

***Residency Program
Doctor of Medicine (MD)
Curriculum (Phase-B)***

Critical Care Medicine (CCM)



**Bangabandhu Sheikh Mujib Medical University
Dhaka, Bangladesh**

C o n t e n t s

01.	Introduction	03
02.	Competencies to be Obtained by the Resident	04
03.	Objectives of the Course Phase-B	08
04.	Pre-Requisites for Admission in Phase-B	09
05.	Phase-B Curriculum Structure	09
06.	Teaching and Learning Methods	11
07.	Record of Training	14
08.	Research	15
09.	Assessments	15
10.	Supervision and Training Monitoring	21
11.	Curriculum Implementation, Review and Updating	21
12.	Phase-B Syllabus	22
	Annexure 1	43
	Annexure 2	49

1. Introduction:

Critical Care Medicine (CCM) also referred to as Intensive Care Medicine, is that body of specialist knowledge and practice concerned with the treatment of patients, with at risk of or recovering from potentially life threatening failure of one or more of the body organ systems. It includes the provision of organ system support, investigations, diagnosis and treatment of acute illness, systems management and patient safety, ethics, end-of-life care and support of families.

CCM is dynamic specialty with the responsibility for caring for the most critical ill patients in hospital. Whilst other medical specialties deal exclusively with specific organs or body systems, CCM encompasses patients with the entire spectrum of medical and surgical pathology. A CCM doctor is able to provide advanced organ support during critical illness and is responsible for co-ordinating the care of patients on the ICU. CCM is high-tech, life saving care that underpins and interacts with all other areas of the hospital.

The Critical Care Medicine Curriculum has been designed according to Residency program laid down by Bangabandhu Sheikh Mujib Medical University which is a five years course. The total 5 Years residency course is divided in to two Phases: Phase-A and Phase B. Phase-A has been designated as Basic Medical Training (BMT) to provide broad experience in General Internal Medicine including Emergency Medicine, Airway Management and CCM, Anesthesiology within two years. This training program will focus on developing core knowledge and skills, providing a foundation for consolidation and further study within advanced specialty-specific training. Phase 'B' designated as 'specialty training' (ST) during 3 years. In-depth specialty-specific educational and training

program in this phase will make the resident competent and prepare them for the specialty qualification.

This document identifies the aims and objectives, content, outcomes and processes of postgraduate specialist training leading to MD in Critical Care Medicine. It defines the structure and expected methods of learning, teaching, feedback and supervision. It sets out what knowledge, skills, attitudes and behaviors the trainee will achieve. These are identified as learning outcomes that are specific enough to be a precise guide for trainers and trainees. A system of assessments is used to monitor the trainee's progress through the stages of training.

In Phase-B there will be three groups of trainee: one group entering Phase-B after passing Phase-A of the Residency course, the second group having FCPS/MD in Internal Medicine and the third group having FCPS/MD in Anesthesiology. The Phase-B curriculum has been formulated in such a way that the training program in Phase-B of the later two groups becomes uniform with the group completing Phase-A.

2. Competencies to be Obtained by the Resident:

The competencies to be developed through the course are as follows:

- a) Medical Knowledge.
- b) Clinical competency.
- c) Communication skills.
- d) Teaching skills.
- e) Conducting research.
- f) Team member.
- g) Humanism.
- h) Professionalism
- i) Ethical and legal issues.

a. Medical Knowledge:

- Core medical knowledge should include an appropriate content of anatomy, biochemistry, immunology, physiology, pharmacology, statistics, ethics and human behavior as needed for the clinical practice of critical care medicine.
- In-depth knowledge of critically ill patients
- Knowledge of history-taking, examination, relevant investigations and interpretations to diagnose and manage a critically ill patient
- Knowledge of therapeutic intervention including details of drug use which includes rational and evidence based use of such interventions, drug interactions, adverse effects etc.

b. Clinical competencies:

- Data gathering skills- Interviewing the patient, physical examination, data interpretation.
- Clinical reasoning skills- formulating diagnosis, planning further investigation.
- Therapeutic decision making-formulating diagnosis (provisional/differential diagnosis), making a cost-effective plan of laboratory and imaging studies, outline of therapeutic management and patient education
- Procedural skills- diagnostic and therapeutic procedures common to the practice of CCM.
- Cardio pulmonary and other life saving procedures.

c. Communication skills:

Both verbal and written communication skills are necessary with patients and family members of patients admitted in ICU.

d. Teaching skills:

They should develop themselves in teaching and learning. The resident should achieve understanding and competency in different

adult learning systems, principles of teaching and learning, use of effective teaching aids and assessment methods. They should be at times prepared to facilitate the learning sessions.

e. Conducting research:

A period of supervised research of good quality is considered a highly desirable part of MD (CCM) course. The resident will be competent in dealing with the principles of research ethics and contribute to the process by which ethical research in human subjects is ensured.

f. Team member:

As a team player specialist should effectively work with in a health and social care team to achieve optimal patient care.

g. Humanism:

This should signify a set of defined knowledge, skills and attitudes that bring about admirable clinical process and desired health outcomes. Within the broad topic of humanism reside several core topics, some of which will be dealt like medical interview, counseling with the patient attendant, behavioral medicine and medical ethics. These competencies are essential to deal with patients to meet the needs associated with medical problems and processes and the lifestyle issues that contribute to health and disease.

Competencies for humanistic practice of medicine are essential for the intensives to:

- Create and sustain doctor patient relationship that maximizes the likelihood of the best outcome for the patients and the greatest personal satisfaction for the physician.

- Be able to identify the types of patient physician relationship, factors promoting their relationship and one's own relating style, preference and limitations.
- Deal with dying critical patients; demonstrate knowledge and skill in obtaining and interpreting advance directives for care at the end of life, and providing comfort care and managing the family's grieves.
- Recognize one's own personal reactions to difficult situation; use these reactions to generate explanatory hypothesis and to understand potential barriers to communication.

h. Professionalism:

Professionalism in medical practice requires the physician to place the interest of the patient above the physicians self interest. Professionalism aspires to self sacrifice, accountability, excellence, service, honor, integrity and respect for others. The resident should develop further development of qualities of professionalism and respect for patients, peer and paramedical personnel.

i. Ethical and legal issues:

Ethics is the systematic application of values. Medical ethics focuses on the prevention, recognition, clarification and resolution of ethics issues and conflicts that arise in the care of particular patients and on the prevention and resolution of conflicts associated with ethical issues. Topics in clinical medical ethics include professional responsibility, informed consent, determination of decision making capacity, truth telling, confidentiality and the physician's role in cost containment.

3. Objectives of the Course Phase-B:

General:

- To produce Specialist in Critical care Medicine who will be knowledgeable, independent and clinically competent to manage the critically ill patient as a consultant.
- To produce Specialist in Critical care Medicine who will be primary care physician in close ICU setup.

