**

1. Exercise empathy in all patient encounters.
2. Demonstrate effective skills in listening and speaking with patients, families, and other members of the health care team.
3. Reliably and accurately communicate the patient's and his/her family's views and concerns to the attending physician.

## ROTATION OBJECTIVES

4. Demonstrate competency in documentation including histories and physical, progress, and discharge notes.
5. Counsel patients, families, and colleagues regarding side effects and appropriate use of specific medications, providing written documentation when appropriate.

### **Professional**

1. Be prompt and prepared for rounds and/or clinic.
2. Recognize the importance of patient primacy, privacy, and autonomy; informed consent, and equitable respect and care to all.
3. Respect patients, patients' families, staff, and colleagues.
4. Model ethical behavior by reporting back any key clinical findings to the attending and referring providers; following through on clinical questions, laboratory testing, and other patient care issues; and recognizing potential conflicts of interest.
5. Demonstrate integrity, honesty, and openness in discussion of therapeutic options with patients and respect for patient's preferences and cultural differences.
6. Respond to phone calls, pages, and messages in a timely manner.

### **Leader**

1. Learn to efficiently carry out patient care tasks allocated during ward rounds.
2. Recognize personal limitations and seek help when appropriate.
3. Utilize personal resources effectively to balance patient care, continuing education, and personal activities.
4. Understand and judiciously allocate health care resources.
5. Work efficiently and effectively within a health care system.
6. Utilize information technology for optimal patient care and personal scholarship.

### **Health Advocate**

#### *General Requirements*

1. Identify the important determinants of health affecting patients.
2. Contribute effectively to improving the health of patients and communities.
3. Recognize and respond to issues where advocacy is appropriate.
4. Educate patients and families about and promote the importance of long-term healthy behaviors and preventive health care (e.g., smoking cessation, screening tests, vaccinations, exercise, and nutrition).
5. Respect and empower patient autonomy.
6. Promote fair health care.
7. Apply the principles of quality improvement and quality assurance.
8. Appreciate the existence of global health advocacy and initiatives for the elimination of disease (e.g., TB, malaria, HIV) and the roles of advocacy groups and funding agencies.

### **B. Rotation in Nephrology**

**Goals:** The goal of this rotation will be for the Residents to gain experience in the inpatient evaluation and management of patients with a broad spectrum of renal disorders.

## ROTATION OBJECTIVES

### **Medical Expert/Clinical Decision Maker:**

#### *Measurable competencies:*

1. Describe the epidemiology, genetics, natural history, and clinical expression of the renal disorders encountered in the inpatient setting.
2. Describe the structure and function of the kidneys.
3. Summarize approaches to the evaluation of the common presentations of renal disorders.
4. Interpret diagnostic tests used in the evaluation of inpatients with suspected renal disorders.
5. Demonstrate the ability to critically appraise and cite literature pertinent to the evaluation of inpatients with renal disorders.

#### *Patient Care competencies:*

1. Effectively obtain a comprehensive history and perform a complete physical examination in patients with renal symptoms, abnormal creatinine clearance, or acute or chronic renal disorders.
2. Construct an appropriate differential diagnosis.
3. Appropriately select and interpret laboratory, imaging, and pathologic studies used in the evaluation of renal disorders.
4. Construct a comprehensive treatment plan and assess patient response to therapy.
5. Counsel patients concerning their diagnosis, planned diagnostic testing, and recommended therapies.
6. Describe the appropriate use of validated instruments in the assessment of pain, function, and quality of life to monitor and adjust therapy.

### **Scholar**

1. Effectively use technology to manage information, support patient care decisions, and enhance both patient and physician education.
2. Integrate and apply knowledge obtained from multiple sources to the care of inpatients.
3. Demonstrate an ability to critically assess the scientific literature.
4. Set and assess individualized learning goals.
5. Analyze clinical experience and employ a systematic methodology for improvement.
6. Develop and maintain a willingness to learn from errors and use errors to improve the system or processes of care.

### **Collaborator**

1. Discuss how the health care system affects the management of outpatients with renal disorders.
2. Demonstrate effective collaboration with other health care providers, including nursing.
3. Determine cost-effectiveness of alternative proposed interventions.
4. Design cost-effective plans based on knowledge of best practices.
5. Demonstrate an awareness of the impact of diagnostic and therapeutic recommendations on the health care system, cost of a procedure, insurance coverage, and resources utilized.

## ROTATION OBJECTIVES

### **Communicator**

1. Exercise empathy in all patient encounters.
2. Demonstrate effective skills of listening and speaking with patients, families, and other members of the health care team.
3. Reliably and accurately communicate the patient's and his/her family's views and concerns to the attending physician.
4. Demonstrate competency in documentation including histories and physical, progress, and discharge notes.
5. Counsel patients, families, and colleagues regarding side effects and appropriate use of specific medications, providing written documentation when appropriate.

### **Professional**

1. Be prompt and prepared for rounds and/or clinic.
2. Recognize the importance of patient primacy, privacy, and autonomy; informed consent, and equitable respect and care to all.
3. Respect patients, patients' families, staff, and colleagues.
4. Model ethical behavior by reporting back any key clinical findings to the attending and referring providers; following through on clinical questions, laboratory testing, and other patient care issues; and recognizing potential conflicts of interest.
5. Demonstrate integrity, honesty, and openness in discussion of therapeutic options with patients and respect for patients' preferences and cultural differences.
6. Respond to phone calls, pages, and messages in a timely manner.

### **Leader**

1. Efficiently carry out patient care tasks allocated during ward rounds.
2. Recognize personal limitations and seek help when appropriate.
3. Utilize personal resources effectively to balance patient care, continuing education, and personal activities.
4. Understand and judiciously allocate health care resources.
5. Work efficiently and effectively within a health care system.
6. Utilize information technology for optimal patient care and personal scholarship.

### **Health Advocate**

1. Identify the important determinants of health affecting patients.
2. Contribute effectively to improving the health of patients and communities.
3. Recognize and respond to those issues where advocacy is appropriate.
4. Educate patients and families about and promote the importance of long-term healthy behaviors and preventive health care (e.g., smoking cessation, screening tests, vaccinations, exercise, nutrition).
5. Respect and empower patient autonomy.
6. Promote fair health care.
7. Apply the principles of quality improvement and quality assurance.
8. Appreciate the existence of global health advocacy and initiatives for the elimination of disease (TB, Malaria, HIV) and the role of advocacy groups and funding agencies.

### **C: Rotation in Hematology and Oncology**

**Goals:** The goal of this experience will be for Residents to gain experience in the evaluation and management of inpatients with a broad spectrum of hematologic diseases and the treatment of patients with a broad spectrum of cancers.

#### **Medical Expert/Clinical Decision Maker**

##### *Measurable competencies:*

1. Describe the epidemiology, genetics, natural history, and clinical expression of hematologic illnesses encountered in the inpatient setting.
2. Describe the functions and interplay of factors related to hemostasis and bleeding.
3. Summarize approaches to the evaluation of common presentations of hematologic illnesses (e.g., bleeding, clotting, cytopenias).
4. Interpret diagnostic tests used in the evaluation of inpatients with suspected hematologic disorders.
5. Demonstrate the ability to critically appraise and cite literature pertinent to the evaluation of inpatients with hematologic disorders.
6. Describe the epidemiology, genetics, natural history, and clinical expression of different types of cancers encountered in the inpatient setting.
7. Summarize approaches to the evaluation of common cancer presentations.
8. Exhibit understanding of the epidemiology, pathology, clinical presentation, diagnosis, and treatment of common complications of cancer, chemotherapy, and radiation therapy, including but not limited to tumor lysis syndrome, leukostasis, cord compression, neutropenic fever, and pain crises.
9. Interpret diagnostic tests used in the evaluation of inpatients with suspected cancer.
10. Demonstrate an ability to critically appraise and cite literature pertinent to the evaluation of inpatients with cancer.

##### *Patient Care Competencies*

1. Effectively obtain a comprehensive history and perform a complete physical examination in patients with hematologic symptoms, abnormal coagulation tests, or acute or chronic hematologic disorders.
2. Effectively obtain a comprehensive history and perform a complete physical examination in patients with cancer or its complications.
3. Construct an appropriate differential diagnosis.
4. Appropriately select and interpret laboratory, imaging, and pathologic studies used in the evaluation of hematologic disorders.
5. Appropriately select and interpret laboratory, imaging, and pathologic studies used in the evaluation of cancer or its complications.
6. Construct a comprehensive treatment plan and assess patient response to therapy.
7. Counsel patients concerning their diagnosis, planned diagnostic testing, and recommended therapies.
8. Describe the appropriate use of validated instruments in the assessment of pain, function, and quality of life to monitor and adjust therapy.
9. Utilize validated instruments in the assessment of function and quality of life to monitor and adjust therapy.

## ROTATION OBJECTIVES

### **Scholar**

1. Effectively use technology to manage information, support patient care decisions, and enhance both patient and physician education.
2. Integrate and apply knowledge obtained from multiple sources to the care of inpatients.
3. Demonstrate an ability to critically assess the scientific literature.
4. Set and assess individualized learning goals.
5. Analyze clinical experience and employ a systematic methodology for improvement.
6. Develop and maintain a willingness to learn from errors and use errors to improve the system or processes of care.

### **Collaborator**

1. Discuss how the health care system affects the management of outpatients with hematologic disorders.
2. Demonstrate effective collaboration with other health care providers, including nurses, counselors, and transfusion medicine specialists, in the care of patients with hematologic disorders.
3. Determine the cost-effectiveness of alternative proposed interventions.
4. Design cost-effective plans based on knowledge of best practices.
5. Demonstrate an awareness of the impact of diagnostic and therapeutic recommendations on the health care system, cost of a procedure, insurance coverage, and resources utilized.
6. Demonstrate effective collaboration with other health care providers, including nursing staff, therapists, counselors, surgeons, and consultants in the care of patients with cancer.

