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**College of Intensive Care Medicine  
of Australia and New Zealand**

**COMPETENCIES, LEARNING OPPORTUNITIES,  
TEACHING AND ASSESSMENTS FOR TRAINING IN  
GENERAL INTENSIVE CARE MEDICINE**

## INTRODUCTION

Training is an on-going process of integrating knowledge, skills and attitudes into safe and effective habits. This process continues after training as life-long learning and continuous professional development (CPD), forming a continuum between training and a career as a specialist. The trainee becomes a life-long learner focused on patient care and the activities, which support patient care, using all available learning opportunities.

This document defines the competencies that a trainee should acquire during the training period, and should maintain and enhance throughout professional life. It lists how the competencies may be learnt, taught and assessed in training. It is a statement of the minimal level of competency expected on entering core training and at the end of training. It therefore covers the topics that will be assessed by In-Training Assessments, Workplace Based Assessments (WBA), courses and the First Part and Second Part Examinations in Intensive Care etc. This document is, to some extent, complementary to each exam syllabus.

The domains covered are structured on the Canadian Medical Education Directives for Specialists (or CanMEDS) framework, by permission, and further reading resources for the framework may be found at: <http://www.royalcollege.ca/public/resources/aboutcanmeds>

*The CICM **novice trainee** is a trainee after the foundation year of intensive care medicine, who has passed the First Part exam, has learnt the basic skills of intensive care medicine and is about to assume responsibility for patient care over the ensuing years of core training.*

*The CICM **expert trainee** is a trainee about to move into 'independent' practice as an intensive care specialist. The expert trainee is embarking on a career in which knowledge, skills and personal attributes will continue to be developed and mature.*

Within each competency it is understood that the trainee:

- a) Accumulates knowledge
- b) Learns how to apply the knowledge
- c) Shows how an action is performed, in the light of the applied knowledge
- d) Undertakes the competency in clinical practice

At each step in training it is expected that the trainee will have acquired those skills and attributes which will equip the trainee for functioning as an effective trainee in the following year, so that effective use is made of each year of training time.

### Basic terms used in this document are:

#### **Key Competency**

A Key Competency is a broad statement of skills to be acquired by the trainee. Perusal of these alone will present the general picture of the objectives of training.

#### **Enabling Competencies**

These are specific behavioural objectives. They give examples of more detailed competencies, which indicate that the Key Competency has been achieved. The development of additional competencies is encouraged.

## TEACHING AND LEARNING OPPORTUNITIES

There are differing theories as to how each person learns and many different styles of learning are recognised. This document sets a framework and targets, which the learner and teacher can adapt to the individual learner's needs and style.

The model that specialist training is based on, predicates that the basis of teaching and learning will be:

- Self-directed personal study
- Hospital-based tutorials
- Experiential learning in ICU, hospital wards, emergency departments and operating theatres
- Role modelling

Therefore in each section in this document it should be assumed that each of these learning opportunities would provide the basis of knowledge and skill acquisition.

The apprenticeship model nevertheless requires supplementation with other learning opportunities:

- Courses
- Low fidelity simulation in workplace
- High fidelity simulation
- Learning packages online, books and DVDs

## **ASSESSMENT**

Assessment is an integral part of the continuous process of development, both formative and summative. Assessment should continue into the career of a specialist in the form of appraisal, reflection, self-assessment and re-accreditation. Assessment is a key component to being a life-long learner, focused on patient care and the activities which support that care.

The basis of assessment in training will be:

- In-Training Assessment (ITA) by Supervisors and other specialists
- Workplace Based Assessment (WBA) by Supervisors and other specialists
- Logbooks assessed by the College

Therefore in each section in this document it should be assumed that each of the competencies would be assessed by ITAs and WBAs directly or indirectly. The apprenticeship model nevertheless requires additional assessments be performed to ensure that all competencies are covered in a criterion-referenced, relevant, transparent, reliable, valid and fair manner incorporating feedback and positively impacting learning utilising specific formats e.g.:

- Formal centralised examinations
- Pre and post-tests within courses
- Tests associated with low fidelity simulations in the workplace
- Tests with high fidelity simulations
- Mini Clinical Exams (MiniCEX)
- Pre and post-tests with online learning packages

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# 1. MEDICAL (CLINICAL) EXPERT

## 1.1 BASIC SCIENCES FOUNDATION

This section should be read in conjunction with the syllabus for the First Part Examination.

### 1.1.1 Introduction

The novice trainee acquires a broad understanding of Physiology, Pharmacology, Anatomy, Evidence Based Medicine and Clinical Measurement as is applicable to intensive care practice. These sciences provide a sound basis for learning and clinical practice.

### 1.1.2 Evidence Based Medicine (EBM)

#### **Key Competency:**

The novice trainee understands the scientific method, its application in research and describes the principles of EBM. The expert trainee uses those principles in performing or critically evaluating published research and reviewing evidence.

#### **Enabling Competencies**

*The novice trainee is able to:*

- a) Describe EBM and the principles of original research, a systematic review and a meta-analysis
- b) Describe the stages in the design and performance of a clinical trial
- c) Describe commonly used statistical principles
- d) Describe Error and Bias and their limitation of evidence quality
- e) Explain the ability of a test to predict the presence or absence of a disease
- f) Explain risk estimation and tests of significance

*The expert trainee is able to also:*

- a) Use EBM, original research, systematic review and meta-analysis in performing reviews or research and assessing evidence for clinical practice
- b) Use the stages of the design and performance of a clinical trial
- c) Use common simple statistical principles
- d) Assess Error and Bias in their limitation of evidence quality
- e) Assess the ability of a test to predict the presence or absence of a disease
- f) Use risk estimation and tests of significance

