

**BHARATI VIDYAPEETH  
(DEEMED TO BE UNIVERSITY), PUNE, INDIA  
PhD Entrance Test – 2025  
SECTION-II: Critical Care Medicine- 35 Marks**

The candidate must have gained experience in the diagnosis and treatment of patients with serious medical and surgical disease including coronary artery disease and neurosurgical disease.

During the training the candidate must gain knowledge in two aspects - The knowledge about pathophysiology, diagnosis and treatment of a series of disease processes and skills of specific procedures and interventions that the candidate must be able to perform.

**Theoretical Knowledge-**

The candidate must understand the pathophysiology, construct a differential diagnosis and apply the appropriate prophylactic and therapeutic interventions in the following disorders. This list is not comprehensive.

**Respiratory**

Management of airways (including respiratory arrest, upper airways obstruction, smoke or burns airways damage), pulmonary edema, adult respiratory distress syndrome and hypercapnic respiratory failure, severe asthma, chest trauma, respiratory muscle disorders, thoracic surgery.

**Cardiovascular**

Haemodynamic instability and shock, cardiac arrest acute myocardial infarction and unstable angina severe heart failure, common arrhythmias and conduction disturbance, specific cardiac disorders (cardiomyopathies, valvular heart disease, atrial or ventricular septal defects, myocarditis), cardiac tamponade, pulmonary embolism, aortic dissection, hypertensive crisis, peripheral vascular diseases. Cardiovascular surgery. Cardio pulmonary resuscitation (CPR) Training in Basic Life Support (BLS), and Advance Life Support (ALS)

**Neurology**

Coma, head trauma, intracranial hypertension, cerebrovascular accidents, cerebral vasospasm, meningo-encephalitis, acute neuromuscular disease (including myasthenia & Guillain Barre syndrome), post anoxic brain damage, acute confusional states, spinal cord injury, neurosurgery, brain death.

**Renal**

Oliguria. Acute renal failure, renal replacement therapy

**Metabolic & Nutritional**

Fluid electrolyte and acid-base disorders, endocrine disorders (including diabetes), nutritional requirements, monitoring of nutrition.

**Haematological**

Disseminated intravascular coagulation and other coagulation disorders, haemolytic syndromes, acute and anaemia, blood component therapy, immune disorders.

**Infections**

Severe infection due to aerobic and anaerobic bacteria, viruses, fungal and parasites, nosocomial infection, infection in the immunocompromised, tropical disease, antimicrobial therapy, immunotherapy.

**Gastro-intestinal**

Inflammatory bowel diseases, pancreatitis, acute and chronic liver failure, prevention and treatment of acute G.I. Bleeding (including variceal bleeding) peritonitis, mesenteric infarction, perforated viscus, bowel obstruction, abdominal trauma, abdominal surgery.

**Obstetric**

Toxemia (including in HELLP syndrome), amniotic fluid embolism, eclampsia, and haemorrhage.

**Environmental Hazards**

Burns, hypo- and hyperthermia, near-drowning electrocution, radiations, chemical injuries, animal bites.

**Toxicology, poisoning**

Acute intoxications, drug overdose, serious adverse reactions, anaphylaxis.

**General**

Pharmacology, pharmacokinetics and drug interactions. Analgesia, sedation and muscle relaxants, inflammation and anti-inflammatory agents, multiple trauma, transport of the critically ill, multisystem disorders (including Multi-Organ Dysfunction syndrome MODS and the Systemic Inflammatory Response Syndrome SIRS) Management of the organ donor.

**Interventions and procedures****Respiratory**

Maintenance of open airway, endotracheal intubation (oral and nasal) and emergency cricothyrotomy, suctioning of the airway, setting and turning of the respirator with different modes of ventilation, titration of oxygen therapy, use of ambubag, techniques of weaning from mechanical ventilation, placement of an intercostal tube, implementation of respiratory pharmacological support, fiberoptic bronchoscopy, interpretation of arterial and mixed venous blood gases, assessment of gas exchange and respiratory mechanics.

