

**Guidelines**  
**For**  
**Competency Based Training Programme**  
**DrNB - Critical Care Medicine**

**2021**



**NATIONAL BOARD OF EXAMINATIONS IN MEDICAL SCIENCES**  
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## I. INTRODUCTION

Critical care medicine (CCM) or Intensive care medicine is a multidisciplinary and multi-professional medical/nursing field concerned with patients who have sustained or are at risk of sustaining acutely life-threatening single or multiple organ failure due to disease or injury. The intensive care unit (ICU) is a specially staffed and equipped section of the hospital for the management of life-threatening or potentially life-threatening conditions, with expertise and facilities for organ support (e.g., ventilators, multipara monitors, dialysis, etc.) by medical, nursing and other experienced staff. CCM involves the assessment, resuscitation and ongoing management of critically ill patients with life-threatening single and multiple organ system failure. An intensivist or an ICU specialist is a medical professional trained in intensive or critical care medicine. The intensivist makes decisions regarding the care of the patients, including admissions and discharges, appropriate referrals, which physicians to consult, and daily care.

The knowledge and interest in critical care medicine has been gaining in India over the last few decades. Though the awareness and acceptance of this speciality by the public and healthcare providers led to the surge in the number of intensive care facilities across the country, yet there is a lot of unmet need for ICU beds and trained manpower in India.

The gap in the workforce is somewhat compensated presently by the trainees undergoing courses overseen by various professional societies and organisations but some ICUs are still managed by a workforce with no or little formal training.

A good outcome in critically ill patients requires expertise in the whole range of ICU management, including mechanical ventilation, hemodynamic support, dialysis and renal support, infection control, etc. There is an urgent need for trained manpower in Critical Care Medicine including doctors, nurses, technicians and other paramedical staff.

Augmentation of ICU resources and capability will help in better outcomes after major surgery, trauma, severe infections, obstetric complications, and severe non-communicable diseases, and will contribute to the health of the nation. In case of a disaster, it will serve as a base for surge capacity.

Critical Care Medicine was recognized as a super speciality by the MCI only in 2012 which was a welcome step towards the development of trained intensivists, and to



pave the path for increasing ICU beds and better resource utilization in all the government hospitals and Medical Colleges in the country. However, to date, there are very few seats recognized countrywide for DM (CCM). The available resources for training in CCM in medical college hospitals are inadequate to overcome manpower deficiency and to train future intensivists. There are many hospitals, especially in the private sector that are suitable to run the 3-year DNB CCM super speciality degree course. These National board driven DNB courses may be a solution to increasing and developing trained medical manpower in CCM.





## II. OBJECTIVES OF THE PROGRAMME

### 1. Programme Goal

Critical illness varies in severity and in number of organs needing support during recovery from illness. Success of treatment depends on a quick diagnosis, resuscitation, organ support and definitive therapy. It is essential to co-ordinate with multiple specialties and multiple types of health care workers, and to prioritise interventions to optimise outcomes in critically ill patients.

Sickness and death are very common in critically ill patients. This affects not only the patient and the family, but also the treating team. It is imperative that intensivists acquire good communication skills and provide emotional support to all concerned.

The syllabus will prepare the trainees to provide clinical management of the patient as a whole. This requires knowledge of basic and clinical sciences in medicine, and includes procedural, communication and administrative skills and leadership qualities. Audit, research and teaching are other significant aspects of training in critical care medicine.

The goal of course is to produce a competent intensivist who:

- a. Recognizes the health needs of patients and carries out professional obligations in keeping with established standards, professional ethics and National Health policy
- b. Has acquired the competencies pertaining to critical care medicine that are required to be practiced in the community and at all levels of health care system
- c. Has acquired skills in effectively communicating with the patients, family and the community
- d. Is aware of the contemporary advances and developments in medical sciences
- e. Acquires a spirit of scientific enquiry and is oriented to principles of research methodology
- f. Has acquired skills in educating medical and paramedical professionals



## 2. Programme Objectives

At the end of the Postgraduate training the student shall be able to:

- a. Practice CCM ethically and in step with the established standards
- b. Take detailed history, perform full physical examination and make a clinical diagnosis.
- c. Perform and interpret relevant investigations (Imaging and Laboratory) and diagnostic and therapeutic procedures pertaining to the specialty of CCM.
- d. Resuscitate patients from suffering cardiac arrest, or circulatory and respiratory failure and manage other emergencies effectively.
- e. Provide care to the critically ill medical patients including appropriate therapeutics, monitoring, stabilization and organ support.
- f. Provide perioperative care including monitoring, stabilization and organ support following major surgery, including general surgery, cardiovascular and thoracic surgery, neurosurgery, trauma, and solid organ transplant.
- g. Plan and deliver comprehensive treatment for illness using principles of rational drug therapy.
- h. Demonstrate skills in documentation of case details, and of morbidity and mortality data relevant to the situation.
- i. Identify social, economic, environmental, biological and emotional determinants of health in a given case, and take them into account while planning treatment strategies
- j. Provide high quality intensive care and integrate processes for infection control, clinical protocols, checklists, care Bundles, standards and guidelines, and quality control
- k. Demonstrate empathy and humane approach towards patients and their families and exhibit interpersonal behaviour in accordance with the societal norms and expectation and respect their sensibilities
- l. Demonstrate communication skills of a high order in explaining management and prognosis, providing counselling
- m. Provide effective, humane and timely end-of-life care, including discussion, communication and provision of palliative care.
- n. Be aware of the medical, ethical and legal issues surrounding end-of-life care.
- o. Demonstrate sufficient understanding of the basic sciences relevant to CCM.
- p. Provide ICU outreach services including management of patients in other high-dependency units, Medical Emergency or Rapid Response Teams, Trauma team, CPR team, and management of patients in the Emergency Department



- q. Initiate and lead multi-disciplinary post-discharge clinics to manage post-ICU syndrome and chronic critical illness
- r. Develop skills as a self-directed learner, recognize continuing educational needs: select and use appropriate learning resources.
- s. Demonstrate competence in basic concepts of research methodology and epidemiology and be able to critically analyze relevant published research literature.
- t. Develop skills in using educational methods and techniques as applicable to the teaching of medical / nursing students, general physicians and paramedical health workers.
- u. Function as a productive member of a team engaged in health care, research and education.
- v. Organize and supervise the desired managerial and leadership skills.
- w. Recognize the importance of CCM in the context of the health needs of the community and national priorities in the health sector.
- x. Play an assigned role in the implementation of national health programs, effectively and responsibly.
- y. Effectively integrate into a local/regional/national response to disasters, including pandemics and infectious disease outbreaks
- z. In a disaster, provide cost-effective, quality intensive care in a tiered structure
- aa. In a disaster, develop and participate in local, regional and national ICU networks to facilitate sharing of data and information on bed availability, disease patterns, etc.
- bb. Be a member of national/international critical care societies, contribute actively to their activities, and develop and participate in national and international collaborative projects.





### III. TEACHING AND TRAINING ACTIVITIES

#### 1. Teaching and Learning Methodology

Teaching and learning methodology given below includes but not limited to Lecture, Discussion, Student Directed Learning, Case Based Learning etc.

- a. Clinical Case Discussion
- b. Morbidity-Mortality Discussion
- c. Audit presentation
- d. Lectures, Seminars and Journal Clubs
- e. Presentation of progress report on the research projects
- f. Simulation based learning
- g. Joint inter-departmental academic meets

#### 2. Clinical and Practical Training:

Teaching and training of students shall include graded all round patient care responsibility including resuscitation, clinical diagnosis, invasive diagnostic and therapeutic procedures and advanced decision making in the management of critically sick medical and surgical patients.