### **Communicator**

1. Approach patients with an empathetic and understandable manner.
2. Demonstrate effective skills in listening and speaking with patients, families, and other members of the health care team.
3. Reliably and accurately communicate the patient's and his/her family's views and concerns to the attending physician.
4. Compose clear consultation reports and interval notes/letters in a timely fashion, including a precise diagnosis whenever possible, differential diagnoses when appropriate, and recommendations for follow-up or additional studies.
5. Counsel patients, families, and colleagues regarding the side effects and appropriate use of specific medications, providing written documentation when appropriate.
6. Exercise empathy in all patient encounters.
7. Demonstrate competency in documentation including histories and physical, progress, and discharge notes.

### **Professional**

1. Be prompt and prepared for rounds or clinic.
2. Recognize the importance of patient primacy, privacy, and autonomy; informed consent; and equitable respect and care to all.
3. Respect patients, patients' families, staff, and colleagues.

## ROTATION OBJECTIVES

4. Model ethical behavior by reporting back any key clinical findings to the attending and referring providers; following through on clinical questions, laboratory testing, and other patient care issues; and recognizing potential conflicts of interest.
5. Demonstrate integrity, honesty, and openness in discussion of therapeutic options with patients and respect for patients' preferences and cultural differences.
6. Respond to phone calls, pages, and messages in a timely manner.

### **Leader**

1. Efficiently carry out patient care tasks allocated during ward rounds.
2. Recognize personal limitations and seek help when appropriate.
3. Utilize personal resources effectively to balance patient care, continuing education, and personal activities.
4. Understand and judiciously allocate health care resources.
5. Work efficiently and effectively within a health care system.
6. Utilize information technology for optimal patient care and personal scholarship.

### **Health Advocate**

1. Identify the important determinants of health affecting patients.
2. Contribute effectively to improving the health of patients and communities.
3. Recognize and respond to those issues where advocacy is appropriate.
4. Educate patients and families about and promote the importance of long-term healthy behaviors and preventive health care (e.g., smoking cessation, screening tests, vaccinations, exercise, and nutrition).
5. Respect and empower patient autonomy.
6. Promote fair health care.
7. Apply the principles of quality improvement and quality assurance.
8. Appreciate the existence of global health advocacy and initiatives for the elimination of disease (e.g., TB, malaria, HIV) and the roles of advocacy groups and funding agencies.

### **D: Rotation in Infectious Disease**

**Goals:** The goal of this rotation will be for the Residents to gain experience in the evaluation and management of inpatients with a broad spectrum of infectious diseases.

#### *Medical Knowledge Competencies*

1. Describe the epidemiology, genetics, natural history, and clinical expression of infectious diseases encountered in the inpatient setting.
2. Describe the functions and interplay of factors related to host defense, microbial infection, and treatment.
3. Summarize approaches to the evaluation of common presentations of infectious diseases (e.g., AIDS, pneumonia, urinary tract infections, sepsis).
4. Interpret diagnostic tests used in the evaluation of inpatients with suspected infectious diseases.
5. Demonstrate an ability to critically appraise and cite literature pertinent to the evaluation of inpatients with infectious diseases.

## ROTATION OBJECTIVES

### *Patient Care Competencies*

1. Effectively obtain a comprehensive history and perform a complete physical examination in patients with infectious symptoms or chronic infectious disease.
2. Construct an appropriate differential diagnosis.
3. Appropriately select and interpret laboratory, imaging, and pathologic studies used in the evaluation of infectious diseases.
4. Construct a comprehensive treatment plan and assess patient response to therapy.
5. Counsel patients concerning their diagnosis, planned diagnostic testing, and recommended therapies.
6. Describe the appropriate use of validated instruments in the assessment of pain, function, and quality of life to monitor and adjust therapy.

### **Scholar**

1. Effectively use technology to manage information, support patient care decisions, and enhance both patient and physician education.
2. Integrate and apply knowledge obtained from multiple sources to the care of inpatients.
3. Demonstrate an ability to critically assess the scientific literature.
4. Set and assess individualized learning goals.
5. Analyze clinical experience and employ a systematic methodology for improvement.
6. Develop and maintain a willingness to learn from errors and use errors to improve the system or processes of care.

### **Collaborator**

1. Discuss how the health care system affects the management of outpatients with infectious diseases.
2. Demonstrate effective collaboration with other health care providers, including nurses, counselors, and Ministry of Health staff in the care of patients with infectious diseases.
3. Determine the cost-effectiveness of alternative proposed interventions.
4. Design cost-effective plans based on knowledge of best practices.
5. Demonstrate an awareness of the impact of diagnostic and therapeutic recommendations on the health care system, cost of a procedure, insurance coverage, and resources utilized.

### **Professional**

1. Exhibit punctuality for all assigned duties.
2. Incorporate the principles of patient primacy, privacy, and autonomy; informed consent; and equitable respect in the care of patients.
3. Demonstrate respect for patients and their families, staff, and colleagues.
4. Model ethical behavior by reporting back to the attending and referring providers key clinical findings; following through on clinical questions, laboratory testing, and other patient care issues; and recognizing potential conflicts of interest.
5. Demonstrate integrity, honesty, and openness in discussion of therapeutic options with patients and respect for patients' preferences and cultural differences.
6. Respond to phone calls, pages, and messages in a timely manner.

## ROTATION OBJECTIVES

7. Design cost-effective plans based on knowledge of best practices.

### **Communicator**

1. Approach patients with an empathetic and understandable manner.
2. Demonstrate effective skills of listening and speaking with patients, families, and other members of the health care team.
3. Reliably and accurately communicate the patient's and his/her family's views and concerns to the attending.
4. Compose clear consultation reports and interval notes/letters in a timely manner, including a precise diagnosis whenever possible and a differential diagnosis when appropriate, and recommend follow-ups or additional studies.
5. Counsel patients, families, and colleagues regarding side effects and appropriate use of specific medications, providing written documentation when appropriate.
6. Exercise empathy in all patient encounters.
7. Demonstrate competency in documentation including histories and physical, progress, and discharge notes.

### **Leader**

1. Efficiently carry out patient care tasks allocated during ward rounds.
2. Recognize personal limitations and seek help when appropriate.
3. Utilize personal resources effectively to balance patient care, continuing education, and personal activities.
4. Understand and judiciously allocate health care resources.
5. Work efficiently and effectively within a health care system.
6. Utilize information technology for optimal patient care and personal scholarship.

### **Health Advocate**

1. Identify the important determinants of health affecting patients.
2. Contribute effectively to improving the health of patients and communities.
3. Recognize and respond to those issues where advocacy is appropriate.
4. Educate patients and families about and promote the importance of long-term healthy behaviors and preventive health care (e.g., smoking cessation, screening tests, vaccinations, exercise, nutrition).
5. Respect and empower patient autonomy.
6. Promote fair health care.
7. Apply the principles of quality improvement and quality assurance.
8. Appreciate the existence of global health advocacy and initiatives for the elimination of disease (e.g., TB, malaria, HIV) and the roles of advocacy groups and funding agencies.

### **E: Rotation in Gastroenterology**

**Goals:** The goal of this rotation will be for Residents to gain experience in the evaluation and management of inpatients with a broad spectrum of GI diseases.

## ROTATION OBJECTIVES

### *Medical Expert/ Clinical Competencies*

1. Describe the epidemiology, genetics, natural history, and clinical expression of GI illnesses encountered in the inpatient setting.
2. Describe the structure and function of the GI tract, liver, and biliary systems.
3. Summarize approaches to the evaluation of the common presentations of GI illness (e.g., GI bleeding, diarrhea, jaundice/transaminitis).
4. Distinguish patients with functional bowel disorders from those with other, "organic" bowel diseases.
5. Interpret diagnostic tests used in the evaluation of outpatients with suspected GI illness.
6. Demonstrate an ability to critically appraise and cite literature pertinent to the evaluation of outpatients with GI disorders.

### *Patient Care Competencies*

1. Effectively obtain a comprehensive history and perform a complete physical examination in patients with GI symptoms, abnormal liver function tests, or acute or chronic GI disorders.
2. Construct an appropriate differential diagnosis.
3. Appropriately select and interpret laboratory, imaging, and pathologic studies used in the evaluation of GI disorders.
4. Construct a comprehensive treatment plan and assess patient response to therapy.
5. Counsel patients concerning their diagnosis, planned diagnostic testing, and recommended therapies.
6. Describe the appropriate use of validated instruments in the assessment of pain, function, and quality of life to monitor and adjust therapy.

### **Scholar**

1. Effectively use technology to manage information, support patient care decisions, and enhance both patient and physician education.
2. Integrate and apply knowledge obtained from multiple sources to the care of inpatients.
3. Demonstrate an ability to critically assess the scientific literature.
4. Set and assess individualized learning goals.
5. Analyze clinical experience and employ a systematic methodology for improvement.
6. Develop and maintain a willingness to learn from errors and use errors to improve the system or processes of care.

### **Collaborator**

1. Discuss how the health care system affects the management of outpatients with GI diseases.
2. Demonstrate effective collaboration with other health care providers, including nutritionists and GI surgeons, in the care of patients with GI illness.
3. Determine the cost-effectiveness of alternative proposed interventions.
4. Design cost-effective plans based on knowledge of best practices.

## ROTATION OBJECTIVES

5. Demonstrate an awareness of the impact of diagnostic and therapeutic recommendations on the health care system, cost of a procedure, insurance coverage, and resources utilized.

### **Communicator**

1. Approach patients with an empathetic and understandable manner.
2. Demonstrate effective skills in listening and speaking with patients, families, and other members of the health care team.
3. Reliably and accurately communicate the patient's and his/her family's views and concerns to the attending physician.
4. Compose clear consultation reports and interval notes/letters in a timely manner, including a precise diagnosis whenever possible and a differential diagnosis when appropriate, and recommend follow-ups or additional studies.
5. Counsel patients, families, and colleagues regarding side effects and appropriate use of specific medications, providing written documentation when appropriate.

### **Professional**

1. Exhibit punctuality for all assigned duties.
2. Incorporate the principles of patient primacy, privacy, and autonomy; informed consent; and equitable respect in the care of patients.
3. Demonstrate respect for patients and their families, staff, and colleagues.
4. Model ethical behavior by reporting back to the attending and referring providers key clinical findings; following through on clinical questions, laboratory testing, and other patient care issues; and recognizing potential conflicts of interest.
5. Demonstrate integrity, honesty, and openness in discussion of therapeutic options with patients and respect for patients' preferences and cultural differences.
6. Respond to phone calls, pages, and messages in a timely manner.

