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Saudi Commission for Health Specialties

Pediatric Critical Care Medicine

2018


بسم الله الرحمن الرحيم

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INTRODUCTION

Foreword

In this PICU curriculum, we are adopting the CanMEDS framework, as it is an innovative, competency-based framework that describes the core knowledge, skills, and attitude of physicians. This curriculum is intended to provide a broad framework for fellows and faculty to focus on teaching and learning as well as clinical experience and professional development during the training program. This does not intend to be the sole source of defining what is to be taught and learned during the fellowship training. Fellows are expected to acquire knowledge and skills as well as develop appropriate attitude and behaviour throughout their training program and take personal responsibility in learning. They must learn from every patient encounter whether or not that particular condition or disease is mentioned in this curriculum.

This curriculum is part of strategic planning of SCFHS to review and update the curricula of the training programs. The Saudi Commission for Health Specialties, as it is represented by The Scientific Board, Paediatric Intensive Care Fellowship Committee, and Central Accreditation Committee are committed to providing full support for the implementation of the curriculum by way of allocating necessary resources, providing faculty development, and establishing a monitoring system. Further reinforcements and continuous quality improvement process through feedback from fellows, trainers and program directors and site visits will be done by the Central Accreditation Committee and The Paediatric Intensive Care Board Committee.

CONTEXT OF PRACTICE

Historical background

The Saudi population is a rapidly growing population with 30% below the age of 14 years. Health services for the pediatric population have expanded to match the needs for the fast population growth. The pediatric residency program was one of the earliest training program established under the umbrella of the Saudi Commission for Health Specialties. Furthermore, pediatrics subspecialties emerged to reach 13 subspecialties in 2014.

The pediatric ICU and the specialty of pediatric critical care medicine were born from the need to care for the growing number of critically ill children. Pediatric Intensive Care is a multidisciplinary subspecialty crossing the boundaries with various pediatric subspecialties. It started in the 1960s and kept growing since then in North America and Europe[1]. A similar momentum of growth of the specialty in Saudi Arabia has been observed where pediatric intensive care practice started in the major governmental and university hospitals in the mid 1980's. A better understanding of the underlying pathophysiology and treatment of critical illnesses, the developments related to the postoperative care of children, especially post cardiac surgery, the advance in the technologies used in monitoring and treatment, and the growth in the field of pediatric sedation and pain management have improved the outcome of critically ill patients.

The concept of the multidisciplinary team in PICU was crucial to enhance the standard of patient care. The intensivist is the leader of a multidisciplinary team that includes other subspecialists, nurses, respiratory therapists, clinical pharmacists, dietitians, psychologists, social workers, physiotherapists, occupational therapists, and religious officers. The need for a formal training in Pediatric Critical Care became obvious. The intensivist synchronizes complex and elaborate treatment plans with many specialists towards a better care of critically ill children.

The Society of Critical Care Medicine in the USA describes the intensivist as a qualified critical care practitioner who is physically available in the PICU "without competing obligations and possesses knowledge, skill, judgement, attitude and compassion acquired through training, experience and focus to achieve the best outcome for patients suffering from critical illness and injury"(4).

With the increase demands for critical care services for sick children and the need for formally trained intensivist, the existing PICU curriculum for training pediatric residents in PICU was developed in 2002. Two centers in Riyadh were accredited in the beginning. Three other centers from Riyadh joined in 2008. In 2013, one center from Jeddah was accredited. At present, 60 fellows from various regions of the kingdom and gulf countries have graduated from the program. The Saudi Critical Care Society (SCCS) was established in 2008 with the inception of the Pediatric chapter in 2010. The SCCS conducts regularly courses and workshop to train fellows and to strengthen the skills of intensivist. It also annually an international symposium to discuss the most recent updates in the specialties.

To further emphasize the importance of training pediatric intensivists, it has been reported in the literature that the survival of critically ill children has improved in a pediatric ICU with an intensivist. Moreover, the risk of dying was reduced in a pediatric ICU with a critical care fellowship program versus a pediatric ICU without a critical care fellowship program[2, 3].

Scope of practice

The PICU fellowship program in the Saudi Commission for Health Specialties is committed to:

1. Provide acute care for the critically ill children from early infancy till 14 years of age
2. Provide care for critically ill children with acute and life threatening medical and surgical illness
3. Monitor post-surgical and transplant patients
4. Train intensivists who will be safe, competent, compassionate, and humane in treating children with critical illness

Current Challenges

The pediatric intensive care specialty is challenging and demanding. The PICU is a closed unit with multiple disciplines. The intensivist works long hours and is physically available round the clock dealing with various stresses in a closed unit. Those stresses include dealing with the critically ill child and his/her family, orchestrating the various health professionals of the PICU team, dealing with rapidly evolving technologies, and allocating resources. Those stresses are contributing factors that lead the "burnout" syndrome and the poor marketing of the professions. Breaking bad news is a further additive stress that the intensivist has to deal with. The paucity of well trained nurses and respiratory therapists, who might suffer from the burnout syndrome, is an ongoing challenge in PICU. Stress coping strategies and improving communication skills in the intensivist help overcoming those challenges.

Ethical challenges result from the scarce costly resources and the necessity to distribute them appropriately, end of life care, and futility of treatment. Amid this busy and stressful profession, the need for research and conducting clinical trials is an added challenge. In comparison to adult ICU, the literature has fewer clinical therapeutic trials in critically ill children.

Options of Carrier Paths

The intensivist is an enthusiastic and dedicated professional who aspires for continuous self-improvement and continuous learning throughout his career. Options for career development include academic involvement, clinical and laboratory research, quality and safety contribution, simulation based teaching, integrated palliative care service, administrative involvement.

Future Directions

The rapid expansion of the intensive care specialty has improved the outcome of critically ill children. Future subspecialties in the field of PICU will further improve the outcome. Such subspecialties may include: cardiac, neuro, trauma and burns, transplant, oncology, and renal ICU.

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DIFFERENCES BETWEEN PROPOSED AND EXISTING CURRICULA

The PICU fellowship program is a well-structured hospital-based clinical program. The program incorporates education in basic sciences, technical skills training, clinical bedside teaching, and acquisition of research skills. It teaches the trainee how to integrate basic sciences in understanding the pathophysiology of diseases and providing optimal care. It also teaches the trainee how to become a self-disciplined and responsible physician. This updated curriculum includes major changes as the following:
a-Expanding the program to become of three years' duration.
b-Adapting to competency based module
c-Updating assessment section to comply with the new regulations of formative assessment.

Criteria for enrolment

Please refer to the updated executive policy of SCFHS on admission and registration.
Website: www.scfhs.org.sa

Graded responsibility for fellows

Two-Year Curriculum

First Year Fellows F1
1-Round every morning on all patients. 2-Join the consultant round. 3-Attend the handover rounds. 4-Do the call duties as per monthly rota. 5-Distribute patients among the residents. 6-Provide consultations to other services in the hospital. 7-Maintain a log book for all procedures performed. 8-Document assessment and plan of management in the medical records daily. 9-Document procedures in the medical record. 10-Document any change in the patient's clinical condition. 11-Write a social note after counselling the family. 12-Participate in educational and academic activities in the department 13-Participate in a quality project in the department
Second Year Fellows F2
1-Round every morning on all patients. 2-Join the consultant round. 3-**Lead the round once weekly.** 4-Attend the handover rounds 5-Do the call duties as per monthly rota 6-**Distribute patients among the fellows** 7-Maintain a log book for all procedures performed 8-Provide consultations to other services in the hospital. 9-Document assessment and plan of management in the medical records daily. 10-Document procedures in the medical record. 11-Document any change in the patient's clinical condition. 12-Write a social note after counselling the family. 13-**Supervise junior fellows and rotating residents in the unit** 14-Participate in the educational and academic activities in the department. 15-**Perform clinical research/quality projects supervised by senior staff**

Approved New Curriculum

Three-year hospital-based clinical and research program

Third Year Fellow F3
1-Round every morning on all patients.
2-Join the consultant round.
3-**Lead the round twice weekly**
4-Attend the handover rounds
5-Do the call duties as per monthly rota
6-Provide consultations to other services in the hospital.
7-Maintain a log book for all procedures performed
8-Document his assessment and plan of management in the medical records daily.
9-Document procedures in the medical record.
10-Document any change in the patient's clinical condition.
11-Write a social note after counselling the family.
12-**Prepare the call schedule**
13-**Supervise junior fellows and rotating residents in the unit**
14-Participate in the educational and academic activities in the department.
15-**Perform clinical research/quality projects supervised by senior staff**
16-**Publish a research paper**
17-**Shares administrative responsibilities**
18-**Writes policies and procedures**

Hospital Program Director Responsibilities

- Coordination of the fellowship program
- Planning the rotations of the fellows
- Planning the educational activities of the fellow
- Supervising the research process of the fellows
- Receiving the In-Training Evaluation Reports of fellows after each clinical rotation, and reporting to the SCFHS scientific committee every three (3) months
- Reporting any concerns about the performance of the fellows to the SCFHS scientific committee of the fellowship.
- Approval of fellow's admission to the promotion exam.
- Counseling when needed with fellows, at least once a month and more frequently whenever possible

Hospital Teaching Staff Responsibilities

- Supervising and teaching fellows during their clinical rotations
- Teaching and debriefing the fellows regarding to their level of performance
- Mentoring the fellows
- Supervising the research projects of the fellows

Scientific Committee Responsibilities

- The Scientific Committee will supervise and guide the fellowship program
- The Scientific Committee sets educational standards for the training and certification of candidates
- The Scientific Committee coordinates with the examination committee to prepare end-of-year OSCE, final oral and written examinations for candidate fellows
- The Scientific Committee will review the evaluation of In-Training Evaluation Reports every three months.
- The Scientific Committee develops reference practice guidelines that can be adopted and modified by local hospitals as needed to promote a unified standard of care within KSA
- The committee members will appoint a chairperson by majority vote
- The members of the committee will be the fellowship program directors of their respective hospitals

Core Curriculum

Three-year hospital based clinical and research Program

	First Year	Second Year	Third Year
Rotations			
Pediatric Intensive Care	8 months	7 months	3 months
Pediatric Cardiac Intensive Care	1	2	1
Anesthesia	1		
Elective ICU related	1		
Elective		1	1
Research		1	6
Vacation	1	1	1
Total	12 months	12 months	12 months

Description of the Three-Year Fellowship Program

Core Rotations

1-Pediatric Intensive Care Unit

- Fellows will spend eighteen months in PICU
  - 8 months in the first year
  - 7 months in the second year
  - 3 months in the third year
- Fellows will care for children with critical medical conditions
- Fellows will care for children with critical surgical conditions

2-Pedatric Cardiac Intensive Care

- Fellows will spend four months in Pediatric Cardiac Intensive Care
  - 1 month in the first year
  - 2 months in the second year
  - 1 month in the third year

- Fellows will care for children with critical cardiac conditions
- Fellows will manage the preoperative cardiac patients
- Fellows will manage the postoperative cardiac patients

3-Anesthesia

- Fellows will spend one month in anesthesia during the first year
- Fellows will demonstrate skills in:
  - Airway management
  - Laryngeal mask use
  - Bag-mask ventilation
  - Endotracheal intubation
  - Capnography
  - Inhaled anesthesia use

4-Research

- Fellows will spend 7 months in research
  - 1month in the second year
  - 6 months in the third year
- Second year fellow (F2) should:
  - Formulate a research question
  - Develop a research proposal
  - Submit the proposal to IRB
- Third year fellow(F3) should:
  - Collect data
  - Analyze data Statistically
  - Write manuscript
  - Present his research project in national or international meetings.

Elective Rotations

Elective rotations allow fellows to gain experience and improve skills in an area of ICU interest. The elective rotation should be spent in a training program accredited by the SCFHS

1-Elective ICU Rotations

- Fellows will spend one month during the first year in one of the following:
  - Neonatal Intensive Care Unit, NICU
  - Emergency room department
  - Adult General Intensive Care Unit
  - Any other PICU

2-Elective Rotations

- Fellows will have two months of elective
  - 1 month during the second year
  - 1 month during the third year
- The elective should be relevant to the Pediatric ICU specialty

Independent Learning within a Formal Structure

Pediatric Advanced Life Support Course (PALS) Instructor.
Pediatric Fundamental critical care Support) course.
Neonatal and pediatric mechanical ventilation course.
Difficult airway management course.
Ultrasound applications in PICU.
Boot simulation camp.
Research methodology course.
Evidence-based medicine course.
Advanced Trauma Life Support course (ATLS- optional).

Expanded Range of Competencies

Leading round with multi-disciplinary team.
Teaching and supervising residents.
Directing Journal Club.
Presenting academic topic in national and international conferences.
Instructing in different courses e.g. PALS, PFCCS.
Organizing case conference meeting for complex cases.
Participating in Morbidity Discussion.
Participating in Mortality Discussion.
Team leader for quality performance indicator

Profile of the Practice

Evidence Based Approach

Demographic Data
The challenging disease processes most encountered in Pediatric Intensive Care where great progress has been made include:

I-Respiratory
1-Acute respiratory distress syndrome
2-Bronchiolitis
3-Pneumonia
4-Laryngotracheobronchitis
5-Neuromuscula weakness
6-Sickle cell acute chest syndrome
7-Status asthmaticus
8-Pleural effusion and empyema
9-Postoperative care following tracheostomy

II-Cardiovascular
1-Shock: hypovolemic, distributive, obstructive, neurogenic, and cardiogenic
2-Cardiorespiratory arrest
3-Myocarditis and cardiomyopathy
4-Congenital heart disease
5-Postoperative cardiac surgery

III-Neuromuscular
1-Seizures and status epilepticus
2-Meningitis and encephalitis
3-Spinal muscular atrophy
4-Guillain-Barre syndrome
5-Intracranial hypertension
6-Stroke due to sickle cell disease
7-Postoperative care after tumor resection or ventriculoperitoneal shunt insertion

IV-Fluids and electrolytes disturbances
1-Acute kidney injury
2-Critical abnormalities of sodium, potassium, calcium, phosphate, and magnesium

V-Gastrointestinal
1-Gastritestinal bleeding
2-Acute hepatic failure

VI-Hematology and oncology
1-Sickle cell crisis
2-Tumor lysis syndrome

VII-Endocrine and metabolism
1-Diabetic ketoacidosis
2-Metabolic crisis
3-Diabetes insipidus

VIII-Trauma and burns
1-Non accidental trauma
2-Accidental:
- Traumatic brain injury
- Torso-trauma
- Drowning
- Inhalation injury

IX-Poisoning
IX-Perioperative transplantation management

Practice Data
The advances in the therapeutic technologies include:
1-Airway management
2-Mechanical ventilation
- Invasive
- Non-invasive
- Non- conventional

2-Continuous Renal Replacement Therapy
3-Central venous lines insertion
4-Central and peripheral arterial lines insertion
5-Ultrasound guided procedures
6-Chest tube insertion

7-Pleural tap
8-Abdominal tap
9-Extracorporeal membrane oxygenation

Patient Profile
Critically ill inpatients in wards, emergency department, PICU, other ICUs, post-operative patients.