### 1.1.3 General Pharmacology

#### **Key Competency:**

The trainee describes the principles of general pharmacology, as they are applicable to the safe practice of intensive care medicine

### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe how drugs are made and presented (pharmaceutics)
- b) Describe how the body handles drugs in normal and disease states (pharmacokinetics)
- c) Describe how drugs affect the patient (pharmacodynamics) in therapeutic dose, in disease states and overdose

*The expert trainee is able to also:*

Apply knowledge of pharmacology principles to the use of a broad range of medications in varied clinical settings in patients with organ failure

## **1.1.4 Procedural Anatomy, Applied Physiology and System Based Pharmacology**

### **Key Competency:**

The trainee describes the principles of Physiology, Anatomy and Pharmacology applied to each Body System, as they are applicable to intensive care medicine, including how they are affected by disease state and common intensive care treatments e.g. the effects of acute lung injury on compliance or positive pressure ventilation on respiratory and cardiovascular physiology.

### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Explain basic Cellular Physiology
- b) Describe Applied Physiology, Procedural Anatomy and Clinical Pharmacology in normal humans and the critically ill relevant to intensive care practice, related to:
  - i. The Cardiovascular system
  - ii. The Respiratory system
  - iii. The Autonomic System
  - iv. The Renal system
  - v. The Musculoskeletal system
  - vi. The body fluids, and electrolytes
  - vii. The Nervous System
  - viii. The Haematological System including Immunology
  - ix. Metabolism and Nutrition, the Endocrine system and Thermoregulation
  - x. Maternal, Foetal and Neonatal medicine

*The expert trainee is able to also:*

Apply knowledge of anatomy and physiology to the use of a broad range of treatments and an understanding of disease pathophysiology in varied clinical settings and in patients with organ failure.

## **1.1.4 Principles of Measurement and Clinical Monitoring**

See the syllabus for the First Part Examination.

**Key Competency:**

The trainee is able to safely use and explain the principles of monitoring and clinical measurement relevant to ICM

**Enabling Competencies**

*The novice trainee is able to:*

- a) Explain the general mathematical and physical principles on which common ICU monitoring is based
- b) Explain the specific techniques used in a wide range of devices
- c) Explain the principles underlying errors, limitations and difficulties in interpretation.

*The expert trainee is able to also:*

Apply knowledge of clinical measurement to the use of a broad range of techniques and an understanding of use in varied clinical settings in patients with organ failure.

## **1.2 INTENSIVE CARE UNIT CARE**

### **1.2.1 THE APPROACH TO ACUTE ILLNESS**

#### **Introduction**

Management of acute illness is the cornerstone of the intensive care specialist's work. A safe and comprehensive approach is essential. This requires an understanding of how normal physiology may be disrupted by disease and a broad knowledge of medical and surgical conditions. It also requires mastery of procedural skills, priority setting, diagnostic skills and longitudinal care, whilst supervising junior doctors.

#### **Immediate Assessment and Therapy (Resuscitation)**

**Key Competency:**

The novice trainee is developing the ability to obtain a rapid and accurate assessment of life threatening problems in a critically ill patient and helps to apply life-supporting therapy.

The expert trainee anticipates clinical problems. He/she is able to assess and define clinical problems in the critically ill in the broader context and develops and facilitates a diagnostic and management plan, which has the highest probability of a satisfactory outcome. The expert trainee is able to make a timely, structured and accurate assessment of a comprehensive range of life threatening problems in a critically ill patient and apply life-supporting therapy and is also able to supervise junior doctors in the provision of safe care.

### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Judge the priorities of immediate resuscitation
- b) Undertake emergency management including basic and advanced life support
- c) Obtain relevant information rapidly and accurately and perform a brief, pertinent examination enabling immediate and effective resuscitation to be achieved including the management of rapidly reversible problems (e.g. tension pneumothorax)
- d) Instigate emergency investigations during the course of resuscitation to exclude other rapidly reversible problems (e.g. hyperkalaemia)
- e) Obtain an accurate history (if this was not possible previously) and perform a clinical examination as soon as possible to detect the primary disease process
- f) Monitor physiological functions whilst further assessment is undertaken
- g) Recognise and respond rapidly to adverse trends in monitored parameters

*The expert trainee is able to:*

- a) Triage and also prioritise patients appropriately including timely admission to ICU
- b) Judge which patients are likely to benefit from resuscitation and which patients are likely to benefit from a palliative-only approach to care
- c) Judge the priorities of immediate resuscitation versus diagnosis and treatment of the primary disease process
- d) Undertake emergency management, including management of the difficult airway and difficult vascular access

## **POST RESUSCITATION CARE**

### **Formal Medical Assessment, Problem Solving and Decision Making**

#### **Key Competency:**

Following resuscitation, the **novice** trainee effectively contributes to the continuing management of the acutely ill patient and the **expert** trainee effectively leads and undertakes the continuing management of the acutely ill patient.

### **Enabling Competencies:**

#### **Assessment**

*The novice trainee is able to:*

- a) Obtain relevant information from the patient, relatives and other informed sources
- b) Take and record an accurate and thorough medical history (with relevant family, past, social, and occupational history)
- c) Perform an appropriate physical examination
- d) Assist in the diagnosis of a system failure, a disease, a pathological process, a clinical syndrome or a complication of therapy
- e) Order appropriate initial investigations and interpret the results correctly to assist diagnosis, monitoring and assessment of therapy

*The expert trainee is able to also:*

- a) Ensure a comprehensive physical examination is performed and a complete history is documented
- b) Recognise and diagnose a system failure, a disease, a pathological process, a clinical syndrome or a complication of therapy, develop a reasonable differential diagnosis which allows a rational management plan
- c) Order appropriate initial investigations and interpret the results correctly to assist or confirm the diagnosis, monitoring and assessment of therapy