Specific:

- Aim is to provide strong foundation for the latest updates and evolutionary challenges regarding clinical skills and abilities in Critical Care Medicine.
- To promote the advancement of modern technology in Bangladesh.
- To identify and analyze the strategic deficits in the management of critically ill patients.
- To establish the new strategies to develop skilled and trained manpower who are likely to be successful to implement these training materials into reality.
- After completion of the residency course candidate will be able to act as a team leader of the ICU team.
- To develop clinical practice which is based on an analysis of relevant clinical trials and to have an understanding of their methodologies.
- Will be able to identify and take responsibility for their own educational needs and the attainment of these needs.
- To be developed the skills of an effective teacher.

4. Pre-Requisites for Admission in Phase-B:

There will be three categories of doctors eligible for getting admission in Phase-B of Critical Care Medicine:

Category I: Residents successfully completing Phase-A training program and passing Phase-A final examination of CCM.

Category II: Medicine specialists having FCPS or MD in Internal Medicine or any equivalent qualifications recognized by BMDC

Category III: Anesthesiologists having FCPS or MD in Anesthesiology or any equivalent qualifications recognized by BMDC

5. Phase-B Curriculum Structure:

The training is designed to develop both the generic and specialty-specific attributes necessary to practice independently as a consultant intensivist. The aim is to train individuals to provide the highest standard of service to patients requiring critical care. This includes the development of positive attitudes towards lifelong learning and the ability to adapt future technological advances and the changing expectations of society.

In depth specialty-specific educational and training program in this phase will make the resident competent and prepare them for specialty qualification. It will provide educational program covering the specialty of critical care medicine and its allied subspecialties, Research methodology, Medical education &

perform a clinical research (Thesis) along with rotation specific clinical training.

During the whole 3 years period of training the Phase-B residents will be placed in the Critical Care Medicine/ Anaesthesiology Department. Full 36 months will be dedicated to training in Critical Care Medicine for Category I & II residents. But In case of Category II residents the first three months will be solely dedicated for Airway management and intubation. For Category III resident the first 12 months will be for training in Internal Medicine and allied subjects and the remaining 24 months they will be placed in the CCM/Anesthesiology Department. For all categories necessary exposure in the fields of trauma, post cardiac surgery, post neurosurgery, surgical emergency, Obs-Gyne emergency, burn, post transplant, renal replacement therapy and radiology, to be ensured during their CCM placement for a period of one month in each (total 9 months). The course co-ordinator of CCM will ensure their rotations; arrange End of Block Assessment in collaborations with the supervisor of the concerned department. However the last 3 months will be for preparation of final examination.

The total training period of 3 years will be divided into blocks each comprised of 3 to 6 months. At the end of each block (except last 3 months block) there will be an End of Block Assessment (EOBA). For convenience of block assessment the whole syllabus (see Annexure-1) is spreader over different blocks. The EOBA will follow these contents of syllabus for theoretical part. In addition, the cases discussed in the grand rounds, clinical meetings and journal club presentations, any competency attained in a particular block will be included in the EOBA. The different stages of thesis development are also depicted in the block schedule.

6. Teaching and Learning Methods:

Each year, the residents will be placed for didactic teaching program (Knowledge) and clinical training (skills) in an assigned block comprises of three to six months.

6.1 Teaching Program

The bulk of learning occurs as a result of clinical experiences (experimental learning) and self directed study. The degree of self-directed learning will increase as trainees become more experienced. Teaching and learning occurs using several methods that range from formal didactic lectures to planned clinical experiences. Aspects covered will include knowledge, skills and practices relevant CCM in order to achieve specific learning outcomes and competences. The theoretical part of the curriculum presents the current body of knowledge necessary for practice. This can be imparted using the followings:

a) Knowledge (Didactic Teaching Program)

It comprises of applied basic sciences, patho-physiology, management & prognosis of the clinical topics related to critical care medicine.

b) Departmental Academic Meetings

The residents are expected to participate in all departmental meetings and conferences, the journal club and research activities of the department on the allocated date and it will be notified in advance:

- Journal Club
- Morbidity and Mortality meeting
- Case Presentations
- Audit Meetings
- Research Meeting
- Critically ill patient Quality Care Issues
- Lectures

6.2. Clinical Training (skills development)

The resident will be involved in specialty training (ST) for 3 years who has already successfully completed the Basic medical training program in Phase-A or directly entered the Phase-B through a process of selection.

There will be three categories of doctors eligible for getting admission in Phase-B of CCM

Category I: Residents successfully completing Phase-A training program and passing Phase-A final examination

Category II: Postgraduate Medicine specialists e.g., having FCPS or MD in Internal Medicine or any equivalent qualifications recognized by BMDC

Category III: Postgraduate Anesthesiologists e.g. having FCPS or MD in Anesthesiology or any equivalent qualifications recognized by BMDC

Rotations for Category I:

Critical Care Medicine. <i>Necessary exposure in the fields of trauma, burn, post cardiac surgery, post neurosurgery, surgical emergency, Obs-Gyne emergency, post transplant, renal replacement therapy and radiology to be ensured during this placement for a period of one month in each (total 9 months)</i>	33 (24 + 9) months	6 months x 5 blocks + 3 month x1 block
Preparation for Examination	03 months	1 block

Rotations for Category II:

Airway management, intubation & critical care (as per Phase-A)	03 months	1 block
Critical Care Medicine <i>Necessary exposure in the fields of trauma, burn, post cardiac surgery, post neurosurgery, surgical emergency, Obs-Gyne emergency, post transplant, renal replacement therapy and radiology to be ensured during this placement for a period of one month in each (total 9 months)</i>	30 (21+9) months	6 months x 5 blocks
Preparation for Examination	03 months	1 block

Rotations for Category III:

Internal Medicine & allied	12 months	3 months x 4 blocks
Critical Care Medicine <i>Necessary exposure in the fields of trauma, burn, post cardiac surgery, post neurosurgery, surgical emergency, Obs-Gyne emergency, post transplant, renal replacement therapy and radiology to be ensured during this placement for a period of one month in each (total 9 months)</i>	21(12+9) months	6 months x 3blocks+3 month x1 block
Preparation for Examination	03 months	1 block

7. Record of Training:

The evidence requires confirming progress through training includes:

1. Details training plan agreed with weekly timetables and duty roster.
2. Confirmation of attendance at events in the educational program, at departmental and interdepartmental meetings and other educational events.
3. Confirmation (certificates) of attendance at subject-based/skill-training/instructional course.
4. Recorded attendance at conference and meetings.
5. A properly completed logbook with entries capable of testifying to the training objectives which have been attained the standard of performance achieved.
6. Supervisor's reports on Observed performance in the workplace.

7.1 Logbook

The Residents will maintain LOG BOOK from their enrolment to finish the residency program and dully signed by supervisor in each block. The logbook should incorporate all entries of academic/professional work done during the period of training made on a daily basis and signed be the supervisor. Residents are required to maintain completed and duly certified logbook which is mandatory for appearing in Phase final examination.

7.2 Portfolio

The portfolio of learning is more than a logbook.

This is collection of evidence documenting trainee's learning and achievements during their training. The trainee takes responsibilities for the portfolio's creation and maintenance. It will form the basis of assessment of progression.

8. Research:

Development of research competencies forms an important part of the Residency program curriculum as they are an essential set of skills for effective clinical practice. Undertaking research helps to develop critical thinking and the ability to review medical literature. Every resident shall carry out work on an assigned research project under the guidance of a recognized supervisor; the project shall be written and submitted in the form of a Thesis.