Catered Towards Future Needs
Support for CODE BLUE team
Support for Rapid Response team

Holistic Assessment

	Two-year Curriculum 2002- 2016	Three-Year Curriculum
Assessment		
Rotation evaluation	Fellow level - 1,2	Fellow level - 1,2,3
Quarterly Assessment	Fellow level - 1,2	Fellow level - 1,2,3
Structured Oral assessment		Fellow level - 1,2
Log-book		Fellow level - 1,2
Multidisciplinary Critical Care Knowledge Assessment program (MCCKAP)		Fellow level - 1,2,3
End of year written Exam	Fellow level - 1,2	Fellow level - 1,2
Saudi PICU fellowship Board Certifying Exam	Fellow level -2	Fellow level - 3
End year OSCE Exam	Fellow level -2	Fellow level - 3
Research		Fellow level 2-3
Specific Academic Task		Fellow level -3

OUTCOMES AND COMPETENCIES

Rationale

The rationale of the three-year PICU fellowship program is to ensure the training of safe and competent intensivist in the care of the critically ill child and to maintain a standard of excellence in Saudi Arabia and the Gulf countries.

Overall Goal

The aim of the Pediatric Intensive Care Fellowship Program is to provide the fellow with knowledge, skills, and attitudes to manage critically ill children. The program will emphasize on the importance of professionalism, clinical ethics, and advanced communication skills for the intensivist. It will, also, teach the fellow how to conduct research and develop into an academician.

Learning Outcomes

Educational Objectives of the Program

1. The three-year fellowship program is intended to prepare candidates to practice independently as experts in the field.
2. Upon successful completion of the program, fellows will master and apply the principles, knowledge, skills, and ethics of Pediatric Intensive Care discipline.
3. Upon successful completion of the program, fellows must exhibit the Royal College of Physicians and Surgeons of Canada CanMEDS competencies.

Core Rotations

Role#1: Medical Expert

A. Pediatric Intensive Care Rotation

I. Cardiopulmonary Resuscitation

Fellows must acquire knowledge of the underlying pathophysiology of cardiopulmonary arrest in children and the skills to resuscitate patients.

1. Science of cardiopulmonary resuscitation
2. Epidemiology of Pediatric Cardiopulmonary arrest
3. Physiologic foundations of cardiopulmonary resuscitation
4. Performance of cardiopulmonary resuscitation in children and infants
   a. Circulation and chest compression
   b. Airway
   c. Breathing
5. Pharmacotherapy
6. Post resuscitation management
7. Other considerations
   a. CPR quality
   b. Extracorporeal cardiopulmonary resuscitation

II. Monitoring

Fellows must be skilful and confident in the use, interpretation, and troubleshooting of monitoring.

1. Principles of monitoring
   a. Utilization, zeroing, and calibration of transducers
   b. Trouble shooting equipment
2. Indications for monitoring
3. Non-invasive monitoring
   a. Vital signs
   b. Capnography and capnometry
   c. Pulse oximetry
   d. Near infrared spectroscopy
   e. Bispectral index spectrometry
   f. Continuous electroencephalogram
   g. Cardiac output measurement
4. Invasive monitoring
   a. Blood pressure monitoring
   b. Central venous pressure monitoring
   c. Intracranial pressure monitoring
   d. Intraabdominal pressure monitoring
   e. Cardiac output measurement
5. Ultrasound hemodynamic monitoring
6. ICU Hemodynamic Laboratory
   a. Blood gas analysis
   b. Calculation of oxygen content, oxygenation index, alveolar-arterial gradients, P/F ratio, oxygen transport, oxygen consumption
   c. Calculation of systemic and pulmonary vascular resistance, and intrapulmonary shunt

III. Skills and Procedures

Fellows must be skilled and well-trained in performing the following procedures as well as recognise the indications, contraindications, complications, and pitfalls of these interventions.

1. Airway Management
   a. Maintaining airway
   b. Laryngeal mask airway insertion
   c. Endotracheal intubation
   d. Use of video-assisted laryngoscopy
2. Breathing and ventilation
   a. Use of oxygen delivery systems
   b. Bag-mask ventilation
   c. Pulse oximetry
   d. Suction techniques
   e. Chest physiotherapy and incentive spirometry
   f. Fiberoptic laryngotracheo bronchoscopy
   g. Monitoring of airway pressures
   h. Measurement of endotracheal tube cuff pressures
   i. Mechanical ventilation
   j. Operation of mechanical ventilators
   k. Weaning techniques
   l. Management of pneumothorax (needle and chest tube insertion drainage systems)

m. Management of pleural effusion (needle and chest tube insertion drainage systems)
n. Interpretation of sputum cultures by smear
o. Principles of performing percutaneous tracheostomy
p. Extracorporeal membrane oxygenation

3. Circulation
   a. Arterial puncture and blood sampling
   b. Intraosseous insertion
   c. Insertion of central lines
      1. Femoral, Internal jugular, Subclavian
      2. Arterial
   d. Hemodialysis line insertion
   e. Ultrasound guided procedures
   f. Ultrasound goal directed therapy
   g. Synchronised cardioversion/defibrillation
   h. Cardiac output estimates by thermodilution techniques
   i. Application of non-invasive cardiovascular monitoring
   j. Pericardiocentesis
   k. Use of infusion pumps for vasoactive drugs
   l. Infusion of inotropes, vasodilators, inodilators
4. Central Nervous System
   a. Lumbar puncture
   b. Intracranial pressure monitoring
   c. Monitoring and interpretation of modified EEG
   d. Application of hypothermia
5. Renal
   a. Management of peritoneal dialysis
   b. Management of renal replacement therapy
6. GI tract
   a. Peritoneal tap
7. Infection
   a. ICU sterility techniques and precautions
   b. Sampling and staining of blood, sputum, urine, and other body fluids
   c. Interpretation of laboratory results
   d. Interpretation of antibiotic levels and sensitivities

IV. Respiratory System

The fellow should acquire knowledge in the pathophysiology, anatomy, and the diseases involving the respiratory system.

1. Anatomic considerations of the upper respiratory system
2. Respiratory monitoring
3. Physiology of the respiratory system
4. Pharmacology of the respiratory system
5. Airway Management
6. Upper Airway Disease
   a. Anatomic abnormalities
      - Congenital
      - Acquired
   b. Infections and inflammation
   c. Foreign body aspiration
   d. Post-operative care

7. Lower Airway Disease
    a. Pneumonia and bronchiolitis
    b. Status asthmaticus
    c. Pediatric Acute Respiratory Distress Syndrome
    d. Acute chest syndrome
    e. Empyema
    f. Pulmonary hemorrahage
    g. Pneumothorax
    h. Foreign body aspiration
    i. Pneumonitis
    j. Interstitial parenchymal lung disease
8. Neonatal respiratory diseases
9. Apparent Life Threatening Event
10. Non pulmonary conditions associated with respiratory diseases
11. Acute respiratory failure
12. Chronic respiratory failure
13. Pulmonary hypertension

V. Mechanical Ventilation

The fellow should apply and demonstrate skills in applying different modes of mechanical ventilation

1. Principles of mechanical ventilation
2. Applied physiology
3. Respiratory mechanics
4. Indications for intubation
5. Indications for mechanical ventilation
6. Interpretation of arterial blood gas
7. Weaning and extubation
8. Modes of mechanical ventilation
9. Waveform interpretations
10. Conventional mechanical ventilation
    a. Invasive
    b. Non invasive
11. High Frequency Oscillatory Ventilation
12. Other new modalities of mechanical ventilation
13. Respiratory dynamics
14. Ventilator Induced Lung Injury
15. Complications of mechanical ventilation
16. Home mechanical ventilation

VI. Cardiovascular System

The fellow should acquire knowledge in the pathophysiology, anatomy, and the diseases involving the cardiovascular system.

1. Anatomic considerations of the cardiovascular system
2. Physiology of the cardiovascular system
3. Pathophysiology of congenital heart diseases
4. Cardiopulmonary interactions
5. Monitoring of the cardiovascular system
6. Pharmacology of the cardiovascular system

7. Congestive heart failure
8. Cardiomyopathies
9. Myocarditis
10. Rhythm disturbances
11. Hypertension

VII. Shock

The fellow should acquire knowledge in the pathophysiology, the various types of shock and its management.

1. Pathophysiology of shock
2. Systemic inflammatory response syndrome
3. Biochemical makers in shock
4. Definition of sepsis and septic shock
5. Classification of shock
   a. Hypovolemic
   b. Obstructive
   c. Distributive
   d. Cardiogenic
6. Septic shock
7. Management of shock
8. Reperfusion injury
9. Multiorgan dysfunction syndrome
10. Pharmacology of shock

VIII. Central Nervous System

The fellow should acquire knowledge in the pathophysiology, anatomy, and the diseases involving the central nervous system.

1. Anatomic considerations of the central nervous system
2. Neurophysiology
3. Neuromonitoring
4. Neuroradiology
5. Neuropharmacology
6. Physiology and management of intracranial hypertension
7. Space occupying lesions
8. Meningitis and encephalitis
9. Infected/obstructed ventriculoperitoneal shunt
10. Hypoxic-ischemic encephalopathy
11. Status epilepticus
12. Coma
13. Metabolic encephalopathies
14. Neuromuscular disease
15. Stroke
16. Brain death
17. Intracranial haemorrhage
18. Critical illness neuropathy
19. Critical illness myopathy

IX. Renal System

The fellow should acquire knowledge in the pathophysiology, anatomy, and the diseases involving the renal system.

1. Anatomic considerations of the renal system
2. Physiology of the renal system
3. Monitoring of the renal system
4. Pharmacology of the renal system
5. Acid-base disorders
6. Dysnatremias
7. Acute kidney injury
8. Chronic renal failure
9. Hypertension
10. Renal replacement therapy
11. Peritoneal dialysis
12. Hemodialysis

X. Fluids and electrolytes

The fellow should discuss the physiology of fluids and electrolytes and it application in critically ill children

1. Body fluid composition
2. Fluids requirements
3. Fluid balance
4. Dysnatremias
5. Disorders of potassium metabolism
6. Disorders of calcium metabolism
7. Disorders of magnesium metabolism

XI. Endocrine and metabolic disorders

The fellow should acquire knowledge in the pathophysiology, anatomy, and the diseases involving the endocrine system and inborn errors of metabolism.

1. Anatomic considerations of the endocrine system
2. Physiology of the endocrine system
3. Pharmacology of the endocrine system
4. Pathophysiology of inborn errors of metabolism
5. Pharmacology of inborn errors of metabolism
6. Diabetic ketoacidosis
7. Diabetes insipidus
8. Syndrome of inappropriate ADH secretion
9. Cerebral salt wasting syndrome
10. Adrenal crisis
11. Thyroid crisis
12. Hyperammonemia
13. Metabolic crisis

XII. Gastrointestinal System

The fellow should acquire knowledge in the pathophysiology, anatomy, and the diseases involving the gastrointestinal system.

1. Anatomic considerations of the gastrointestinal system
2. Physiology of the gastrointestinal system

3. Monitoring of the gastrointestinal system
4. Pharmacology of the gastrointestinal system
5. Abdominal compartment syndrome
6. Gastrointestinal bleeding
7. Acute hepatic failure
8. Hepatic encephalopathy
9. Chronic liver failure
10. Pancreatitis
11. Corrosive injury to the esophagus
12. Gastroesophageal Reflux Disease

XIII. Nutrition

The fellow should acquire knowledge in the importance of feeding and nutritional assessment of the critically ill child.

1. Nutritional assessment
2. Nutritional requirements
3. Assessing energy expenditure in PICU
4. Metabolic consequences of the stress response
5. Malnutrition in the critically ill child
6. Enteral nutrition
7. Parenteral nutrition
8. Refeeding syndrome

XIV. Hematology and Oncology

The fellow should acquire knowledge in the hematologic and oncologic emergencies

1. Anatomic considerations of the hematopoietic system
2. Physiology of the hematopoietic system
3. Pharmacology of the hematopoietic system
4. Massive blood transfusion
5. Transfusion associated lung injury
6. Hemoglobinopathies
7. Coagulation disorders
8. Thrombosis in PICU
9. Hemophagocytic lymphohistiocytosis
10. Tumor lysis syndrome
11. Mediastinal masses
12. Typhlytis
13. Radiation injury

XV. Infections in PICU

The fellow should acquire knowledge in the common infections affecting the critically ill child.

1. Infection prevention/control
2. Intervention bundles
3. Hand hygiene

XVI. Immunology in PICU

The fellow should acquire knowledge in the immunology of the critically ill child and the diseases affecting the immune system.

1. Anatomical considerations of the immune system
2. Pathophysiology of the immune system

3. Pharmacology of the immune system
4. Congenital immunodeficiency
5. Acquired immunodeficiency
6. Autoimmune disorders
7. Vasculitis
8. Diagnostic methods
9. Therapeutic modalities

XVII. Trauma and Burns

The fellow should be knowledgeable and well-trained in the management of trauma and burns.

1. Trauma resuscitation
2. Traumatic brain injury
3. Thoracic injuries
4. Abdominal injuries
5. Spinal cord injury
6. Non accidental injury
7. Drowning
8. Inhalation and smoke injuries
9. Burns
10. Thermal injury
11. Electrical injury
12. Rhabdomyolysis

XVIII. Sedation and Analgesia

The fellow should be knowledgeable in the use and the side effects of sedatives and analgesics.

1. Sedation assessment
2. Sedation scores
3. Pain assessment
4. Pain scores
5. Pharmacokinetics of sedatives and analgesics
6. Pharmacodynamics of sedatives and analgesics
7. Delirium
8. Side effects
9. Withdrawal from sedatives and analgesics

XIX. Toxins and Poisoning

The fellow should be knowledgeable in the clinical presentation of various toxidromes and their management.