### **Problem Definition**

*The novice trainee is able to:*

- a) Document patient information either in a chronological, system or problem oriented format, allowing a clear presentation of the problems and progress
- b) Generate an appropriate list of differential diagnoses and prioritise investigations

*The expert trainee is able to also:*

- a) Confirm or refute early diagnoses, before data collection is complete, and deal with the ambiguity and uncertainty that otherwise results. Based on the changing diagnosis, make contingency plans to combat further threats to the patient's life
- b) Establish a probable diagnosis and list of differential diagnoses. Redefine the patient's problems in the light of these choices, while remaining alert to the possible presence of less likely diagnoses, which may have life-threatening consequences.
- c) Analyse new information as it becomes available and continually review diagnostic probabilities and management plan

### **Solution Generation and Decision Making**

*The novice trainee is able to:*

- a) Assemble facts and logically compare potential solutions to the patient's problems
- b) Suggest a course or courses of action.

*The expert trainee is able to also:*

- a) Assign weight and priorities to the patient's problems and initiate a course or courses of action
- b) Decide if there are elements of the patient's problem, which are not dealt with by the selected course of action and develop appropriate solutions for those elements.

### **Planning**

*The novice trainee is able to:*

- a) Suggest a therapeutic plan, which incorporates the selected courses of action
- b) Take note of potential interactions of elements of the plan

*The expert trainee is able to also:*

- a) Institute a therapeutic plan, which incorporates the selected courses of action and takes note of potential interactions of elements of the plan (e.g. what will happen if a particular therapy is used or not, when and how will it act, are there interactions with other therapies or interventions)
- b) Plan counter-measures to potential complications of the disease or therapy

- c) Consider risk benefit and cost benefit of therapeutic alternatives in developing a plan

## **Progress**

*The novice trainee is able to:*

Understand the requirement to assess the patient's progress and to modify diagnosis and therapy when necessary.

*The expert trainee is able to also:*

- a) Assess the patient's progress often and modify diagnosis and therapy when necessary
- b) Develop criteria for discharge from the Intensive Care Unit and discharge the patient in a timely and safe fashion with communication of plan and issues to patient, family and receiving team as appropriate.
- c) Assess the value of intensive care by follow-up after discharge
- d) Counsel patients and relatives

## **Consultations and Collaboration**

*The novice trainee is able to:*

- a) Explain that consultation and collaboration play a vital role in the management of the critically ill patient
- b) Recognise his/her limitations in providing optimal patient care
- c) Know how, when and who to ask for assistance
- d) Organise consultations effectively

*The expert trainee is able to also:*

- a) Effectively utilise multidisciplinary input (e.g. from physiotherapy, pharmacist, aboriginal liaison officer etc.)
- b) Explain how, when and whom to ask for a second opinion and appropriately incorporate the advice into management
- c) Recognise his/her limitations in providing advice to other specialists
- e) Keep referring specialists informed of the patient's progress and encourages their participation in decision making

## **Assessment of Illness and Injury Severity and Outcome Prediction**

*The novice trainee is able to:*

- a) Explain that there are clinical and physiological markers used to assess illness and injury severity and scoring systems developed for assessing the likely outcome from acute illness
- b) Explain that sudden gross changes in certain physiological parameters are life threatening (e.g. mean arterial pressure, pH, PaO<sub>2</sub>, plasma potassium concentration)
- c) Assist in the accurate recording of the various scoring systems (e.g. Glasgow Coma Scale, APACHE II and III, PRISM, organ system failure scores, injury severity scores)

*The expert trainee is able to also:*

- a) Appreciate when clinical severity of illness and organ dysfunctions or failure are an immediate threat to life
- b) Explain that the validity of a scoring system as a predictor of likely outcome may be influenced by the injury or illness being considered (e.g. Glasgow Coma Score [GCS] in head injury versus drug overdose)
- c) Explain the limitations of scoring systems in general in predicting individual patient outcome
- d) Use clinical and physiological markers to assess illness and injury severity and uses the scoring systems for assessing the likely outcome from acute illness

## **1.2.2 PRINCIPLES OF ORGAN SYSTEM FAILURE MANAGEMENT**

### **Introduction**

Patients with single or multiple systems organ failure (MSOF) form a major part of the workload of an Intensive Care Unit and providing safe care of these patients is an essential skill for specialists. System(s) failure may be the result of a local cause or disease process, or be related to a systemic disease or process. Failure of one system may adversely affect the function of other systems, although in most cases of multiple systems failure, there is an underlying systemic cause (e.g. an uncontrolled generalised inflammatory response secondary to sepsis or other insult).

### **Management of System(s) Failure**

#### **Key Competency:**

The novice trainee assists safely in managing a patient with a single or multiple systems failure and the expert trainee manages patients with single or multiple systems failure.

#### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Recognise a specific organ failure and assesses its severity
- b) Describe the underlying causes of system(s) failure and the importance of preventing and treating these quickly and definitively

*The expert trainee is able to also:*

- a) Provide optimal treatment for any type of system failure
- b) Adopt a balanced approach to the patient with multiple system failure so that the aggressive management of one system is not to the detriment of other systems unless this course of action is necessary for the immediate survival of the patient
- c) Describe commonly used definitions of organ failure and scoring systems based on these
- d) Describe current concepts of the pathophysiological pathways and mechanisms involved and the evidence for and against interruption of such pathways as a means of treatment
- e) Explain the prognostic implications of multiple systems failure or multiple organ dysfunction syndrome (MODS)

**Examples include, but are not restricted to:**

**(i) Acute Circulatory Failure**

**Enabling Competencies:**

*The novice trainee is able to:*

- a) Define and recognise shock and assess its severity
- b) List the causes of shock and how they are identified and treated
- c) Explain the steps involved in reversing shock according to its aetiology and in response to haemodynamic and other physiological data
- d) Explain the importance and limitations of non-invasive and invasive monitoring in the management of such patients

*The expert trainee is able to also:*

- a) Describe current concepts of the pathogenesis of shock and the potential therapies
- b) Explain the sequelae of shock, and therapeutic strategies relevant to their prevention and management
- c) Explain the principles of outcome prediction in shock states.