### **Leader**

1. Efficiently carry out patient care tasks allocated during ward rounds.
2. Recognize personal limitations and seek help when appropriate.
3. Utilize personal resources effectively to balance patient care, continuing education, and personal activities.
4. Understand and judiciously allocate health care resources.
5. Work efficiently and effectively within a health care system.
6. Utilize information technology for optimal patient care and personal scholarship.

### **Health Advocate**

1. Identify the important determinants of health affecting patients.
2. Contribute effectively to improving the health of patients and communities.
3. Recognize and respond to those issues where advocacy is appropriate.
4. Educate patients and families about and promote the importance of long-term healthy behaviors and preventive health care (e.g., smoking cessation, screening tests, vaccinations, exercise, nutrition).
5. Respect and empower patient autonomy.
6. Promote fair health care.

## ROTATION OBJECTIVES

7. Apply the principles of quality improvement and quality assurance.
8. Appreciate the existence of global health advocacy and initiatives for the elimination of disease (e.g., TB, malaria, HIV) and the roles of advocacy groups and funding agencies.

### Elective Rotation

**Objectives:** The objectives of the elective experience are to provide flexibility and opportunities to explore career possibilities, gain experience in aspects of Critical Care Medicine beyond the core curriculum, and study certain areas in greater depth. Knowledge, skills, and attitudes are further developed in the Resident's choice of area across the curriculum.

Residents are free to identify and choose specific electives in keeping with their individual training objectives, subject to approval by the program director. It is expected that electives be undertaken in Saudi Arabia, barring exceptional circumstances where the Resident demonstrates that the national facilities are insufficient to meet his/her training objectives. For each elective, Residents must identify a supervisor responsible for monitoring his/her experience and evaluating his/her performance. Both the Resident and supervisor are responsible for ensuring mutual understanding of the learning activities designed to meet the objectives of the elective.

#### Medical Expert

Residents should be able to:

1. Function effectively as consultants to provide optimal ethical and patient-centered medical care.
2. Establish and maintain clinical knowledge, skills, and attitudes appropriate to the rotation subject.
3. Perform a complete and appropriate assessment of a patient.
4. Use preventive and therapeutic interventions effectively.
5. Demonstrate proficient and appropriate use of procedural skills, both diagnostic and therapeutic.
6. Seek appropriate consultation from other health professionals, recognizing the limits of their expertise.

#### Communicator

Residents should be able to:

1. Develop rapport, trust, and ethical therapeutic relationships with patients and families.
2. Accurately elicit and synthesize relevant information and the perspectives of patients, patients' families, colleagues, and other professionals.
3. Convey relevant information and explanations accurately to patients, patients' families, colleagues, and other professionals.
4. Develop a common understanding of the issues, problems, and plans with patients, patients' families, and other professionals to develop a shared care plan.
5. Convey effective oral and written information about a medical encounter.

## ROTATION OBJECTIVES

### **Collaborator**

Residents should be able to:

1. Participate effectively and appropriately in a multidisciplinary health care team.
2. Work with other health professionals effectively to prevent, negotiate, and resolve interprofessional conflict.

### **Leader**

Residents should be able to:

1. Participate in activities that contribute to the effectiveness of their health care organizations and systems.
2. Manage their practice and career effectively.
3. Allocate finite health care resources appropriately.
4. Serve in administration and leadership roles as appropriate.

### **Health Advocate**

Residents should be able to:

1. Respond to individual patient health needs and issues as part of patient care.
2. Respond to the health needs of the communities that they serve.
3. Identify the determinants of health affecting the populations that they serve.
4. Promote the health of individual patients, communities, and populations.

### **Scholar**

Residents should be able to:

1. Maintain and improve professional activities through ongoing learning.
2. Critically evaluate medical information and its sources and apply this information appropriately to practice decisions.
3. Facilitate the learning of patients, families, students, other Residents, other health professionals, the public, and others.
4. Contribute to the development, dissemination, and translation of new knowledge and practices.

### **Professional**

Residents should be able to:

1. Demonstrate a commitment to their patients, profession, and society through ethical practice.
2. Demonstrate a commitment to their patients, profession, and society through participation in profession-led regulation.
3. Demonstrate a commitment to physician health and sustainable practice.

### **Mandatory Workshops and Courses**

The following courses are integral parts of the program, allowing candidates to improve both their theoretical knowledge and their practice skills. Consultants in the specialties indicated should provide these courses.

## ROTATION OBJECTIVES

The presentation format should be a mixture of more than one educational tool (e.g., didactic lectures, problem-based learning, small group exercises, hands-on workshops for task training, low or moderate-to-high fidelity simulation training) according to the objectives of each course:

Mandatory workshops and courses are as follows:

1. Basic Life Support (BLS)
2. Advanced Cardiovascular Life Support (ACLS)
3. Research Methodology And Statistics
4. Communication Skills
5. Advanced Airway Management
6. Professionalism And Ethics
7. Crisis Resource Management in Critical Care
8. Advanced Trauma Life Support (ATLS)
9. Fundamental Critical Care Support (FCCS)
10. Bedside Ultrasonography for Critically Ill Patients
11. E-FAST Workshop
12. Ultrasound-Guided Central Venous Catheter Insertion
13. Examination Preparation

### **Logbook**

1. All Residents are required to keep a logbook where they will record all clinical and academic activities performed during training (electronic records are highly recommended).
2. The logbook is used, at a minimum, to record the required procedure (see details below).
3. Residents are also required to record the number of “clinical case studies” using the Case Based Discussion (CBD) format. During the 5-year program, Residents are expected to complete a minimum of 20 clinical case studies.
4. The completed logbook will be countersigned by the Program Director.

## ROTATION OBJECTIVES

### Portfolio

The resident is encouraged to demonstrate knowledge of the following:

#### Mandatory Procedures During Residency:

Procedure	Minimum Number Required	Junior (70%)	Senior (30%)
Central venous catheter	80	56	24
Arterial line cannulation	80	56	24
Direct laryngoscopy	60	42	18
Awake fiberoptic intubation	15	11	4
Cricothyroidotomy	10	7	3
Percutaneous tracheostomy	30	21	9
Pericardiocentesis	10	7	3
Pleural tap	30	21	9
Ascetic tap	20	14	6
Lumber puncture	30	21	9
TTE for assessment of critically ill patients	80	56	24
E-FAST	50	35	15
Inferior vena cava assessment for volume responsiveness	80	56	24
Bronchoscopy	40	28	12
Chest tube insertion	30	21	9

#### Optional Procedures During Residency:

Procedure	Minimum Number Required	Junior (70%)	Senior (30%)
Spinal anesthesia	20	14	6
Epidural anesthesia	40	28	12
Intercostal nerve block	20	14	6

## Rotation Objectives

### Rotation Schedule

Year	1	2	3	4	5	6	7	8	9	10	11	12
R1	ICU	ICU	ICU	EM	EM	Anesthesia	Anesthesia	ICU	ICU	ICU	General medicine	General medicine
R2	ICU	ICU	ICU	CCU	CCU	Pulmonology	Pulmonolog	ICU	ID	ID	Nephro	Nephro
R3	ICU	ICU	ICU	Trauma	Trauma	Maternity ICU	Burn ICU	CVICU	CVICU	ICU	General Surgery	General Surgery
R4	ICU	Echo	Radiology	ICU	ICU	Research	Neuro ICU	ICU	ICU	ICU	Anesthesia	Anesthesia
R5	ICU	ICU	ICU	ICU	ICU	ICU	ICU	Thoracic Surgery	Research	Elective	Elective	Elective

Elective rotations:

Vascular surgery

pain

Cardiac anesthesia

Neuroanesthesia

Regional anesthesia

Transplant

## Universal Topics

## UNIVERSAL TOPICS

### Intent

These are high-value, interdisciplinary topics of utmost importance to the Resident. The reason for centralizing these topics is to ensure that every Resident receives high-quality teaching and develops essential core knowledge. These topics are common to all specialties.

The topics included here meet one or more of the following criteria:

- Impactful: these are topics that are common or life-threatening
- Interdisciplinary: topics that are difficult to teach in a single discipline
- Orphaned: topics that are poorly represented in the undergraduate curriculum
- Practical: topics that trainees will encounter in hospital practice

**Development and Delivery:** Core topics for the postgraduate curriculum will be developed and delivered centrally by the SCFHS through an e-learning platform. A set of preliminary learning outcomes for each topic will be developed. Content experts, in collaboration with the central team, can modify the learning outcomes. These topics will be didactic in nature and will focus on the practical aspects of care. These topics will be more content-heavy as compared to the planned workshops and other face-to-face interactive sessions. The suggested duration of each topic is 1.5 hours.

**Assessment:** 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. All trainees must attain the minimum competency in the summative assessment. Alternatively, these topics can be assessed in a summative manner within a specialty examination. Some topics may include case studies, high-quality images, examples of prescribing drugs in disease states, and Internet resources.

### Module 1 - General Hemodynamic Monitoring

The goal of hemodynamic monitoring is to maintain adequate tissue perfusion. Classical hemodynamic monitoring is based on the invasive measurement of systemic, pulmonary arterial, and venous pressures as well as cardiac output.