1. Toxidromes
2. Common toxins involved
3. Laboratory tests
4. Toxicology screen
5. Principles of treatment
6. Specific treatment
7. Scorpion sting
8. Snake bite

XX. Palliative care

Pediatric palliative care is a rapidly growing speciality. Palliative care starts from the admission, during the stay in PICU, and beyond PICU. The fellow should evaluate and alleviate the child's physical, psychological, and social distress. The fellow should comprehend:

1. The necessity of the presence of parents and caregivers at the bedside of the dying patient
2. Values, wishes, and beliefs of parents or guardians
3. Importance of Communication skills
4. Importance of debriefing the PICU team
5. Pharmacologic management of symptoms at end-of-life
6. Withholding and withdrawing ICU interventions
7. Multidisciplinary team involvement and support
8. The delivery of palliative care as:
    a. Integrated service
    b. Consultation service

XXI. Rehabilitation and Home Health Care

The fellow should be able to identify children who will need rehabilitation and provide developmentally appropriate and family-inclusive interventions. Rehabilitation will start in PICU and will continue beyond PICU at home and at school to improve the quality of life of children discharged from PIU. The fellow should discuss the importance of:

1. Maximising patient's function and independency
2. Planning discharge to home or rehabilitation facilities
3. Palliative service consultation
4. Home health care services consultation
5. The involvement of a multidisciplinary team
6. The involvement of the family in rehabilitation
7. Prevention and treatment of physical clinical complications
    a. Bed ulcers
    b. Muscle wasting
    c. Musculoskeletal contractures
    d. Disuse osteopenia
    e. Thromboembolism events
    f. Complications of intubation and tracheostomy
    g. Complications of long-term mechanical ventilation
    h. Swallowing incoordination
8. Prevention and treatment of psychological complications
    a. Post- traumatic stress disorder
    b. Delirium
    c. Depression
9. Prevention and treatment of cognitive complications
    a. Learning disabilities
    b. Speech disability
    c. Special senses
10. Enrolment in special rehabilitation program individualised to each patient

XXII. Simulation training and Team Dynamics

The fellow should recognise the importance of simulation training and its effects on improved patient care.

1. Standardized patients
2. High-technology mannequins

3. Virtual simulation
4. Simulation scenarios
5. Teamwork dynamics

XXIII. Ethics

The PICU fellow is likely to face ethically challenging situations on a regular basis. Medical ethics is the discipline devoted to the identification, analysis, and resolution of value-based problems in patient's care.

1. Medical ethics principles
    a. Autonomy
    b. Beneficence
    c. Non maleficence
    d. Justice
2. Goal of therapy
    a. Cure
    b. Care
    c. Comfort
3. Family-centred care
    - Preparing for and responding to death
        - Anticipating loss
        - Cultural context of death and dying
        - Shared decision of end-of-life care
        - Parental presence
        - Follow up meetings
4. Clinical ethics
    a. Informed consent
    b. Refusal of treatment
    c. End of life care
    d. Futility of care
    e. Brain death
    f. Organ donation
5. Ethics and law

XXIV. Transport

The fellow should recognise the importance of transport on improving patient's outcome and demonstrate the skills of safe transport.

1. Physiology relevant to transport medicine
2. Transport team dynamics
3. Transport team responsibilities
4. Communication between
    a. Team members
    b. Referring hospitals and receiving hospitals
5. Adequate training of team members
6. Availability of optimal transport equipment
7. Safety of transport

XXV. Quality and safety
The domains of quality in PICU are: safety, effectiveness, patient-centeredness, efficiency.

A- Severity-of-illness scores
The fellow should recognise the use, application, and interpretation of severity-of-illness scores. The severity-of-illness scores assist in population stratification based on disease burden.
1. Severity-of-illness scores can be used for:
   a. Better understanding of clinical performance and resource allocations
   b. Providing guidance for quality improvement activities
   c. Adjusting for case-mix differences in clinical research and comparative benchmarking
2. Standardized ratios can be used for outcomes of:
   a. Mortality
   b. Length of stay
   c. Infection rates
   d. Quality outcome

B- Safety in PICU
1. The fellow should describe the importance of safety in PICU which includes:
   a. Risk identification
   b. Risk analysis
   c. Risk reduction
2. The fellow should discuss safety measures concerning
   a. Patient
   b. Health information system
   c. Environment
   d. Health care workers
3. The fellow should discuss
   a. How to prevent medical errors
   b. How to differentiate medical errors
      1. Human errors
      2. System errors
   c. How to handle medical errors
   d. How to disclose medical errors

C- Continuous quality improvement
The fellow should discuss
1. Outcome measures
2. Quality performance indicators
3. Mortality and morbidity meetings

XXVI. Surgery
The fellow should describe the preoperative and postoperative management in the following specialities.
1. Pediatric surgery
2. Thoracic surgery
3. Neurosurgery
4. ENT and airway surgery
5. Urology
6. Trauma surgery

7. Spinal surgery
8. Plastic surgery
9. Burns
10. Orthopedic surgery

XXVII. Rapid Response Team

The fellow should recognise the importance of the rapid response team in early recognition and management of the sick child in the pediatric wards.

1. Rapid response team dynamics
2. Rapid response team responsibilities
3. Communication between afferent and efferent limbs
4. Communication with the family
5. Adequate training of team members
6. Availability of equipment
7. Outcome measures

XXVIII. Organ Donation and Transplantation

The fellow should discuss the importance of organ donation and the management of the transplanted patients

1. Brain death criteria
2. Cadaveric organ transplantation
3. Living-related transplantation
4. Non-living related transplantation
5. Solid organ transplantation
    a. Liver
    b. Kidney
    c. Heart
    d. Lungs
    e. Intestines
    f. Others
6. Bone marrow transplantation
7. Stem cells transplantations
8. Management protocols
9. Saudi centre for organ transplantation (SCOT)

XXIX. Pharmacology

The fellow should apply the principles of pharmacology to patient care.

1. Pharmacodynamics
2. Pharmacokinetics
3. Drug metabolism
4. Drug monitoring
5. Drug toxicity
6. Dose adjustment for organ dysfunction
7. Application to pediatric intensive care
    a. Benzodiazepines
    b. Barbiturates
    c. Opioids
    d. Ketamine
    e. Dexmedetomidine
    f. Propofol

g. Neuromuscular blockers
h. Sympathomimetics
i. Vasodilators
j. Inodilators
k. Steroids

XXX. Information Technology

The fellow should be aware of the rapidly developing digital technology

1. Electronic health records
   a. Data acquisition
   b. Data access
   c. Data storage
   d. Use of clinical data registries for research
2. Telemedicine
3. Virtual PICU

The fellow should be aware of the potential drawbacks of digital technology

1. Breach to confidentiality
2. Overdependence on technology
3. Reduction of face to face communication
4. Potential increase in human errors

XXXI. Impact of PICU

Excellence in PICU is achieved through a combination of many factors and is dependent on a healthy work environment. The fellow will recognise the impact of PICU admission on the family, community, and society.

1. Family-centred care:
   - Parental anxiety
   - Endorsement parents as capable to deliver care to their children
   - Sharing goals and wishes for the good of the child
   - Early planning for discharge that include counselling, teaching, and training of the family.
2. Patient-centred care
   - Anxiety/fear at different ages
   - Separation anxiety
   - Post-traumatic stress disorders
   - Withdrawal and delirium
   - Reintegration into the family
   - Reintegration into schooling
   - Need for special care
3. Impact on PICU team
   - Increase likelihood of medical error
   - Grief experiences
   - Burnout
   - Self-care strategies

B. Cardiac Intensive Care Rotation

Role#1: Medical Expert
The fellow should acquire knowledge in the pathophysiology, anatomy, and management of the diseases involving the cardiovascular system.

1. Anatomic considerations of the cardiovascular system
2. Physiology of the cardiovascular system
3. Physiology of the fetal circulation
4. Cardiopulmonary interactions
5. Principles of invasive and non-invasive hemodynamic monitoring
6. Pharmacology of the cardiovascular system
7. Advanced CPR
8. Interpretation of electrocardiogram
9. Congenital heart diseases
    a. Anatomy
    b. Physiology
    c. Preoperative management
    d. Postoperative management
    e. Postoperative complications
    f. Palliative surgery
10. Congestive heart failure
11. Pulmonary edema
12. Cardiomyopathies
13. Cardiac tamponade
14. Cardiac arrhythmias
    a. Pathophysiology
    b. Pharmacology
    c. Electrical therapy
    d. Pacemakers and the indications for and applications of the various modes of temporary pacing
15. Pericardiocentesis with supervision
16. Mechanical ventilation of the cardiac patients
17. Extracorporeal life support
18. Neurologic risk stratification during cardiopulmonary bypass procedures
19. Current indications and recommendations for SBE prophylaxis
20. Cardiac transplantation
21. Transportation of the child with congenital heart disease

C. Anesthesia Rotation

Role#1: Medical expert
The fellows will recpgnise the anatomic, physiologic, pharmacologic, and psychological concepts in relation to anesthesia practice.

1. The Respiratory System
    - Anatomic differences of the neonate and pediatric airway
    - Age differences in control of respiration, compliance, lung volumes, oxygen consumption
2. The Cardiovascular System
    - Anatomy and physiology of transitional circulation
    - Maturation of the myocardium and autonomic nervous system

3. The Central Nervous System
   - Age differences: intracranial pressure, cerebral blood flow, autoregulation
4. The Genitourinary System
   - Renal Maturation
   - Fluids & electrolytes, maintenance requirements, hydration assessment
5. The Gastrointestinal/Hepatic System
   - Feeding, fasting guidelines, glucose control
   - Maturation of hepatic function
6. The hematological System
   - Normal values in infants and children
   - Natural history of fetal hemoglobin
   - Blood component therapy
7. Thermoregulation
   - Body surface area and heat loss
   - Differences and ability to thermoregulate
   - Heat loss & prevention
   - Malignant hyperthermia
8. Psychological Issues
   - Anxiety/fear at different ages
   - Separation anxiety and parental anxiety
   - Use of premeditations
9. Pharmacology
   - Pediatric induction techniques, inhalation, intravenous, sedation
   - Neuromuscular blockade
   - Age differences in: volume of distribution, pharmacokinetics, pharmacodynamics, and toxicity
10. Pain Management
11. Use of muscle relaxants
12. Anesthesia Equipment
    - Sizes of masks, endotracheal tubes, laryngeal mask airways, laryngoscopy blades, bronchoscopes, GlideScope
    - Vascular access and invasive monitoring
    - Warming devices

D. Research Rotation

Role#1: Medical Expert

The fellow should learn and discuss the principles of conducting research, reviewing the literature, writing a proposal, and publishing papers.

1. Identify research areas in pediatric intensive care
2. Perform critical review of the literature
3. Differentiate common statistical principles
4. Differentiate various research methods and designs and their application.
5. Discuss principles of research ethics on humans and animals.
6. Formulate research questions.
7. Write research proposals
8. Comply with the institutional review board(IRB)
9. Demonstrate knowledge of how to prepare protocols involved in hypothesis and observational research.

10. Discuss the process of organizing a laboratory research project.
11. Discuss the principles of evidence-based medicine techniques
12. Perform data collection
13. Prepare, organize, and analyze a data base.
14. Write manuscripts
15. Apply principles of publication ethics
16. Submit to internationally recognised journals
17. Learn how to apply for a grant
18. Recognise the importance of teamwork
    a. Supervisor
    b. Co-investigators
    c. Clinical research coordinator
    d. Statistician

E. Elective Intensive Care Rotation

1- Neonatal Intensive Care
Role#1: Medical expert
The fellow will acquire knowledge and skills related to the care of the critically ill neonate.
1. Sound knowledge in the principles of Perinatal-neonatal medicine.
2. The understanding of the physiology of common diseases of the premature and low-birth weight infants.
3. Recognition and management of common disorders in newborn infants
4. Recognition and management of rare disorders in newborn infants
5. Recognition and management of inherited disorders in newborn infants
6. Recognition and management of surgical conditions in newborn infants
7. Recognition and management of duct-dependent cardiac anomalies in newborn infants
8. Interpretation of relevant investigations
9. Acquisition of skills in various diagnostic and therapeutic procedures in NICU
10. Recognition and management of emergency situations
11. Acquisition of skills in procedures
    - Umbilical vein catheterisation
    - Umbilical artery catheterisation
    - Percutaneous intravenous catheterisation
    - Exchange transfusions
12. Performing neonatal CPR
13. Consultation to the delivery room for the high-risk deliveries.
14. Participating in neonatal transportation
15. Successful completion of the Neonatal Resuscitation Program (NRP)

2- Pediatric Emergency Room
Role#1: Medical expert
The fellow should demonstrate the skills in the management of the sick child in the emergency department
1. Early recognition, assessment, and management of medical emergencies
2. Early recognition, assessment, and management of surgical emergencies
3. Early recognition, assessment, and management of polytrauma
    - Recognize unique anatomic and physiologic features
    - Recognize mechanisms and patterns of injury features

- Discuss priorities in management
- Recognise the importance of thermal environment
- Evaluation and stabilization

4. Early recognition, assessment, and management of poisoning
5. Early recognition, assessment, and management of burns
6. Early recognition, assessment, and management of non-accidental injury
7. Cardiopulmonary resuscitation
8. Acquisition of skills in:
   - Maintaining airways
   - Rapid sequence intubation
   - Intravenous catheterisation
   - Intraosseous cannulation
   - Procedural sedation and analgesia
   - Wound management and suturing
   - Thoracentesis
   - Pericardiocentesis
9. Ultrasonography
   - Indications for use of ultrasonography for diagnostic emergencies and for guidance during procedures
   - Focused Assessment with Sonography in Trauma (FAST)
10. Triage of patients with major illness or injury
11. Transport of patients with major illness or injury
12. Discuss principles in providing emergency care in disasters, multi-casualty events, and mass gatherings
13. Recognize the special medicolegal problems
14. Discuss the natural history of illness or injuries
15. Discuss the social and family implication of illness or injury

3- Coronary Care Unit
Role#1 Medical Expert
The fellow should acquire knowledge and experience in the following domains:

1. 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.

2. Commonly used cardiac drugs, heparin, thrombolytics, and antiplatelet agents and their appropriate dosages.
3. Ani-fibrinolytic agents and their mechanism of action.
4. Commonly used vasodilators, vasoconstrictors, inotropic and lusitropic agents, their dosages and effects.
5. Commonly used antiarrhythmic agents.
6. Interpret ECGs for ischemia, infarction, arrhythmias, and paced rhythms.
7. Current indications and recommendations for SBE prophylaxis
8. The basic principles of applying an intra-aortic balloon pump as well as its indications and contraindications.

Adult Intensive Care Unit
Role#1 Medical Expert
The fellow should:

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. Become comfortable in the management of cardiac arrest and the acute resuscitation of a traumatized or acutely ill patient.
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.
11. Appropriately select and interpret laboratory, imaging, and pathologic studies used in the evaluation of pulmonary diseases.
12. 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.
13. Obtain and document informed consent from patients and explain the risks, benefits, and rationale for the options discussed.
14. Counsel patients concerning their diagnosis, planned diagnostic testing, and recommended therapies.

F. Elective Rotation

Objectives: The objectives of the elective rotation 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. Fellows are free to identify and choose specific electives in keeping with their individual training objectives, subject to approval by the program director.