**(ii) Respiratory Failure**

**Enabling Competencies**

*The novice trainee is able to:*

- a) Define and recognise respiratory failure
- b) Describe the causes of respiratory failure and how these may be prevented or managed
- c) Explain the principles of oxygen therapy

*The expert trainee is able to also:*

- a) Distinguish acute from chronic respiratory failure and explain the implications for management
- b) Diagnose the cause of respiratory failure and explain the concepts of pathogenesis
- c) Explain the role of investigations in the diagnosing of respiratory failure including pulmonary function tests, bronchoalveolar lavage and open lung biopsy
- d) Explain the potential for interruption of inflammatory mediator and other pathways as methods of treatment
- e) Use oxygen therapy, mechanical methods of ventilatory support (invasive and non-invasive) and techniques to secure the airway
- f) Explain the principles of outcome prediction in patients with respiratory failure

**(iii) Acute Renal Failure (ARF)**

**Enabling Competencies:**

*The novice trainee is able to:*

- a) Define and recognise ARF and chronic renal failure (CRF)
- b) Describe the causes of ARF and CRF
- c) Explain how ARF may be diagnosed and managed

*The expert trainee is able to also:*

- a) Identify patients at risk of developing ARF, know the therapies that may have prophylactic benefits, and explain the indications for their use
- b) Describe concepts of the pathogenic mechanisms of ARF
- c) Explain the role of urinary analysis, biomarkers, ultrasound and renal biopsy in the diagnosis of the cause of ARF
- d) List the complications of renal failure and its treatment and propose a plan for their prevention or management
- e) Describe and prescribe the various forms of renal replacement therapy and their indications and applications and uses them effectively
- f) Explain the principles of outcome prediction in patients with ARF

#### **(iv) Neurological Failure**

##### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe the factors affecting cerebral blood flow and intracranial pressure
- b) Define, recognise and list the causes of acute neurological failure including coma, confusion, delirium and acute weakness
- c) Explain how coma, confusion, delirium and acute weakness are managed
- d) Define and recognise coma and assesses its severity

*The expert trainee is able to also:*

- a) Perform structured resuscitation, assessment and investigation of an unconscious patient
- b) Describe the indications for immediate neurosurgical consultation
- c) Explain the indications for urgent neuro-imaging and the requirements for safe performance of the procedure
- d) Describe the indications for monitoring intracranial pressure, jugular venous bulb oxygen saturation and other relevant parameters, and their limitations
- e) Explain the importance of cerebral perfusion pressure, cerebral oxygenation and the methods by which they may be optimised
- f) Describe the effects of coma, confusion, delirium and acute weakness and its support, treatment and effects on other organ systems
- g) Explain the principles of outcome prediction in patients with coma, confusion, delirium and acute weakness

### **1.2.3 MEDICAL, SURGICAL AND OBSTETRIC CONDITIONS**

#### **Introduction**

The trainee will be required to manage patients with a wide range of primary or complicating medical, surgical and obstetric conditions. "Manage" means resuscitation, thorough

assessment, treatment and comprehensive continuing support. See Appendix 1 for a list of relevant conditions.

**Key Competency:**

The novice trainee is required to assist in management of a broad range of medical, surgical and obstetric conditions and the expert trainee leads the management. The expert trainee has developed a broad knowledge of diverse conditions together with a detailed knowledge of those that may be life threatening. The trainee manages these patients efficiently and safely.

**Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe the alterations to normal physiology produced by a variety of medical, surgical and obstetric conditions and principles behind their management
- b) Assist in the management of patients with these conditions

*The expert trainee is able to also:*

- a) Describe the pathogenesis of a variety of medical, surgical and obstetric conditions
- b) Diagnose and manage those conditions, which are recognised to be within the domain of the Intensive Care Unit specialist including the contribution of chronic and co-morbid disease
- c) Diagnose and manage other acute conditions until the appropriate specialist assistance is available
- d) Recognise the need for operative intervention and consults appropriately
- e) Recognise the complications of common operations and consults appropriately
- f) Understand the effect of chronic disease processes (and their management) on the management and course of acute diseases

**Examples include, but are not restricted to:**

**(i) Ischaemic Heart Disease and Myocardial Infarction**

**Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe the factors involved in the balance of oxygen supply and demand to the heart
- b) Explain the aetiology of coronary artery disease and its effects
- c) List and recognise the signs and symptoms of ischaemic heart disease
- d) Describe and recognise the signs and symptoms of myocardial infarction, its pathogenesis, the differential diagnosis and diagnostic criteria
- e) Describe the acute management of myocardial infarction including the indications and contraindications for thrombolysis, angioplasty and surgical intervention

*The expert trainee is able to also:*

- a) Describe the indications for the insertion of a transvenous pacemaker, right heart catheterisation, angiography, echocardiography, Intra-aortic Balloon Pump and radionucleotide imaging of the heart
- b) Recognise the complications of myocardial infarction and the need for medical and surgical intervention
- c) Describe the principles of postoperative cardiac surgical care and undertakes it effectively
- d) Explain the long term effects of acute myocardial infarction and recognises late complications
- e) Explain the management of ischaemic heart disease in patients undergoing anaesthesia and surgery, and in patients with concurrent illness.