1. Indications for hemodynamic monitoring
2. Types of hemodynamic monitoring (invasive vs. noninvasive) for assessing the adequacy of tissue perfusion
3. Management of fluid in patients with shock
4. Management of acid-base and electrolyte imbalances

**Indications for hemodynamic monitoring:** At the end of the Learning Unit, Residents should be able to:

- Describe the physiology of the cardiovascular system
- Describe different types of shock:
  - Cardiogenic

## UNIVERSAL TOPICS

- Distributive
- Hypovolemic
- Obstructive
- Mention the indications for hemodynamic monitoring
- Describe monitoring-directed management of various type of shock

Types of hemodynamic monitoring (invasive vs. noninvasive) for assessing the adequacy of tissue perfusion: At the end of the Learning Unit, Residents should be able to:

- Describe the various monitoring devices
- Describe different types of invasive monitoring devices:
  - Pulmonary artery catheter
  - FloTrac Vigileo
  - PULSION PiCCO
  - LiDCO
- Describe different types of noninvasive monitoring devices (e.g., TTE, noninvasive cardiac output monitors)

**Management of fluid in shocked patient:** At the end of the Learning Unit, Residents should be able to:

- Demonstrate a knowledge of the physiological basis of water balance in the body
- Assess patients' hydration status
- Recognize patients with over- and under-hydration
- Order fluid therapy for a critically ill patient
- Monitor fluid status and response to therapy through physical examination, selected laboratory investigations, and hemodynamic monitoring tools

**Management of acid-base and electrolyte imbalances:** At the end of the Learning Unit, Residents should be able to:

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

## Module 2 - Acute Care

5. Preoperative assessment
6. Postoperative care
7. Acute pain management
8. Chronic pain management

**Preoperative Assessment:** At the end of the Learning Unit, Residents should be able to:

- Describe the basic principles of preoperative assessment
- Perform preoperative assessments on uncomplicated patients, with a special emphasis on:
  - General health assessment
  - Cardiorespiratory assessment
  - Medications and medical device assessment
  - Drug allergy
  - Pain relief needs
- Categorize patients according to risks

**Postoperative Care:** At the end of the Learning Unit, Residents should be able to:

- Devise a postoperative care plan including monitoring of vitals, pain management, fluid management, medications, and laboratory investigations
- Handover patients properly to appropriate facilities
- Demonstrate knowledge of the process of postoperative recovery in a patient
- Identify common postoperative complications
- Monitor patients for possible postoperative complications
- Institute immediate management for postoperative complications

**Acute pain management:** At the end of the Learning Unit, Residents should be able to:

- Demonstrate knowledge of the physiological basis of pain perception
- Proactively identify patients who might be in acute pain
- Assess patients with acute pain
- Apply various pharmacological and non-pharmacological modalities available for acute pain management
- Provide adequate pain relief for uncomplicated patients with acute pain
- Identify and refer patients with acute pain who can benefit from specialized pain services

**Chronic pain management:** At the end of the Learning Unit, Residents should be able to:

- Demonstrate a knowledge of the biopsychosocial and physiological basis of chronic pain perception
- Discuss various pharmacological and non-pharmacological options available for chronic pain management
- Provide adequate pain relief for uncomplicated patients with chronic pain
- Identify and refer patients with chronic pain who can benefit from specialized pain services

### Module 3 - Airway Management

9. Identify a patient who needs airway support
10. Routine and difficult airway management
11. Appropriate use of various airway devices
12. Predict and identify patients with difficult airways
13. Predict, identify, and manage complications related to airway management

For all the above, the following learning outcomes apply:

At the end of the Learning Unit, Residents should be able to:

- Identify patients at risk of airway compromise
- Identify and assess difficult airways
- Describe the use of different airway management tools:
  - Nasal and oral airways
  - Bag mask ventilation
  - Different types and sizes of laryngoscope
  - Alternative airway adjuncts (e.g., laryngeal mask airway, Combitube)
  - Appropriate use of fiberoptic bronchoscope
  - Perform surgical airways
- Predict when to call for help and utilize more resources to protect patients' airways and provide adequate oxygenation and ventilation

#### Module 4 - Medical and Surgical Emergencies

14. Management of altered level of consciousness
15. Management of hypotension and hypertension
16. Management of acute breathlessness
17. Management of obstetric emergencies
18. Management of hematological emergencies
19. Management of GI bleeding
20. Management of endocrine emergencies

For all the above, the following learning outcomes apply:

At the end of the Learning Unit, Residents should be able to:

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

#### Module 5 - Ethics and Healthcare

21. Occupational hazards of health care workers.
22. Patient advocacy
23. Breaking bad news
24. Ethical issues: transplantation/organ harvesting and withdrawal of care
25. Ethical issues: treatment refusal and patient autonomy
26. Role of doctors in death and dying

**Occupation hazards of health care workers (HCWs):** At the end of the Learning Unit, Residents should be able to:

- Recognize common sources and risk factors of occupational hazards among HCWs
- Describe common occupational hazards in the workplace

## UNIVERSAL TOPICS

- Develop familiarity with legal and regulatory frameworks governing occupational hazards among HCWs
- Develop a proactive attitude towards promoting workplace safety
- Protect themselves and colleagues against potential occupational hazards in the workplace

**Patient advocacy:** At the end of the Learning Unit, Residents should be able to:

- Define patient advocacy
- Recognize patient advocacy as a core value governing medical practice
- Describe the role of patient advocates in the care of patients
- Demonstrate a positive attitude towards patient advocacy
- Be a patient advocate in conflicting situations
- Demonstrate a knowledge of local and national patient advocacy groups

**Breaking bad news:** At the end of the Learning Unit, the Resident should be able to:

- Elicit patients' main problems; their perception of these problems; and the emotional, social, and physical impact of the problems on patients and their families.
- Tailor information to patients' needs.
- Confirm patients' understanding.
- Elicit and explore patients' reactions to the information given.
- Determine how much patients want to participate in decision making.
- Discuss the treatment options such that patients can understand the implications of said treatment.
- Enable the patient to follow agreed-upon decisions on treatment.
- Identify, offer, discuss, and signpost relevant further support sources (e.g., psycho-oncology services, counseling, information resources, support groups) that the patient and relatives/carers might find helpful.

**Ethical issues: transplantation/organ harvesting and withdrawal of care:** At the end of the Learning Unit, Residents should be able to:

- Apply key ethical and religious principles governing organ transplantation and withdrawal of care.
- Demonstrate knowledge of the legal and regulatory guidelines regarding organ transplantation and withdrawal of care.
- Counsel patients and families in light of applicable ethical and religious principles.
- Guide patients and families to make informed decisions.

**Ethical issues: treatment refusal and patient autonomy:** At the end of the Learning Unit, Residents should be able to:

- Predict situations where a patient or family is likely to decline the prescribed treatment.
- Describe the concept of a "rational adult" in the context of patient autonomy and treatment refusal.
- Analyze key ethical, moral, and regulatory dilemmas in treatment refusal.
- Recognize the importance of patient autonomy in the decision-making process.

- Counsel patients and families who decline medical treatment in light of patients' best interests.

**Role of doctors in death and dying:** At the end of the Learning Unit, Residents should be able to:

- Recognize the importance of doctors' roles in the dying process.
- Provide emotional and physical care to a dying patient and his/her family.
- Provide appropriate pain management to a dying patient.
- Identify and refer suitable patients to palliative care services.

### Module 6 - Topics that Residents Will Encounter in Hospital Practice

27. Safe drug prescription
28. Hospital-acquired infections (HAIs)
29. Antibiotic stewardship
30. Blood transfusion

**Safe drug prescription:** At the end of the Learning Unit, Residents should be able to:

- Recognize the importance of safe drug prescription in health care.
- Describe various adverse drug reactions with examples of commonly prescribed drugs that can cause such reactions.
- Apply the principles of drug–drug, drug–disease, and drug–food interactions in common situations.
- Apply the principles of prescribing drugs in special situations such as renal failure and liver failure.
- Apply the principles of prescribing drugs for the elderly, children, and pregnant or lactating women.
- Promote evidence-based, cost-effective prescription.
- Discuss the ethical and legal framework governing safe drug prescription in Saudi Arabia.

**Hospital acquired infections (HAIs):** At the end of the Learning Unit, Residents should be able to:

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

**Antibiotic stewardship:** At the end of the Learning Unit, Residents should be able to:

- Recognize antibiotic resistance as one of the most pressing public health threats globally.
- Describe the mechanism of antibiotic resistance.
- Determine what constitutes appropriate and inappropriate use of antibiotics.
- Develop a plan for safe and proper antibiotic usage including the indications, duration, types of antibiotic, and discontinuation.
- Appraise local guidelines in the prevention of antibiotic resistance.

**Blood transfusion:** At the end of the Learning Unit, Residents should be able to:

- Demonstrate knowledge of the different components of blood products available for transfusion.
- Recognize the indications and contraindications of blood product transfusion.
- Discuss the benefits, risks, and alternatives to transfusion.
- Undertake consent for specific blood product transfusion.
- Perform steps necessary for safe transfusion.
- Develop an understanding of special precautions and procedures necessary during massive transfusions
- Recognize transfusion-associated reactions and provide immediate management

### Module 7 - Bedside Ultrasound for Assessment of Critically Ill Patients

31. Assessment of hemodynamically unstable patients using bedside ultrasound
32. Assessment of the lung and pleura
33. Ultrasound-guided central line insertion
34. E-FAST examination

Assessment of hemodynamically unstable patients using bedside ultrasound: At the end of the Learning Unit, Residents should be able to:

- Demonstrate a knowledge of the basic principles of ultrasonography
- Perform focused cardiac examinations to answer specific questions:
  - Left ventricle size and function
  - Right ventricle size and function
  - Pericardial space for cardiac tamponade
  - Fluid status and responsiveness
- Demonstrate ability to identify the causes of hemodynamic instability:
  - Cardiogenic
  - Distributive
  - Hypovolemic
  - Obstructive

**Ultrasound-guided central line insertion:** At the end of the Learning Unit, Residents should be able to:

- Demonstrate knowledge of the anatomy of the central vessels
- Perform ultrasound-guided central line insertion
- Demonstrate knowledge of the common artifacts of ultrasound wave forms

**Assessment of the lung and pleura:** At the end of the Learning Unit, Residents should be able to:

- Recognize ultrasound findings of respiratory failure due to various causes including:
  - Pleural effusion
  - Pneumothorax
  - Alveolar-interstitial syndrome (e.g., congestive heart failure, acute respiratory distress syndrome)
  - Normal aeration pattern (e.g., PE, obstructive lung disease)
  - Lobar collapse
- Generate general critical care ultrasound images in the assessment of pneumothorax, pleural effusion, and ascites.
- Demonstrate an ability to perform ultrasound-guided procedures (e.g., pleurocentesis and paracentesis).

**E-FAST examination:** At the end of the Learning Unit, Residents should be able to:

- Demonstrate a knowledge of the ultrasound machine knobology
- Demonstrate a knowledge of the basic principles of ultrasonography
- Demonstrate an ability to perform the FAST examination, a limited ultrasound examination directed solely at identifying the presence of free intraperitoneal and pericardial fluid and hemothorax in trauma patients.