To achieve these objectives, it is recommended that the resident doctors should spend their time in the following manner:

- a. Minimum of 24 months in core discipline i.e. Intensive Care Units of the Department/Division of Critical Care Medicine
- b. Minimum of 6 months and a maximum of 12 months of need-based elective rotation in medical, surgical and allied / basic and clinical specialties relevant to CCM, as per the assessment of the Course Director / Guide (including but not restricted to Internal Medicine, Anaesthesiology, Coronary Care, Pulmonology, Nephrology, Neurology, Gastroenterology, Oncology, Trauma and Emergency Care, Infectious disease, Microbiology, Radiology and Intensive Care Units of other disciplines/hospitals to cover up any deficiency in the required case-mix.)
  - Competency in airway-breathing-circulation management (for those from a non-Anaesthesia background) and principles of general medicine (for those from Anaesthesia and Emergency Medicine background) should be acquired at the earliest during the early training period.





- A minimum of two weeks in any speciality and minimum of three electives is recommended.
  - It is suggested that during the elective period the student continue to take active part in critical care departmental academic activities and if necessary some clinical duties as assessed by the Program director/Guide
- c. Wherever the case-mix is deficient either in surgical and medical patients, the deficiency must be fulfilled by intra-hospital or inter-hospital ICU rotation of the trainees in such units/departments where such facilities are available

**3. Recommended Courses and workshops:**

It is recommended that candidates attend courses / workshops on cardiopulmonary resuscitation, management of severe trauma, mechanical ventilation, hemodynamic monitoring, difficult airway management, critical care ultrasound and echocardiography, bronchoscopy, renal replacement therapy and critical care nutrition.



#### IV. SYLLABUS AND COMPETENCIES

The document provided is a structured syllabus which consists of three segments i.e. Domains, Competencies and Aggregated syllabus. Domains consist of broad skill set which needs to be acquired during the three years training period. Competencies are general skill set within each domain that needs to be acquired to become competent on the Domain requirement. These competencies may further be acquired through specific skill sets enumerated in Aggregated syllabus which is classified systematically and within each system consist of Basic and Applied Anatomy and Physiology, Pharmacology, Clinical examination skills, Procedural skills, Data interpretation, Equipment knowledge and Disease management skills. A comprehensive list of knowledge set is enumerated within each of these sections in Aggregated syllabus. Critical Care is a broad super speciality and some of the knowledge and skill set may not have been fully covered in this Syllabus. Moreover, as critical care is a rapidly advancing science with emerging evidence, knowledge and newer strategies of management, the trainees are encouraged to use this syllabus as a guide in their training program and not as an all-inclusive document.

##### 1. Domains

- a. Resuscitation
- b. Disease Management: Diagnosis/Monitoring/Supportive care/Definitive care
- c. Procedures
- d. Perioperative Care
- e. Transport
- f. Ethics/End of Life Care/Prognostication
- g. Quality and Patient Safety
- h. Administration/Clinical Governance
- i. Research/Teaching
- j. Professionalism /Communication
- k. Medico Legal
- l. Organ donation



## 2. Competencies

### a. Resuscitation

- Assess and stabilise patients with Shock/Respiratory failure/other organ failure
- Assess and stabilise patient with acute physiologic derangement/Rapid response
- Manage Cardio respiratory arrest and post arrest care
- Manage Trauma/ Burn/Environmental hazards
- Disaster management and Mass casualty initial Management
- Triaging
- Resuscitation in special situations: Obstetrics/Paediatric

### b. Disease Management: Diagnosis/Monitoring/Supportive care/Definitive care

- History taking
- Focused physical examination
- Relevant investigation/imaging
- Provisional and Differential diagnosis
- Interdepartmental consultation
- Documentation
- General monitoring
- Organ specific monitoring
- Hemodynamic support
- Respiratory support
- Renal support
- Nutritional support
- Neurological support
- Hematological support
- Metabolic support
- Immunological support
- Definitive care
- Physiotherapy



**c. Procedures**

- Organ specific procedures

**d. Perioperative care**

- Perioperative care of high risk surgical patient
- Perioperative care in cardiac surgery
- Perioperative care in neurosurgery
- Perioperative care in Transplant surgery
- Perioperative care in Thoracic surgery
- Perioperative care in Trauma surgery
- Post -operative analgesia
- DVT prophylaxis

**e. Transport**

- Intra hospital transport of high risk patient
- Inter hospital Ground/Air Transport of High risk patient
- Transport of patient with contagious disease
- Documentation/Hand over

**f. Ethics/End of Life/Prognostication**

- Prognostication Scoring systems
- Withholding and Withdrawing life support: Communication
- Principles of medical ethics
- Palliative care
- Empathy towards Family, Social and Religious belief

**g. Quality and Patient safety**

- Structure, Process and Outcome data on Quality
- Root Cause analysis of Near Miss and Medical errors
- Medication safety and Adverse drug reaction monitoring
- Auditing and Bench marking performance
- Environmental hazards and safety of patient and health care staff
- Infection control measures

**h. Administration/Clinical Governance**

- Human Resource/Design/Equipment/Budgeting
- Conflict resolution





- Team leader role
- Critical Care Outreach team
- Critical Care follow up clinic
- Admission and discharge planning
- Developing ICU policies and Protocols

**i. Research /Teaching**

- Plan Research Project
- GCP training
- Critically appraising a research paper
- Participate in departments teaching/research programs
- Simulation training
- Teaching Nurse/Allied health care Professional
- Presentation in Scientific meetings

**j. Professionalism**

- Professional attitude/communication towards patients, family, colleagues
- Patient care related documents
- Respects privacy, confidentiality of patients data
- Involves patient and family in decision making
- Promote team management and multidisciplinary care
- Patient and Family centered care
- Understand principles of reducing cost while maintaining quality

**k. Medico legal**

- State and National laws
- Medical negligence
- Informed consent
- Medical indemnity

**l. Organ Donation:**

- Certifying Brain Death
- Managing Organ donor/Organ Transport

**3. Aggregated Syllabus**

**a. Cardiovascular system**



- Basic and Applied Anatomy and Physiology of Cardiovascular system
  - ✓ Coronary circulation
  - ✓ Surface marking of Heart, Major vessels and Landmark for vascular access
  - ✓ Cardiac conduction system
  - ✓ Cardiac muscle, Valve, Chambers, Pericardium
  - ✓ Cardiac innervation
  - ✓ Hemodynamics
    - Cardiac output
    - Starling curve
    - Oxygen delivery and oxygen consumption
    - Oxygen debt
    - Control of blood pressure
    - Preload, afterload, transmural pressures
    - Systemic and pulmonary vascular resistance
    - Heart lung interaction
    - Flow dependent oxygen delivery-changes in diseased states
    - Regional circulations in shock
  - ✓ Arrhythmia
  - ✓ Starling's law of movement of fluids
  - ✓ Guytonian theory of circulation
  - ✓ Circulatory changes during ECMO and cardiopulmonary bypass
  - ✓ Microcirculation
  - ✓ Neurohumoral control of cardiovascular system

**b. Pharmacology of Cardiovascular Drugs**

- Inotropes and Vasoactive agents
- Antiarrhythmics
- Antihypertensives
- Diuretics
- Resuscitation Fluids
- Antiplatelets, Anticoagulants and Thrombolytics



**c. Examination of Cardiovascular systems**

- Clinical assessment of hemodynamic status

**d. Practical Skills**

- CPR/Defibrillation/Cardioversion/Pacing (Transvenous /External)
- Cannulation
  - ✓ Venous: Central /Peripheral
  - ✓ Arterial
  - ✓ PICC line
  - ✓ Ultrasound guided
- Hemodynamic monitoring (Invasive/Non Invasive)
- Echocardiography
- Setting up of invasive monitor
- Invasive/Minimally invasive cardiac output
- Intra-aortic balloon pump
- Pulmonary artery catheter
- Assist in ECMO cannulation