**Cardiovascular**

Placement of a central venous catheter (by different routes), pulmonary artery (Swan Ganz) catheter, arterial catheter (by different routes) measurement and interpretation of

the hemodynamic variables (including the derived variables), implementation of cardiovascular support antiarrhythmic therapy and thrombolysis.

**Neurologic**

Basic interpretation of brain CT/MRI scan, intracranial pressure monitoring.

**Nutrition**

Metabolic and Nutritional Implementation of intravenous fluid therapy, enteral and parental nutrition.

**Haematologic**

Correction of haemostatic and coagulation disorders, interpretation of a coagulation profile, implementation of thrombolysis.

**Renal**

bladder catheterization, renal replacement techniques.

**Gastro-intestinal**

Placement of gastric tube, an esophageal and gastric tamponade balloon

**General**

Measurement of severity of illness and outcome assessment. Exposure to clinical research, ethical and legal aspects of critical care. Participation in regional and national CME's seminars, and conference in critical care and affiliation with such critical care organizations is desirable.

**Rotations for specialties- for the said duration during second year of training**

**Cardiothoracic ICU for 1 month**

**Transplant ICU for 1 month**

**Radiology/ ECHO for 1 month**

## **Critical Care Competencies (Adapted from CoBaTrICE and ISCCM Competencies)**

Trainers and trainees should both be involved in the judgment of competence. Trainees should assess and monitor their own progress during training. When they believe they are competent they should ask a trainer to evaluate the evidence upon which they have made this judgment and sign off the competence or competencies. Please remember that these competencies should be acquired over the course of the entire training programme, not at one single point in time. Each must be signed both by a trainer and the trainee.

Satisfactory completion of all competencies within each single domain should be confirmed by two trainers as well as the trainee. These two trainers are not reassessing the individual competencies but are simply stating that, to the best of their knowledge; the individual competencies within a domain were obtained and documented appropriately.

Trainers will not be able to assess every aspect of each competence, and it is very likely that as busy clinicians, they will need to rely on assessments from several individuals acquired over a period of time during routine clinical work.

### **DOMAIN 1. RESUSCITATION AND INITIAL MANAGEMENT OF THE ACUTELY ILL PATIENT**

1.1	Adopts a structured and timely approach to the recognition, assessment and stabilization of the acutely ill patient with disordered physiology
1.2	Manages cardiopulmonary resuscitation
1.3	Manages the patient post-resuscitation
1.4	Triages and prioritizes patients appropriately, including timely admission to ICU
1.5	Assesses and provides initial management of the trauma patient
1.6	Assesses and provides initial management of the patient with burns
1.7	Describes the management of mass casualties

**DOMAIN 2. DIAGNOSIS: ASSESSMENT, INVESTIGATION, MONITORING AND DATA INTERPRETATION**

2.1	Obtains a history and performs an accurate clinical examination
2.2	Undertakes timely and appropriate investigations
2.3	Describes indications for echocardiography (transthoracic / transoesophageal)
2.4	Performs electrocardiography (ECG / EKG) and interprets the results
2.5	Obtains appropriate microbiological samples and interprets results
2.6	Obtains and interprets the results from blood gas samples
2.7	Interprets chest x-rays
2.8	Liaises with radiologists to organise and interpret clinical imaging
2.9	Monitors and responds to trends in physiological variables
2.10	Integrates clinical findings with laboratory investigations to form a differential diagnosis