## Assessment

## ASSESSMENT

### Purpose

The purposes of trainee assessments during the residency are to:

- Support learning.
- Develop professional growth.
- Monitor progression.
- Judge competency and allow for certification.
- Evaluate the quality of the training program.

### General Principles

- Judgments should be based on holistic profiling of a trainee, rather than individual traits or instruments.
- Assessment should be continuous in nature.
- The trainee and faculty must meet to review portfolios and logbooks once every two months, and at the end of a given rotation.
- Assessments should be strongly linked to SCCM Program curriculum and content.
- Resident who fail 2 rotations in the same year, will not be able to proceed to the next training year.
- Attendance of program academic activities shall not be less than 75%.
- Average rotation evaluation score accepted is 75% or above

Evaluations and assessments throughout the program are conducted in accordance with the Commission’s training and examination rules and regulations. The process includes the following steps.

## Annual Assessment

### Continuous Appraisal

This assessment is conducted toward 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.

### Formative Continuous Evaluation

To fulfill the CanMEDS competencies based on the end-of-rotation evaluation, the resident’s performance will be jointly evaluated 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- to 20-min direct observational 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

## ASSESSMENT

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 2 weeks after the end of each rotation (preferably in 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 4 weeks after the end of the rotation.
6. The assessment tools used, can be in the form of an educational portfolio (i.e., monthly evaluation, rotational Mini-CEX<sup>\*</sup>, long case assessment CBDs,<sup>\*\*</sup> DOPS,<sup>\*\*\*</sup> and MSF<sup>\*\*\*\*</sup>).
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 for the procedures and clinical skills, as determined by the program.

\*Clinical evaluation exercises

\*\*Case-based discussions

\*\*\*Direct observation of practical skills

\*\*\*\*Multisource feedback

### Summative Continuous Evaluation

This is a summative continuous evaluation report prepared for each resident at the end of each academic year. The report may also involve the result of clinical examination, oral examination, objective structured practical examination (OSPE), objective structured clinical examination (OSCE), and international in training evaluation exam

### 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 posted on the commission website: [www.scfhs.org.sa](http://www.scfhs.org.sa)

### Principles of Critical Care Medicine Examination (Saudi Board Examination: Part I)

This written examination, which is conducted in multiple choice question formats, is 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](http://www.scfhs.org.sa)

### **Final In-training Evaluation Report (FITER)/Comprehensive Competency Report (CCR)**

In addition to 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 or her final year in residency (R5). This report may also involve clinical examinations, oral examinations, or other academic assignments.

### **Final Critical Care Medicine Board Examination (Saudi Board Examination: Part II)**

The final Saudi Board Examination comprises two parts.

#### **Written Examination**

This examination assesses the trainee's theoretical knowledge base (including recent advances) and problem-solving capabilities with regard to the specialty of Critical Care Medicine. It is delivered in multiple choice question formats and held at least once a year. The number of exam items, exam format, 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](http://www.scfhs.org.sa)

#### **Clinical Examination**

This examination assesses a broad range of high-level clinical skills, including data collection, patient management, communication, and counseling skills. The examination is held at least once a year, preferably in an OSCE format in the form of patient management problems (PMPs). The exam eligibility, format, 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](http://www.scfhs.org.sa)

### **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 Critical Care Medicine" certificate.

## **Program Summary and Competencies**

## PROGRAM SUMMARY AND COMPETENCIES

### Critical Care Medicine Program

This program is designed to prepare physicians for practicing competently and independently in Critical Care Medicine. Specifically, using the CanMEDS framework, it teaches the fundamental skills, knowledge, and humanistic qualities inherent to Critical Care Medicine practice and provides progressive responsibility for and experience in the application of these principles to enable effective management of clinical problems.

Equal opportunity must be provided to Residents, under the guidance and supervision of qualified faculty, to develop a satisfactory level of clinical maturity, judgment, and technical skill. Upon completion of this program, Residents should be capable of practicing Critical Care Medicine, learning new skills and knowledge during their careers, and monitoring both their own physical and mental well-being and that of others.

The total duration of the program is 5 years of approved residency training. The program must include:

1. 3 Years of Junior Residency
  - a) 1<sup>st</sup> Year Rotation
    - A minimum of 24 weeks in General ICU
    - A minimum of 8 weeks in Emergency Medicine
    - A minimum of 8 weeks in Anesthesia
    - A minimum of 8 weeks in Trauma
  - b) 2<sup>nd</sup> Year Rotation
    - A minimum of 20 weeks in General ICU
    - A minimum of 8 weeks in CCU
    - A minimum of 8 weeks in Pulmonology
    - A minimum of 4 weeks in Infectious Disease
    - A minimum of 8 weeks in Nephrology
  - c) 3<sup>rd</sup> Year Rotation
    - A minimum of 12 weeks in General ICU
    - A minimum of 8 weeks in General Medicine
    - A minimum of 4 weeks in Maternity
    - A minimum of 4 weeks in Burn ICU
    - A minimum of 8 weeks in Cardiovascular ICU
    - A minimum of 4 weeks in Infectious Disease
    - A minimum of 8 weeks in Thoracic
2. 2 Years of Senior Residency
  - d) 4<sup>th</sup> Year Rotation
    - A minimum of 8 weeks in General ICU
    - A minimum of 4 weeks in Echocardiography
    - A minimum of 4 weeks in Radiology
    - A minimum of 8 weeks in General Surgery
    - A minimum of 4 weeks in Vascular Surgery
    - A minimum of 4 weeks in Neuro ICU

## PROGRAM SUMMARY AND COMPETENCIES

- A minimum of 4 weeks in Pain Anesthesia
  - A minimum of 4 weeks in Regional Anesthesia
  - A minimum of 4 weeks in Cardiac Anesthesia
  - A minimum of 4 weeks in Neuroanesthesia
- e) 5<sup>th</sup> Year Rotation
- A minimum of 28 weeks in ICU
  - A minimum of 8 weeks in Research
  - A minimum of 12 weeks in Elective

**Overall Program CanMEDS Competencies**

**CanMEDS Specific Objectives Guide for R1, R2, and R3**

Goals	Competencies						
CanMEDS Roles	Medical Expert	Communicator	Collaborator	Leader	Health Advocate	Scholar	Professional
<p>Resident should demonstrate ability to integrate medical knowledge and skills to provide patient-centered, safe, and quality care. The trainee should develop skills in providing advice to and planning care for critically ill patients with consideration for the patients' clinical status, surrounding environment, cultural preferences, and available resources. Timely decision making with the ability to organize and be involved in teamwork are essential skills that must be developed.</p>	<p>Describe the natural history and clinical expression of critical care illnesses encountered in the inpatient, ICU, and ER settings.</p>	<p>Communicate effectively using a patient-centered approach and demonstrate empathy and respect in all patient encounters.</p>	<p>Participate in effective teamwork and demonstrate a respectful attitude toward other colleagues and staff members of inter- and intraprofessional teams.</p>	<p>Promote a culture of teamwork that recognizes, supports, and responds effectively to colleagues in need during patient care.</p>	<p>Identify the important determinants of health affecting patients.</p>	<p>Develop, monitor, and revise a personal learning plan by utilizing meaningful feedback and evaluations to promote goal-directed learning.</p>	<p>Exhibit professional commitment to rounds.</p>

PROGRAM SUMMARY AND COMPETENCIES

Goals	Competencies						
CanMEDS Roles	Medical Expert	Communicator	Collaborator	Leader	Health Advocate	Scholar	Professional
The Resident should be able to conduct comprehensive and multidisciplinary rounds independently to assess patients, synthesize differential diagnoses, and create problem lists and plans of action.							
	Understand the pathophysiology of commonly observed diseases in critically ill patients.	Optimize the physical environment for patient comfort, dignity, privacy, and safety.	Demonstrate teamwork to prevent conflict and is able to identify and negotiate overlapping and shared responsibilities.	Efficiently carry out patient care tasks allocated during ward rounds	Contribute effectively to improving the health of patients and communities	Set, assess, and prioritize individualized learning goals.	Demonstrate a commitment to maintaining and enhancing competence, quality improvement, and patient safety.
The Resident should obtain experience in the evaluation and management of inpatients with adult critical care diseases.							

PROGRAM SUMMARY AND COMPETENCIES

Goals		Competencies					
CanMEDS Roles	Medical Expert	Communicator	Collaborator	Leader	Health Advocate	Scholar	Professional
	Demonstrate a working knowledge of Critical Care Medicine by actively participating in the management of critically ill patients.	Communicate well with patients, families, and admitting services about daily patient progress.	Recognize own differences, misunderstandings, and limitations with respect to others' point of views and opinions.	Recognize personal limitations and seek help when appropriate.	Recognize and respond to those issues where advocacy is appropriate	Use assessment tools and practices in a given learning context.	Recognize the importance of patient privacy, and autonomy; informed consent; and equitable respect and care to all.
	Demonstrate an understanding of the integrative nature of disease in critically ill patients and the interdisciplinary approach to the management of such patients.	Communicate well with an ICU team (nurses, other Residents, or attending staff) about patient care issues	Discuss how the health care system affects the management of inpatient ICU care.	Recognize and professionally respond to unprofessional and unethical behaviors in other staff.	Educate patients and families about and promote the importance of long-term healthy behaviors and preventive health care (e.g., smoking cessation, screening tests, vaccinations, exercise, and nutrition).	Recognize own knowledge gaps in clinical and other professional encounters.	Respect patients, patients' families, staff, and colleagues

PROGRAM SUMMARY AND COMPETENCIES

Goals	Competencies						
CanMEDS Roles	Medical Expert	Communicator	Collaborator	Leader	Health Advocate	Scholar	Professional
	Identify at-risk patients, perform appropriate physical examinations, formulate a problem list, and institute a course of therapy under the direction of senior personnel.	Engage patients in a way that is respectful and non-judgmental with regard to their religious values, cultural values, and biases.	Demonstrate effective collaboration with other health care providers.	Utilize resources effectively to balance patient care, continuing education, and personal activities.	Respect and empower patient autonomy	Integrate evidence into decision making.	Model ethical behavior by reporting back any key clinical findings to the attending and referring providers; following through on clinical questions, laboratory testing, and other patient care issues; and recognizing potential conflicts of interest.
	Prioritize and summarize approaches to the evaluation of common presentations in critical care patients.	Recognize and respond appropriately to patients' non-verbal communication behaviors.	Demonstrate awareness of the impact of diagnostic and therapeutic recommendations on the health care system..	Understand and judiciously allocate health care resources.	Promote fair health care.	Promote patient safety and safe learning environment.	Demonstrate integrity, honesty, and openness in discussion of therapeutic options with patients and respect for patients' preferences and cultural differences.