**e. Data Interpretation**

- Central Venous pressure Waveform
- Arterial Waveform
- Chest X-ray/Electrocardiography/Echocardiography
- Hemodynamic monitoring
  - ✓ Cardiac output
  - ✓ Pulse pressure variation
  - ✓ Stroke volume variation
  - ✓ SCVO<sub>2</sub>/SVO<sub>2</sub>
  - ✓ Arterio-Venous PaCO<sub>2</sub> Gap analysis
  - ✓ Lactate
  - ✓ Tidal volume challenge
  - ✓ Plethysmographaic variability index
  - ✓ Capillary refill time
  - ✓ Passive Straight Leg raising
- Analysis of PA waveform

**f. Equipment Knowledge**

- 12 lead ECG machine



- Continuous ECG monitor
- Cardiac arrest tray
- Defibrillator
- NIBP
- Pressure Transducers
- Syringe pump
- Volumetric infusion pumps
- Pressure bag for rapid fluid infusion
- Temporary pacemaker: transvenous/transcutaneous device/paddles
- Blood warmer
- Cannulae: Venous/Arterial/Introducer sheath
- Cardiac output monitor
- Calibrated
- Non Calibrated
- ECMO machine
- IABP
- PA catheter
- ECHO machine

**g. Clinical Management Skill**

- Shock (all categories)
- Acute/Acute on chronic heart failure
- Arrhythmias
- Acute coronary syndrome
- Hypertensive urgencies/emergencies
- Pericardial tamponade
- Aortic dissection
- Pulmonary embolism
- Invasive management of cardiogenic shock
  - ✓ ECMO
  - ✓ IABP
  - ✓ Ventricular assist device
- Acute Valvular emergencies





- Heart failure in Pregnancy
- Cyanotic and Acyanotic congenital heart disease
- Cardiomyopathy and Myocarditis
- Air, Fat and Amniotic fluid embolism
- Acute Aortic and Peripheral vascular disorders

#### 4. Respiratory System

##### a. *Basic and Applied Anatomy and Physiology of Respiratory system*

- Anatomy
  - ✓ Upper and Lower airway
  - ✓ Pleura, mediastinum
  - ✓ Lungs, lobes, microstructure of lung
  - ✓ Diaphragm, other muscles of respiration
  - ✓ Sternum and Rib cage
- Surface marking /Landmarks
  - ✓ Lung/Pleura
  - ✓ Tracheal Cartilages
  - ✓ Thoracic Procedures
  - ✓ Thoracocentesis
  - ✓ Tension Pneumothorax
  - ✓ Percutaneous tracheostomy
  - ✓ Cricothyrotomy
- Lung Ultrasound
- Lung Mechanics
  - ✓ Work of breathing
  - ✓ Central control of respiration
- Oxygenation and Ventilation
  - ✓ Hypoxia/Hyperoxia/ Hypo/Hypercarbia
  - ✓ V/Q mismatch/Shunt/Dead space/Diffusion defect
  - ✓ Oxygen and Carbon dioxide dissociation curve
  - ✓ Respiratory Quotient
  - ✓ Compliance and Resistance
  - ✓ Oxygenation and Ventilation Indices
- West Zones
- Effect of IPPV and PEEP on lungs and circulation



- Heart lung interactions in health and disease

**b. Pharmacology of Drugs in Respiratory system**

- Bronchodilators
- Anti-inflammatory
- Mucolytics
- Oxygen
- Pulmonary vasodilators
- Steroids
- Neuromuscular blocking agent

**c. Examination of Respiratory systems**

- Clinical assessment of Respiratory failure
  - ✓ Upper airway obstruction
  - ✓ Exacerbation of Obstructive airway disease
  - ✓ Collapse/Consolidation
- Clinical assessment of Pleural effusion/Pneumothorax/Hemothorax/ Flail chest

**d. Practical Skills**

- Airway Management
- Non-invasive ventilation
- Prone ventilation
- Invasive ventilation
- Thoracic procedures
  - ✓ Thoracocentesis
  - ✓ Chest tube placement
- Cricothyroidotomy
- Tracheostomy
- Bronchoscopy
- Chest Ultrasound
- Chest Physiotherapy
- Intercostal nerve block
- ECMO



**e. Data Interpretation**

- Arterial Blood Gas
- Pulse Oximetry
- Capnography
- Ventilatory graphics
- Imaging
  - ✓ Chest X-ray
  - ✓ Chest CT Scan
- Pulmonary Function test

**f. Equipment Knowledge**

- Oxygen delivery systems
- Pulse oximeter
- Oxygen cylinder/Flow meter/Concentrator
- Capnograph
- Airway management devices
- Non-invasive ventilation devices with interface
- Invasive ventilators
- Chest drain system
- Bronchoscope
- Nebulizers
- ECMO
- Hyperbaric oxygen
- High Frequency Oscillator

**g. Clinical Management Skill**

- Acute and Acute on Chronic Respiratory failure
  - ✓ COPD exacerbation
  - ✓ Acute severe asthma
  - ✓ ARDS
- Upper airway obstruction
- Massive hemoptysis
- Pulmonary embolism



- Pneumonia
  - ✓ Severe Community acquired
  - ✓ Hospital acquired/ VAP
  - ✓ Aspiration
- Pulmonary hypertension
- Pulmonary vasculitis
- Hepatopulmonary syndrome
- Bronchopleural fistula
- Pleural diseases
- Chest Trauma

## 5. Gastrointestinal and Hepatobiliary system

### a. Basic and Applied Anatomy and Physiology

- Surface marking
- Abdominal paracentesis
- Acid secretion
- Peristalsis /Digestion/Absorption
- Bile synthesis and excretion
- Ammoniogenesis

### b. Pharmacology of Hepatobiliary and Gastrointestinal drugs

- Acid suppressants
  - ✓ H2 blockers
  - ✓ Proton Pump Inhibitor
  - ✓ Antacid
- Pepsin inhibitor - Sucralfate
- Prokinetic/Antimotility / Laxatives and Anti emetics
- Lactulose and other ammonia reducing drugs
- Vasopressin and analogues:  
Terlipressin/Octreotide/Somatostatin/Midodrine
- Drug dosing in liver failure

### c. Clinical skills

- Focused abdominal examination





- Rectal examination

**d. Practical skills**

- Insertion of Feeding tubes
  - ✓ Nasogastric
  - ✓ Nasojejunal
- Insertion of Sengstaken Blackmore tube
- Abdominal paracentesis
- Intrabdominal pressure measurement
- Stoma care
- Focused abdominal ultrasound

**e. Data interpretation**

- Liver function test
- Abdominal imaging
- Intrabdominal pressure
- Peritoneal fluid analysis

**f. Equipment knowledge**

- Feeding tubes
  - ✓ Nasogastric
  - ✓ Nasojejunal
  - ✓ PEG tube
  - ✓ Surgical feeding jejunostomy
- Sengstaken tube

**g. Clinical management skill**

- Management of acute abdomen
- Acute pancreatitis
- Acute/Acute on chronic liver failure
  - ✓ Hepatic encephalopathy
  - ✓ Massive ascites
  - ✓ Portal hypertension with variceal bleed
  - ✓ Spontaneous bacterial peritonitis
  - ✓ Hepatorenal syndrome
  - ✓ Hepatopulmonary syndrome
  - ✓ Jaundice in pregnancy



- Upper and lower Gastrointestinal bleed
- Stress ulcer prophylaxis
- Acute colonic dilatation
- Mesenteric infarct
- Management of short gut syndrome
- Postoperative management of major abdominal surgery
- Rupture esophagus
- Cholecystitis
  - ✓ Acute calculus cholecystitis
  - ✓ Acalculuscholecystitis
- Abdominal compartment syndrome
- Corrosive injury
- Tracheo-esophageal fistula
- Inflammatory Bowel disease: Toxic megacolon
- Budd Chiari syndrome
- Hepatitis
- Plasmapheresis in liver disease
- Diarrhea in critically ill