**DOMAIN 3. DISEASE MANAGEMENT**

<b>ACUTE DISEASE: *</b>	
3.1	Manages the care of the critically ill patient with specific acute medical conditions
<b>CHRONIC DISEASE:</b>	
3.2	Identifies the implications of chronic and co-morbid disease in the acutely ill patient
<b>ORGAN SYSTEM FAILURE:</b>	
3.3	Recognises and manages the patient with circulatory failure
3.4	Recognises and manages the patient with, or at risk of, acute renal failure
3.5	Recognises and manages the patient with, or at risk of, acute liver failure
3.6	Recognises and manages the patient with neurological impairment
3.7	Recognises and manages the patient with acute gastrointestinal failure
3.8	Recognises and manages the patient with acute lung injury syndromes (ALI / ARDS)
3.9	Recognises and manages the septic patient

3.10	Recognises and manages the patient following intoxication with drugs or environmental toxins
3.11	Recognises life-threatening maternal peripartum complications and manages care under supervision

**Acute Diseases :-**

1. Acute Myocardial Infarction
2. Pulmonary Embolism
3. Cardiogenic Shock
4. Life Threatening Arrhythmias
5. Pericardial Tamponade
6. Acute Ischemic Stroke
7. Intracranial Hemorrhage
8. Status Epilepticus
9. Head & Spine Trauma
10. Acute neuromuscular failure (OPP / GBS / MG / Snakebite, etc)
11. Acute severe Asthma
12. Acute Exacerbation of COPD
13. Severe Community acquired pneumonia
14. Chest Trauma
15. Acute Hypoxemic Respiratory Failure including ARDS
16. Acute GI Bleed
17. Acute Liver Failure
18. Acute Pancreatitis
19. Acute Abdomen
20. Neutropenia
21. Acute coagulation disorders
22. Thrombocytopenia
23. Sepsis & Septicemic Shock
24. Meningitis
25. Acute Hemorrhagic Fevers
26. Severe Malaria
27. Acute Renal Failure
28. Eclampsia

29. Acute poisoning

\*This list is not exclusive and may be expanded to include relevant conditions.

**DOMAIN 4. THERAPEUTIC INTERVENTIONS / ORGAN SYSTEM SUPPORT IN SINGLE OR MULTIPLE ORGAN FAILURE**

4.1	Prescribes drugs and therapies safely
4.2	Manages antimicrobial drug therapy
4.3	Administers blood and blood products safely
4.4	Uses fluids and vasoactive / inotropic drugs to support the circulation
4.5	Describes the use of mechanical assist devices to support the circulation
4.6	Initiates, manages, and weans patients from invasive and non-invasive ventilatory support
4.7	Initiates, manages and weans patients from renal replacement therapy
4.8	Recognises and manages electrolyte, glucose and acid-base disturbances
4.9	Co-ordinates and provides nutritional assessment and support

## **DOMAIN 5. PRACTICAL PROCEDURES**

<b>RESPIRATORY SYSTEM:</b>	
5.1	Administers oxygen using a variety of administration devices
5.2	Performs fiberoptic laryngoscopy under supervision
5.3	Performs emergency airway management
5.4	Performs difficult and failed airway management according to local protocols
5.5	Performs endotracheal suction
5.6	Performs fiberoptic bronchoscopy and BAL in the intubated patient under supervision
5.7	Performs percutaneous tracheostomy under supervision
5.8	Performs thoracentesis via a chest drain
<b>CARDIOVASCULAR SYSTEM:</b>	
5.9	Performs peripheral venous catheterisation
5.10	Performs arterial catheterisation
5.11	Describes a method for surgical isolation of vein / artery
5.12	Describes ultrasound techniques for vascular localisation
5.13	Performs central venous catheterisation
5.14	Performs defibrillation and cardioversion
5.15	Performs cardiac pacing (transvenous or transthoracic)
5.16	Describes how to perform pericardiocentesis
5.17	Demonstrates a method for measuring cardiac output and derived haemodynamic variables
<b>CENTRAL NERVOUS SYSTEM:</b>	
5.18	Performs lumbar puncture (intradural / 'spinal') under supervision
5.19	Manages the administration of analgesia via an epidural catheter
<b>GASTROINTESTINAL SYSTEM:</b>	
5.20	Performs nasogastric tube placement
5.21	Performs abdominal paracentesis
5.22	Describes Sengstaken tube (or equivalent) placement