## (ii) Severe Trauma

### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe the effects of severe trauma on organs and organ systems
- b) Explain the principles of the EMST system for the management of the critically injured and the advantages of an organised team approach

*The expert trainee is able to also:*

- a) Explain the principles of management of a mass casualty situation
- b) Function as an appropriate trauma team member
- c) Use a systematic approach to the resuscitation, assessment, investigation and emergency management of a critically injured patient
- d) Prioritise life-threatening injuries requiring immediate intervention, including urgent surgical management
- e) Prioritise the order of investigations for individual injuries according to their threat to life
- f) Undertake those appropriate investigations in a safe and timely manner
- g) Recognise those aspects in which the management of the injured child is different from that of the adult
- h) Determine when the patient's needs exceed local capacity and arranges safe transfer
- i) Undertake the continuing management of the patient including the prevention, recognition and management of complications
- j) Describe injury severity scoring systems and their relationship to outcome and use one system effectively

## (iii) Sepsis

### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Define sepsis and related syndromes and applies these definitions to diagnosis
- b) Describe the concept of the pathogenesis of sepsis and related syndromes

- c) Assist in the resuscitation of a patient with septic shock using appropriate monitoring, fluid therapy and vasoactive agents
- d) Take appropriate specimens for laboratory examination

*The expert trainee is able to also:*

- a) Ensure that appropriate microbiological specimens are obtained in a timely fashion and act upon the results
- b) Prescribe appropriate and timely antimicrobial therapy based on the history, examination and preliminary investigations
- c) Recognise whether there is a need for surgical intervention to treat the underlying cause and consult appropriately
- d) Recognise the multisystem effects of sepsis and instigates appropriate supportive therapy including nutritional therapy
- e) Describe the scientific basis of therapy based on modulation of inflammatory mediators and recognise its limitations
- f) Describe the risk factors for nosocomial infection and use appropriate infection control measures to limit its occurrence

#### **1.2.4 PAEDIATRICS FOR THE GENERAL INTENSIVE CARE PHYSICIAN**

##### **Introduction**

The level of competence to be acquired by the expert General Intensive Care trainee is that which is expected of an Intensivist working in a general Adult Intensive Care Unit into which a paediatric patient might be admitted for a limited period of time, before being transferred to a Paediatric or Neonatal Unit. In addition to specific paediatric problems, trainees should be familiar with the paediatric management of conditions common to children and adults (e.g. acute severe asthma, renal failure, trauma).

##### **Care of the Critically Ill Child**

##### **Key Competency:**

The expert trainee recognises critical illness in a paediatric patient and resuscitates those patients with life-threatening conditions, institutes appropriate intensive care management, and when required, prepares for transport to a Paediatric or Neonatal Intensive Care Unit.

##### **Enabling Competencies:**

*The expert trainee is able to:*

- a) Describe the physiological changes that occur at birth
- b) Demonstrate a knowledge of the anatomical, physiological, pharmacological and psychological differences between neonates, infants, small children and adults
- c) Use knowledge of these differences in the resuscitation and management of critically ill paediatric patients
- d) Manage a paediatric airway, obtain vascular access (including the option of intraosseous access), perform Basic and Advanced Paediatric Life Support
- e) Prescribe appropriate resuscitation and maintenance fluid regimens
- f) Manage analgesia and sedation in a critically ill child
- g) Recognise specific disorders that may be life threatening to a paediatric patient

- h) Describe the pathophysiology and principles of management of these disorders
- i) Describe and use the principles of intensive care management pertaining to the care of critically ill children e.g. monitoring, ventilation, nutrition and circulatory support
- j) Demonstrate the ability to prepare and manage a critically ill child for and during transport
- k) Explain the concept of family-centred care

### 1.2.5 ICU THERAPY

#### **Introduction**

Intensive care management involves therapy to reverse life-threatening physiological derangements as well as specific treatment of the underlying disease. The intensive care specialist must have an extensive knowledge of therapies commonly undertaken in the Intensive Care Unit, and their complications. These include pharmacological treatments (e.g. inotropes), surgical treatments, mechanical treatments (e.g. mechanical ventilation) and other treatments (e.g. physiotherapy).

#### **Key Competency:**

The novice trainee describes the principles of treatment of physiological derangements and specific diseases and the initiates and monitors common therapies. The expert trainee critically appraises treatment options and appropriately treats and corrects physiological derangements and specific diseases.

#### **Enabling Competencies:**

*The novice trainee is able to:*

Demonstrate a developing understanding of the range of treatments available for a specific physiological derangement or disease

*The expert trainee is able to also:*

- a) Describe when treatment is unnecessary or futile and prioritises therapy according to patient need
- b) Critically appraise the evidence for and against particular treatments including the indications and contraindications
- c) Explain the likely success rate and the limitations of an individual treatment for a specific condition
- d) Describe the complications of particular therapies and their incidence and management
- e) Describe the effects of concomitant treatment and/or co-morbid conditions on an individual patient's response to treatment
- f) Explain the concept of risk: benefit ratio of a therapy and can apply this concept to a particular patient
- g) Describe the concept of cost effectiveness of a therapy and the value of a specific treatment to both the individual and the community
- h) Formulate a plan of management for an individual patient
- i) Review the efficacy of the chosen treatment at regular intervals and institute alternative therapies according to patient need
- j) Review outcomes of specific therapies

**Examples include, but are not restricted to:**

**(i) Fluid Therapy**

**Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe the causes and pathophysiological effects of altered intravascular volume and states of hydration
- b) Demonstrate how to assess the intravascular volume status and state of hydration of a patient using clinical signs and monitoring
- c) Describe the components, physical properties, and behaviour of fluids commonly used in therapy
- d) Describe the indications, contraindications and complications of various fluid therapies and their administration
- e) Explain the principles and risks of blood and blood component therapy