## 6. Renal system

### a. Basic and Applied Anatomy and Physiology of Renal system

- Surface marking
  - ✓ Kidneys: Anteriorly and Posteriorly
  - ✓ AV fistula
- Renal circulation: Macro and Micro
- Role of kidney in homeostasis
- Physiology of formation of Urine
- Basic principles of Dialysis and Hemofiltration



**b. Pharmacology**

- Diuretics
- Renoprotective agent
- Dose modification in renal failure
- Nephrotoxicity

**c. Clinical examination of renal system**

- Kidney palpation/Renal bruit

**d. Procedural skill**

- Insertion of hemodialysis catheter
- Insertion of temporary peritoneal dialysis catheter
- Measurement of Bladder pressure
- Setting up of Dialysis: Hemo (including CRRT) and Peritoneal

**e. Data Interpretation**

- Urine dipstick
- Urine routine microscopy
- Urinary electrolytes
- Creatinine clearance
- Renal imaging

**f. Use of Equipment**

- Hemodialysis catheter
- Temporary dialysis catheter
- Hemodialyser including CRRT machine

**g. Clinical skills**

- Assessing oliguria
- Managing acute/acute on chronic kidney injury
- Preventing acute kidney injury
- Managing complications of Hemo and Peritoneal dialysis
- Managing electrolyte emergencies
- Managing Plasmapheresis/Hemoperfusion



**h. Hematology/Oncology**

- **Hematology**
  - ✓ Physiology
    - Coagulation system
    - Life cycle of Blood Corpuscles
- Pharmacology
- Antiplatelets
- Anticoagulants
- Anti Fibrinolytics
- Thrombolytics
- Anticoagulant reversing agents

**i. Equipment**

- Blood warmer
- Pheresis machine
- Thromboelastograph
- ACT machine

**j. Data interpretation**

- Peripheral smear
- DIC panel/Coagulation test
- Thromboelastograph
- Blood grouping and cross matching

**k. Procedural skills**

- Safe blood and component transfusion
- Iron transfusion
- Blood preservation

**l. Clinical skills**

- Assessing and Managing
  - ✓ Anemia
  - ✓ Bleeding disorder
  - ✓ Hemolytic disorders
  - ✓ Thrombotic disorders





- Massive Blood transfusion
- Managing TTP/HUS/HIT
- Managing Mismatch blood transfusion

**m. Oncology**

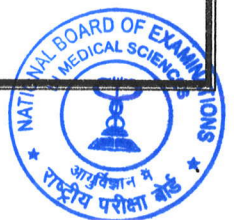
- Pharmacology
  - ✓ Chemotherapeutic agents
- Clinical skills
  - ✓ Managing oncological emergencies
    - Tumor lysis syndrome
    - SVC compression
    - Spinal cord compression
    - Hyperviscosity syndrome
- Managing Chemotherapy induced complications
- Assessing Graft versus Host disease

**n. Nutrition/Metabolic /Fluid and Electrolyte**

- **Physiology**
  - ✓ Malnutrition in critically ill
  - ✓ Glucose /Lipid/Protein metabolism
  - ✓ Respiratory Quotient
  - ✓ Water and Electrolyte balance
- **Equipment knowledge**
  - ✓ Indirect calorimeter (Metabolic cart)
  - ✓ Glucometer
- **Data interpretation**
  - ✓ Nutrition score
  - ✓ Urinary urea nitrogen
  - ✓ Respiratory quotient
  - ✓ Thyroid function test
  - ✓ Adrenal function test
- **Pharmacology**
  - ✓ Crystalloids
  - ✓ Colloids



- ✓ Electrolytes
- ✓ Micronutrients
- **Clinical management skills**
  - ✓ Nutrition
    - Assessing nutritional status
    - Formulating a nutritional plan in general
    - Formulating nutritional plan in specific disease states e.g .
      - Sepsis
      - Renal failure
      - Liver failure
      - Pancreatitis
      - Hypercapnic respiratory failure
      - Short gut /Fistula
      - Burn
    - Immunonutrition
    - Principles of Enteral and Parenteral nutrition
  - ✓ Glucose metabolism
    - Diabetic ketoacidosis
    - Hyperglycemic, Hyperosmolar state
    - Glycemic control
  - ✓ Endocrine disorders
    - Managing Endocrine emergencies e.g.
      - Thyrotoxic crisis
      - Myxedema coma
      - Adrenal crisis
      - Pituitary apoplexy
      - Hypercalcemia
    - Diabetes insipidus
    - Postoperative management of Parathyroidectomy
    - Postoperative management of Pheochromocytoma
    - Hormonal therapy in Brain dead organ donor
  - ✓ Electrolyte /Acid Base
    - Sodium/Potassium/Calcium/Magnesium/Phosphate balance



- Acidotic/Alkalotic states: Respiratory and Metabolic
- Osmolar gap

**o. Nervous System**

- **Basic and Applied Anatomy and Physiology**
  - ✓ Central/Peripheral and Autonomic nervous system
  - ✓ Action potential, nerve conduction, Neuromuscular junction
  - ✓ EEG
  - ✓ Surface marking
    - Lumbar puncture
    - Spinal, Plexus and nerve block
  - ✓ Intracranial pressure
  - ✓ Cerebral autoregulation
  - ✓ CSF production, circulation and absorption
- **Pharmacology**
  - ✓ Osmotic agents
  - ✓ Sedatives/Anxiolytics/Antipsychotic/Anaesthetics/Analgesics
  - ✓ Neuromuscular blockers/Anticholinesterases/Anticholinergic
  - ✓ Anticonvulsant
  - ✓ Thrombolytics
- **Clinical skills**
  - ✓ Focused neurological examination
  - ✓ Coma /Sedation/Delirium scale
  - ✓ Brain death certification
- **Practical skill**
  - ✓ Lumbar puncture
  - ✓ Neuromuscular junction monitoring
  - ✓ Transducing ICP monitor
  - ✓ Cerebral protection/ Targeted temperature management
- **Data Interpretation**
  - ✓ Cerebrospinal fluid analysis
  - ✓ EEG
  - ✓ Neuroimaging
  - ✓ Transcranial Doppler
  - ✓ ICP waveform analysis
  - ✓ EMG and NCV analysis



- ✓ Bispectral Index (BIS)
- **Use of Equipment**
  - ✓ Lumbar puncture needle
  - ✓ Ventriculostomy catheter and drainage bag
  - ✓ ICP monitors and transducers
  - ✓ Neuromuscular junction blockade monitor
  - ✓ Bispectral index Monitor (BIS)
- **Clinical management skills**
  - ✓ Assessment of Coma /Delirium
  - ✓ Stroke
    - Ischemic
    - Hemorrhagic
  - ✓ Subarachnoid hemorrhage
  - ✓ Status epilepticus
  - ✓ Non convulsive status
  - ✓ Meningitis/Meningoencephalitis/Brain abscess/Acute demyelinatingencephalopathy/Posterior Reversible Encephalopathy (PRES)
  - ✓ Toxic/Metabolic/septic/Hypoxic-ischemic encephalopathy
  - ✓ Cerebral venous sinus thrombosis
  - ✓ Head injury
  - ✓ Hydrocephalus
  - ✓ Spinal cord injury
  - ✓ Transverse myelitis
  - ✓ Acute cord compression
  - ✓ Guillain Barre Syndrome
  - ✓ Critical illness neuropathy
  - ✓ Myasthenic crisis

**p. Infectious disease**

- **Microbiology**
  - ✓ Principles of collection, storage, transport of microbial samples
  - ✓ Staining
  - ✓ Culture and Sensitivity interpretation
  - ✓ Molecular based diagnostics
  - ✓ Serological tests
  - ✓ Mechanism of bacterial resistance