Role#1: Medical Expert
The fellow should:
1. Provide optimal ethical and patient-centred medical care.
2. Acquire clinical knowledge, skills, and attitudes appropriate to the rotation subject.
3. Use preventive and therapeutic interventions effectively
4. Demonstrate proficient and appropriate use of procedural skills, both diagnostic and therapeutic.
5. Seek appropriate consultation from other health professionals, recognizing the limits of their expertise.

Elective rotation includes but are not limited to:
1. Medical imaging and ultrasonography
2. Pediatric cardiology
3. Pediatric pulmonology
4. Infectious disease
5. Cardiac anesthesia
6. Neuroanesthesia
7. Neurointensive care

1-Medical Imaging and Ultrasonography
Role#1: Medical Expert
The fellow will discuss the applications, indications, and interpretation of various radiological examinations required in the management of critically ill patients.
1. Develop the skills to interpret chest X-rays and CT scans of the thorax.
2. Discuss the indications for and read abdominal X-rays and CT scans of the abdomen.
3. Discuss the indications for and read skull X-rays and CT scans of the brain.
4. Discuss the indications for:
   a) MRI
   b) Angiograms/interventional radiology procedures
   c) Bone/gallium scans
   d) Other nuclear medicine scans
5. Demonstrate knowledge of the causes and ultrasound findings in respiratory failure:
   a) Pleural effusion
   b) Pneumothorax
   c) Alveolar-interstitial syndrome (e.g., congestive heart failure, acute respiratory distress syndrome)
   d) Normal aeration pattern
   e) Lobar collapse
6. Demonstrate ability to perform ultrasound-guided procedures.
7. Demonstrate ability to perform FAST exam

2- Neuro-anesthesia
Role#1: Medical Expert
The fellow will discuss the preoperative evaluation, intraoperative management, and postoperative care of patients undergoing central nervous system and spinal surgeries. 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.

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
3. Demonstrate knowledge of the anatomy of cerebral circulation
4. Monitor intracranial pressure
5. Apply the principles of treating increase ICP.
6. Apply safe anesthesia techniques to avoid increases in ICP during induction, intubation, and emergence from anesthesia.
7. Demonstrate clinical knowledge and skills necessary for the practice of neuroanesthesia including:
   - Preoperative neurological assessment (Glasgow Coma Scale classifications for subarachnoid hemorrahage, and basic neurological exam)
   - Intraoperative support (special positioning, i.e., sitting, prone, lateral, and knee-chest).
   - Understanding basic principles of neurophysiologic monitoring
     - EEG
     - Evoked potentials: somatosensory, visual, and brainstem auditory
     - Transcranial Doppler
8. Management of specific perioperative complications;
   - Seizures
   - Cerebral ischemia
   - Intracranial hypertension
   - Intraoperative aneurysm rupture
   - Air embolism
   - Cranial nerve dysfunction
   - Neuroendocrine disturbance: diabetes insipidus, syndrome of inappropriate antidiuretic hormone secretion.
9. Postoperative management of neurological patients

3- Cardiac Anesthesia
Role#1: Medical Expert
The fellow will demonstrate knowledge of the basic sciences as applied to the preoperative, intraoperative, and postoperative periods of cardiac surgery.

1. Describe common physiological changes occurring in the postoperative period and the impact they have on end-organ function.
2. Describe the different congenital cardiac anomalies and their surgical management.
3. Describe the altered respiratory physiology of immediate postoperative cardiac cases.
4. Compare common medications for cardiac surgical patients including anesthetic agents, vasodilators, vasoconstrictors, and inotropic agents.
5. Know the basics of introductory transesophageal echocardiography (TEE), including techniques of probe insertion and several basic views, and implications and application in the critical care patient.
6. Know the significance of temperature management in the intraoperative period, including hypothermic techniques.
7. Recognise the indicators of volume status.
8. Manage metabolic and electrolyte disturbances in the intraoperative period.
9. Differentiate the basic principles of cardiac support devices including the intra-aortic balloon pump and extracorporeal membrane oxygenation (ECMO).

4- Pediatric Infectious Disease
Role#1: Medical Expert
The fellow will be trained in the evaluation and management of inpatients with a broad spectrum of infectious diseases.

1. Discuss the epidemiology, genetics, natural history, and clinical expression of infectious diseases encountered in the inpatient setting.
2. Discuss the epidemiology, genetics, natural history, and clinical expression of Health-Care Associate infections.
3. Understand the importance of antimicrobial surveillance.
4. Learn the preventive measures to minimise Health-Care Associated infections and the importance of implementing the various bundles in PICU.
5. Recognise the interplay of factors related to host defence, microbial infection, and treatment.
6. Develop a comprehensive approach to the diagnosis of common infectious diseases in PICU (e.g., AIDS, pneumonia, urinary tract infections, and sepsis).
7. Develop a comprehensive approach to the management of common infectious diseases in PICU (e.g., AIDS, pneumonia, urinary tract infections, and sepsis).
8. Learn the various type of antimicrobials, their uses, side effects, and indications.
9. Differentiate the mechanisms of action, mechanism of resistance, and spectrum of activity of antimicrobials used in PICU.
10. Learn how to interpret the therapeutic levels of antimicrobials, the adjustment of the drug doses, and the special considerations in the presence of organ dysfunction.
11. Select and interpret laboratory, imaging, and pathologic studies used in the evaluation of infectious diseases.
12. Discuss the importance of PICU and hospital antibiograms and its impact on the choice of antimicrobials.
13. Develop knowledge of clinical laboratory, the mechanisms by which specimens are processed, organisms identified, susceptibility testing performed, and test results reported.
14. Apply the biosafety regulations for handling different classes of microbial pathogens.

5- Pediatric Pulmonology
Role#1: Medical Expert
The fellow will be trained in the evaluation and management of inpatients with a broad spectrum of pulmonary diseases.

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. Develop a comprehensive approach to the diagnosis of common pulmonary diseases in PICU.
4. Develop a comprehensive approach to the management of common pulmonary diseases in PICU.
5. Demonstrate the principles of performing flexible bronchoscopy.
6. Assist in performing bronchoscopy.
7. Discuss the indications and basics of interpretation of sleep studies in the clinical context.

6- Critical Care Echocardiography
Role#1: Medical Expert
The fellow will describe the assessment of critically ill patients by identifying and treating the underlying causes of hemodynamic instability in a timely manner.

1. Assess critically ill patients using focused and goal-directed cardiac examinations via appropriate transthoracic echocardiography (TTE).
2. Understand the basic thoracic anatomy.
3. Discuss the importance of proper positioning of the patient for optimal cardiac examination.
4. Apply the basic principles of cardiac transducer orientation and positioning.
5. Discuss the anatomy and orientation of basic echocardiographic views.
6. Obtain a safe and optimal echocardiographic examination via the transthoracic approach in acutely ill patients.
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

Role#2: Communicator

CanMEDS Key Competencies	Methods to achieve competencies
• Provide educational and supportive counselling for patients and their families in simple terms • Express empathy through verbal and non-verbal communication • Identify barriers to effective communication and modify approach to minimize those barriers • Provide succinct and clear explanation of life resuscitative measures to patient's family • Demonstrate effective communication skills in dealing with terminally ill patients and breaking bad news • Resolve conflicts between the family and the healthcare professionals • Document properly in the patient's medical record • Respect the role of each member of the multidisciplinary PICU team to maintain a good teamwork spirit in the unit • Demonstrate effective communication skills with other subspecialties • Counsel the junior trainees about their performance in a constructive manner	• Learning from a role model • Simulation-based scenarios • Communicates with family under supervision of senior fellows and consultants • Organizing case conference meeting for complex cases • Making rounds under the supervision of consultant • Monitoring the fellow performance when consulted outside unit • Review by the consultant of the fellow note in the medical record • Supervise junior residents and fellows • Present at national and international conferences • Present at journal clubs

Role#3: Collaborator

CanMEDS Key Competencies	Methods to achieve competencies
• Realize the importance of collaboration and assess the stages of team formation • Recognize the unique roles of members of the interdisciplinary PICU team • Demonstrates effective collaboration among members of the interdisciplinary team and other health care professionals • Discuss management plan with team members and ensure that it is well understood and carried • Demonstrate integration and responsibility as a team member	• Organizing case conference meeting for complex cases • Facilitating simulation-based learning • Participating in Morbidity Discussion • Participating in Mortality Discussion • Collaborate as a team member for Quality – performance indicator • Web based programs

Role#4: Health Advocate

CanMEDS Key Competencies	Methods to achieve competencies
• Discuss the long -term consequences of disease in the critical ill children • Discuss the impact of disease on family dynamics • Apply quality improvement measures • Recognise the patterns of disease in the critical ill children in relation to the society • Acknowledge the sociocultural and spiritual preferences in the society • Coordinate social and financial support for families • Comprehend various ethical and legal issues such as informed consent, end of life care, and beneficence. • Consider appropriate utilisation of resources to avoid futility of care	• Application of severity-of-illness measurement scores • Discuss case scenarios with the members of the multidisciplinary team which include nurse, respiratory therapists, dietitians, occupational therapists, social workers, clinical psychologists, home health care providers, spiritual counsellors • Collaborate in creating support group for the patients and their families • Obtain detailed inform consent under direct supervision • Seminars on ethics • Patient-centred discussion

Role#5: Leader

CanMEDS Key Competencies	Methods to achieve competencies
• Run the unit in an efficient and smooth manner • Demonstrates the ability to make independent decision on patients • Demonstrate skills in time management • Demonstrate the ability to function under stress • Acknowledge signs of burnout • Recognise signs of burnout of other members of the team • Demonstrate skills in triage, transfer, and bed allocations • Recognise the importance of resource allocations	• Direct discussion with the consultant after taking decisions related to patients • Direct supervision of junior colleagues with feedback • Make rounds as a leader once per week or as requested • Conduct the monthly mortality and morbidity meeting of the unit • Collaborate as a team leader for Quality – performance indicator • Workshop for time management • Workshop for stress coping strategies • Workshop for conflict resolution management • Attend the monthly unit meeting • Share administrative responsibilities • Write policies and procedures • Get involved in ordering and purchasing equipment • Get involved in planning the unit expansion

Role#6: Scholar

CanMEDS Key Competencies	Methods to achieve competencies
• Make evidence-based decision • Review literature in solving clinical problems • Apply critical appraisal skills to literature • Provide clinical teaching and mentoring for juniors • Describe the unique challenges of intensive care research and strategies to overcome it • Differentiate principles of qualitative and quantitative research methodology • Discuss biostatistics	• Participate in all academic activities • Perform clinical research/quality projects supervised by senior staff • Publish papers • Attend Research Methodology course • Attend Evidence-based medicine course

Role#7: Professional

CanMEDS Key Competencies	Methods to achieve competencies
• Demonstrate integrity, honesty, and compassion in the care of patients • Demonstrate accountability and punctuality • Guarantee continuity of patient care • Consider principles of bioethics in daily practice • Develop skills in resolving conflicts • Discuss the legal and ethical aspects of the informed consent • Adhere to hospital policies and procedures	• Attend handover round in morning and evening • Give a comprehensive handover when transferring patients • Take a comprehensive handover when receiving patients to the unit • Organizing case conference meeting for complex cases • Simulation-based teaching

Top Ten Core Clinical Conditions

I- Status Asthmaticus

1. **Medical Knowledge Competencies**
   - The fellow should have a sound and deep knowledge of the definition, epidemiology, and risk factors of status asthmatics.
   - The fellow should discuss the pathophysiology of status asthmaticus which is characterised by airflow obstruction due to airway hyper-responsiveness, bronchospasm, airway inflammation, mucosal edema, and mucous plugging.
   - The fellow should have a deep understanding ofdiscuss cardiopulmonary interactions, pulmonary mechanics, and gas exchange abnormalities status asthmaticus.
   - The fellow should be knowledgeable in the use of monitoring tools: pulse oximetry, end-tidal CO2, arterial blood gas interpretation, waveform interpretation.
   - The fellow should be updated about the advances in the field and the current literature.

2. **Patient Care Competencies**
   - The fellow should perform a comprehensive clinical assessment of the patient for optimal management.
   - The fellow should recognise when the patient is not improving on maximal aggressive therapy in the emergency room.
   - The fellow should know the indications for admission to PICU for a higher level of monitoring and escalation of therapy
   - The fellow should recognise that clinical interventions for spontaneously breathing asthmatics is based on clinical evaluation and not on blood gas determination.
   - The fellow should know the standard modalities of therapy: oxygen, fluids, beta-agonists, anticholinergic agents, corticosteroids, magnesium sulfate, methylxanthines, helium-oxygen.
   - The fellow should recognise the indications for use of non-invasive ventilation in a conscious cooperative patient.

- The fellow should recognise the high risks associated with the intubation of the asthmatic child. The intubation should be performed by the most skilled intensivist, with appropriate fluid and medications.
- The fellow should apply the various strategies in mechanical ventilation of the asthmatic child.
- The fellow should apply the various ventilatory monitoring and their interpretation.
- The fellow should recognise the importance of a safe ventilator strategy that aims to minimize dynamic hyperinflation.
- The fellow should know the most appropriate drugs for analgesia, sedation, and neuromuscular blockade that maintain stable hemodynamics and avoid worsening of bronchospasm.
- The fellow should consider the use of inhalational anesthetics in nonresponding cases.
- The fellow should consider the use of ECMO with the failure of all modalities of treatment.
- The fellow should recognise the importance of rehabilitation care and pulmonologist follow-up

II- Pediatric Acute Respiratory Distress Syndrome (PARDS)

1. Medical Knowledge Competencies

- The fellow should have a sound and deep knowledge of the definition, epidemiology, and risk factors of PARDS.
- The fellow should understand the pathophysiology of acute respiratory distress which include endothelial and epithelia injury, interstitial and intra-alveolar edema, haemorrhage as well as hyaline membrane formation.
- The fellow should know the various stages of the disease.
- The fellow should have a deep understanding of cardiopulmonary interactions, pulmonary mechanics, and gas exchange abnormalities.
- The fellow should be knowledgeable in the use of monitoring tools: pulse oximetry, end-tidal CO2, arterial blood gas interpretation, waveform interpretation.
- The fellow should be updated about the advances in the field and the current literature.