9. Assessments:

The assessment for certification of the MD degree of the University is comprehensive, integrated and phase-centered attempting to identify attributes expected of specialists for independent practice and lifelong learning and covers cognitive, psychomotor and affective domain. It keeps strict reference to the components, the contents, the competencies and the criteria's laid down in the curriculum. Assessment includes both **formative assessment** and **summative (Phase-B final) Examination**.

9.1. Formative Assessment

Formative assessment will be conducted throughout training phases. It will be carried out for tracking the progress of residents, providing feedback, and preparing them for final assessment (phase completion exams). There will be continuous (day to day) and periodic type of formative assessment.

- i) **Continuous (day to day) formative** assessment in classroom and work place settings provides guide to a resident's learning and a faculty's teaching / learning strategies to ensure formative lesson / training outcomes.

ii) **Periodic formative assessment** is quasi-formal and is directed to assessing the outcome of a block placement or academic module completion. It is held at the end of block placement and Academic Module completion. The contents of such examinations include Block Units of the training curriculum and Academic Module Units of the Academic curriculum.

End of Block Assessment (EBA) is a periodic formative assessment and is undertaken after completion of each training block, assessing knowledge, skills and attitude of the residents. Components of EBA are written examination, Structured Clinical Assessment (SCA), medical record review, logbook review and portfolio assessment. Unsatisfactory block training must be satisfactorily completed by undergoing further training for the block to be eligible for appearing in the next phase completion examination.

Formative assessment for academic modules for biostatistics and research methodology and medical education will be conducted in the first nine months of Phase-B training. Residents getting unsatisfactory grade must achieve satisfactory grade by appearing the re-evaluation examination before sitting for the Phase-B final examination for certification. Before sitting for the Phase-B final examination they should submit valid training certification on ACLS (Advanced Cardiac Life Support) programs recognized by BSMMU

9.2. Summative Examination

The Phase-B final examination will be undertaken only after successful completion of Phase-B training. The Phase-B final examination is considered as the exit examination

Assessment will be done in two broad compartments:

a) **Compartment A:** Consist of 3 (three) components.

1. Written Examination (Consisting of 2 papers).

2. Clinical Examination (One long and four short cases).
3. SCA (10 stations) and Oral (one board consisting of 2 examiners)

Every Resident must pass all the 3 components of compartment A separately. Candidates will be declared failed if he/she fails in one or more component of the compartment. He/she then have to appear all the 3 components in the next Phase Final Examination.

b) **Compartment B:** Thesis and Thesis defense.

9.2.1. Written Examination: Marks – 200

a) **Content** (as per learning content of the curriculum)*

1. Clinical Methods (knowledge part)
2. Emergency presentations
3. Common symptom-based presentations
4. Problem Solving Skill (History, Physical Exam.)
5. Planning Investigation and Interpretation of data
6. Clinical Reasoning Skill / Clinical judgment
7. Synthesis of information / Interpretation of Medical Literature
8. System Specific Knowledge
9. Ability to judicious diagnostic tests
10. Management Skill and Professional Behavior
11. Disease Prevention

* See *annexure 2 for content for each written paper*

b) **Question types and mark distribution :**

Paper I : Marks-100

Group A : 10 short questions

Group B : 5 Scenario based problem solving questions

Paper II: Marks-100

Group A : 10 short questions, 5 marks each

Group B : 5 Scenario based problem solving questions

9.2.2. Clinical Examination: Marks-200

- **Long case : Marks : 100**
 - Directly observed
 - Two examiners for each examinee
 - History taking and examinations by the examinee- 30 minutes
 - Discussion on the case 20 minutes (presentation 6 min, crossing 6 min X 2 and Discussion 2 min)
 - Examiners will not ask any question nor stop the examinee in any way during history taking and physical examination
 - Discussion should be done as per structured format and proper weightage on different segments of clinical skills.
- **Short cases : Marks : 100**
 - Four in number
 - Total time 20 to 30 minutes (time will be equally divided for each short case
 - Two Examiners per examinee
 - Crossing should be done with proper weightage on different segment of clinical skills

9.2.3. (a) Structured Clinical Assessment (SCA): Marks-100

- 10 stations ; 5 minutes each
- Assessment Areas (number of stations) :
 1. Communication (1)
 2. Case scenario/ Clinical reasoning (3)
 3. Referral note / Discharge notes/ Operation notes/ Procedure notes (1)
 4. Data Interpretation (2)
 5. Procedures (2)
 6. Images/ Photograph (3)

9.2.3. (b) Oral Examination: Marks-100

- One Board with 2 Members; One must be external
- 20 minutes (9+9+2)

10. Thesis and Thesis defense

- To be evaluated by 3 (three) evaluators:- 2 subject specialist and one academician involve in research and teaching research methodology.
- Among the subject specialists one should be external.
- Evaluators shall be in the rank of Professor/Assoc. Professor.
- Supervisor will attend the defense as an observer and may interact only when requested by the evaluators.
- Thesis must be submitted to the controller of Exam not later than 27 months of enrolment in Phase-B.
- Thesis must be sent to the evaluators 2 (Two) week prior to assessment date.
- Evaluation will cover Thesis writing and its defense. Marks: Thesis writing 200, Defense: 100.
- For thesis writing evaluator will mark on its structure, content, flow, scientific value, cohesion, etc.
- For defense – Candidate is expected to defend, justify and relate the work and its findings.
- Assessment must be completed in next 3 months.
- Outcome of the assessment shall be in 4 categories – “Accepted”, “Accepted with minor correction”, “Accepted with major correction” and “Not Accepted”.

Description of terms:

- **Accepted:** Assessors will sign the document and resident will bound it and submit to the Examination Department by 7days.
- **Accepted with minor correction:** Minor correction shall include small inclusion/exclusion of section; identified missing references, correction of references and typographical and language problem. To be corrected and submitted within 2 weeks.
- **Accepted with major correction:** Task is completed as per protocol with acceptable method but some re-analysis of result and corresponding discussion are to be modified.
 - To be corrected, confirmed by Supervisor and submit within 3 (Three) weeks.
- **Not Accepted:** When work is not done as per protocol or method was faulty or require further inclusion or confirmation of study.
 - To complete the suggested deficiencies and reappear in defense examination during its next Phase Final Examination.
 - Candidate has to submit his/her thesis and sit for examination and pay usual examination fess for the examination.

Residents must submit and appear Thesis defense at notified date and time. However non- acceptance of the Thesis does not bar the resident in appearing the written, clinical and oral exam.

10. Supervision and Training Monitoring:

As training progresses the resident should have the opportunity for increasing autonomy consistent with safe and effective care for the patient. Residents will at all times have a supervisor, responsible for overseeing their education and training.

Supervisors are responsible for supervision of learning throughout the program to ensure patient safety, service delivery as well as the progress of the resident with learning and performance. They set the lesson plans based on the curriculum, undertaken appraisal, review progress against the curriculum, give feedback on both formative and summative assessments and ensures proper recording and signing of the logbook. The residents are made aware of their limitations and are encouraged to seek advice and receive help at all times.