PROGRAM SUMMARY AND COMPETENCIES

Goals		Competencies					
CanMEDS Roles	Medical Expert	Communicator	Collaborator	Leader	Health Advocate	Scholar	Professional
	Triage interventions, taking into account clinical urgency, the potential for unexpected outcomes, and available alternatives.	Demonstrate counseling skills and decision aids to help patients or patients' decision makers make informed choices or give informed consent.	Demonstrate effective and safe handover during sign-out or transition of responsibility of care, either within the institution or to a different setting or stage of care.	Work efficiently and effectively within a health care system.	Apply the principles of quality improvement and quality assurance.	Effectively use technology to manage information, support patient care decisions, and promote both patient and physician education.	Respond to phone calls, pages, and messages in a timely manner.
	Triage interventions, taking into account clinical urgency, the potential for unexpected outcomes, and available alternatives.	Demonstrate effective skills in listening and speaking with patients, families, and other members of the health care team.		Utilize information technology for optimal patient care and personal scholarship.	Appreciate the existence of global health advocacy and initiatives for the elimination of diseases (e.g., TB, malaria, and HIV) and the roles of advocacy groups and funding agencies.	Demonstrate a teamwork attitude and promote collaborative learning.	Recognize and professionally respond to unprofessional and unethical behaviors in other staff.

PROGRAM SUMMARY AND COMPETENCIES

Goals	Competencies						
CanMEDS Roles	Medical Expert	Communicator	Collaborator	Leader	Health Advocate	Scholar	Professional
	Become comfortable in the management of cardiac arrest and the acute resuscitation of a traumatized or acutely ill patient.	Reliably and accurately communicate the patient's and his/her family's views and concerns to the attending physician		Use information technology appropriately		Integrate and apply knowledge obtained from multiple study sources to the care of critically ill patients.	Promote a teamwork culture that recognizes, supports, and responds effectively to colleagues in need during patient care.
	Effectively obtain a relevant history and perform a pertinent physical examination of critically ill patients.	Demonstrate competency in documentation including histories and physical, progress, and discharge notes		Demonstrate knowledge of the physical requirements of the design of an ICU.		Analyze clinical experience and employ a systematic methodology for improvement.	Demonstrate commitment to the disclosure of error and or adverse events and their impact.
	Demonstrate competence in performing common procedures performed in the medical and surgical ICU, including central and arterial line insertions, orotracheal intubation, paracentesis,	Disclose adverse events and procedural complications to the patients and their families accurately and appropriately.				Develop and maintain a willingness to learn from errors and use errors to improve the system or processes of care.	Demonstrate self-responsibility, including personal care, to best serve others.

PROGRAM SUMMARY AND COMPETENCIES

Goals	Competencies						
CanMEDS Roles	Medical Expert	Communicator	Collaborator	Leader	Health Advocate	Scholar	Professional
	thoracentesis, and lumbar puncture.						
	Appropriately select and interpret laboratory, imaging, and pathologic studies used in the evaluation of pulmonary diseases.	Document clinical encounters accurately and in a timely manner in compliance with the legal and regulatory requirements.				Pose medically and scientifically relevant questions that are amenable to scholarly investigation and address the critique of a given scholarly question.	
	Construct a comprehensive treatment plan and assess patient response to therapy.	Share information with patients and appropriate others in a manner that respects patients' privacy and confidentiality.					

PROGRAM SUMMARY AND COMPETENCIES

Goals	Competencies						
CanMEDS Roles	Medical Expert	Communicator	Collaborator	Leader	Health Advocate	Scholar	Professional
	Effectively interpret diagnostic tests used in the evaluation of ICU patients such as interpretation of arterial blood gases, chest x-rays, abdominal films, and CT scans.	Participate in end-of-life discussions with the ICU team and family members					
	Demonstrate an ability to critically appraise and cite pertinent literature.						
	Determine indicated interventions for assessment and management.						
	Obtain and document informed consent and explain the risks, benefits, and rationale for the options discussed.						

PROGRAM SUMMARY AND COMPETENCIES

Goals	Competencies						
CanMEDS Roles	Medical Expert	Communicator	Collaborator	Leader	Health Advocate	Scholar	Professional
	Counsel patients concerning their diagnosis, planned diagnostic testing, and recommended therapies.						
	Utilize validated instruments effectively in the assessment of function and quality of life to monitor and adjust therapy.						
	Establish the roles of the patient and all team members for follow-up investigations of treatment response and consultations and ensure that the agreed-upon follow-up takes place; this is especially necessary after a change of service such						

PROGRAM SUMMARY AND COMPETENCIES

Goals	Competencies						
CanMEDS Roles	Medical Expert	Communicator	Collaborator	Leader	Health Advocate	Scholar	Professional
	as on-call or transfer of the patient within the hospital or to an outside facility.						

PROGRAM SUMMARY AND COMPETENCIES

CanMEDS Specific Objectives Guide for R4 and R5

Goals	Competencies						
CanMEDS Roles	Medical Expert	Communicator	Collaborator	Leader	Health Advocate	Scholar	Professional
The goal of this rotation is that Residents obtain experience in the evaluation and management of inpatients with adult critical care diseases.	Describe the natural history and clinical expression of the critical care illnesses encountered in the inpatient setting, ICU, and ER.	Communicate effectively using a patient-centered approach and able to demonstrate empathy and respect in all patient encounters.	Participate in effective teamwork and demonstrate a respectful attitude toward other colleagues and staff members of inter- and intraprofessional teams.	Promote a culture of teamwork that recognizes, supports, and responds effectively to colleagues in need during patient care.	Identify the important determinants of health affecting patients.	Develop, monitor, and revise a personal learning plan by utilizing meaningful feedback and evaluations to promote goal-directed learning.	Exhibit professional commitment to rounds.
	Understand the pathophysiology of commonly observed diseases in critically ill patients.	Optimize the physical environment for patient comfort, dignity, privacy, and safety.	Demonstrate teamwork to prevent conflict and identify and negotiate overlapping and shared responsibilities.	Efficiently carry out patient care tasks allocated during ward rounds.	Contribute effectively to improving the health of patients and communities.	Set, assess, and prioritize individualized learning goals.	Demonstrate a commitment to maintaining and enhancing competence, quality improvement, and patient safety.
	Demonstrate a working knowledge of Critical Care Medicine by actively participating in the management of critically ill patients.	Communicate well with patients, families, and admitting services about daily patient progress.	Recognize own differences, misunderstandings, and limitations with respect to others' point of views and opinions	Recognize personal limitations and seek help when appropriate.	Recognize and respond to those issues where advocacy is appropriate.	Use assessment tools and practices in a given learning context.	Recognize the importance of patient primacy, privacy, and autonomy; informed consent; and equitable respect and care to all.

PROGRAM SUMMARY AND COMPETENCIES

Goals	Competencies						
CanMEDS Roles	Medical Expert	Communicator	Collaborator	Leader	Health Advocate	Scholar	Professional
	Demonstrate an understanding of the integrative nature of disease in critically ill patients and the interdisciplinary approach to the management of such patients.	Communicate well with an ICU team (nurses, other Residents, or attending staff) about patient care issues.	Discuss how the health care system affects the management of inpatient ICU care.	Recognize and professionally respond to unprofessional and unethical behaviors in other staff.	Educate patients and families about and promote the importance of long-term healthy behaviors and preventive health care (e.g., smoking cessation, screening tests, vaccinations, exercise, nutrition).	Recognize own knowledge gaps in clinical and other professional encounters.	Respect patients, patients' families, staff, and colleagues.
	Identify at-risk patients, perform appropriate physical examinations, formulate a problem list, and institute a course of therapy under the direction of senior personnel.	Engage patients in a way that is respectful and non-judgmental with regard to their religious values, cultural values, and biases.	Demonstrate effective collaboration with other health care providers.	Utilize resources effectively to balance patient care, continuing education, and personal activities	Respect and empower patient autonomy.	Integrate evidence into decision making.	Model ethical behavior by reporting back any key clinical findings to the attending and referring providers; following through on clinical questions, laboratory testing, and other patient care issues; and

PROGRAM SUMMARY AND COMPETENCIES

Goals	Competencies						
CanMEDS Roles	Medical Expert	Communicator	Collaborator	Leader	Health Advocate	Scholar	Professional
							recognizing potential conflicts of interest.
	Prioritize and summarize approaches to the evaluation of common presentations in critical care patients.	Recognize and respond appropriately to patients' non-verbal communication behaviors.	Demonstrate an awareness of the impact of diagnostic and therapeutic recommendations on the health care system.	Understand and judiciously allocate health care resources	Promote fair health care.	Promote patient safety and a safe learning environment.	Demonstrate integrity, honesty, and openness in discussion of therapeutic options with patients and respect for patients' preferences and cultural differences.
	Triage interventions, taking into account clinical urgency, the potential for unexpected outcomes, and available alternatives.	Demonstrate counseling skills and decision aids to help patients or patients' decision makers make informed choices or give informed consent.	Demonstrate effective and safe handover during sign-out or transition of responsibility of care, either within the institution or to a different setting or stage of care.	Work efficiently and effectively within a health care system.	Apply the principles of quality improvement and quality assurance.	Effectively use technology to manage information, support patient care decisions, and promote both patient and physician education.	Respond to phone calls, pages, and messages in a timely manner.