2. Patient Care Competencies

- Perform a comprehensive clinical assessment of the patient
- Recognize the importance of supportive care in the management.
- Assess the severity of PARDS.
- Interpret the chest X-ray in PARDS.
- Describe indications for bronchoscopy and bronchoalveolar lavage.
- Apply ventilation protective strategies as a mainstay of therapy.
- Strategically apply permissive hypercapnia, permissive hypoxemia, and their potential effects on the hemodynamics.
- Recognize the rational and applications of prone positioning in PARD.
- Demonstrate a thorough understanding of standard modalities of therapy such as oxygen, fluids, hemodynamic support, nutritional support, sedation, and neuromuscular blockade.
- Consider the use of adjunct therapy: inhaled nitric oxide, surfactant, corticosteroids, and extracorporeal life support and recognize the indications, contraindication and safe-usage
- Anticipate complications of PARDS and predict the outcome in PARDS

III- Acute Bronchiolitis

1. **Medical Knowledge Competencies**
   - The fellow should have a sound and deep knowledge of the definition, epidemiology, and risk factors of acute bronchiolitis.
   - The fellow should know the pathogenesis of acute bronchiolitis.
   - The fellow should know the underlying viral etiology besides respiratory syncytial virus in acute bronchiolitis.
   - The fellow should know the laboratory testing to be done in acute bronchiolitis.
   - The fellow should know the comorbidities associated with the severity of acute bronchiolitis: prematurity, chronic lung disease, immunodeficiency, and congenital heart disease.
   - The fellow should be knowledgeable in the use of monitoring tools: pulse oximetry, end-tidal CO2, arterial blood gas interpretation, waveform interpretation.
   - The fellow should know that antibiotics and bronchodilators have no proven benefit in the treatment of acute bronchiolitis.
   - The fellow should know the indication for the use of Respiratory Syncytial Virus immunoglobulins in high-risk patients.
   - The fellow should be updated about the advances in the field, the updated guidelines, and the current literature.

2. **Patient Care Competencies**
   - Perform a comprehensive clinical assessment of the patient for optimal management.
   - Recognize the PICU admission criteria for acute bronchiolitis.
   - Provide supportive care in acute bronchiolitis management.
   - Provide adequate hydration and oxygenation in acute bronchiolitis management.
   - Practice careful hand washing and other infection control measures necessary to prevent the spread of viruses.
   - Apply respiratory support in acute bronchiolitis for refractory and recurrent apnea, progressive hypoxia, refractory hypercapnia, or increasing respiratory distress.
   - Demonstrate a thorough understanding of the standard modalities of therapy: oxygen, fluids, hemodynamic support, nutritional support, sedation, and neuromuscular blockade.
   - Demonstrate a thorough understanding of the various modalities of ventilatory monitoring and their interpretation.
   - Demonstrate a thorough understanding of the importance of a safe ventilator strategy that aims to minimize dynamic hyperinflation.

IV- Status Epilepticus

1. **Medical Knowledge Competencies**
   - The fellow should have a sound and deep knowledge of the definition, epidemiology, and risk factors of status epilepticus.
   - The fellow should know the classification of status epilepticus.
   - The fellow should know the underlying pathophysiology of status epilepticus.
   - The fellow should know the importance of early recognition and aggressive intervention in status epilepticus.
   - The fellow should know that the outcomes after status epilepticus are primarily related to the underlying cause of the seizures.
   - The fellow should be knowledgeable in the use of monitoring and diagnostic tools.

- The fellow should learn the various type of anticonvulsants, their uses, indications, side effects, and their mechanisms of action.
- The fellow should know how monito the therapeutic levels of anticonvulsants.
- The fellow should understand, and spectrum of activity of antimicrobials used in PICU.
- The fellow should be updated about the advances in the field, the updated guidelines, and the current literature.

2. Patient Care Competencies

- Perform a comprehensive clinical assessment of the patient for optimal management.
- Recognize the PICU admission criteria for status epilepticus.
- Differentiate between convulsive and non-convulsive seizures.
- Recognize the importance and indications for continuous electroencephalogram monitoring.
- Perform the relevant diagnostic tests: serum glucose and electrolytes levels, anticonvulsants levels, neuroimaging, lumbar puncture, electroencephalogram.
- Check the serum level of ammonia, lactate, aminoacids and urine level of organic acids in infants at high risk of inborn errors of metabolism.
- Perform initial stabilisation: airway protection, oxygen therapy, proper positioning to avoid aspiration, intravenous access.
- Treat the underlying etiology of status epilepticus.
- Use the appropriate anticonvulsants for electrographic seizure termination.
- Recognize the special considerations in the management of refractory and super-refractory status epilepticus.
- Consider other modalities of treatment: immunomodulation, ketogenic diet, surgical intervention.
- Recognize the potential resulting functional disabilities.

V- Traumatic Brain Injury (TBI)

1. Medical Knowledge Competencies

- The fellow should have a sound and deep knowledge of the epidemiology, and risk factors of traumatic brain injury.
- The fellow should know and follow the guidelines of pediatric traumatic brain injury.
- The fellow should know the underlying pathophysiology in pediatric TBI, understand the mechanisms and pattern of head and brain injury, the impact of primary and secondary injury in TBI, the pathophysiology of increase intracranial pressure.
- The fellow should know the age-dependent targets for cerebral perfusion pressure-directed therapy.
- The fellow should understand the principles of autoregulation, the importance of an intact blood barriers, the types of cerebral edema.
- The fellow should recognize the signs of increase intracranial pressure and pending herniation and manage it appropriately.
- The fellow should understand the utilisation and importance of advanced neuromonitoring and neuroimaging in providing insight into pathophysiology-guided treatment.
- The fellow should recognize the importance of adequate hydration and nutrition in pediatric TBI.
- The fellow should have a high index of suspicion to recognize non-accidental brain injury.
- The fellow should be updated about the advances in the field, the updated guidelines, and the current literature.

2. Patient Care Competencies

- Perform a comprehensive clinical assessment of the patient for optimal management.
- Perform a rapid physiological resuscitation as hypoxemia and hypotension are strongly associated with poor outcomes.
- Calculate and correlate the Glasgow Coma scale in pediatric TBI.
- Perform initial resuscitation and stabilisation: airway patency, adequate ventilation, optimal positioning with immobilisation of the neck fluid resuscitation.
- Apply the criteria for intubation, the precautions to be followed
- Use the optimal medications for intubation.
- Request neuroimaging of the brain.
- Consider intracranial pressure monitoring after physiologic resuscitation.
- Apply the first-tier of the recommendations of pediatric TBI guidelines: ventricular cerebrospinal fluid drainage, osmolar therapy, sedation, analgesia, head position, hyperventilation.
- Discuss and apply the second-tier of the Pediatric TBI guidelines: hypothermia, decompressive craniectomy.
- Recognize the complications and potential resulting functional disabilities.

VI- Sepsis

1. Medical Knowledge Competencies

- The fellow should have a sound and deep knowledge of
  - The epidemiology and risk factors of sepsis
  - The pathophysiology of shock, ischemia, and reperfusion injury
  - The cellular and molecular mechanisms of injury
  - The consensus definitions and classification of shock
  - The laboratory tests and biomarkers
- The fellow should understand that the management of shock depends on the causes of shock and delivering cause-directed and early goal directed therapies
- The fellow should know how to calculate oxygen delivery, oxygen content, and mixed venous oxygen saturation,
- The fellow should understand the pharmacokinetics, pharmacodynamics of commonly used medications in sepsis.
- The fellow should know the consensus definitions, the pathophysiology of Multiorgan Dysfunction Syndrome (MODS)
- The fellow should know the high mortality and poor outcome of children with sepsis, shock, and MODS
- The fellow should be updated about the advances in the field, the updated guidelines, and the current literature.

2. Patient Care Competencies

- Perform a comprehensive clinical assessment of the patient for optimal management.
- Perform laboratory tests that include markers such as arterial blood gas, lactate measurement, and mixed venous oxygen saturation
- Apply invasive and non-invasive monitoring techniques to guide fluids administration and use of vasoactive drugs
- Demonstrate thorough understanding that early normalization of hemodynamic status can improve outcome.

- Master the initial management that focus on interpreting and treating hemodynamic derangements with targeted therapeutic interventions aimed at improving tissue perfusion and restoring balance between oxygen delivery and oxygen demand. This goal-directed therapy includes:
  - Prompt fluid resuscitation
  - Targeted vasoactive therapy
  - Early empiric antimicrobial therapy
  - Continuous monitoring of hemodynamic status
- Recognise the importance of early and prompt goal-directed therapy in preventing the development of MODS.
- Recognise that the mainstay of therapy for MODS remains general supportive care.

VII- Diabetic Ketoacidosis (DKA)

1. Medical Knowledge Competencies

- The fellow should have a sound and deep knowledge of the definition, pathophysiology, epidemiology, and risk factors of diabetes and diabetic ketoacidosis
- The fellow should know that cerebral edema is the most frequent serious complication of DKA and the most frequent cause of morbidity and mortality resulting from DKA
- The fellow should know that early identification and prompt management of cerebral edema is crucial in improving the outcome in children DKA.
- The fellow should know that hyperglycemic hyperosmolar syndrome is underrecognized in children and may be mistaken for DKA.
- The fellow should be updated about the advances in the field, the updated guidelines, and the current literature.

2. Patient Care Competencies

- Perform a comprehensive clinical assessment of the patient for optimal management.
- Perform the relevant diagnostic tests: serum glucose, plasma and urine ketones, arterial blood gas, serum electrolytes levels, urea, creatinine, osmolarity, calcium, and phosphorus levels.
- Perform frequent monitoring of blood sugar and ABG according to protocols
- Correct rapidly dehydration with isotonic fluids and insulin for optimal management of DKA
- Demonstrate thorough understanding that insulin infusion should not be discontinued until DKA resolves, and that glucose should be provided to avoid hypoglycemia.
- Perform the optimal clinical management to:
  - Correct dehydration and electrolytes deficits
  - Correct of acidosis and reversal of ketosis
  - Restore of blood glucose to near normal
  - Avoid complications of therapy
- Identify and treat any precipitating condition.

VIII- Acute Kidney Injury (AKI)

1. Medical Knowledge Competencies

- The fellow should have a sound and deep knowledge of the definition, pathophysiology, classification, epidemiology, etiologies, and risk factors of AKI
- The fellow should know that AKI is common during critical illness and is associated with significant morbidity and mortality

- The fellow should realize that the incidence of AKI is rising because of increased use of intensive care and advanced technologies.
- The fellow should have a sound knowledge of the biomarkers and laboratory tests to be done to assess renal function
- The fellow should understand the importance of prevention of AKI
- The fellow should be updated about the advances in the field, the updated guidelines, and the current literature.

2. Patient Care Competencies

- Perform a comprehensive clinical assessment of the patient for optimal management
- Perform the optimal clinical management which includes:
  - Adequate fluid management
  - Correction of electrolytes deficits
  - Use of diuretics
  - Use of vasoactive agents
  - Correction of acidosis
  - Correction of electrolytes
  - Avoidance of nephrotoxic medications, proper dosing of medications, and monitoring of drug levels
  - Management of hypertension
  - Adequate nutritional support
  - Renal Replacement Therapy
- Demonstrate thorough understanding of renal replacement therapy (RRT)
  - The physiology of RRT
  - The indications of RRT
  - The optimal start time of RRT
  - The types of RRT: peritoneal dialysis, intermittent hemodialysis, Continuous renal replacement therapy (CRRT)
  - The technique of RRT
  - The anticoagulation used
- Recognise the impact of short-term and long-term outcome of AKI

IX- Abdominal Compartment Syndrome (ACS)

1. Medical Knowledge Competencies

- The fellow should have a sound and deep knowledge of the consensus definition, pathophysiology, epidemiology, etiologies, and risk factors of AKI.
- The fellow should know that abdominal perfusion pressure is a resuscitation endpoint with good prediction of outcome
- The fellow should know that clinical examination is not a reliable substitute to measure Intraabdominal hypertension
- The fellow should know that intraabdominal hypertension and ACS can lead to multi-organ system failure and ae associated with increase morbidity and mortality
- The fellow should be updated about the advances in the field, the updated guidelines, and the current literature.

2. Patient Care Competencies

- Identify patients at risk to develop ACS
- Demonstrate the techniques for measuring intraabdominal pressure(IAP)

- Apply the important principles for management of ACS
  - Serial IAP measurements
  - Treat the underlying condition and pre-existing co-morbidities
  - Implement IAP lowering interventions
  - Optimize systemic mean arterial pressure and abdominal perfusion pressure
  - Recognise and support organ dysfunction
  - Surgical abdominal decompression

X- Multiple Trauma

1. Medical Knowledge Competencies

- The fellow should know that trauma is the leading cause of pediatric deaths in developed countries, and that most children suffer significant morbidity following trauma
- The fellow should know the mechanisms and pattern of injury:
  - Blunt trauma is more frequent than penetrating trauma
  - Penetrating trauma is associated with higher mortality
  - The mechanisms of injury often predict the pattern of injuries and suggest a management strategy
- The fellow should know that the primary survey is a prioritized evaluation and management on identifying and treating the most life-threatening injuries
- The fellow should be updated about the advances in the field, the updated guidelines, and the current literature.