The Course coordinator of each department coordinates all training and academic activities of the program in collaboration with the course manager(s). The course director of each faculty directs guides and manages curriculum activities under his/her jurisdiction and is the person to be reported to for all events and performances of the residents and the supervisor.

11. Curriculum Implementation, Review and Updating:

Both Supervisors and residents are expected to have a good knowledge of the curriculum and should use it as a guide for their training program. Since critical care medicine has historically been rapidly changing specialty the need for review and up-dating of curriculum is evident. The curriculum is specifically designed to guide an educational process and will continue to be the subject of active redrafting to reflect

changes in educational theory and practice. Residents and supervisors are encouraged to discuss the curriculum and to feedback on content and issue regarding implementation with the course director. Review will be on time annually for any minor changes to the curriculum.

12. Phase-B Syllabus:

12.1. Domains of learning

Overview

Junior trainees would be expected to understand the general principles of Critical care medicine, to be familiar with the more common conditions and reasons for admission, to be able to identify patients at risk of organ system failures, and to resuscitate and stabilise critically ill patients. They will also know the degree of urgency required in summoning senior help. The senior trainees will have developed these skills further, often in relation to their base specialty (anaesthesia, medicine, surgery, and accident & emergency medicine). More advanced level trainees will have acquired broad knowledge of general and specialist aspects of CCM. They will also have skills in management and service organisation, in teaching and audit, and well developed integrative skills.

Knowledge

- Presentation and treatment of common life-threatening emergencies
- Detailed knowledge of general aspects of critical care
- General and specialist aspects of critical care, including management of the service

Skills

- Manages initial assessment and stabilization of emergencies safely. Provides continuing care under supervision.
- Stabilization, assessment, routine management and investigation of critically ill patients on a daily basis.
- Defines and supervises long-term collaborative management plans for larger numbers of patients. Leads whole ICU team effectively. Teaches and supervises junior colleagues. Integrates information.

Attitudes

- Recognizes limitations, refers and communicates promptly and effectively.
- Proactive, able to co-ordinate and supervise care delivered by junior trainees.
- Recognizes limits of expertise and summons help appropriately
- Ensures that critical care service functions effectively within wider environment. Supports service development and research. Plans personal professional development

12.2. The core syllabus

1) Resuscitation

- a) Cardiopulmonary resuscitation
- b) Central nervous system resuscitation, Therapeutic hypothermia.

All Critical care specialist must be able to recognise, resuscitate and stabilise patients sustaining, or at risk of, cardiopulmonary arrest or other life-threatening disturbances in

acute physiology. The advanced level trainees should be able to identify and provide initial management of more complex problems including a difficult airway or vascular access, and would be expected to have ALS provider certification.

2) Cardiovascular disorders

Shock

- 1) Hypovolemic
- 2) Cardiogenic
- 3) Distributive low vs. high resistance
- 4) Septic

Myocardial infarction and complications

Cardiac arrhythmias and conduction disturbances, pacemakers, Pulmonary embolism, Pulmonary edema: Cardiogenic and noncardiogenic, Acute pericardial diseases including cardiac tamponade, Acute valvular disorders, Acute aortic and /or peripheral vascular disease disorders including A-V fistulae, Cardiomyopathies and myocarditis, Management of early post-cardiac surgical patients, Vasopressor and/or vasodilator therapy and cardio assist devices, Hemodynamic effects caused by ventilatory assistance devices, Hypertension and hypertensive crises, Pulmonary hypertension, Angioplasty and thrombolytic therapy of acute coronary artery disease.

3) Respiratory diseases

- A. Acute respiratory failure
 - 1. Hypoxic: acute respiratory distress syndrome (ARDS)
 - 2. Hypercapnic
 - 3. Neurological; mechanical
- B. Status asthmaticus
- C. Smoke inhalation; airway burns
- D. Aspiration; chemical pneumonitis; drowning

- E. Flail chest; barotraumas
- F. Insertion and safe management of chest drains
- G. Bronchopulmonary infections
- H. Upper airway obstruction
- I. Oxygen therapy
- J. Hyperbaric oxygen
- K. Mechanical ventilation
- L. Airway maintenance
 - 1. Endotracheal intubation
 - 2. Tracheostomy
 - 3. Long term intubation vs. tracheostomy
 - 4. Alternative airway devices and airway techniques
- M. Non-Invasive ventilation (NIV)

4) Renal disorders

- A. Renal failure
 - 1. Prerenal
 - 2. Renal
 - 3. Postrenal
- B. Derangements secondary to alterations in volume, osmolality and electrolytes
- C. Acid-base disorders
- D. Renal replacement therapy (HD, CRRT, SLED, CAPD, IPD): Principles of hemodialysis and peritoneal dialysis
- E. Urinary tract bleeding
- F. Urosepsis

5) CNS disorders

- A. Coma
 - 1. Metabolic
 - 2. Traumatic/Head injury
 - 3. Infectious

4. Mass lesions/ raised intracranial pressure
 5. Vascular-anoxic-ischaemic-hemorrhagic
 6. Overdose and poisonings
- B. Seizure disorders
- C. Guillain-Barre syndrome
- D. Myasthenia Gravis
- E. Psychiatric emergencies

6) Metabolic and endocrinologic aspects of critical illness

- A. Nutrition: Principles of adequate nutrition in the critically ill patients; assessment of nutritional status and selection of enteral or parenteral routes for nutrition
- B. Endocrine
1. Thyroid storm
 2. Myxedema coma
 3. Adrenal crisis
 4. Disorders of antidiuretic hormone metabolism
 5. Diabetes mellitus
 - a. Ketotic and nonketotic hyperosmolar coma
 - b. Hypoglycaemia
 - 6) Pheochromocytoma

7) Infection and sepsis

- A. Antimicrobial agents including adverse reactions
- B. Appropriate use of antimicrobials Organ specific infection
- C. Infection control for special care units
- D. Sepsis and septic shock
- E. Infections in immunocompromised hosts
- F. Hospital acquired and opportunistic infections in critically ill

8) Hematologic disorders related to acute illness

- A. Acute coagulation defects
- B. Anticoagulation fibrinolytic therapy
- C. Principles and complications of blood component therapy
- D. Acute hemolytic disorders
- E. Acute syndromes associated with neoplastic disease and/or antineoplastic therapy
- F. Acute disorders of the immunosuppressed patient
- G. Plasmapheresis

9) Gastrointestinal acute disorders

- A. Acute pancreatitis
- B. Upper gastrointestinal bleeding, including variceal bleeding
- C. Lower gastrointestinal bleeding
- D. Acute hepatic failure
- E. Toxic megacolon
- F. Acute perforations of the gastrointestinal tract
- G. Ruptured esophagus
- H. Acute inflammatory diseases of the intestine
- I. Acute vascular disorders of the intestine

10) Obstetric and gynecologic acute disorders

- A) Serious complications of pregnancy
- B) Septic abortion

11) Trauma, Burns (medical management)

- A. Management of multisystem trauma
- B. CNS trauma (Brain and spinal cord)
- C. Skeletal trauma including the spine

- D. Chest trauma
 - 1. Blunt
 - 2. Penetrating
 - 3. Cardiac
- E. Abdominal trauma including blunt and penetrating
- F. Crush injury
- G. Burns

12) Post operative problems and anesthetic complications

Substantial proportions of patients admitted to Critical care are postoperative admissions, or have surgical problems. All the trainees should have a working knowledge of the problems encountered by general surgical patients, surgical specialties such as cardiothoracic and neurosurgery. The advanced level trainees will have an understanding of transplantation.