- ✓ Diagnostic stewardship
- **Antimicrobials**
  - ✓ Antibiotics
  - ✓ Antiviral
  - ✓ Antifungal
  - ✓ Antitubercular
  - ✓ Antiprotozoals
  - ✓ PK/PD of antimicrobials
  - ✓ Antimicrobial stewardship
  - ✓ Therapeutic drug monitoring
- **Bacteria/Virus/Fungi/Parasites**
  - ✓ Gram positive bacteria
  - ✓ Gram negative bacteria
  - ✓ Drug resistant bacteria
  - ✓ Fungi
  - ✓ Mycobacterium
  - ✓ Virus
  - ✓ Rickettsiae
  - ✓ Parasitic diseases
- **Infectious syndrome**
  - ✓ Complicated Abdominal/Gastrointestinal infections
    - Peritonitis
    - Liver abscess
    - Cholecystitis
    - Colitis
  - ✓ Device associated infections
    - VAP
    - CRBSI
    - CAUTI
    - SSI
  - ✓ Sepsis and Septic shock
  - ✓ Complicated skin and soft tissue infections
  - ✓ Neurological infections
    - Meningitis
    - Encephalitis
    - Brain abscess



- ✓ Pleuro Pulmonary infections
  - Pneumonia
  - Empyema
- ✓ Genitourinary infections
  - Pyelonephritis
- **Infection Prevention**
  - ✓ Prevention of nosocomial infection
  - ✓ Principles of isolation precaution
  - ✓ Environmental disinfection
  - ✓ Autoclaving and Sterilisation
  - ✓ Infection risk to health care workers
- **Obstetrical Critical Care**
  - ✓ Physiological alterations in pregnancy
  - ✓ Hypertensive disorders in pregnancy
    - Pregnancy induced hypertension
    - Preeclampsia
    - Eclampsia
  - ✓ Jaundice in pregnancy
    - HELLP syndrome
    - Acute fatty liver
    - Hepatitis
  - ✓ Respiratory failure in pregnancy
    - Thromboembolic disease
    - Asthma
    - Amniotic fluid embolism
    - Mechanical ventilation during pregnancy
  - ✓ Peripartum cardiomyopathy
  - ✓ Postpartum hemorrhage
  - ✓ Trauma in pregnancy
  - ✓ Infections in pregnancy
    - Septic pelvic thrombophlebitis
  - ✓ Cardiac arrest in pregnancy
  - ✓ Pharmacotherapy in pregnancy



q. Trauma/ Burn/Transplant / Environmental hazard/ Toxicology/  
Pharmacology / Transport/ Imaging / Bioengineering

- **Trauma**

- ✓ Principles of management of Polytrauma
- ✓ Head injury
- ✓ Spinal cord injury
- ✓ Airway injury / Chest trauma
- ✓ Blunt and penetrating abdominal injury
- ✓ Crush injury
- ✓ Inhalation injury
- ✓ Major vascular injury
- ✓ Skeletal trauma
- ✓ Epidural and patient controlled analgesia

- **Burn**

- ✓ Assessment, initial resuscitation
- ✓ Wound management
- ✓ Smoke inhalation and airway burns
- ✓ Detection and management of Infections
- ✓ Nutrition management

- **Transplant**

- ✓ Managing Brain dead organ donor
- ✓ Perioperative management of solid organ transplant
- ✓ Managing hematopoietic stem cell transplant
- ✓ Pharmacology of Immunosuppression
- ✓ Infections in immune compromised patients
- ✓ Brain death certification
- ✓ Transplant immunology

- **Environmental hazard**

- ✓ Temperature related injuries
- ✓ Electrical injury
- ✓ Radiation /Nuclear hazards
- ✓ Near drowning
- ✓ Partial hanging
- ✓ Disaster management
- ✓ Mass casualty management
- ✓ Preventing Fire hazard in ICU



- ✓ Industrial chemical hazard
- ✓ Biological hazards
- **Toxicology**
  - ✓ Management of patients with acute poisoning
  - ✓ Syndromic diagnosis of poisoning
  - ✓ Poisoning and Envenomation
    - Organophosphorus
    - Corrosive
    - Benzodiazepines
    - Antidepressants
    - Narcotics
    - Calcium channel blocker
    - Beta blocker
    - Hypoglycemic
    - Anticholinergic
    - Salicylates
    - Alcohol
    - Cocaine
    - Acetaminophen
    - Carbon monoxide
    - Barbiturates
    - Snake/Scorpion envenomation
    - Other animal/insect bites
    - Plant poisons
  - ✓ Methemoglobinemia
  - ✓ Sulphhemoglobinemia
  - ✓ Metal toxicity
  - ✓ Cyanide toxicity
- **Pharmacology**
  - ✓ PK/PD principles of drugs
  - ✓ Drug Drug interaction
  - ✓ Adverse drug reaction
  - ✓ Drug reconciliation
  - ✓ Drug dosing in renal and liver failure
  - ✓ Principles of Therapeutic Drug Monitoring





- **Transport**
  - ✓ Intrahospital and interhospital transport
  - ✓ Air ambulance
  - ✓ Handover and documentation
- **Imaging**
  - ✓ Portable x-ray
  - ✓ Point of care Ultrasound /Echo
  - ✓ Peripheral venous and arterial doppler
  - ✓ Hazards of contrast
  - ✓ CT scan
  - ✓ MRI/MRCP
  - ✓ Basics of Transcranial doppler
  - ✓ Basics of PET scan
  - ✓ Basics of Nuclear scan
  - ✓ Utilising PACS system
  - ✓ Important interventional radiological procedures
- **Bioengineering**
  - ✓ Principles of strain gauge transducers
  - ✓ Signal conditioners, gain
  - ✓ Calibration, adjustment, display technique
  - ✓ Electrical safety
  - ✓ Computers
  - ✓ Amplifiers and recorders
  - ✓ Medical gases and pipelines

**r. Research/Administration/Ethics/Legal/Quality/Teaching**

- **Research**
  - ✓ Study design, protocol writing and conduct of clinical research
  - ✓ Biostatistics
  - ✓ Presentation to Ethics committee
  - ✓ Manuscript writing
- **Ethical and Legal**
  - ✓ Principles of medical ethics
  - ✓ Indian laws/acts pertaining to critical care
  - ✓ Communication skills
  - ✓ Handling medical negligence complaints
  - ✓ Documentation



- **Administration**
  - ✓ Resource allocation
  - ✓ Design of intensive care unit
  - ✓ Performance assessment
  - ✓ Critical pathway development
  - ✓ Electronic medical record
  - ✓ Economics of ICU care
  - ✓ Managing conflict in ICU
  - ✓ ICU burn out
- **Quality**
  - ✓ Auditing ICU processes and outcome
  - ✓ Clinical governance
  - ✓ Prognostic scores
  - ✓ Key performance indicators (KPI)
- **Education**
  - ✓ Reviewing literature
  - ✓ Critiquing papers
  - ✓ Presenting paper
  - ✓ Case presentation
  - ✓ Participating in journal club
  - ✓ Simulation training
  - ✓ Teaching skills



## V. LOG BOOK

Postgraduate students shall maintain a log book of all their academic and training activities during the whole training period.

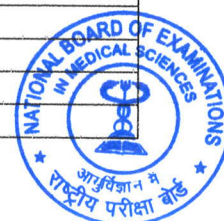
The faculty members should periodically check and verify the contents of log book with an aim to review the quality and involvement of the trainee in the teaching and training activities of the program.

- ✓ Front page (as per NBE)
- ✓ Certificate of training and posting details signed by Director/Head Critical Care & the Hospital Medical Superintendent/Head Administrator
- ✓ Details of Lectures by faculty
- ✓ Details of Seminars
- ✓ Details of Journal clubs
- ✓ Details of procedures done: Performed under supervision, Performed independently
- ✓ Abridged report of Thesis undertaken
- ✓ Abridged report of clinical projects undertaken
- ✓ Details of papers/ presentation made in regional/national/International meetings/conferences
- ✓ Publications
- ✓ Participation in Conferences and Workshops

The list and minimum number of procedures required to be performed to attain various competencies is provided in the log book in a tabular format and need to be completed by the postgraduate student. The supervisors/trainers need to verify each competency achieved by the post graduate student.