PROGRAM SUMMARY AND COMPETENCIES

Goals	Competencies						
CanMEDS Roles	Medical Expert	Communicator	Collaborator	Leader	Health Advocate	Scholar	Professional
	Triage interventions, taking into account clinical urgency, the potential for unexpected outcomes, and available alternatives.	Demonstrate effective skills in listening and speaking with patients, families, and other members of the health care team.		Utilize information technology for optimal patient care and personal scholarship.	Appreciate the existence of global health advocacy and initiatives for the elimination of disease (e.g., TB, malaria, HIV) and the roles of advocacy groups and funding agencies.	Demonstrate a teamwork attitude and promote collaborative learning.	Recognize and professionally respond to unprofessional and unethical behaviors in other staff.
	Become comfortable in the management of cardiac arrest and the acute resuscitation of a traumatized or acutely ill patient.	Reliably and accurately communicate the patient's and his/her family's views and concerns to the attending physician.		Use information technology appropriately.		Integrate and apply knowledge obtained from multiple study sources to the care of critically ill patients.	Promote a teamwork culture that recognizes, supports, and responds effectively to colleagues in need during patient care.
	Effectively obtain a relevant history and perform a pertinent physical examination of critically ill patients.	Demonstrate competency in documentation including history and physical, progress, and discharge notes.		Demonstrate knowledge of the physical requirements of the design of an ICU.		Analyze clinical experience and employ a systematic methodology for improvement.	Demonstrate commitment to the disclosure of error and/or adverse events and their

PROGRAM SUMMARY AND COMPETENCIES

Goals	Competencies						
CanMEDS Roles	Medical Expert	Communicator	Collaborator	Leader	Health Advocate	Scholar	Professional
							impact.
	<p>Demonstrate competence in performing common procedures performed in the medical and surgical ICU, including central and arterial line insertions, orotracheal intubation, paracentesis, thoracentesis, and lumbar puncture.</p>	<p>Disclose adverse events and procedural complications to the patients and their families accurately and appropriately.</p>				<p>Develop and maintain a willingness to learn from errors and use errors to improve the system or processes of care.</p>	<p>Demonstrate self-responsibility, including personal care, to best serve others.</p>
	<p>Appropriately select and interpret laboratory, imaging, and pathologic studies used in the evaluation of pulmonary diseases.</p>	<p>Document clinical encounters accurately and in a timely manner in compliance with the legal and regulatory requirements.</p>				<p>Pose medically and scientifically relevant questions that are amenable to scholarly investigation and address the critique of a given scholarly question.</p>	

PROGRAM SUMMARY AND COMPETENCIES

Goals	Competencies						
CanMEDS Roles	Medical Expert	Communicator	Collaborator	Leader	Health Advocate	Scholar	Professional
	Construct a comprehensive treatment plan and assess patient response to therapy.	Share information with patients and appropriate others in a manner that respects patients' privacy and confidentiality.					
	Effectively interpret diagnostic tests used in the evaluation of ICU patients such as interpretation of arterial blood gases, chest x-rays, abdominal films, and CT scans.	Use counseling skills to effectively communicate end-of-life care issues to patients and patients' families.					
	Demonstrate an ability to critically appraise and cite pertinent literature.	Participate in end-of-life discussions with the ICU team and family members					
	Perform an appropriately timed consultation and present well-documented assessments and recommendations in written, electronic, or						

PROGRAM SUMMARY AND COMPETENCIES

Goals	Competencies						
CanMEDS Roles	Medical Expert	Communicator	Collaborator	Leader	Health Advocate	Scholar	Professional
	oral formats.						
	Determine indicated interventions for assessment or management.						
	Obtain and document informed consent from patients and explain the risks, benefits, and rationale for the options discussed.						
	Execute interventions in a skillful and safe manner and adapt to new findings or changing clinical circumstances.						
	Counsel patients concerning their diagnosis, planned diagnostic testing, and recommended therapies.						
	Utilize validated instruments in						

PROGRAM SUMMARY AND COMPETENCIES

Goals	Competencies						
CanMEDS Roles	Medical Expert	Communicator	Collaborator	Leader	Health Advocate	Scholar	Professional
	the assessment of function and quality of life to monitor and adjust therapy.						
	Establish the roles of the patient and all team members for follow-up investigations of treatment response and consultations and ensure that the agreed-upon follow-up takes place; this is especially necessary after a change of service such as on-call or transfer of the patient within the hospital or to an outside facility.						
	Recognize when care should be transferred to another physician or health care provider.						

## List of Serious Conditions

### A. Cardiovascular, Physiology, Pathology, and Therapy

1. Shock:
  - a) Hypovolemic
  - b) Cardiogenic
  - c) Distributive
  - d) Obstructive
2. Myocardial infarction and its complications
3. Cardiac arrhythmia and conduction disturbances; indications for Pacemakers
4. Pulmonary embolism
5. Pulmonary edema (cardiogenic and non-cardiogenic)
6. Cardiac tamponade and other acute pericardial diseases
7. Acute valvular disorders
8. Acute aortic and peripheral vascular disorders including arteriovenous fistulae (optional)
9. Acute complications of cardiomyopathies and myocarditis
10. Vasoactive and inotropic therapy
11. Complications of devices and artificial hearts (optional)
12. Complications of angioplasty (optional)
13. Current concepts related to the Frank–Starling law of the heart and perfusion to calculate and interpret hemodynamic parameters
14. Hemodynamic effects caused by ventilator assist devices
15. Thrombolytic therapy
16. Perioperative management of patients undergoing cardiovascular surgery (optional)
17. Recognition, evaluation, and management of hypertension

### B. Respiratory, Physiology, Pathology, and Therapy

1. Acute respiratory failure:
  - a) Acute respiratory distress syndrome
  - b) Hypercapnic
  - c) Hypoxemic
2. Status asthmaticus
3. Smoke inhalation and airway burns
4. Aspiration and chemical pneumonitis
5. Flail chest and chest trauma
6. Bronchopulmonary infections
7. Upper airway obstruction
8. Drowning
9. Pulmonary function tests:
  - a) Pulmonary mechanics
  - b) Respiratory adequacy (arterial and venous blood gas interpretation)
10. Oxygen therapy
11. Hyperbaric oxygenation
12. Mechanical ventilation:
  - a) Pressure and volume ventilators

## PROGRAM SUMMARY AND COMPETENCIES

- b) Positive end-expiration pressure, intermittent mandatory ventilation, continuous positive airway pressure, high frequency ventilation, inverse ratio ventilation, pressure support ventilation, negative pressure ventilation
  - c) Extracorporeal membrane oxygenations (desirable for pediatrics)
  - d) Indications for and hazards of mechanical ventilation
  - e) Barotrauma
  - f) Criteria for weaning and weaning techniques
13. Airway maintenance:
- a) Emergency airway management
  - b) Endotracheal intubation
  - c) Tracheostomy
  - d) Long-term intubations versus tracheostomy
14. Ventilatory muscle physiology, pathophysiology, and therapy

### **C. Renal Physiology, Pathology, Pathophysiology, and Therapy**

- 1. Renal regulation of fluid balance and electrolytes
- 2. Renal failure (prerenal, renal, and postrenal)
- 3. Derangement secondary to alterations in osmolality and electrolytes
- 4. Acute acid-base disorders and their management
- a. Principles of hemodialysis, peritoneal dialysis, ultrafiltration, continuous arteriovenous hemofiltration (CAVH), and continuous veno-venous hemofiltration (CVVH)
- 5. Interpret urine electrolytes
- 6. Evaluate oliguria
- 7. Drug dosing in renal failure

### **D. Central Nervous System Physiology, Pathology, Pathophysiology, and Therapy**

- 1. Coma:
  - a. Metabolic
  - b. Traumatic
  - c. Infectious
  - d. Mass lesions
  - e. Vascular anoxic-ischemic
  - f. Drug overdose:
    - Barbiturates
    - Narcotics
    - Tranquilizers
    - Organophosphates
    - "Street" drugs
    - Salicylate; acetaminophen
    - Petroleum distillates
    - Heavy metals
    - Industrial products
    - Alcohol
    - Cocaine
- 2. Hydrocephalus

3. Psychiatric emergencies
4. Preoperative management of patient undergoing neurological surgery
5. Brain death evaluation and certification
6. Diagnosis and management of persistent vegetative state

**E. Infectious Disease Physiology, Pathology, Pathophysiology, and Therapy**

1. Antibiotics:
  - a) Aminoglycosides
  - b) Antifungal agents
  - c) Antituberculosis agents
  - d) Penicillin and other antibiotics
  - e) Antiviral agents
  - f) Agents for parasitic infections
2. Infection control for special care units
3. Anaerobic infections
4. Systemic sepsis
5. Tetanus
6. Hospital-acquired and opportunistic infections in critically ill patients
7. Adverse reactions to antimicrobial agents
8. AIDS
9. Infectious risks to health care workers

**F. Hematological Disorders Secondary to Acute Illness**

1. Acute defects in hemostasis:
  - a) Thrombocytopenia
  - b) Disseminated intravascular coagulation
  - c) Primary fibrinolytic therapy
2. Anticoagulation; fibrinolytic therapy
3. Principles of blood component therapy:
  - a) Platelet transfusion
  - b) Packed red cells including frozen red cells
  - c) Fresh frozen plasma
  - d) Specific coagulation factor concentrates
  - e) Albumin and plasma protein fraction
  - f) Stroma-free hemoglobin
  - g) White blood cell transfusion
  - h) Cryoprecipitate
4. Acute hemolytic disorders
5. Acute syndromes associated with neoplastic disease and antineoplastic therapy
6. Acute disorders of immunosuppressed patients
7. Neonatal bleeding disorders (optional)
8. Sickle cell crisis
9. Plasmapheresis

**G. Gastrointestinal (GI), Genitourinary (GU), Obstetric/Gynecological (Ob/Gyn) Acute Disorders**

1. Acute pancreatitis with shock
2. Upper GI bleeding including variceal bleeding
3. Lower GI bleeding
4. Acute and fulminant hepatic failure
5. Toxic megacolon
6. Acute perforations of the GI tract
7. Ruptured esophagus
8. Acute inflammatory diseases of the intestine
9. Acute vascular disorders of the intestine, including mesenteric infarction
10. Obstructive uropathy and acute urinary retention
11. Urinary tract bleeding
12. Toxemia of pregnancy; amniotic fluid embolism (optional for pediatrics)
13. Hydatidiform mole
14. Perioperative management of patients undergoing GI, GU, or Ob/Gyn surgery
15. Stress ulcer prophylaxis
16. Drug dosing in hepatic failure