13). Pharmacokinetics and dynamics: drug metabolism, toxicity and excretion in critical illness

14) Monitoring, and clinical measurement

Critical care is synonymous with close observation, documentation, and interpretation of clinical information. Routinely used methods for obtaining clinical information must be understood by all trainees. Higher level trainees should develop skills at integrating information from several sources and interpreting them in a clinical context.

- A. Prognostic indices and severity scores
- B. Invasive cardiovascular monitoring
- C. Noninvasive cardiovascular monitoring including ECG
- D. Electrical safety
- E. Brain monitoring including intracranial pressure, cerebral blood flow, cerebral metabolic rate etc.

- F. Respiratory monitoring. Pulse Oxymetry, Capnography
- G. Metabolic monitoring (Oxygen consumption, CO2 production, respiratory quotient)
- H. Imaging techniques (e.g. chest x-rays, radionuclide studies, MRI, CT scans,

15) Transport care

Critically ill patients are frequently moved, either within the ICU to a different bed space, or within hospital for diagnostic radiology or for surgical procedures, or between hospitals. The principles of safe transfer are the same, regardless of the distance travelled. All trainees should gain supervised experience in safe transfer of the patients under their care. Inter hospital transfer in particular requires a high level of expertise because additional help cannot be obtained if problems occur.

16) Comfort care

For many patients and most relatives the ICU is an intimidating environment. Critical illness is often attended by discomfort and pain, and sometimes by the most extreme distress. Minimising unpleasant symptoms and delivering care with compassion is an essential duty of all staff, as is supporting each other during difficult periods.

17) Outreach intensive care

"Outreach" care is now recognized as an essential component of the "ICU service without walls". It is the responsibility of the ICU staff to provide safe care to all patients regardless of environment, within the constraints of available service provision. Early intervention may reduce cardiopulmonary arrest rates and hence risk of critical illness. Optimization of the high-risk surgical patient reduces mortality and costs of care.

18) Safe use of equipment

Proper use of equipment is an essential component in the safe delivery of effective care. Basic level trainees should know the indications, contraindications and safe use of those items of equipment that they are expected to use, particularly those required for organ system support. They should also understand some of the physical principles underlying their operation

19) Psychological aspects of Critical Care Medicine

Death is a common event in Critical care; it may also be inevitable, and a dignified death may be desirable though sad outcome. The manner in which it is conducted may affect the survivors – family and staff for the rest of their lives. Sustained organ system support of patients who are certain to die is unkind, unethical, and inappropriate. Treatment limitation or withdrawal does not mean denial of care; patients should not suffer, and, where possible, their wishes should be ascertained and respected.

Brain death and organ donation must be handled with sensitivity and strictly according to national guidelines. Autopsy (post-mortem) examination often provides important opportunities for learning.

- A. Patient
- B. Family
- C. Health-care team
- D. Communication skill
- E. End-of-life care in ICU

20) Administrative and management principles and techniques

- A. Guidelines for trainee physicians in Critical Care Medicine
- B. Organization and staffing critical care units (special care units)
- C. Medical record-keeping in special care units
- D. Priorities in care of the critically ill or injured.

21) Universal precaution**12.3. Procedures and skills**

Following procedural skills should be achieved during Phase-B training program.

Airway Techniques:

- a) Basic Airway Techniques
- b) Bag Valve Mask Ventilation / Mapelson "C" circuit
- c) Intermediate airways- laryngeal mask, and others
- d) Tracheal Intubation
 - Nasotracheal
 - Orotracheal
- e) Rapid sequence induction (not in children)
- f) Difficult intubation techniques (bougies, introducers and alternative laryngoscopes)
- g) Mechanical ventilation (not in children)
- h) Surgical Airway Techniques
 - Percutaneous transtracheal ventilation
 - Cricothyroidotomy
 - Tracheostomy
- i) Techniques for upper airway obstruction
 - Heimlich manoeuvre

- j) Tracheal suctioning
- K) Endotracheal tube drug administration

Pulmonary Procedures:

- a) Oxygen delivery techniques
- b) Bronchoscopy
- c) Pulse oxymetry
- d) Needles thoracocentesis
- e) Tube thoracostomy
- f) Pulmonary artery catheter placement
- g) Non-invasive ventilation (not in children)
 - CPAP
 - BIPAP

Cardiac Procedures

- a) Cardiopulmonary resuscitation (CPR)
- b) Carotid Sinus Massage
- c) Direct Current Electrical Cardioversion
- d) Defibrillation
- e) Emergency Transthoracic Cardiac Pacing
- f) Pericardiocentesis
- g) Resuscitative thoracotomy (not in children)
- h) Echocardiography

Vascular Access Techniques:

- a) Arterial puncture and cannulation
- b) Peripheral intravenous access
- c) High flow infusion techniques
- d) Venous cut down (not in children)
- e) Central venous catheterization techniques (including ultrasound guided)
 - Subclavian (not in children)

- Internal jugular (not in children)
- Femoral
- f) CVP measurements
- g) Intraosseous infusion

Gastrointestinal Procedures:

- a) Orogastric tube placement
- b) Balloon tamponade of gastroesophageal varices
- c) Diagnostic peritoneal lavage
- d) Proctoscopy and sigmoidoscopy

Genitourinary/abdominal Techniques:

- a) Bladder catheterisation
 - Urethral catheter
 - Suprapubic catheterisation (not in children)
- b) Peritoneal dialysis
- c) Abdominal paracentesis

ENT Procedures:

- a) Control of epistaxis
 - Anterior packing
 - Posterior packing and balloon placement
- b) Foreign body removal

Neurological Procedures

Lumbar puncture

13. Ten expanded case summaries

These case summaries should be completed during Core Specialist training (ST).

The supervisor must sign to confirm that each case summary is of an acceptable standard. They will be used as topics for discussion during one of the viva voce examinations.

A total of ten case summaries are required. An example is included below. They should be discussed with the supervisor and should cover a broad range of topics relevant to Critical care practice. They could be selected either to complement areas of particular interest or to help develop areas of weakness identified by the trainee or the trainee's supervisor, or simply to illustrate the learning points from a clinical case.- Each expanded case summary should be a minimum of 500 words long with at least 5 references and should be prepared on separate sheets using the following subheadings as a guide:

1. Clinical problem.
2. Relevant management.
3. Further information and discussion.
4. Learning points from this case & future management plan.
5. References.

	Titles of case summaries	Supervisor's signature
1		
2		
3		
4		
5		
6		
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8		
9		
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I certify that these case summaries have been completed to an acceptable standard.