5.23	Describes indications for, and safe conduct of gastroscopy
<b>GENITOURINARY SYSTEM:</b>	
5.24	Performs urinary catheterisation

\*Performs USG / 2DEcho under supervision

#### **DOMAIN 6. PERI-OPERATIVE CARE**

6.1	Manages the pre- and post-operative care of the high risk surgical patient
6.2	Manages the care of the patient following cardiac surgery under supervision
6.3	Manages the care of the patient following craniotomy under supervision
6.4	Manages the care of the patient following solid organ transplantation under supervision
6.5	Manages the pre- and post-operative care of the trauma patient under supervision

#### **DOMAIN 7. COMFORT AND RECOVERY**

7.1	Identifies and attempts to minimise the physical and psychosocial consequences of critical illness for patients and families
7.2	Manages the assessment, prevention and treatment of pain and delirium
7.3	Manages sedation and neuromuscular blockade
7.4	Communicates the continuing care requirements of patients at ICU discharge to health care professionals, patients and relatives
7.5	Manages the safe and timely discharge of patients from the ICU

#### **DOMAIN 8. END OF LIFE CARE**

8.1	Manages the process of withholding or withdrawing treatment with the multidisciplinary team
8.2	Discusses end of life care with patients and their families / surrogates
8.3	Manages palliative care of the critically ill patient
8.4	Performs brain-stem death testing
8.5	Manages the physiological support of the organ donor

\*Describes ISCCM Guidelines on End of Life Care.

### **DOMAIN 9. TRANSPORT**

9.1	Undertakes transport of the mechanically ventilated critically ill patient outside the ICU
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Describes the ISCCM Guidelines for the transport of critically ill.

### **DOMAIN 10. PATIENT SAFETY AND HEALTH SYSTEMS MANAGEMENT**

10.1	Leads a daily multidisciplinary ward round
10.2	Complies with local infection control measures
10.3	Identifies environmental hazards and promotes safety for patients & staff
10.4	Identifies and minimises risk of critical incidents and adverse events, including complications of critical illness
10.5	Organises a case conference
10.6	Critically appraises and applies guidelines, protocols and care bundles
10.7	Describes commonly used scoring systems for assessment of severity of illness, case mix and workload
10.8	Demonstrates an understanding of the managerial & administrative responsibilities of the ICM specialist

Describe ISCCM Guidelines for catheter related blood stream infection.

## **DOMAIN 11. PROFESSIONALISM**

<b>COMMUNICATION SKILLS</b>	
11.1	Communicates effectively with patients and relatives
11.2	Communicates effectively with members of the health care team
11.3	Maintains accurate and legible records / documentation
<b>PROFESSIONAL RELATIONSHIPS WITH PATIENTS AND RELATIVES</b>	
11.4	Involves patients (or their surrogates if applicable) in decisions about care and treatment
11.5	Demonstrates respect of cultural and religious beliefs and an awareness of their impact on decision making
11.6	Respects privacy, dignity, confidentiality and legal constraints on the use of patient data
<b>PROFESSIONAL RELATIONSHIPS WITH MEMBERS OF THE HEALTH CARE TEAM</b>	
11.7	Collaborates and consults; promotes team-working
11.8	Ensures continuity of care through effective hand-over of clinical information
11.9	Supports clinical staff outside the ICU to enable the delivery of effective care
11.10	Appropriately supervises, and delegates to others, the delivery of patient care
<b>SELF GOVERNANCE</b>	
11.11	Takes responsibility for safe patient care
11.12	Formulates clinical decisions with respect for ethical and legal principles
11.13	Seeks learning opportunities and integrates new knowledge into clinical practice
11.14	Participates in multidisciplinary teaching
11.15	Participates in research or audit under supervision