### Rotation postings:

Posting	Institution: Specify in case of External rotation	From	To	Supervisor Name & signature
Medical ICU				
Surgical ICU				
CTVS ICU				
Neuro ICU				
Coronary care unit				
Nephrology/dialysis unit				
Internal Medicine				
Anaesthesia				
Laboratory Sciences				



Other electives				

**Lectures:**

S. No.	Date	Lecture Topic	Faculty
1.			
2.			
3.			
4.			

**Journal Club:**

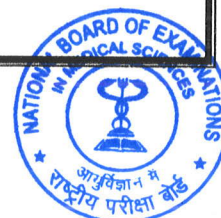
S. No.	Date	Journal club Topic	Journal /Issue	Presenter	Signature of Supervisor
1.					
2.					
3.					
4.					

**Seminar:**

S. No.	Date	Seminar Topic	Presenter	Moderator	Signature of Supervisor
1.					
2.					
3.					
4.					

**Summary of minimum number of procedures to achieve competence**

Procedure number	Minimum
1. Airway	
a. Bag mask ventilation	10
b. Laryngeal mask insertion	10
c. Endotracheal intubation	
i. Application of Cricoid pressure	5
ii. Endotracheal Intubation	20
iii. Use of equipments for difficult airway	
1. Bougie	5
2. Airway exchange catheter	5
3. McCoy Laryngoscope	5
4. Video-laryngoscope	10
iv. Naso-tracheal intubation	2
v. Fibre-optic intubation	5
d. Cricothyrotomy	2





e. Percutaneous tracheostomy	5
f. Tracheostomy tube exchange	5
2. Cardiovascular	
a. Central venous cannulation (Ultrasound guided)	
i. Internal jugular	20
ii. Subclavian	10
iii. Femoral	15
b. Arterial puncture and cannulation	
i. Radial	15
ii. Femoral	10
c. Trouble shooting intra-arterial pressure wave tracing	10
d. Cardiac output measurement	
i. Invasive	5
ii. Minimally invasive	5
e. Basic echocardiography	25
f. Pericardiocentesis	2
g. Cardiopulmonary resuscitation	30
h. Defibrillation	15
i. Transcutaneous pacing and Transvenous pacing	4
j. Dynamic tests for preload	20
3. Respiration	
a. Setting up and weaning from mechanical ventilator	
i. Moderate to Severe ARDS	30
ii. Acute severe asthma	30
iii. Non-invasive ventilation	30
b. Prone ventilation	20
c. Needle thoracostomy	10
d. Intercostal drain placement	10
e. Lung ultrasound	20
f. Mini-BAL	5
g. Bronchoscopy and Broncho-alveolar lavage	5
4. Renal	
a. Placement of dialysis catheter	10
b. Prescription of RRT	30
5. Nervous System	
a. Lumbar puncture	15
b. Interpreting ICP waveform	5
c. Brain death certification	5
d. Targeted temperature management	5
e. Managing of cadaveric organ donor	5
f. Monitor neuromuscular junction	10
6. Miscellaneous	
a. Obtaining blood culture	10
b. Abdominal paracentesis	5
c. Setting and Measurement of intra-abdominal pressure	5
d. Conscious sedation	5
e. Placement of Sengstaken Blackmore tube	2
f. Intra and Inter-hospital transfers	5 each



g. eFAST	10
h. Massive blood transfusion	5
i. Others including ECMO	5
7. Communication	
a. Routine	25
b. Breaking bad news	15
c. Brain death and organ donation	2
d. End of life care	5



# MINIMUM NUMBER OF PROCEDURES TO ACHIEVE COMPETENCE

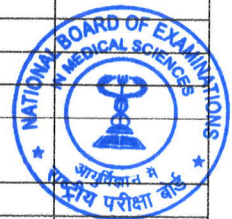
## Airway

Procedure		Date	Indication	Details / Comments	Solo / Supervised	Supervisor's signature
Bag-Mask Ventilation	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
Laryngeal mask insertion	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
Endotracheal Intubation: Cricoid Pressure	1					
	2					
	3					
	4					
	5					
Endotracheal Intubation	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
	11					
	12					
	13					
	14					



# Airway

Procedure		Date	Indication	Details / Comments	Solo / Supervised	Supervisor's signature
Endotracheal Intubation continued.....	15					
	16					
	17					
	18					
	19					
	20					
Difficult Airway Management						
Bougie	1					
	2					
	3					
	4					
	5					
Airway Exchange catheter	1					
	2					
	3					
	4					
	5					
McCoy Laryngoscope						
	1					
	2					
	3					
	4					
	5					
Video-Laryngoscope						
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
Naso-tracheal intubation	1					
	2					





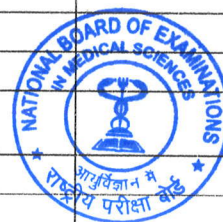
## Airway

Procedure		Date	Indication	Details / Comments	Solo / Supervised	Supervisor's signature
Fibre-optic Intubation	1					
	2					
	3					
	4					
	5					
Cricothyrotomy	1					
	2					
Percutaneous Tracheostomy	1					
	2					
	3					
	4					
	5					
Tracheostomy tube exchange	1					
	2					
	3					
	4					
	5					
Others	1					
	2					
	3					
	4					
	5					



## Hemodynamics

Procedure		Date	Indication	Details / Comments	Solo / Supervised	Supervisor's signature
<b>Central Venous Cannulation</b>						
Internal Jugular Vein	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
	11					
	12					
	13					
	14					
	15					
	16					
	17					
	18					
	19					
	20					
Subclavian Vein	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
Femoral Vein	1					
	2					



3					
4					
5					
6					
7					
8					
9					
10					

### Hemodynamics

Procedure		Date	Indication	Details / Comments	Solo / Supervised	Supervisor's signature
Femoral Vein continued.....	1					
	1					
	1					
	2					
	1					
	3					
	1					
Arterial Cannulation	4					
	1					
	5					
Radial Artery	1					
	2					
	3					
	4					
	5					
	6					
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	9					
	10					
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	14					
	15					
Arterial cannulation						

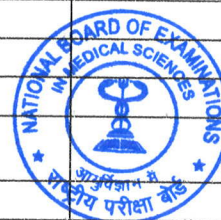




Femoral Artery	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
Trouble Shooting Arterial Pressure waveform	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					

### Hemodynamics

Procedure		Date	Indication	Details / Comments	Solo / Supervised	Supervisor's signature
Trouble Shooting Arterial Pressure waveform continued....	9					
	10					
<b>Cardiac Output Measurement</b>						
Invasive and Minimally invasive Pulmonary artery catheter	1					
Pulse contour analysis inclusive	2					
	3					
	4					
	5					
Non-Invasive Trans-esophageal doppler	1					
Trans-thoracic echocardiogram	2					
	3					
	4					
	5					
Basic Echocardiogram	1					
	2					
	3					





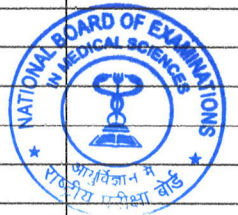
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	24					
	25					
Pericardiocentesis	1					
	2					

### Hemodynamics

Procedure		Date	Indication	Details / Comments	Solo / Supervised	Supervisor's signature
Cardiopulmonary Resuscitation	1					
	2					
	3					
	4					
	5					
	6					