Name and Signature of supervisor:

Example of expanded case summary:**Title: Chronic Obstructive Pulmonary Disease:
Non-invasive ventilation****Clinical Problem**

A 60-year-old male was admitted to the Critical Care Unit (CCU) via the Emergency Department (ED). He was an ex-smoker who suffered from chronic obstructive pulmonary disease (COPD) but was normally well managed on a "Combivent" inhaler and had had no previous hospital admissions. He normally had a good exercise tolerance. Prior to his admission he had a four day history of a productive cough and increasing breathlessness that had become much worse in the 24 hours prior to admission. In the ED he was tachycardic (140 beats per minute) and tachypnoeic (36 breaths per minute) and was unable to complete sentences; auscultation of the chest revealed widespread wheezing. A portable chest radiograph showed hyperexpanded lungs but no focal pathology. Arterial blood gases breathing 40% oxygen showed an acute type II respiratory failure (pH 7.17, PaCO₂ 12 kPa, PaO₂ 11.5 kPa) that was refractory to a reduction in the inspired oxygen concentration. Despite initial treatment with corticosteroids, nebulised salbutamol and ipratropium, aminophylline, and antibiotics, he remained very tachypnoeic. The decision was made to admit him to the ICU.

Relevant management

On arrival in the ICU the patient was started on bi-level positive airway pressure (BiPAP) non-invasive ventilation (NIV)

via a facemask with inspiratory and expiratory pressures of 20 cmH₂O and 5 cmH₂O respectively, and a rate ~ 30 breaths per minute). He initially found the NIV extremely uncomfortable but after a number of adjustments to the ventilator settings, and a lot of psychological support, his breathing became easier. Over the next few hours he felt subjectively much better as his respiratory rate fell and the CO₂ retention and associated acidaemia resolved. Over the next few days the NIV was weaned and he was discharged from the ICU on the sixth day of his admission on 40% oxygen.

Further information

Patients with COPD are prone to respiratory failure, often resulting in admission to hospital. Between a fifth and a third of patients admitted with hypercapnic respiratory failure secondary to COPD will die in hospital despite mechanical ventilation [1].

Conventional treatment aims to improve oxygenation and to treat the cause of the exacerbation. Traditionally, patients who do not respond to conventional treatment are considered for tracheal intubation and ventilation; however, this is associated with considerable morbidity and mortality, and it may be difficult to wean the patient [1].

There is now considerable evidence for the role of NIV in the management of acute exacerbations of COPD. In 1990 Brochard et al. showed that pressure support ventilation, administered via a facemask, significantly reduced the need for intubation, the duration of mechanical ventilation, and the length of ICU stay when compared to historically matched

control subjects [2]. Subsequently, a number of randomized controlled trials have confirmed these findings.

Bott et al. randomised 60 patients with exacerbations of COPD, who had similar levels of arterial blood gas abnormalities, to receive conventional therapy or conventional therapy plus NIV via a nasal mask [3]. The NIV group had significantly greater improvements in PaCO₂ as well as in dyspnoea scores within the first hour. There was a reduction in 30-day mortality (10% vs. 30%) in the NIV group; however, this was not statistically significant unless four patients who were randomised to NIV, but did not actually receive it, were excluded from the analysis.

Kramer et al. randomised 31 patients with hypercapnic respiratory failure and found that in the subjects with COPD the incidence of tracheal intubation was reduced from 67% in the control group to 9% in the NIV group (P<0.05); however, they did not show a difference in hospital length of stay or mortality rates [4]. Physiological derangements (heart rate, respiratory rate, PaO₂) improved more quickly in the NIV treated group.

In a large study of 85 patients with hypercapnic respiratory failure due to COPD, Brochard et al. randomised patients to receive facemask pressure support ventilation or standard therapy alone; both groups had similar baseline physiology [5]. The study demonstrated a more rapid improvement in vital signs, arterial blood gases, and encephalopathy scores in the group allocated to NIV. They also found that intubation rates (26% vs. 74%), hospital lengths of stay (17 days vs. 35 days), total complications rate (16% vs. 48%), and mortality rates (9% vs. 31%) was significantly lower in the NIV group.

In the largest randomised controlled trial to date Plant et al. treated 236 patients with either BiPAP NIV or conventional therapy administered by nursing and physiotherapy staff on the general medical wards [6]. Patients were eligible for the study if they fulfilled the following criteria:

1. Admitted as an emergency with an acute exacerbation of COPD (on the basis of the clinical history, physical examination, and chest radiograph)
2. On arrival on to the medical ward they were tachypnoeic (respiratory rate >23 breaths per minute) and had a pH 7.25-7.35 and a PaCO₂>6 kPa

Standard therapy included oxygen to maintain SpO₂ 85-90%, nebulised salbutamol (5 mg every 4 hours) and ipratropium bromide (500µg every 6 hours), corticosteroids (prednisolone 30 mg every day for a minimum of 5 days), and an antibiotic. The NIV group received standard therapy plus BiPAP NIV with a PEEP of 4 cm H₂O and a minimum inspiratory pressure of 10 cm H₂O. Oxygen was entrained to maintain SpO₂ 85-90%. Patients were encouraged to use NIV as much as possible on day 1, for 16 hours on day 2, and 12 hours on day 3. NIV was routinely discontinued on day 4. The primary endpoint of the study was the „need of intubation“ that was defined by a set of objective criteria: pH <7.2, pH 7.2-7.25 on two occasions 1 hour apart, hypercapnic coma (Glasgow coma score <8 and PaCO₂ > 8 kPa), PaO₂ <6 kPa despite maximum tolerated FiO₂, and cardio respiratory arrest. The two groups had similar characteristics at enrolment. The use of NIV significantly reduced the „need for intubation“ (15% vs. 27%) and the in-hospital mortality rate (10% vs. 20%) without dramatically

increasing the nursing workload. NIV led to a more rapid improvement in pH, respiratory rate, and breathlessness. On subgroup analysis there was a much higher mortality in patients whom had a pH <7.3 on enrolment, whether they received NIV or not; the authors concluded that these patients may benefit from treatment in a higher dependency setting.

The above studies all suggest that NIV is effective therapy in patients with COPD exacerbations, not only bringing symptomatic and physiological improvements but also significantly reducing the need for intubation, mortality rate, and hospital length of stay. These benefits are also associated with a reduced level of overall complications, despite the propensity of NIV to cause nasal bridge ulceration and gastric distension; most complications are related to intubation suggesting that avoidance of intubation is the major benefit of NIV [7].

A systematic Cochrane review and meta-analysis of eight studies on the use of NIV to treat exacerbations of COPD has recently been published [1]. This confirmed the benefits of NIV in reducing mortality (relative risk 0.41, 95% confidence intervals 0.26 to 0.64), the need for intubation (relative risk 0.42, 95% confidence intervals 0.31 to 0.59), and the likelihood of treatment failure (0.51, 95% confidence intervals 0.38 to 0.67). NIV resulted in greater improvements at 1 hour for pH, CO₂ and respiratory rate; fewer complications and a shorter hospital stay.

The major mechanism causing acute respiratory failure in COPD is dynamic hyperinflation as a result of increased airways resistance. This results in increased levels of intrinsic

PEEP (PEEP_i) and thus an increase in the work of breathing, wasted ventilation, carbon dioxide retention, and respiratory muscle fatigue. NIV offsets PEEP_i and provides inspiratory support, and so reduces the work of breathing.