*The expert trainee is able to also:*

- a) Describe the theoretical advantages and disadvantages of crystalloid and colloid solutions
- b) Choose the appropriate fluid, volume and rate of administration of fluid
- c) Set goals and regularly review the efficacy of fluid therapy
- d) Consider and exclude unidentified pathology (e.g. continued bleeding) if goals are not achieved
- e) Institute an alternative fluid or drug regimen (e.g. inotropic therapy) if goals are not achieved

**(ii) Inotropic/Vasopressor Therapy**

**Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe the physiology and anatomical distribution of adrenergic and other relevant receptors
- b) Describe the effects of relevant inotropic/vasopressor agents on specific receptor populations
- c) Recognise the need for inotropic or vasopressor therapy
- d) Characterise the haemodynamic derangement using clinical examination and invasive haemodynamic monitoring
- e) Describe the limitations, potential adverse effects and complications of inotropic/vasopressor therapy in general and of individual medications

*The expert trainee is able to also:*

- a) Describe the effects of critical illness and concomitant therapies on receptor function (e.g. down-regulation)
- b) Set goals for inotropic/vasopressor therapy
- c) Choose an appropriate inotrope/vasopressor for the individual patient
- d) Choose an appropriate dose, physiological endpoint, rate and route of administration of the selected inotrope/vasopressor
- e) Describe the potential adverse effects and complications of inotropic/vasopressor therapy in general and of individual medications
- f) Explain the interactions among inotropic/vasopressor agents and concomitant therapies and with co-morbid disease (e.g. ischaemic heart disease)
- g) Review the efficacy of inotropic/vasopressor therapy at regular intervals
- h) Consider and exclude unknown pathology (e.g. sepsis) if goals are not achieved
- i) Review the goals of therapy, institute alternative therapy (e.g. balloon counterpulsation), and/or consider an alternative inotropic/vasopressor regimen if initial goals are not achieved

### **(iii) Respiratory Support**

#### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Demonstrate a sound knowledge of respiratory physiology and describe the effects of pulmonary pathology on physiological parameters
- b) Recognise respiratory failure and know when intervention is necessary
- c) Describe how to secure the airway safely and effectively
- d) Describe the principles of oxygen therapy and oxygen delivery systems
- e) Describe the principles of continuous positive airways pressure (CPAP) and positive end-expiratory pressure (PEEP) and CPAP and PEEP delivery systems
- f) Describe the principles of mechanical ventilation and mechanical ventilators

*The expert trainee is able to also:*

- a) Describe the complications of endotracheal intubation and take steps to minimise these
- b) Use non-invasive ventilation appropriately and efficiently
- c) Explain when and how to secure the airway safely and effectively, including the difficult airway
- d) Describe the principles of mechanical ventilation and mechanical ventilators
- e) Describe the principles of the different modes of mechanical ventilation
- f) Choose an appropriate type and mode of respiratory support for an individual patient
- g) Describe the potential adverse effects and complications of the various types and modes of respiratory support and take steps to minimise these
- h) Set goals for respiratory therapy
- i) Review the efficacy of therapy at regular intervals

- j) Consider and exclude problems (e.g. tube in right main bronchus, tension pneumothorax), and institute alternative respiratory and non-respiratory therapy if goals are not achieved

## 1.2.6 TECHNICAL SKILLS

### Introduction

The expert trainee is proficient in a wide range of technical skills necessary for therapeutic and monitoring purposes and safely teaches and supervises clinical practice. The ability to perform procedures must be accompanied by knowledge of normal anatomy, indications, contraindications and complications. The latter includes not only physical hazards, but possible delays in instituting obviously needed therapy whilst procedures are undertaken and the possibility of obtaining and acting upon wrong information.

### Key Competency:

The novice trainee describes the relevant anatomy, what preliminary measures must be undertaken, confirms they have been done and then performs core procedures in a manner, which minimises the risks of complications. The expert trainee confirms that preparation is complete and then either performs or supervises core procedures in a manner, which minimises the risks of complications.

### Enabling Competencies:

*The novice trainee is able to:*

- a) Perform core procedures
- b) Seek assistance for the performance of those procedures, which are not core procedures, within the trainees experience or potentially complicated
- c) Describe the important preliminary preparation before undertaking a procedure
- d) Describe relevant anatomy and how physiological function may be altered during the procedure
- e) Describe the common complications, how to recognise them and institute appropriate management
- f) Perform the procedure and carry out continuing management in a manner, which minimises the risks of complications

*The expert trainee is able to also:*

- a) Perform, teach and supervise safe performance of those procedures, which are accepted in the hospital as within the competence of the Intensive Care Unit specialist
- b) Consult for the performance of those procedures, which are not within his/her expertise

Examples include, but are not restricted to:

- (i) Insertion of a Central Venous Catheter
- (ii) Insertion of a Pulmonary Artery Thermodilution Balloon Tipped Flotation Catheter

## 1.2.7 SUPPORTIVE CARE OF THE CRITICALLY ILL PATIENT

### Introduction

Long-term support is often required while injured tissues and organs heal and while the physiological consequences of illness and injury are corrected. Total patient care is central to the discipline of intensive care medicine. This includes support of the function of all organs, measures to prevent complications, and alleviation of pain, anxiety and psychosocial distress. According to need social support should extend to the immediate family.

### **Support of Organ Function**

#### **Key Competency:**

The novice trainee understands that support of all organ systems is vital to the care of critically ill patients irrespective of the organ or system primarily affected by the presenting illness. The expert trainee effectively delivers supportive management to the acutely ill patient.

#### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe the regulatory processes controlling the function of the particular organ or system
- b) Describe how critical illness may affect homeostatic mechanisms
- c) Recognise disorders of function of the particular organ or system

*The expert trainee is able to also:*

- a) Explain the consequences of abnormal function of the particular system
- b) Institute appropriate treatment for abnormal function of the particular system
- c) Propose an appropriate supportive regimen for an individual patient

**Examples include, but are not restricted to:**

#### **(i) Nutritional Support**

#### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe normal nutritional requirements
- b) Describe the metabolic response to critical illness and starvation

*The expert trainee is able to also:*

- a) Assess the nutritional requirements of critically ill patients
- b) Appreciate the adverse consequences of malnutrition
- c) Monitor nutritional status
- d) Explain the advantages and disadvantages of different nutritional formulations and different routes of administration
- e) Institute appropriate nutritional regimens for critically ill patients

## **(ii) Metabolic support**

### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe the normal processes controlling fluid, electrolyte, acid-base and glucose balance
- b) Recognise disorders of fluid, electrolyte, acid-base and glucose balance
- c) Appreciate the pathophysiological consequences of disordered fluid, electrolyte, acid-base and glucose balance

*The expert trainee is able to also:*

- a) Treat abnormalities of fluid, electrolyte, acid-base and glucose balance
- b) Institute an appropriate fluid and electrolyte regimen for an individual critically ill patient

## **(iii) General Care and Prevention of Complications**

The novice trainee describes the importance of and principles of an appropriate plan for care of bowels, skin, mouth, eyes and maintenance of mobility and muscle strength in critically ill patients and the expert trainee institutes and revises an appropriate plan for care of bowels, skin, mouth, eyes and maintenance of mobility and muscle strength in critically ill patients.

### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Explain the risk of colonisation with potentially pathogenic micro-organisms, and the factors associated with patient, staff, equipment and environmental colonisation
- b) Explain the importance of culturing body fluids and the principles of their collection
- c) Explain the risk of development of a particular complication and the predisposing factors
- d) Modify treatment to minimise the risk
- e) Monitor appropriate parameters to allow early detection if the complication cannot be avoided
- f) Treat the particular complication effectively

#### **(iv) Pain Management**

##### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe the pain pathways and theory of pain generation
- b) Describe the physiological and psychological effects of pain
- c) Describe and assist in the use of pain assessment techniques
- d) Describe the pharmacology and roles of topical, enteral, parenteral and regional agents used in the treatment of pain syndromes including:
  - opioids
  - paracetamol, NSAIDs, COX-2 inhibitors
  - NO<sub>2</sub>
  - Ketamine
  - Antidepressants
  - Gabapentin and carbamazepine
  - Local anaesthetic agents
- e) Anticipate the development of pain and/or anxiety and assist with strategies for its prevention or minimisation
- f) Recognise and assess the degree of pain and/or anxiety
- g) Describe the effects of analgesic, sedative and hypnotic drugs and their uses and complications

*The expert trainee is able to also:*

- a) Describe the indications and contraindications for regional anaesthetic techniques, and use them appropriately
- b) Propose and implement a plan to prevent and manage pain, anxiety and psychosocial distress depending on individual need, leading and supervising the novice trainee in the multi-modal management of pain

#### **(v) Stress Ulceration**

##### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe the normal gastric mucosal protective mechanisms
- b) Explain the pharmacodynamics of different prophylactic regimens
- c) Explain the rationale of a therapeutic plan for gastrointestinal bleeding

*The expert trainee is able to also:*

- a) Describe the pathogenesis and risk factors for stress ulceration
- b) Explain the benefits and risks of different prophylactic regimens and effectively institute them
- c) Propose and institute a therapeutic plan for gastrointestinal bleeding

## **(vi) Nosocomial Infection**

### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe the normal innate and acquired immune defences and how they may be affected by acute illness and its treatments
- b) Order and collect cultures of appropriate body fluids effectively

*The expert trainee is able to also:*

- a) Explain the risk of colonisation with potentially pathogenic micro-organisms, and the factors associated with patient, staff, equipment and environmental colonisation
- b) Describe and implement infection control procedures relevant to the ICU
- c) Explain the importance of culturing body fluids and the principles of their collection
- d) Delineate the difference between colonisation and invasive infection
- e) Propose and implement plans for care of intravascular catheters and other invasive devices
- f) Describe an antibiotic policy for the ICU
- g) Efficiently manage individual patients with nosocomial infection

## **(vii) Ventilator-Associated Lung Injury (VALI)**

### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe mechanics of normal spontaneous ventilation and mechanics of artificial ventilation
- b) Describe the concept of lung time constants

*The expert trainee is able to also:*

- a) Explain the pathogenesis and risk factors for ventilator-associated lung injury
- b) Describe the potential complications of different forms of ventilation
- c) Describe the manifestations of pulmonary barotrauma, volutrauma or biotrauma
- d) Describe the manifestations of absorption atelectasis, oxygen induced tracheo-bronchitis and pulmonary oxygen toxicity
- e) Propose and implement a treatment plan for an individual patient with severe pulmonary barotrauma
- f) Appreciate that lung injury in ventilated patients may result from other causes (e.g. super-infection, fluid overload, suctioning, inadequate humidification)

## **(viii) Thromboembolic Disease**

### **Enabling Competencies**

*The novice trainee is able to:*

- a) Describe the normal haemostatic mechanisms and physiological anticoagulant systems

- b) Describe the pathogenesis and risk factors for venous, arterial and intra-cardiac thrombosis and embolism

*The expert trainee is able to also:*

- a) Explain the benefits and risks of different prophylactic regimens
- b) Recognise the signs and symptoms of thromboembolism and effectively confirm or reject the diagnosis
- c) Implement treatment for intravascular thrombosis, as well as pulmonary and systemic embolism

### **(ix) Sleep Deprivation**

#### **Enabling Competencies:**

*The novice and expert trainee are able to:*

- a) Describe the importance of diurnal rhythm and sleep to all patients
- b) Describe how diurnal rhythm and sleep may be disturbed in ICU
- c) Propose and implement a plan to provide adequate rest and sleep in Intensive Care Unit patients

## **1.2.8 MONITORING, MEASUREMENT, INVESTIGATIONS AND INTERPRETATION OF DATA**

### **Introduction**

The expert trainee will acquire a broad knowledge of monitoring, measurement, investigations and the interpretation of data in ICU, built on an understanding of the physical principles. This includes an understanding of the indications, limitations and complications of techniques involved and proficiency in the relevant technical skills where these fall within the ambit of the intensive care specialist.