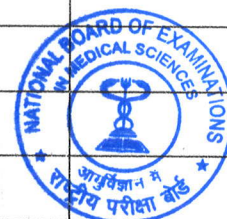
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	5				
	2				
	6				
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	7				
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	0				
Defibrillation	1				
	2				
	3				
	4				
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	6				
	7				
	8				



9					
1					
0					
1					
1					

### Hemodynamics

Procedure		Date	Indication	Details / Comments	Solo / Supervised	Supervisor's signature
Defibrillation continued....	1					
	2					
	1					
	3					
	1					
	4					
	1					
	5					
<b>PACING</b>						
Transcutaneous And Transvenous	1					
	2					
	3					
	4					
Dynamic Tests for Pre-load	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	1					
	0					
	1					
	1					
	2					
	1					
	3					
	1					
	4					
	1					
	5					
	1					
	6					
	1					



	7					
	1					
	8					
	1					
	9					
Others	2					
	0					
	1					
	2					
	3					
	4					
	5					





## Respiration

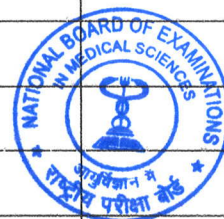
Procedure		Date	indication	Details / Comments	Solo / Supervised	Supervisor's signature
Mechanical Ventilation						
Moderate to Severe ARDS	1					
With relevant knowledge of Lung protective ventilation	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
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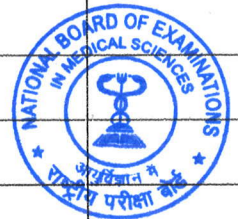
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Acute Severe Asthma	1					
With relevant knowledge of Intrinsic PEEP	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	1					
	0					
	1					
	1					
	1					
	2					

### Respiration

Procedure		Date	Indication	Details / Comments	Solo / Supervised	Supervisor's signature
Acute Severe Asthma continued .....	1					
	3					
	1					
	4					
	1					
	5					
	1					
	6					
	1					
	7					
	1					
	8					
	1					
	9					
	2					
	0					
	2					
	1					
	2					
	2					
	3					
	2					
	4					
	2					



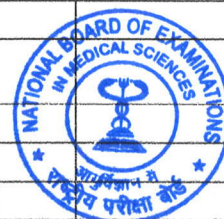
	5					
	2					
	6					
	2					
	7					
	2					
	8					
	2					
	9					
	3					
	0					
Non-Invasive Ventilation	1					
COPD, Cardiogenic pulmonary edema, Ventilator weaning inclusive	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	1					
	0					
	1					
	1					
	1					
	2					
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	4					
	2					
	5					





## Respiration

Procedure		Date	Indication	Details / Comments	Solo / Supervised	Supervisor's signature
Non-Invasive Ventilation continued .....	2					
	6					
	2					
	7					
	2					
	8					
	2					
	9					
	3					
	0					
Prone Ventilation	1					
Awake voluntary and intubated	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	1					
	0					
	1					
	1					
	1					
	2					
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	3					
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	5					
	1					
	6					
	1					
	7					
	1					
	8					
	1					
	9					
	2					
	0					
Needle Thoracocentesis	1					
	2					
	3					
	4					
	5					

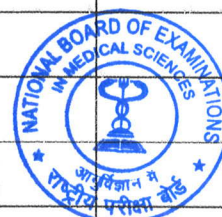




	6					
	7					
	8					
	9					
	1					
	0					
Tube Thoracostomy (ICD)	1					
	2					
	3					
	4					
	5					
	6					

### Respiration

Procedure		Date	Indication	Details / Comments	Solo / Supervised	Supervisor's signature
Tube Thoracostomy continued.....	7					
	8					
	9					
	1					
	0					
Lung Ultrasound	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	1					
	0					
	1					
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	5					
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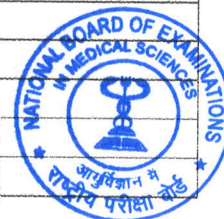
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	1					
	7					
	1					
	8					
	1					
	9					
	2					
	0					
Mini-BAL	1					
	2					
	3					
	4					
	5					
Fibre-optic bronchoscopy ± Bronchoalveolar Lavage	1					
	2					
	3					
	4					
	5					
Others	1					
	2					
	3					
	4					
	5					



## Nephrology

Procedure		Date	Indication	Details / Comments	Solo / Supervised	Supervisor's signature
Placement of Dialysis Catheter	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
Prescription of Renal Replacement Therapy	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
	11					
	12					
	13					
	14					
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	26					
	27					
	28					
	29					
	30					

Include all available modes Hemodialysis, SLED, CRRT and Ultrafiltration equally





## Nervous System

Procedure		Date	Indication	Details / Comments	Solo / Supervised	Supervisor's signature
Lumbar Puncture	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
	11					
	12					
	13					
	14					
	15					
Interpreting ICP waveform	1					
	2					
	3					
	4					
	5					
Brain Death Certification	1					
	2					
	3					
	4					
	5					
Targeted temperature management (Hypothermia)	1					
	2					
	3					
	4					
	5					
Cadaver donor management	1					
	2					





	3					
	4					
	5					
Neuromuscular Junction Monitoring	1					
	2					
	3					
	4					

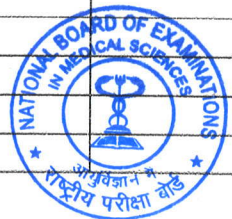
### Nervous System

Procedure		Date	Indication	Details / Comments	Solo / Supervised	Supervisor's signature
Neuromuscular Junction Monitoring continued.....	5					
	6					
	7					
	8					
	9					
	10					
Others	1					
	2					
	3					
	4					
	5					



**Miscellaneous**

Procedure		Date	Indication	Details / Comments	Solo / Supervised	Supervisor's signature
Blood Culture	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
Abdominal Paracentesis	1					
	2					
	3					
	4					
	5					
Setting and Measurement of intra-abdominal pressure	1					
	2					
	3					
	4					
	5					
Conscious sedation	1					
	2					
	3					
	4					
	5					
Placement of Sengstaken Blakemore Tube	1					
	2					
Intra / Inter Hospital Transfer	1					
	2					
	3					
	4					
	5					
	6					



7					
8					
9					
1					
0					

### Miscellaneous

Procedure		Date	Indication	Details / Comments	Solo / Supervised	Supervisor's signature
eFAST (Extended Focused assessment With sonography in trauma)	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
Massive Blood Transfusion Protocol	1					
	2					
	3					
	4					
	5					
Others including ECMO	1					
	2					
	3					
	4					
	5					





## Communication

Procedure		Date	Indication	Details / Comments	Solo / Supervised	Supervisor's signature
Routine Communication	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
	11					
	12					
	13					
	14					
	15					
	16					
	17					
	18					
	19					
	20					
	21					
	22					
	23					
	24					
	25					
Breaking Bad News	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
	11					
	12					
	13					
	14					





	15					

### Communication

Procedure		Date	Indication	Details / Comments	Solo / Supervised	Supervisor's signature
Brain Death and Organ Donation	1					
	2					
End of Life Care	1					
	2					
	3					
	4					
	5					
Others	1					
	2					
	3					
	4					
	5					

### Abridged report of Thesis

- Title of thesis:
- CTRI registration number: (if registered)
- Names of guides/Co-guides:
- Abstract:

### Abridged report of Project

- Title of Project:
- Names of guides/Co-guides:
- Abstract:

### Papers/ Posters presented

- Title of paper:
- Name of conference/Meeting:
- Place and Date:
- Abstract of presentation:



### **Publication**

- Title of Scientific paper:
- Name & Issue of Journal:
- Abstract of paper:

Date	Name of conference/Workshop attended	City/State	Country

Date	Details of the Prize / event received	City/State	Country



## VI. RECOMMENDED TEXT BOOKS AND JOURNALS

### 1. Recommended Text books and Journals:

#### a. Text Books

- Oh's Intensive Care Manual
- The ICU Book - Paul L Marino
- Textbook Of Critical Care Including Trauma & Emergency Care - Mehta Y, et al
- The Washington Manual of Critical Care Medicine
- The Ventilator book - William Owens
- The Advanced ventilator book - William Owens
- Essential of Mechanical Ventilation - Dean Hess

#### b. Journals

- Critical Care Medicine
- Intensive Care Medicine (ESICM)
- American journal of Respiratory and Critical care medicine
- Critical Care
- Indian Journal of Critical Care Medicine
- New England Journal of Medicine (NEJM)
- Journal of the American Medical Association (JAMA)
- The Lancet
- British Medical Journal

Relevant articles from major journals from allied specialties such as Internal Medicine, Infectious diseases, Anaesthesiology, Trauma, Emergency Medicine Cardiology, Neurology, Gastroenterology, Surgery, etc.