Learning Points

I am now aware that there is a place for NIV in the management of respiratory failure secondary to exacerbations of COPD. NIV should be instigated early in the course of respiratory failure and before severe acidosis ensues.

References

1. Lightowler JV, Wedzicha JA, Elliott MW, Ram FS (2003) Non-invasive positive pressure ventilation to treat respiratory failure resulting from exacerbations of chronic obstructive pulmonary disease: Cochrane systematic review and meta-analysis. *BMJ* 326: 185-
2. Brochard L, Isabey D, Piquet J, et al. (1990) Reversal of acute exacerbations of chronic obstructive lung disease by inspiratory assistance with a face mask. *N Engl J Med* 323: 1523-30
3. Bott J, Carroll MP, Conway JH, et al. Randomised controlled trial of nasal ventilation in acute ventilatory failure due to chronic obstructive airways disease. *Lancet* 341: 1555-1557
4. Kramer N, Meyer TJ, Meharg J, Cece RD, Hill NS (1995) Randomized, prospective trial of noninvasive positive pressure ventilation in acute respiratory failure. *Am J Respir Crit Care Med* 151: 1799-1806

5. Brochard L, Mancebo J, Wysocki M, et al. (1995) Noninvasive ventilation for acute exacerbations of chronic obstructive pulmonary disease. *N Engl J Med* 333: 817-22
6. Plant PK, Owen JL, Elliott MW (2000) Early use of non-invasive ventilation for acute exacerbations of chronic obstructive pulmonary disease on general respiratory wards: a multicentre randomised controlled trial. *Lancet* 355: 1931-35
7. Liesching T, Kwok H, Hill NS (2003). Acute applications of noninvasive positive pressure ventilation. *Chest* 124: 699-713

Annexure 1

Category I

Block 1						
Months	1 st	2 nd	3 rd	4 th	5 th	6 th
Progression of Thesis works	Protocol development/submission/IRB clearance					
Training rotations	Critical Care Medicine					
Academic activities	Research methodology, Medical statistics and Medical education Hematological disorders, postoperative problems and anesthetic complications, administrative and management principles					

Block 2						
Months	7 th	8 th	9 th	10 th	11 th	12 th
Progression of Thesis works	Protocol development/submission/IRB clearance			Data collection continue		
Training rotations	Critical Care Medicine					
Academic activities	Cardiovascular disorders, Metabolic and endocrine disorders, comfort care, safe use of equipments, monitoring & clinical measurement					

Block 3						
Months	13 th	14 th	15 th	16 th	17 th	18 th
Progression of Thesis works	Data collection continue					
Training rotations	Critical Care Medicine					
Academic activities	Respiratory diseases, Gastrointestinal & hepato pancreatic disorders, Pharmacokinetics & dynamics of drugs					

Residency Program

Critical Care Medicine (CCM)

Block 4						
Months	19 th	20 th	21 st	22 nd	23 rd	24 th
Progression of Thesis works	Data collection continue			Data collection continue		
Training rotations	Critical Care Medicine					
Academic activities	Infection & sepsis, CNS disorders, psychological aspects of CCM, transport care, outreach care					

Block 5						
Months	25 th	26 th	27 th	28 th	29 th	30 th
Progression of Thesis works	Data analysis and thesis writing and submission of the thesis			Thesis assessment		
Training rotations	Critical Care Medicine					
Academic activities	Trauma, burn, post cardiac surgery, post neurosurgery, surgical emergency, & obs gyne emergency					

Block 6						
Months	31 st	32 nd	33 rd	34 th	35 th	36 th
Progression of Thesis works						
Training rotations	Critical Care Medicine					
Academic activities	Post transplant, renal replacement therapy, Radiology, radiology & universal precaution			Eligibility assessment and Phase-B Final examination		

Category II

Block 1						
Months	1 st	2 nd	3 rd	4 th	5 th	6 th
Progression of Thesis works	Protocol development/submission/IRB clearance					
Training rotations	Critical Care Medicine					

Residency Program

Critical Care Medicine (CCM)

Academic activities	Research methodology, Medical statistics and Medical education Airway management & intubation Postoperative problems and anesthetic complications, Hematological disorders, Administrative and management principles
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Block 2						
Months	7 th	8 th	9 th	10 th	11 th	12 th
Progression of Thesis works	Protocol development/ submission/IRB clearance			Data collection continue		
Training rotations	Critical Care Medicine					
Academic activities	Cardiovascular disorders, Metabolic and endocrine disorders, comfort care, safe use of equipments, monitoring & clinical measurement					

Block 3						
Months	13 th	14 th	15 th	16 th	17 th	18 th
Progression of Thesis works	Data collection continue					
Training rotations	Critical Care Medicine					
Academic activities	Respiratory diseases, Gastrointestinal & hepato pancreatic disorders, Pharmacokinetics & dynamics of drugs					

Block 4						
Months	19 th	20 th	21 st	22 nd	23 rd	24 th
Progression of Thesis works	Data collection continue			Data collection continue		
Training rotations	Critical Care Medicine					
Academic activities	Infection & sepsis, CNS disorders, psychological aspects of CCM, transport care, outreach care					

Residency Program

Critical Care Medicine (CCM)

Block 5						
Months	25 th	26 th	27 th	28 th	29 th	30 th
Progression of Thesis works	Data analysis and thesis writing and submission of the thesis			Thesis assessment		
Training rotations	Critical Care Medicine					
Academic activities	Trauma, burn, post cardiac surgery, post neurosurgery, surgical emergency, & obs gyne emergency					

Block 6						
Months	31 st	32 nd	33 rd	34 th	35 th	36 th
Progression of Thesis works						
Training rotations	Critical Care Medicine					
Academic activities	Post transplant, renal replacement therapy, radiology & universal precaution			Final examination/summative assessment		

Category III

Block 1						
Months	1 st	2 nd	3 rd	4 th	5 th	6 th
Progression of Thesis works	Protocol development/submission/IRB clearance					
Training rotations	Internal Medicine					
Academic activities	Research methodology, Medical statistics and Medical education Cardiovascular, Respiratory, Nephrology, and Neurological disorders					

Block 2						
Months	7 th	8 th	9 th	10 th	11 th	12 th
Progression of Thesis works	Protocol development/submission/IRB clearance			Data collection continue		

Residency Program

Critical Care Medicine (CCM)

Training rotations	Internal Medicine					
Academic activities	Hemato-oncological disorders, Infectious and tropical diseases, Endocrine & metabolic disorders, Gastrointestinal and hepatopancreatic disorders, Poisoning, Psychiatry, Dermatological disorders					

Block 3						
Months	13 th	14 th	15 th	16 th	17 th	18 th
Progression of Thesis works	Data collection continue					
Training rotations	Critical Care Medicine					
Academic activities	Cardiovascular, Renal, Metabolic and endocrine, Hematological disorders, Comfort care, Safe use of equipments, administrative and management principles					