**H. Immunology and Transplantation**

1. Principles of transplantation (organ donation, procurement, preservation, transportation, allocation, implantation, and national organization of transplantation activities)
2. Immunosuppression
3. Transplantation of different organs (indications and postoperative care)

**I. Trauma and Burns**

1. Initial approach to the management of multisystem trauma
2. Central nervous system trauma (brain and spinal cord)
3. Skeletal trauma including the spine
4. Chest trauma:
  - a) Blunt
  - b) Penetrating
  - c) Cardiac
5. Abdominal trauma (blunt and penetrating)
6. Crush injury

**J. Monitoring, Bioengineering, and Biostatistics**

1. Prognostic indices (severity and therapeutic intervention scores)
2. Principles of electrocardiographic monitoring, measurement of skin temperature and resistance, and transcutaneous measurements
3. Invasive hemodynamic monitoring:
  - a) Principles of strain gauge transducers
  - b) Signal conditioners, calibration, and gain adjustment
  - c) Display techniques

## PROGRAM SUMMARY AND COMPETENCIES

- d) Principles of PICO and arterial, central venous, and pulmonary artery pressure catheterization and monitoring
- e) Assessment of cardiac function and derived hemodynamic parameters
- 4. Noninvasive hemodynamic monitoring (e.g., Vigileo, LiDCO)
- 5. Electrical safety
- 6. Thermoregulation
- 7. Brain monitoring (intracranial pressure, cerebral blood flow, cerebral metabolic rate, and EEG)
- 8. Respiratory monitoring (airway pressure, intrathoracic pressure, tidal volume, pulse oximetry, dead-space tidal volume ratio, compliance, resistance, and capnography)
- 9. Metabolic monitoring (oxygen consumption, carbon dioxide production, and respiratory quotient)
- 10. Use of computers in critical care units (optional)

### **K. Administrative and Management Principles and Techniques**

- 1. Recommendations for training physicians in Critical Care Medicine
- 2. Organization and staffing of critical care units
- 3. Standards for special care units and the Joint Commission on Accreditation Of Health Care Organizations
- 4. Medical record keeping in special care units:
  - a) Problem-oriented record approach
  - b) System-structure record approach
  - c) Manual versus mechanical (computerized record generation)
  - d) Organization of physician, nursing, technical, and laboratory records within special care units
- 5. Priorities in the care of critically ill or injured patients
- 6. Collaborative practice principles
- 7. Emergency medical systems in pre-hospital care
- 8. Quality improvement, principles, and practices
- 9. Principles of triage and resource allocation

### **L. Pharmacokinetics and Dynamics: Drug Metabolism and Excretion in Critical Illness**

- 1. Uptake
- 2. Metabolism
- 3. Excretion

### **M. Ethical and Legal Aspects of Critical Care Medicine**

- 1. Death and dying
- 2. Foregoing life-sustaining treatment and orders not to resuscitate
- 3. Standards of treatment for the physically and mentally disabled
- 4. Rights of patients and the right to refuse treatment
- 5. Living wills, advance directives, and durable power of attorney

- N. Psychosocial Aspects (optional):** Awareness of the Physiological and Social Effects of Life-threatening Illness on Patients and Families
- O. Medical Economics (optional):** Essential Principles of Hospital Financial Reimbursement

## List of Essential Procedures

### A. Airway Management

1. Maintenance of open airway in non-intubated, unconscious, paralyzed patients
2. Intubation (oral and nasotracheal)
3. Cricothyrotomy, transtracheal catheterization, and tracheostomy

### B. Breathing and Ventilation

1. Ventilation of bag and mask
2. Indications, applications, techniques, criteria, and physiological effects of positive end-expiratory pressure; intermittent positive pressure breathing; intermittent mandatory ventilation; continuous positive airway pressure, pressure support ventilation; noninvasive ventilation; and (optionally) airway pressure release ventilation
3. Suction techniques
4. Chest physiotherapy and incentive spirometry (optional)
5. Fiberoptic laryngotracheobronchoscopy
6. Weaning techniques
7. Management of pneumothorax (e.g., needle, chest tube insertion drainage systems)
8. Monitoring airway pressures
9. Operation of mechanical ventilators
10. Measurement of endotracheal tube cuff pressures
11. Interpretation of sputum cultures by smear
12. Performance of bedside pulmonary function tests
13. Application of appropriate oxygen therapy

### C. Circulation

1. Arterial puncture and blood sampling
2. Insertion of monitoring lines
  - a) Central venous
  - b) Arterial
  - c) Pulmonary artery catheters
3. Pericardiocentesis
4. Management of arterial and venous air embolism
5. Transvenous pacemaker insertion
6. Cardiac output determinations by thermodilution techniques
7. Use of computers and calculators to determine derived parameters
8. Including systemic and pulmonary vascular resistance
9. Obtain 12-lead ECGs

## PROGRAM SUMMARY AND COMPETENCIES

10. Dynamic ECG interpretation
  11. Infusion of epinephrine, dopamine, norepinephrine, nitroglycerin, dobutamine, isoproterenol, nitroprusside, and other vasoactive drugs
  12. Use of infusion pumps for vasoactive drugs
  13. Cardioversion
  14. Application and regulation of intra-aortic assist devices
  15. Application of noninvasive cardiovascular monitoring
  16. Transcutaneous pacing/defibrillation
- D. Central Nervous System**
1. Lumbar puncture
  2. Management of intracranial pressure monitors and intracranial hypertension
  3. Monitoring of modified EEG (optional).
  4. Application of hypothermia
- E. Renal**
1. Manage peritoneal dialysis
  2. Management of CAVH and CAVHD
  3. Insertion of hemodialysis catheters
- F. Gastrointestinal Tract**
1. Insertion of transesophageal devices
  2. Prevention and management of upper GI bleeding
- G. Hematology**
1. Insertion of transesophageal devices
  2. Management of massive transfusions
  3. Autotransfusion
  4. Proper ordering and interpretation of coagulation studies
- H. Infection**
1. ICU sterility techniques and precautions
  2. Sampling, staining, and interpretation of blood, sputum, urine, drainage, and other body fluids
  3. Interpretation of antibiotic levels and sensitivities
- I. Metabolism and Nutrition**
1. Tube feeding
  2. Parental nutrition
  3. Monitoring and assessment of metabolism and nutrition
  4. Maintenance of temperature homeostasis

**J. Monitoring of Bioengineering**

1. Utilization, zeroing, and calibration of transducers
2. Use of amplifiers and recorders
3. Troubleshooting equipment
4. Correcting basic electrical safety hazards

**K. Trauma**

1. Temporary immobilization of fractures
2. G-suit applications
3. Use of special beds (e.g., circle electrical bed, roto bed, Flexicare bed)
4. Peritoneal lavage

**L. Intensive Care Unit Laboratory**

1. Blood gas analysis
2. Calculation of oxygen content, intrapulmonary shunt, Alveolar-arterial gradients, systemic and pulmonary vascular resistance, oxygen transport, and oxygen consumption

**Core Teaching Topics**

- A. Respiratory Dysfunction
- B. Cardiovascular Dysfunction
- C. CNS Dysfunction
- D. Neuromuscular Dysfunction
- E. Renal Dysfunction
- F. GI Dysfunction
- G. Jaundice and Hepatic Dysfunction
- H. Nutritional and Fluid Deficiency
- I. Hematologic Dysfunction
- J. Metabolic and Endocrine Dysfunction
- K. Sepsis
- L. Pharmacotherapy for the ICU Patient
- M. Environmental Hazard
- N. Transportation of the Patient
- O. Academic Development of Critical Care Physicians
- P. Legal, Moral, and Ethical Issues
- Q. Techniques and Skills
- R. Mandatory Skills:
  1. Airway management suctioning techniques and airway toilet: oropharyngeal airways; access to the airway by all routes under any circumstance; orotracheal and nasotracheal intubation; intubation over a fiberoptic bronchoscope; surgical establishment of an airway; and relative merits and management of different tubes and suction catheters
  2. Mechanical ventilation: fundamentals of circuitry; flow characteristics and dangers of currently available mechanical ventilators; and the methods of

## PROGRAM SUMMARY AND COMPETENCIES

- monitoring ventilation, including alarm systems, and specific modes of ventilation
3. Oxygen and nebulizer therapy: supplementary oxygen equipment, use of special gas mixture, and airway pharmacology
  4. Vascular access: Risk-benefit ratio for all invasive, as opposed to noninvasive, techniques used to gain vascular access for information gathering. Arterial vascular access methods include percutaneous methods and cutdown routes (radial, femoral, dorsalis pedis, and posterior tibial). Venous vascular access methods include percutaneous methods (peripheral, central, internal jugular, external jugular, subclavian, femoral, and umbilical) and surgical cutdown.
  5. Basic principles of wound management
  6. Hemodynamic monitoring
  7. Peritoneal tap
  8. Chest tube thoracostomy
  9. Thoracentesis and pericardiocentesis
  10. Temporary pacemaker insertion and management
  11. Lumbar puncture
  12. ICP monitoring (excluding insertion of devices; subdural, epidural, and intraventricular monitors)
  13. Gastroesophageal tube placement for hemostasis (e.g., Sengstaken-Blakemore)
  14. Placement of nasogastric or gastric tubes for suction and nutrition
  15. Urinary bladder access
  16. Fracture immobilization techniques
  17. Gram stain of body secretions
  18. Urinalysis
  19. Diagnostic and therapeutic bronchoscopy, including brush and sheath brush
  20. Application and use of pneumatic anti-shock garments
  21. Renal support: peritoneal dialysis
- S. Desirable Skills:
1. Vascular access: permanent vascular access catheters
  2. Diagnostic and therapeutic bronchoscopy, transbronchial biopsy, transthoracic needle, and bronchoalveolar lavage
  3. Renal support: continuous hemofiltration, hemoperfusion, and hemodialysis
  4. Intra-aortic balloon counter-pulsation
  5. Plasmapheresis
- T. Research in Critical Care Medicine





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