**c. Suggested Online Resources**

Comprehensive Critical Care Course - 4C

(<https://isccmcourses.org/local/staticpage/view.php?page=4c-course-contents>)

Critical Care Infectious disease Course

(<https://isccmcourses.org/local/staticpage/view.php?page=course-contents>)

Medical Research Methodology

(<https://isccmcourses.org/local/staticpage/view.php?page=mrp-course-contents>)

Uptodate ([www.uptodate.com](http://www.uptodate.com))





## VII. OTHER RECOMMENDATION OF THE SPEACIALITY BOARD

### 1. CASE-MIX RECOMMENDED (for hospital accreditation for DNB CCM)

As critical care medicine is multidisciplinary in nature, the program must provide opportunities to manage adult patients with a wide variety of serious illnesses and injuries requiring treatment in a critical care setting

At least seven ICU patients must be available for every DNB seat allotted to an institution/hospital.

### 2. Case mix categories:

#### a. Respiratory

- Asthma
- COPD
- ARDS
- Pneumonia- CAP/VAP
- Pleural disease- Effusion/Pneumothorax
- ILD
- Pulmonary TB

#### b. CVS

- ACS: STEMI/NSTEMI/UA
- Arrhythmias
- Heart failure: LVF/Corpulmonale
- Cardiomyopathy
- Endocarditis
- DVT/PE

#### c. Infections

- Community acquired
- Nosocomial: VAP/BSI/CLABSI/CAUTI/SSI
- Tropical infections
- Fungal infections
- Intraabdominal infections
- Sepsis & Septic shock

#### d. Neurology

- Acute Stroke: Hemorrhagic/Ischemic
- SAH/SDH/EDH
- Meningitis, Encephalitis, meningoencephalitis
- Traumatic brain injury
- Spine injury
- Seizure disorder/NCS
- Intracranial SOL
- GB Syndrome
- Myasthenia gravis
- Critical illness polyneuropathy/ Critical illness myoneuropathy



**e. Nephrology**

- AKI/ Contrast induced nephropathy
- CKD and its complications
- Urinary tract infection
- Renal replacement therapy
- Obstructive uropathy

**f. Gastroenterology**

- GI bleed
- Acute Pancreatitis
- Acute abdomen
- Abdominal compartmental syndrome

**g. Hepatology**

- Acute liver failure/ACLF
- Decompensated Chronic liver disease
- CLD and its complications
- Hepatic encephalopathy
- Hepatorenal syndrome
- Hepatopulmonary syndrome
- Acute cholangitis
- Liver abscess
- Hepatitis

**h. Musculoskeletal**

- Thoracic injury
- Skeletal trauma/ Polytrauma
- Fat embolism
- Crush injury/Rhabdomyolysis

**i. Endocrine**

- DM/DKA/HHS
- Myxoedema coma
- Thyroid crisis
- Adrenal crisis

**j. Oncology**

- Tumor lysis syndrome
- Febrile neutropenia
- Pancytopenia
- Acute respiratory failure
- Infections following BMT
- Oncological emergencies: TLS/SVC syndrome/
- HUS/ITP/TTP
- HLH

**k. Organ transplantation**

- Cadaveric
- Live related
- Liver, Kidney, Heart, lung, bone marrow

**l. Toxicology**

- Unknown Poisoning
- OP poisoning
- Aluminum phosphide poisoning



- Envenomation
- Drug overdose/Substance abuse
- Neurolept malignant syndrome

**m. Pregnancy**

- Amniotic fluid embolism
- Obstetric bleed - PPH
- Acute fatty liver of pregnancy
- Post- Peri partum Cardiomyopathy
- HELLP syndrome
- Pre-eclampsia, eclampsia

**n. Trauma and environment**

- Polytrauma
- Traumatic brain injury
- Cervical spine injury
- Penetrating/blunt injuries: Abdomen, thorax
- Crush injury/Rhabdomyolysis
- Burns
- Hypo/hyperthermia/ Drowning
- High altitude sickness

**o. Surgical patients**

- Postoperative major thoracic, abdominal and orthopedic patients
- Postoperative major trauma patients
- Postoperative emergency surgery patients including LSCS

**3. Infrastructure:**

**a. Academic requirements:**

• **Essential**

At least seven ICU patients must be available for every DNB seat allotted to an institution/hospital.

The training institution must provide a broad range of facilities and clinical support services required to provide comprehensive care of adult patients.

DNB Critical Care Medicine should be permitted in hospitals that have basic specialities: General Surgery, General Medicine, Gynaecology & Obstetrics, Trauma (accident) and Emergency.

• **Desirable:**

It would be preferable to have super specialities including and not limited to:

- ✓ Cardiac sciences including CTVS
- ✓ Coronary Care Unit
- ✓ CTVS ICU:



- ✓ Neurosciences including Neurosurgery- NICU
- ✓ Oncology including Surgical oncology & BMT
- ✓ Gastroenterology & Hepatology including Surgical GE & Liver transplantation
- ✓ Renal sciences including Urology & kidney transplantation
- ✓ Surgical ICU(SICU)
- ✓ Paediatric and neonatal intensive care unit (PICU, NICU)

- **Essential:**

In case these specialities are not available, signed MOU for 1-2 months external posting in a hospital in the same city, where such training opportunities are present should be available.

**b. Supporting Laboratory & Imaging Services:**

- **Essential:**

- ✓ The training site should have a supporting laboratory that provides complete laboratory evaluation including microbiology services.
- ✓ Blood bank services
- ✓ Training site should have bedside imaging services for patients in the critical care units (X-ray, ECHO, USG);
- ✓ Imaging: Computed tomography (CT) including CT angiography, MRI.

- **Desirable:**

- ✓ PET CT, Radiotherapy

**c. Other Support services**

- **Essential:**

- ✓ Emergency department with resuscitation and ventilation facility
- ✓ Respiratory care service (physiotherapy)
- ✓ Nutritional support department

- **Bed requirement**

**Minimum:** 10 ICU beds.

**Definition of bed:**

Motorized ICU fowler bed including but not limited to, a multiparameter invasive monitoring system linked to a central monitoring system, non-invasive and invasive ventilation facility (including advanced modes).





**Positive and negative pressure isolation beds:**

For infected and/or immunocompromised patients, there should be provision for isolation beds (2 beds/10 bed ICU)

• **Equipment:**

✓ **Essential**

- Invasive monitoring, ETCO<sub>2</sub>, Invasive and non-invasive CO Measurement
- USG, ECHO
- Functional hemodynamic monitoring: PPV, SPV
- Video/fiber optic bronchoscope
- Advanced airway equipment including: all types of LMA, Videolaryngoscope
- Therapies: CRRT, SLED, Plasmapheresis
- Training mannequin/simulator
  - ACLS simulator
  - Airway trainer
  - Basic CPR trainer

• **Desirable:**

✓ EEG Monitoring

✓ ECMO

✓ Simulators and mannequins

- Trauma trainer
- ICD trainer
- Percutaneous cricothyrotomy & tracheostomy trainer
- USG trainer