Block 4						
Months	19 th	20 th	21 st	22 nd	23 rd	24 th
Progression of Thesis works	Data collection continue			Data collection continue		
Training rotations	Critical Care Medicine					
Academic activities	Respiratory, CNS disorders, Infection & sepsis, Gastrointestinal & hepatopancreatic disorders, Transport care, outreach care, Psychological aspects of CCM including end of life care					

Block 5						
Months	25 th	26 th	27 th	28 th	29 th	30 th
Progression of Thesis works	Data analysis and thesis writing and submission of the thesis			Thesis assessment		
Training rotations	Critical Care Medicine					
Academic activities	Trauma, burn, post cardiac surgery, post neurosurgery, surgical emergency, & obs gyne emergency					

Block 6						
Months	31 st	32 nd	33 rd	34 th	35 th	36 th
Progression of Thesis works						
Training rotations	Critical Care Medicine					
Academic activities	Post transplant, renal replacement therapy, radiology & universal precaution			Final examination/summative assessment		

Annexure 2

Contents written examination

Paper I

1) Cardiovascular disorders

A) Shock

- 1) Hypovolemic
- 2) Cardiogenic
- 3) Distributive low vs. high resistance
- 4) Septic

B. Myocardial infarction and complications

C. Cardiac arrhythmias and conduction disturbances, pacemakers

D. Pulmonary embolism

E. Pulmonary edema: Cardiogenic and noncardiogenic

F. Acute pericardial diseases including cardiac tamponade

G. Acute valvular disorders

H. Acute aortic and /or peripheral vascular disease disorders including A-V fistulae

I. Cardiomyopathies and myocarditis

J. Management of early post-cardiac surgical patients

K. Vasopressor and/or vasodilator therapy and cardio assist devices

L. Hemodynamic effects caused by ventilatory assistance devices

M. Hypertension and hypertensive crises

N. Pulmonary hypertension

O. Angioplasty and thrombolytic therapy of acute coronary artery disease

P. Cardiopulmonary resuscitation

2) Renal disorders

- A. Renal failure
 - (i) Prerenal
 - (ii) Renal
 - (iii) Postrenal
- B. Derangements secondary to alterations in volume, osmolality and electrolytes
- C. Acid-base disorders
- D. Renal replacement therapy (HD, CRRT, SLED, CAPD, IPD): Principles of hemodialysis and peritoneal dialysis
- E. Urinary tract bleeding
- F. Urological sepsis

3) Metabolic and endocrinologic aspects of critical illness

- A) Nutrition: Principles of adequate nutrition in the critically ill patients; assessment of nutritional status and selection of enteral or parenteral routes for nutrition
- B) Endocrine
 - 1. Thyroid storm
 - 2. Myxedema coma
 - 3. Adrenal crisis
 - 4. Disorders of antidiuretic hormone metabolism
 - 5. Diabetes mellitus
 - a) Ketotic and nonketotic hyperosmolar coma
 - b) Hypoglycaemia
 - 6. Pheochromocytoma

4) Hematologic disorders related to acute illness

- A. Acute coagulation defects
- B. Anticoagulation fibrinolytic therapy
- C. Principles and complications of blood component therapy
- D. Acute hemolytic disorders
- E. Acute syndromes associated with neoplastic disease and/or antineoplastic therapy
- F. Acute disorders of the immunosuppressed patient
- G. Plasmapheresis

5) Obstetric and gynecologic acute disorders

- A. Serious complications of pregnancy
- B. Septic abortion

6) Post operative problems and anesthetic complications

General surgical, post cardiac, cardiothoracic, neurosurgery and transplantation.

7) Monitoring, and clinical measurement

- A. Prognostic indices and severity scores
- B. Invasive cardiovascular monitoring
- C. Noninvasive cardiovascular monitoring including ECG
- D. Electrical safety
- E. Brain monitoring including intracranial pressure, cerebral blood flow, cerebral metabolic rate etc.
- F. Respiratory monitoring. Pulse Oxymetry, Capnography
- G. Metabolic monitoring (O₂ consumption, CO₂ production, respiratory quotient)
- H. Imaging techniques (e.g. chest x-rays, radionuclide studies, MRI, CT scans).

8) Comfort care

9) Safe use of equipment

10) Administrative and management principles and techniques

- A. Guidelines for trainee physicians in Critical Care Medicine
- B. Organization and staffing critical care units (special care units)
- C. Medical record-keeping in special care units
- D. Priorities in care of the critically ill or injured.

Paper II

1) Respiratory diseases

- A. Acute respiratory failure
 - 1) Hypoxic: acute respiratory distress syndrome (ARDS)
 - 2) Hypercapnic
 - 3) Neurological; mechanical
- B. Status asthmaticus
- C. Smoke inhalation; airway burns
- D. Aspiration; chemical pneumonitis; drowning
- E. Flail chest; barotraumas
- F. Insertion and safe management of chest drains
- G. Bronchopulmonary infections
- H. Upper airway obstruction
- I. Oxygen therapy
- J. Hyperbaric oxygen
- K. Mechanical ventilation
- L. Airway maintenance
 - 1. Endotracheal intubation
 - 2. Tracheostomy
 - 3. Long term intubation vs. tracheostomy
 - 4. Alternative airway devices and airway techniques
- M. Non-Invasive ventilation (NIV)

2) CNS disorders

- A. Coma
 - 1. Metabolic
 - 2. Traumatic/Head injury
 - 3. Infectious
 - 4. Mass lesions/ raised intracranial pressure
 - 5. Vascular-anoxic-ischaemic-hemorrhagic
 - 6. Overdose and poisonings
- B. Seizure disorders
- C. Guillain-Barre syndrome
- D. Myasthenia Gravis
- E. Psychiatric emergencies
- F. Central nervous system resuscitation, Therapeutic hypothermia.

3) Infection and sepsis

- A. Antimicrobial agents including adverse reactions
- B. Appropriate use of antimicrobials, Organ specific infection
- C. Infection control for special care units
- D. Sepsis and septic shock
- E. Infections in immunocompromised hosts
- F. Hospital acquired and opportunistic infections in critically ill

4) Gastrointestinal and hepato pancreatic acute disorders

- A. Acute pancreatitis
- B. Upper gastrointestinal bleeding, including variceal bleeding
- C. Lower gastrointestinal bleeding
- D. Acute hepatic failure
- E. Toxic megacolon
- F. Acute perforations of the gastrointestinal tract
- G. Ruptured esophagus
- H. Acute inflammatory diseases of the intestine
- I. Acute vascular disorders of the intestine

5) Trauma, Burns (medical management)

- A. Management of multisystem trauma
- B. CNS trauma (Brain and spinal cord)
- C. Skeletal trauma including the spine
- D. Chest trauma
 - 1. Blunt
 - 2. Penetrating
 - 3. Cardiac
- E. Abdominal trauma including blunt and penetrating
- F. Crush injury
- G. Burns

6) Pharmacokinetics and dynamics: drug metabolism, toxicity and excretion in critical illness

7) Transport care

8) Outreach intensive care

9) Psychological aspects of Critical Care Medicine

- A. Patient
- B. Family
- C. Health-care team
- D. Communication skill
- E. End-of-life care in ICU

10) Universal precaution