2. Patient Care Competencies

- Perform the primary survey which includes:
  - The ABCDSs: Airway, Breathing, Circulation, Disability
- Perform the secondary survey to definitively evaluate the injured child:
- Manage chest trauma:
  - Pulmonary contusion, laceration, and hematoma
  - Hemopneumothorax
  - Rib fractures and flail chest
  - Myocardial contusion
  - Cardiac tamponade
  - Rupture of diaphragm
  - Aortic disruption
  - Tracheobronchial tears
- Manage abdominal trauma:
  - Liver and spleen
  - Kidney and urinary tract
  - Gastrointestinal tract
  - Pancreas
  - Abdominal compartment syndrome
- Manage skeletal trauma:
  - Fractures
  - Compartment syndromes
- Demonstrate thorough understanding of the importance of a multidisciplinary team involvement
- Demonstrate a high index of suspicion to rule out non-accidental injury
- Recognise the potential resulting complications: infections, acute stress, post-traumatic stress disorder, thromboembolic events

Continuum of Learning

Competencies milestones

F 1 (Junior Level)	F 2, F 3 (Senior Level)	Continuing development as a consultant
Obtains fundamental knowledge related to core clinical problems of PICU	Applies knowledge to provide appropriate clinical care related to core clinical problems of PICU	Evaluates ad update knowledge Modifies clinical care Enhances patient care
Acquires clinical examination and assessment skills and apply it to clinical practice	Analyses and interprets the findings from clinical skills to develop appropriate differential diagnoses and management plan for the critically ill patient	Evaluates assessment findings Modifies management plans
Provide advanced life support Acquires advanced technical skills	Proficient in advanced life support and complex PICU procedures	May acquire speciality advanced PICU skills
Performs allocated tasks Begins to plan tasks	Plans and prioritises tasks appropriately	Develop increasing expertise Prioritises tasks Delegates tasks
Performs allotted teaching tasks	Plans and delivers teaching to trainees and other professionals Develops peer mentoring skills	Plans and modifies curricula Performa assessment and appraisal Able to provide mentorship
Aware of management issues in PICU	Develops management skills Able to take responsibility Participates in committees	Negotiates and deals with conflicts Can contribute to and leads committee Evaluates and modifies management structure
Performs allocated audit projects Understands the audit cycle	Designs audit projects Understands risk management Able to write appropriate clinical guidelines	Facilitates audit and evaluates results Evaluate guidelines and ensures implementation of appropriate changes

Understands the principles of critical appraisal and research methodology Proposes a research idea and writes a proposal	Able to appraise the literature critically and apply to clinical practice Conducts a research study Writes and publish a paper	Able to evaluate critical appraisal performed by others Able to lead research projects Support juniors in research
Works in a multi-professional team	Able to lead a multi-disciplinary team	Evaluates and modifies multi-professional team work

Top Ten Procedures

Procedures	Minimum Number Required	F 1	F 2, F 3	Category*
Bag Mask Ventilation	40	30	10	I
Endotracheal Intubation	30	20	10	I
Laryngeal Mask Insertion	10	5	5	I
Glidescope intubation	10	5	5	III
Chest tube insertion/Pleural tap	15	10	5	I
Arterial Line Cannulation	45	30	15	II
Central venous line insertion	45	30	15	II
Intraosseous insertion	10	5	5	I
Ultrasound guided Procedures	20	15	5	II
Resuscitation skills	40	20	20	II

*Procedures list should be divided into three categories

1. Category I: Assumed competent (i.e. previously learned).
2. Category II: Core Procedures. These are the procedures to be learned and certified to be competent during F 1 and 2.
3. Category III: Mastery level procedures. Trainees are expected to be competent at the end of F 3

List of Behavioural / Communication Skills

- Behavioral/communication Skills
- Open interview
- Informed consent
- Counselling
- Breaking bad news
- Management of conflict
- Refusing treatment
- End of life care

- Clinical Ethics issues
- Research ethics issues
- Administrative skills
- Professionalism

LEARNING OPPORTUNITIES

General Principles

1-Learning is expected to be an active process where fellows participate in teaching, doing presentations, keeping updated with the recent literature, and reviewing evidence-based articles.
2-Teaching will be structured, supervised by consultant pediatric intensivists, and self-directed.
3-Fellows will be given protected time, for teaching activities, that will be scheduled on a weekly and monthly basis.
3-Core Education Program (CEP) includes formal teaching and practice-based learning.
4-Formal teaching time will be conducted over 3 hours, every week. A formal teaching time is an activity that is planned in advance with assigned tutor, time slots, and venue. Formal teaching activities include universal topics, core speciality topics, and trainee selected topics. **Formal teaching time excludes bedside teaching.**
5-Practice-based learning (PBL) include: morning report, case presentations, morbidity and mortality reviews, Journal clubs, Systematic reviews, hospital grand rounds and research presentations.
6-The fellow will be counselled on a monthly basis by the program director and mentor.

Universal Topics

Intent

These are high-value, interdisciplinary topics of utmost importance to the fellow. The reason for centralizing these topics is to ensure that every fellow 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 - Introduction

1. Safe drug prescription
2. Hospital-acquired infections (HAIs)
4. Antibiotic stewardship
5. Blood transfusion

1. **Safe drug prescription:** At the end of the Learning Unit, Fellows 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.

2. **Hospital acquired infections (HAIs):** At the end of the Learning Unit, Fellows 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.

4. **Antibiotic stewardship:** At the end of the Learning Unit, Fellows 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.

5. **Blood transfusion:** At the end of the Learning Unit, Fellows 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 2 - Cancer

8- Management of Oncologic emergency: At the end of the Learning Unit, Fellows should be able to:

- Enumerate important oncologic emergencies encountered both in hospital and ambulatory settings
- Discuss the pathogenesis of important oncologic emergencies
- Recognize the oncologic emergencies
- Institute immediate measures when treating a patient with oncologic emergencies
- Counsel the patients in anticipatory manner to recognize and prevent oncologic emergencies

Module 3: Diabetes and Metabolic Disorders

4. **Abnormal ECG:** At the end of the Learning Unit, Fellows should be able to:
   - Recognize common and important ECG abnormalities
   - Institute immediate management, if necessary

Module 4 – Medical and Surgical Emergencies

7. Management of altered level of sensorium
8. Management of hypotension and hypertension
9. Management of upper GI bleeding

For all the above; following learning outcomes apply.
At the end of the Learning Unit, you should be able to:

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

Module 5 - Acute Care

12. Postoperative care
13. Acute pain management
14. Chronic pain management
15. Management of fluid in the hospitalized patient
16. Management of electrolyte imbalances

12. Postoperative Care: At the end of the Learning Unit, Fellows 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

13. **Acute pain management:** At the end of the Learning Unit, Fellows 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

14. **Chronic pain management:** At the end of the Learning Unit, Fellows 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

15. **Management of Fluid in Hospitalized Patients:** At the end of the Learning Unit, you should be able to:
    a) Review physiological basis of water balance in the body
    b) Assess a patient for his/her hydration status
    c) Recognize a patient with over and under hydration
    d) Order fluid therapy (oral as well as intravenous) for a hospitalized patient
    e) Monitor fluid status and response to therapy through history, physical examination and selected laboratory investigations

16. **Management of Acid-Base Electrolyte Imbalances:** At the end of the Learning Unit, you should be able to:
    a) Review physiological basis of electrolyte and acid-base balance in the body
    b) Identify diseases and conditions that are likely to cause or associated with acid/base and electrolyte imbalances
    c) Correct electrolyte and acid-base imbalances
    d) Perform careful calculations, checks, and other safety measures while correcting acid-base and electrolyte imbalances
    e) Monitor response to therapy through history, physical examination and selected laboratory investigations

Module 7 - Ethics and Healthcare

21. Occupational hazards of health care workers.
23. Patient advocacy
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

21. **Occupation hazards of health care workers (HCWs):** At the end of the Learning Unit, Fellows should be able to:
    - Recognize common sources and risk factors of occupational hazards among HCWs
    - Describe common occupational hazards in the workplace

- 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

23. **Patient advocacy**: At the end of the Learning Unit, Fellows 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

24. **Ethical issues: transplantation/organ harvesting; withdrawal of care:** At the end of the Learning Unit, you should be able to:
    a) Apply key ethical and religious principles governing organ transplantation and withdrawal of care
    b) Be familiar with the legal and regulatory guidelines regarding organ transplantation and withdrawal of care
    c) Counsel patients and families in the light of applicable ethical and religious principles
    d) Guide patients and families to make informed decision

25. **Ethical issues: treatment refusal and patient autonomy:** At the end of the Learning Unit, Fellows 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.115
    - Counsel patients and families who decline medical treatment in light of patient's best interests.

26. **Role of doctors in death and dying:** At the end of the Learning Unit, Fellows 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.

Universal topics	Year of training
Module 1 - Introduction 1. Safe drug prescription 2. Hospital-acquired infections (HAIs) 4. Antibiotic stewardship 5. Blood transfusion **Module 3: Diabetes and Metabolic Disorders** 4.Abnormal ECG	1st year (F1)
Module 2 - Cancer 8-Management of Oncologic emergency **Module 4 – Medical and Surgical Emergencies** 7. Management of altered level of sensorium 8. Management of hypotension and hypertension 9. Management of upper GI bleeding **Module 5 - Acute Care** 12. Postoperative care 13. Acute pain management 14. Chronic pain management 15.Management of fluid in the hospitalized patient 16.Management of electrolyte imbalances	2nd year (F2)
Module 7 - Ethics and Healthcare 21. Occupational hazards of health care workers. 23. Patient advocacy 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	3rd year (F3)

Core Speciality Topics: Case Discussions; Interactive Lectures

Topics	Learning outcomes
Fundamentals of Gas Exchange and Assessment of Oxygenation and Ventilation	1-Apply the alveolar gas equation 2-Define and quantify dead space (alveolar and anatomic) 3-Understand the distribution of ventilation and pulmonary blood flow and their coupling 4-Describe and calculate alveolar/arterial oxygen gradient 5-Understand the hemoglobin/oxygen dissociation curve and carbon dioxide transport 6-Describe the mechanics of, uses, and limitations of pulse oximetry, end tidal carbon dioxide monitoring and transcutaneous oxygen and carbon dioxide measurement
Oxygen Delivery and Oxygen Consumption in Pediatric Critical Care	1-Calculate oxygen delivery 2-Dicus cardiopulmonary interactions 3-Describe the mechanisms for measurement of oxygen consumption 4-Discuss the use of and limitations of the Fick equation in the evaluation of the adequacy of oxygen delivery 5-Define the oxygen extraction ratio 6-Recognise the difference between aerobic and anaerobic metabolism touching
Upper Airway Obstruction	1-Describe the anatomic differences in the airway of a child as compared to an adult 2-Recognize the signs and symptoms of a child with upper airway obstruction 3-Recognise the approach to safe diagnostic evaluation of the infant or child with upper airway obstruction 4-Recognise the differential diagnosis of a child with upper airway obstruction 5-Apply the approach to stabilization and management of the child with upper airway obstruction 6-Differentiate the indications for endotracheal intubation and tracheostomy in a child with upper airway obstruction.
Acute Asthma	1-Review the pathophysiology of status asthmaticus 2-2-Evaluate the child admitted to the PICU with status asthmaticus 3-Identify the major therapies for status asthmaticus:

	Inhaled beta agonists, inhaled anticholinergic agents, corticosteroids, magnesium, Helium/Oxygen mixture, intravenous beta agonists, methylxanthines, ketamine and inhalational anesthetics, non-invasive ventilation 4-Review the theoretical and practical difficulties with mechanical ventilation in patients with status asthmaticus 5-Discuss the complications that may occur with status asthmaticus during positive pressure ventilation
Acute Respiratory Distress Syndrome(ARDS)	1-Be updated with the most recent consensus on pediatric acute respiratory distress syndrome 2-Recognize the importance of the integrity of the alveolar-endothelial barrier 3-Discuss the mechanisms of pulmonary edema in ARDS 4-Describe the pathophysiology of ARDS 5-Identify how changes in compliance and functional residual capacity lead to intrapulmonary shunting and hypoxemia seen in ARDS. 6-Recognize the distinct temporal pathologic changes in ARDS necessitating specific targeted therapies 6-Describe how the “open lung model” maximizes oxygen exchange while minimizing ventilator induced lung injury. 7-Discuss the roles of adjunct therapies: for prone positioning, HFOV, APRV, corticosteroids, surfactant and nitric oxide in the treatment of ARDS.
Acute Pulmonary Infections	1-Learn the epidemiology of acute pulmonary infections that require pediatric intensive care. 2-Understand the pathophysiology of bronchiolitis and pneumonia in children. 3-Identify the common etiologies, signs and symptoms of bronchiolitis 4-Identify the common etiologies, signs and symptoms of pneumonia 5-Review host defense mechanisms during acute pulmonary infections 6-Discussthe treatment options, including modes of ventilation, for bronchiolitis and pneumonia 7-Apply an effective management strategy for parapneumonic effusions and empyemas

Non-conventional Mechanical Ventilation	1-Discuss the indications and contraindications of noninvasive mechanical ventilation 2-Discuss the advantages and disadvantages of noninvasive mechanical ventilation 3-Describe the indications, advantages, and disadvantages for use of high frequency oscillatory ventilation (HFOV) 4-Understand the "open-lung" concept. 5-Describe the mechanics of airway pressure-release ventilation (APRV) 6-Define the concept, indications, and limitation of use of Neurally Adjusted Ventilatory Assistance (NAVA)
Conventional Mechanical Ventilation	1-Describe the differences between negative and positive pressure ventilation 2-Describe the effects of positive pressure ventilation on preload and afterload 3-Recognize the effects of the ventilator circuit on gas exchange and the importance of humidification 4-Describe the differences between pressure and volume ventilation 5-Discuss the advantages and disadvantages of each mode of mechanical ventilation these choices 6-Discuss the concept of ventilator triggering, cycling 7-Describe the methods of delivering assisted breaths 8-Interpret waveforms on the ventilator 9-Dicuss static and dynamic compliance and their calculations 10-Describe the mechanism of ventilator-induced 11-Apply protective ventilation strategy 12-Understand the application of permissive hypercapnia and permissive hypoxemia 13-Discuss weaning and extubation criteria and strategies 14-Interpret Arterial Blood Gas

Hemodynamics	1-Discuss the importance of cardiac histology and anatomy as it relates to the normal cardiac cycle 2-Relate chemical and cellular events in the myocardium to the normal cardiac cycle 3-Describe how pathologic states can alter the normal chemical and cellular events in the heart. 4-Discuss how chemical and cellular changes affect the overall function of the heart and cardiac output. 5-Discuss the components of cardiac output and the response to low cardiac output states at different ages. 6-Understand the cardiovascular response to alterations in intravascular pressure and volume. 7-Discuss afterload physiology and the effect of changes in afterload on cardiac function. 8-Recognize the cardiopulmonary interactions 9-Recognize how positive and negative pressure ventilation affect cardiovascular physiology
Assessment of Cardiovascular Function	1-Describe focused physical examination in assessing the cardiovascular status of the critically ill child. 2-Discuss arterial pressure measurements and waveforms and how they are affected by various disease states. 3-Understand central venous pressure measurements and waveforms and how they are affected by various disease states. 4-Understand what is meant by the assessment of “functional hemodynamics”. 5-Describe invasive and non-invasive techniques for estimation of cardiac output in critically ill children. 6-Identify and describe biochemical markers of cardiovascular function: mixed venous, central venous saturations, lactate and brain natriuretic peptide measurements

The Inflammatory Response	1-Discuss the mechanism of the inflammatory response 2-Describe innate and adaptive immunity and the role of the cellular elements involved in inflammation 3-Learn about key proinflammatory and antiinflammatory 4-Discuss the roles of Toll-like receptors and NFkappaB on the regulation of cytokine production 5-Describe the role of humoral factors in inflammation 6-Identify and describe the major modulatory factors on inflammation 7-Recognize how the genetic makeup of the host may alter the inflammatory response 8-Describe possible therapeutic strategies to control the inflammatory response 9-Describe the concept of immunoparalysis during critical illness
Sepsis	1-Discuss the epidemiology of sepsis 2-Discuss the inflammatory cascade 3-Discuss the cellular responses to systemic infection 4-Recognize the clinical signs and symptoms that result from generalized and organ specific inflammation and injury 5-Recognize the role of appropriate empiric antibiotic coverage, adequate fluid resuscitation and pharmacologic hemodynamic support 6-Discuss the treatment of sepsis 7-Appreciate the role of genetic regulation immunologic and physiologic responses
Health Care Associated Infections	1-Describe the epidemiology, risk factors, potential sources of nosocomial infections in the PICU 2- Describe the specific identification, treatment and outcomes of nosocomial infections: blood stream Infection, ventilator associated infection, urinary tract infection, infections in surgical patients 3-Identify of the general principles of infection control measures in the PICU 4-Apply the infection bundles

Circulatory Failure/Shock	1-Define shock 2-Describe the pathophysiologic changes that occur with the different classifications of shock 3-Understand the molecules that mediate the changes in the cardiovascular system in shock 4-Recognize the role of cardiovascular monitoring in circulatory failure 5-Apply goal-directed therapies (including use of lactate levels and venous saturations) to improve outcome in children with circulatory failure 6-Define and understand the pathophysiology of multiple organ dysfunction syndrome
Multiple Organ Dysfunction Syndrome	1-Discuss the presentation and course of multiple organ dysfunction syndrome 2-Discuss outcomes, and the criteria used to predict them, in multiple system organ failure 3-Discuss the cellular mechanisms that lead to multiple organ dysfunction syndrome 4-Plan a course of therapy in a patient with multiple organ dysfunction syndrome.
Drugs in Hemodynamic Instability	1-Review the anatomy and physiology of the autonomic nervous system 2-Describe the various adrenergic receptors, their agonists and specific relationships with G proteins. 3-Describe the mechanism of action, clinical uses, metabolism and potential adverse effects of: Norepinephrine, Epinephrine, Dopamine, Dobutamine, Isoproterenol , Vasopressin, and Milrinone 4-Keep updated with the current recommendations for use of cardiovascular agents in shock
Disorders of Cardiac Rhythm	1-Understand the physiology of the cardiac action potential 2-Discuss the mechanism of action of antiarrhythmic medications 3-Discuss the various mechanisms that generate tachyarrhythmias 4-Identify and treat common pediatric tachyarrhythmias 5-Describe the causes and treatment of bradycardia 6-Learn basic pacemaker functionality

Post-operative Cardiac Care	1-Understand the techniques for and pathophysiology of cardiopulmonary bypass and oxygenation and carbon dioxide removal 2-Describe the complications and therapies used in the post-operative care of patients 3-Discuss the roles of temporary pacemakers 4-Discuss the principles of respiratory support after cardiac surgery 5-Describe the post-operative care problems after total repair of acyanotic disease 6-Describe the post-operative care problems after total repair or palliative surgery of a cyanotic lesion
Assessment of Neurologic Function	1-Perform a detailed neurologic assessment 2-Differentiate upper motor neuron pathology from lower motor neuron pathology. 3-Recognize the utility and limitations of the Glasgow coma scale. 4-Appreciate dermatomal distribution of peripheral nerves. 5-Recognise in herniation syndromes 6-Describe spinal syndromes 7-Describe the components of a brain death examination. 8-Describe the technique, clinical applications and limitations of intracranial pressure monitoring in the child with intracranial hypertension. 9-Discuss the differences between intracranial monitoring devices. 10-Discuss indications, contraindications and analysis of cerebrospinal fluid and opening pressure measurement. 11-Review the indications for the use of electroencephalography and evoked potentials in the neurologically compromised child. 11-Review indications and limitations of neuroimaging techniques.

Cerebral Resuscitation and Traumatic Brain Injury	1-Recognizes the difference between primary and secondary brain injury 2-Understand the pathophysiology of global cerebral ischemia and reperfusion 3-Describe the modalities and indications for clinical monitoring in brain injured patients 4-Discuss the outcome of a patient with hypoxic ischemic encephalopathy 5-Describe the care of a patient with hypoxic ischemic encephalopathy 6-Describe the initial evaluation of a patient with closed head injury: presumptive neck injury, Glasgow Coma Scale Score, assessment for other injuries 7-Discuss the management of severe head injury including respiratory, hematologic and nutritional issues 8-Discuss the outcome of moderate and severe head injury in the pediatric patient
Neurologic Disease in PICU	1-Discuss the differential diagnosis of coma 2-Develop a management plan for investigation and treatment of coma 3-Discuss the differential diagnosis of neuromuscular weakness in an infant 4-Discuss acquired disorders of neuromuscular weakness in older children 5-Describe the typical presentation, diagnostic evaluation, and treatment of Guillain-Barre Syndrome 6-Discuss the causes, treatment, and outcome of status epilepticus in the pediatric patient 7-Recognise the epidemiology, presentation, diagnosis, treatment, and outcomes of CNS Infections in children 8-Understand the pathophysiology, neuroimaging findings, and potential triggers for posterior reversible encephalopathy syndrome 9-Review the most commonly used guidelines for determining brain death in the pediatric patient 10-Discuss the role of ancillary testing (cerebral angiography, nuclear medicine flow scans, electroencephalography, evoked responses) in determining brain death in children

Overview, Structure and Function of the Nephron	1-Understand the structure and function of the nephron; know the roles of the glomerulus, proximal tubule, loop of Henle, distal tubule and collecting ducts on urine formation and composition 2-Understand the basis for the concentration of urine (counter-current) 3-Discuss the regulation of renal blood flow 4-Discuss the role of the kidney in the maintenance of circulating blood volume 5-Understand the roles of the renin/angiotensin system, Atrial Naturetic Factor, and ADH in maintaining circulating blood volume and electrolyte (sodium) homeostasis 6-Discuss the renal role in acid–base homeostasis 7-Discuss the age related changes in normal renal function and biochemical markers of renal function 8-Define the actions of commonly used diuretics on the renal "unit"
Fluid/Electrolyte/Acid–Base Abnormalities	1-Describe the major causes of dehydration 2-Apply the principles of rehydration therapy 3-Classify the causes and treatment of hypo and hypernatremia 4-Describe the pathophysiology, diagnosis and treatment of diabetes insipidus 5-Describe the pathophysiology, diagnosis and treatment of Syndrome of Inappropriate Anti Diuretic Hormone secretion 6-Describe the pathophysiology, diagnosis and treatment cerebral salt wasting 7-Describe the causes, symptom, electrocardiographic changes and treatment of hypocalcemia 8-Discuss the cause, clinical manifestations, electrocardiographic changes and treatment of hypo and hyperkalemia 9-Discuss the cause, clinical manifestations, and treatment of hypo and hypermagnesemia 10-Describe the symptoms and the treatment of high and low serum phosphorus 11-Describe the pathophysiologic effects caused by metabolic acidosis 12-Describe the clinical conditions associated with high anion gap and their management

	13-Describe the pathophysiologic effects caused by metabolic alkalosis 14-Identify the major causes of acute and chronic metabolic alkalosis 15-Describe the general treatment of metabolic alkalosis
Acute Kidney Injury	1-Discuss the interpretation and limitations of serum creatinine levels as an indicator of renal function 2-Describe the major causes and etiology of acute kidney injury 3-Distinguish between pre-renal, intrinsic, and post-renal causes of acute kidney injury using appropriate laboratory tests and imaging studies 4-Describe the major manifestations of acute kidney injury 5-Discuss the management of acute kidney injury and the controversies surrounding some of the traditional interventions in acute kidney injury, such as diuretics and low-dose dopamine infusion 6-Discuss the indications for renal replacement therapy 7-Discuss interventions that may prevent or modify the course of acute kidney injury 8-Discuss the effect of acute kidney injury on the choice and dosing of drugs 9-Discuss the prognosis of children with acute kidney injury.
Renal Replacement Therapies	1-Discuss the importance of renal replacement therapy in the care of critically ill children with acute renal failure. 2-Discuss the mechanisms of peritoneal dialysis, hemodialysis, and continuous renal replacement therapy 3-Discuss the indications, advantages, and complications of peritoneal dialysis 4-Discuss the indications, advantages, and complications of hemodialysis 5-Discuss the indications, advantages, and complications of continuous renal replacement therapy

Acute Liver Injury and Failure in Children	1-Learn the varied etiologies of acute liver injury and failure in children 2-Formulate an initial management plan for the child with acute liver injury and failure 3-Initiate an appropriate diagnostic workup for acute liver failure 4-Plan the transport of children with progressive liver dysfunction to transplant centres in a timely manner prior to clinical deterioration 5-Recognize, prevent, and treat complications of acute liver failure 6-Identify the prognostic indicators in acute liver injury.
Hematology and Oncology in Critical Illness	1-Understand the pathophysiology, the causes, and the hemodynamic consequences of severe anemia in critically ill children 2-Categorize anemia according to the underlying pathophysiology, whether decreased production versus increased destruction or loss and their red blood cell indices 3-Understand the pathophysiologic basis of disseminated intravascular coagulation (DIC) and detail the common precipitating causes of this condition 4-Discuss the differential diagnosis of thrombocytopenia in the critically 5-Discuss the factors and conditions associated with an increased risk of thromboembolism in children 6-Describe the pathophysiology, clinical presentation, an complications of sickle cell disease 7-Describe the pathophysiology and management of acute chest syndrome in sickle cell disease 8-Describe the pathophysiology and management of stroke in sickle cell disease
Use of Blood Products	1-Recognize the indications for transfusion of various blood products 2-Recognize the indications for irradiated, filtered, and/or leukoreduced blood products 3-Define the types of transfusion reactions and their treatment 4-Recognize the adverse effects of massive blood transfusion 5-Discuss the pathophysiology of Transfusion Associated Lung Injury

Critical Care Endocrinology	1-Recognize the signs and symptoms of endocrine and metabolic disturbances 2-Discuss the important mechanisms in maintaining glucose homeostasis 3-Identify the common causes of hypoglycemia in infants and children 4-Assess and manage hypoglycaemia 5-Discuss the pathophysiology, clinical symptomatology, monitoring, and management of diabetic ketoacidosis 6-Discus the pathophysiology, causes, laboratory monitoring, and management of adrenal insufficiency in a critically ill child 7-Discuss the biochemical and pathophysiological differences between thyroidal and non-thyroidal illnesses 8-Identify the causes and treatment of disorders of calcium homeostasis 9-Recognize disturbances of osmoregulation encountered with tumors of the central nervous system both pre and postoperatively
Metabolic Crises	1-Review the physiologic basis and patterns of inborn errors of metabolism 2-Review the most common clinical and biochemical presentations of children with metabolic diseases 3-Identify the screening laboratory tests to help guide the further diagnostic work up of a child with suspected metabolic disease 4-Recognize potential pitfalls when analyzing the results of metabolic testing 5-Outline initial treatment strategies for managing a child during a metabolic crisis.
Trauma/Burn	1-Apply the ATLS approach to evaluation and initial treatment of the injured child 2-Evaluate and clear the axial skeleton in an injured child 3-Know the current treatment of common thoracic, abdominal and orthopedic injuries in children 4-Apply the comprehensive management of burn

Toxicology for the Pediatric Intensivist	1-Understand the epidemiology of pediatric poisonings 2-Appreciate unique pediatric considerations when approaching the poisoned child 3-Identify the important points in the history, physical examination and laboratory evaluation of the poisoned child; including the recognition of a "toxidrome" 4-Describe the limits and benefits of toxicological drug screening 5-Identify key management strategies in treating the poisoned child 6-Review toxic ingestions of particular importance to the pediatric intensivist
The Approach to the Critically Ill Infant	1-Appreciate the unique physiologic state of transition that occurs in the neonatal period 2-Describe key anatomic and physiologic differences between the small infant and older child and how they may affect critical care management 3-Describe the rapid cardiopulmonary assessment and stabilization of the infant 4-Develop a quick differential diagnosis to allow the timely initiation of specific therapies 5-Develop an initial laboratory and imaging assessment in critically ill infants 6-Recognize the pathophysiology, clinical presentation, and therapy of diseases that may present in neonates and infants: neonatal sepsis, congenital heart disease, abusive head trauma in infancy, inborn errors of metabolism, infantile botulism, hemorrhagic shock and encephalopathy syndrome
Sedation and Analgesia	1-Emphasize the psychological and physiologic necessity of providing sedation and analgesia in the PICU 3-Review the pharmacology, physiology and rationale for use of the major sedative agents in the PICU 4-Review the pharmacology, physiology and rationale for use of the major narcotic agents in the PICU 5-Discuss the risk factors and treatment for the development of opioid and benzodiazepine dependence and withdrawal in the PICU. 6-Apply different scores for sedation and pain.

Neuromuscular Blockade	1-Identify the indications for and pharmacology of neuromuscular blockade in PICU 2-Discuss the physiology of the neuromuscular junction and how it is affected by neuromuscular blockade 3-Describe the various neuromuscular blocking agents used in the PICU including their pharmacokinetics, pharmacodynamics, and adverse effects. 4-Discuss the interactions and adverse effects of neuromuscular blockade including ICU myopathy. 5-Understand the monitoring of neuromuscular blockade 6-Know the agents used for the reversal of neuromuscular blockade 7-Recognize the importance of providing sedation and analgesia to paralyzed patients
Nutrition in Critical Illness	1-Identify the nutritional requirements of healthy children and critically ill children 2-Calculate caloric and protein needs in PICU 3-Make appropriate choices for the provision of nutritional support to patients based on their disease state and clinical status. 4-Discuss the principles of nutritional support for patients with specific disease states 5-Recognise the importance of enteral nutrition and its early use 6-Identify the indications and side effects of parenteral nutrition

Core Speciality Topics: Workshops/Simulation

Pediatric Advanced Life Support course	Mandatory upon starting fellowship
Pediatric Advanced Life Support Instructor course	The fellow should develop as an instructor Recommended for F2 AND F3
Pediatric Fundamental critical care Support course (PFCCS)	Mandatory
Mechanical ventilation course	Mandatory
PICU Ultrasound applications course	Mandatory
Difficult airway management course	Mandatory
Research Methodology course	Mandatory
Evidence-based medicine course	Mandatory

Trainee Selected Topics

Trainee will be given choice to develop a list of topics on their own. All these topics must be planned and need to be approved by the local education committee. Institution might work with trainees to determine the topics as well.

Examples of Trainee Topic
1- Advanced Communication skills
2- Medical ethics
3- Research ethics
4- Formulating a proposal
5- Writing scientific papers
6- Authentic Leadership skills
7- Administrative skills
8- Palliative care
9- Family counselling
10- Coping strategies
11- Presentation skills
12- Passing the MCQs
13- What is after the fellowships
14- Career path

Examples of Weekly Educational Activities

	Sunday	Monday	Tuesday	Wednesday	Thursday
8 am-9 am	Morning report	Morning report	Morning report	Trainee topic Presentation	Morning report
1pm-3 pm		Core topics	1st: JC 2nd : M&M 3rd : Research activity	Grand Round	

JC: Journal Club
M&M: Mortality and Morbidity review

Schedules of Rotations

Three-year hospital based clinical and research Program:

	First Year	Second Year	Third Year
Rotations			
Pediatric Intensive Care	8 months	7 months	3 months
Pediatric Cardiac Intensive Care	1	2	1
Anesthesia	1		
Elective ICU related	1		
Elective		1	1
Research		1	6
Vacation	1	1	1
Total	12 months	12 months	12 months

ASSESSMENT OF TRAINEES

A. Purpose

Assessment plays a vital role in the success of postgraduate training. Assessment will guide trainees and trainers to achieve the targeted learning objectives. On the other hand, reliable and valid assessment will provide excellent means for training improvement as it will inform the following aspects: curriculum development, teaching methods, and quality of learning environment. Assessment can serve the following purposes:

a. Assessment for learning: As trainers will use information from trainees' performance to inform their learning for improvement.
b. Assessment as learning: As assessment criteria will drive trainees' learning.
c. Assessment of learning: As assessment outcomes will represent a quality metrics that can improve learning experience.

Ideally assessment should be aligned with learning objectives (that was explicitly described early) which can be summarized as the following:

I- Knowledge and Academic Activity
   1. Basic sciences knowledge
   2. Clinical Knowledge
   3. Current Literature
   4. Participation in Scientific Activities
   5. Research

II- Clinical and Technical Skills
   1. Organisation of Work
   2. Records and Reports
   3. Interpretation and Utilisation of Information
   4. Clinical Judgement and Decision Making
   5. Indications of Procedures
   6. Procedures and Operative Skills
   7. Performance in Emergencies
   8. Supervision and Consultation

III- Attitudes and Ethics
   1. Discipline and Reliability
   2. Patient Relations
   3. Inter-professional Relations
   4. Ethical Standards

For the sake of organization, assessment will be further classified into two main categories: Formative and Summative

Formative Assessment

Trainees, as an adult learner, should strive for feedback throughout their journey of competency from "novice" to "mastery" levels. Formative assessment (also referred to as continuous assessment) is the component of assessment that is distributed throughout the academic year aiming primarily to provide trainees with effective feedback. Input from the overall formative assessment tools will be utilized at the end of the year to make the decision of promoting each individual trainee from current-to-subsequent training level. Formative assessment will be defined based on the scientific committee recommendations (usually updated and announced for each individual program at the start of the academic year). According to the executive policy on continuous assessment (available online: www.scfhs.org), formative assessment will have the following features:

a. Multisource: minimum four tools and should be continuous in nature, judgment should be based on holistic profiling of a trainee rather than individual traits or instruments.
b. Comprehensive: covering all learning domains (knowledge, skills, and attitude).
c. Relevant: focusing on workplace-based observations.
d. Competency-milestone oriented: reflecting trainee's expected competencies that matches trainee's developmental level (please refer to "Continuum of Learning" mentioned earlier in this curriculum).

Trainees should play an active role seeking feedback during their training. On the other hand, trainers are expected to provide timely and formative assessment. SCFHS will provide an e-portfolio system (currently One45) to enhance communication and analysis of data arising from formative assessment.

Tools and Criteria for Formative Assessment

Domains	Knowledge				Skills		Behavior
	Specific Academic Tasks	SOE	Multidisciplinary Critical Care Knowledge Assessment program (MCCKAP)	Promotion Exam	Log Book	Research	ITER
F1 to F2		√	Requirement	√	√		√
F2 to F3		√	Requirement	√	√	Approved proposal	√
F3 completion of training	Requirement		Requirement			Completed report with results	√

1. In Training Evaluation Rotation (ITER)

To fulfil the CanMEDS competencies based on the end of rotation evaluation, the fellow's performance (F1, F2, and F3) will be evaluated by the PICU consultants for the following competencies:

1. Performance of the trainee during daily work
2. Performance and participation in academic activities
3. Performance in a 10–20 minute direct observation assessment of trainee-patient interactions
4. Trainers are encouraged to perform at least one assessment per clinical rotation, preferably near the end of the rotation
5. Trainers should provide timely and specific feedback to the trainee after each assessment of a trainee-patient encounter
6. Performance of diagnostic and therapeutic procedural skills by the trainee. Timely and specific feedback for the trainee after each procedure is mandatory
7. The CanMEDS-based competencies end of rotation evaluation form must be completed within two weeks following the end of each rotation (preferably in an electronic format) by at least two consultants.
8. The fellow's in-training evaluation should be signed by the program director who will discuss it with the fellow.
9. The fellow should sign the evaluation form.
10. The evaluation form will be submitted to the PICU fellowship committee at the SCFHS within four weeks following the end of the rotation.

2. Multidisciplinary Critical Care Knowledge Assessment program (MCCKAP)

The Multidisciplinary Critical Care Knowledge Assessment Program (MCCKAP) online examination assesses critical care fellowship programs. The annual MCCKAP examination helps program directors:

a. Prepare fellows for the subspecialty board examinations in critical care
b. Identify specific areas of strength and weakness for each fellow with lists of references and key terms for missed questions
c. Assess results for each individual fellow and the overall program as well as the institution's national ranking
d. F 1,2,3 should sit for the exam to be promoted to the next level

3. Structured Oral Assessment (SOE)

a. A performance assessment method using case scenarios with PICU consultants questioning a candidate in a structured and standardized manner.
b. This exam format assesses the "know how" of clinical decision-making and the application or use of medical knowledge with realistic patient scenarios.
c. F1 and F 2 have to sit for the exam
d. It will be considered as a midyear assessment.

F1, F2 Blue print for PICU Structured Oral Exam

Domain for integrated clinical encounter	Patient management	Pathophysiology	Communication and professional behavior
Central nervous system	√		
Respiratory system	√	√	
Cardiovascular system	√		
Infectious and hematology system	√	√	
Psychosocial aspects			√

4. Log Book

1. The logbook will be electronically filled and monitored for the performance of the procedures for F1, F2.
2. Trainee and faculty must meet together to review portfolio and logbook once every two months and at the end of a given rotation.
3. The purposes of the logbook are to:
   a. Monitor trainees' performance on a continual basis
   b. Maintain a record of procedures and technical intervention performed
   c. Enable the trainee and supervisor to determine the learning gaps
   d. Provide a basis of feedback to the trainee

5. End of year written Promotion Exam

a. End of year examination will be limited to F1and F2.
b. The number of exam items, eligibility, and passing score will be the responsibility of the PICU scientific committee
c. The fellow who fails the yearly evaluation will not be allowed to sit the written exam

F1, F2 End of Year Written Promotion Exam

Blue Print

Sections – Acute Subsection :	MCQs numbers for each subsection	Domain 1 Pathophysiology & Etiology	Domain 2 Investigation & Diagnosis	Domain 3 Management	Domain 4 outcome
Cardiovascular	12				
Respiratory	12				
Neurology/ Neuromuscular	10				
Infectious Diseases/ Immunology/ inflammation	11				
Renal and Electrolyte	6				
Metabolism / Endocrinology	4				
Hematology/Oncology	4				
Gastroenterology /Nutrition	6				
Poisoning/ toxin/overdose	4				
Trauma/ Burn	5				
pharmacology	6				
Anesthesia/ postoperative care	4				
Procedures/ Monitoring/ special critical care issues	5				
Quality/safety	5				
Ethics/research	6				
TOTAL	100				

6. Research

a. The second year fellow should submit an IRB approved proposal to be promoted
b. The third year fellow cannot sit for theSaudi PICU fellowship Board Certifying Exam unless the following criteria are fulfilled:
   1. A completed research with an IRB approval, or a research study published, accepted for publication, or presented at a national or international meeting, or an abstract/poster published or presented at a national or international meeting
   2. A letter of recommendation from the program director testifying active involvement of the fellows in research

7. Specific Academic Tasks

a. The third year fellow should do an oral presentation in a conference or during the fellow day. This is a mandatory task
b. The third year fellow should choose one optional activity of the following:
   1. To lead PICU quality improvement project, or
   2. To Be a qualified Instructor in PFCCS or PALS course

- Criteria for promotion

a. Scoring a minimum of borderline pass (BP) in all formative assessment tools will allow the fellow to be promoted to the next level.
b. In case the fellow scored borderline failure (BF) in one of the assessment tools he/she can be considered for promotion to the next training level provided that he/she compensated that by scoring clear pass (CP) in at least another assessment tool after getting the required recommendations from program director and the approval of the supervisory committee (in accordance with the executive policy).
c. Scoring clear failure (CF) in one assessment tool will not allow the fellow to be promoted to the next level.
d. Scoring borderline failure in more than one assessment tool will not allow the fellow to be promoted to the next level.

	Clear Failure	Borderline Failure	Borderline Pass	Clear Pass >70%
ITER	<50%	50-59.4%	60-69.4%	>70%
SOE	<50% Not sitting for exam	50-59.4%	60-69.4%	>70%
Log Book	<50%	50-59.4%	60-69.4%	>70%
MCCKAP		Not sitting for exam	Sitting for exam	
Promotion exam	<50%	50-59.4%	60-69.4%	>70%
Specific Academic Task	None	Completed only one of the optional tasks	Completed only the mandatory task (Oral presentation)	Completed the mandatory task (Oral presentation) plus one of the optional tasks

Research F2	**No proposal**	**Incomplete proposal**	**Submitted proposal to IRB**	**IRB approved proposal**
Research F3	**Incomplete report No results**	**Incomplete report Partial results**	**Initial report with full results**	**Completed report ready to submit**

C-Summative Evaluation

The fellow should pass the final written exam and final OSCE to be certified in the specialty.

In order to be eligible to set for final specialty examinations, each trainee is required to obtain "Certification of Training-Completion". Based on the training bylaws and executive policy (please refer to www.scfhs.org) trainees will be granted "Certification of Training Completion" once the following criteria is fulfilled:

a. Successful completion of all training rotations.
b. Completion of training requirements as outlined by scientific committee of specialty (e.g. logbook, research, others).
c. Clearance from SCFHS training affairs, that ensure compliance with tuitions payment and completion of universal topics. "Certification of Training-Completion" will be issued and approved by the supervisory committee or its equivalent according to SCFHS policies.

1-Saudi PICU fellowship Final Written Board Certifying Exam

a. This examination assesses the theoretical knowledge base (including recent advances) and problem-solving capabilities of candidates in the specialty of
b. It is delivered in an MCQ format and held at the end of the training.
c. The number of exam items, eligibility, and passing score will be in accordance with the Commission's training and examination rules and regulations
d. The fellow must pass the written exam to sit for the final OSCE

F3 Final Written Exam Blueprint Template for PICU

Sections – Acute Subsection :	MCQs numbers for each subsection	Domain 1 Pathophysiology & Etiology	Domain 2 Investigation & Diagnosis	Domain 3 Management	Domain 4 outcome
Cardiovascular	14				
Respiratory	14				
Neurology/ Neuromuscular	10				
Infectious Diseases/ Immunology/ inflammation	11				
Renal and Electrolyte	6				
Metabolism / Endocrinology	3				
Hematology/ Oncology	4				
Gastroenterology /Nutrition	5				
Poisoning/ toxin/overdose	4				
Trauma/ Burn	5				
pharmacology	5				
Anesthesia/ postoperative care	4				
Procedures/ Monitoring/ special critical care issues	5				
Research and Ethics	10				
TOTAL	100				

2-Objective Structured Clinical Examination (OSCE)

a. A standardized way of assessing clinical competencies.
b. It provides a mean to assess:
   1. The “shows how” of physical examination and history taking skills.
   2. The communication skills with patients and family members.
   3. The breadth and depth of knowledge and cognitive skills.
   4. The ability to summarize and document findings.
   5. The ability to make a differential diagnosis and treatment plan.

F3 Blue print for PICU Final OSCE exam

Domain for integrated clinical encounter	Patient management	Procedure and technical skills	Communication and professional behavior	# station
Central nervous system	1			1
Respiratory system	1	1		2
Cardiovascular system	1	1		2
Infectious and hematology system	1			1
Psychosocial aspects			2	2
Total station	4	2	2	8

Trainee Support

1-Each trainee must have an assigned supervisor
2-A clinical supervisor must not have more than 3 trainees in any given point of time
3-Assigned supervisor must follow the trainee for at least one year

Mentorship

Post-graduate residency training is a formal academic program for residents to develop their full potentials as future specialists. This is potentially the last substantial training program before they become an independent specialist. However, unlike the undergraduate program with well-defined structure, residency training is inherently less organized. Residents are expected to be in the clinical settings delivering patient care. They are rotated through multiple sites and sub-specialties.

Goals

1. Guide residents towards personal and professional development through continuous monitoring of progress
2. Early identification of struggling residents as well as high achievers
3. Early detection of residents who are at risk of emotional and psychological disturbances
4. Provide career guidance

Roles of the Mentor

1. The primary role of the mentor is to nurture a long-term professional relationship with the assigned residents.
2. Mentor is expected to provide an 'academic home' for the residents so that they can feel comfortable in sharing their experiences, express their concerns, and clarify issues in a non-threatening environment.
3. Mentor is expected to keep sensitive information about the residents in confidence.
4. Mentor is also expected to make appropriate and early referral to Program Director or Head of the Department if s/he determines a problem that would require expertise or resources that is beyond his/her capacity.

5. Example of such referral might include
   a. Serious academic problems
   b. Progressive deterioration of academic performance
   c. Potential mental or psychological issues
   d. Personal problems interfering with academic duties
   e. Professional misconduct

6. The following are NOT expected roles of a mentor
   a. Provide extra tutorials, lectures, or clinical sessions
   b. Provide counselling for serious mental and psychological problems
   c. Being involved in residents' personal matters
   d. Provide financial or other material supports

Roles of the Fellow

1. Submits resume at the start of the relationship
2. Provide mentor with short term and long term goals
3. Takes primarily responsibility in maintaining the relationship
4. Schedule monthly meeting with mentor in a timely manner; do not request for ad hoc meeting except only in emergency
5. Recognize self-learning as an essential element of residency training
6. Report any major events to the mentor in a timely manner

Frequency and duration of Meetings

1. The recommended minimum frequency is once every 4 weeks.
2. Each meeting might take 30 minutes to 1 hour.
3. It is also expected that once assigned, mentor should continue with the same fellow preferably for the entire duration of the training program

Tasks during the meeting

1. Discuss overall clinical experience of the fellow with particular attention to any concerns raised
2. Review logbook or portfolio with the fellow to determine whether the fellow is on target of meeting the training goals
3. Revisit earlier concerns or unresolved issues, if any
4. Explore any non-academic factors seriously interfering with training
5. Document excerpts of the interaction in the logbook

Mandatory reporting to Program Director

1. Consecutive absence from three scheduled meetings without any valid reasons
2. Unprofessional behaviour
3. Consistent underperformance in spite of counselling
4. Serious psychological, emotional or health problems that may potentially cause unsafe patient care
5. Any other serious concerns by the mentor

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3. Lucking SE et al, 2012. *Pediatric Critical Care Study Guide*. 1st ED. Springer

4. Frank JR, Snell L, Sherbino J, editors. CanMEDS 2015 Physician Competency Framework. Ottawa: Royal College of Physicians and Surgeons of Canada; 2015.).