### **Principles of Measurement**

#### **Key Competency:**

The novice trainee describes the principles of measurement as applied to the critically ill patient and the expert trainee can use a wide range of relevant methods effectively and safely.

#### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe the physical principles of the system used
- b) Identify deviations from normal range
- c) Describe how trend of change may be significant
- d) Identify changes which are life threatening and respond accordingly
- e) Recognise artefact and/or errors

*The expert trainee is able to also:*

- a) Knows when to monitor, measure or investigate

- b) Understands the risk/benefit ratio of the modality chosen
- c) Acts upon the information effectively in a timely fashion

## **Bedside Monitoring**

### **Continuous ECG monitoring**

#### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe how information relating to heart rate, rhythm, conduction, ST segment change and QT interval may be obtained
- b) Describe the indications for ECG monitoring
- c) Describe the limitations of ECG monitoring
- d) Recognise changes which are potentially life threatening

*The expert trainee is able to also:*

- a) Explain the advantages and disadvantages of different lead configurations
- b) Set alarms appropriately
- c) Differentiate real change from artefact
- d) Respond appropriately to dysrhythmias and signs of ischaemia

### **Invasive pressure monitoring**

#### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe the functions of the components of an invasive pressure monitoring system (catheter, tubing, transducer, amplifier and display unit)
- b) Describe correct zeroing and calibration techniques
- c) Describe the principles involved in optimising the dynamic response characteristics of the catheter-tubing-transducer set up and how the natural frequency and damping coefficient determine the dynamics of the system
- d) Describe the indications for invasive pressure monitoring
- e) Describe the limitations of invasive pressure monitoring

*The expert trainee is able to also:*

- a) Understand the risk/benefit ratio of its use
- b) Recognise change which is potentially life threatening
- c) Set alarms appropriately
- d) Differentiate real change from artefact
- e) Respond appropriately to changes and abnormal pressures

### **Pulse oximetry**

### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe the physical principles of pulse oximetry
- b) Explain the indications for pulse oximetry
- c) Explain the limitations of pulse oximetry and the causes of erroneous readings
- d) Recognise changes which are potentially life threatening

*The expert trainee is able to also:*

- a) Set alarms appropriately
- b) Explain the limitations of pulse oximetry, and differentiate real change from artefact
- c) Respond appropriately to abnormalities

### **Monitoring of ventilation**

#### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe the significance of respiratory rate, tidal and minute volume; mean, peak end-inspiratory and plateau pressure and end expiratory pressure (intrinsic and extrinsic); resistance and compliance; inspired oxygen concentration; arterial blood gas and acid base status
- b) Explain the effect of ventilation upon cardiovascular and oxygen delivery parameters

*The expert trainee is able to also:*

- a) Explain how the mode of ventilation may influence the choice of parameters monitored and the effects on these parameters
- b) Describe the hazards of inadequate monitoring including lack or misuse of alarm settings
- c) Explain the mechanisms, effects and clinical manifestations of common problems such as tube blocking, pulmonary deterioration and barotrauma and how monitoring may provide early evidence of these complications
- d) Respond appropriately to problems detected

### **End tidal CO<sub>2</sub> monitoring**

#### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe the physical principles involved in end tidal CO<sub>2</sub> monitoring
- b) Explain the relationship between end tidal CO<sub>2</sub> and arterial PCO<sub>2</sub> in various clinical circumstances
- c) Explain the indications for end tidal CO<sub>2</sub> monitoring
- d) Explain the limitations of end tidal CO<sub>2</sub> monitoring

*The expert trainee is able to also:*

- a) Set alarms appropriately

- b) Explain how common problems may affect the value measured or the capnogram appearance (e.g. hypoventilation, airway obstruction, air embolism, shock, dysynchrony)
- c) Respond appropriately to the abnormalities detected

## **Advanced haemodynamic monitoring using a pulmonary artery catheter etc.**

### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe the significance of and the relationships between central venous pressure, mean pulmonary artery pressure, pulmonary artery diastolic pressure, pulmonary artery wedge pressure, mean systemic arterial pressure, cardiac output and how relationships may change in a range of clinical circumstances (e.g. cardiac tamponade, hypovolaemic shock)
- b) Explain measurement of cardiac output by thermodilution and pulse contour analysis

*The expert trainee is able to also:*

- a) Explain the indications for the use of a pulmonary artery catheter, echocardiography, PICCO etc.
- b) Describe the risks and benefits of these techniques
- c) List the complications of the technique and acts to prevent them
- d) Differentiate abnormality or real change from artefact
- e) Respond appropriately
- f) Explains how to derive additional indices such as cardiac index, systemic and pulmonary vascular resistance (index), left and right stroke work index, oxygen extraction ratio, oxygen delivery and consumption and their relevance.

## **Cerebral dynamics monitoring**

### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe the determinants of cerebral blood flow, cerebral perfusion pressure, CSF production and ICP
- b) Describe the principles of intracranial pressure measurement and its relationship to cerebral perfusion pressure

*The expert trainee is able to also:*

- a) Use intracranial pressure measurement and cerebral perfusion pressure effectively in clinical practice
- b) Knows the indications for and limitations of intracranial pressure measurement
- c) Understands the advantages and disadvantages of the different systems
- d) Understands factors and therapies which may influence intracranial and cerebral perfusion pressure
- e) Recognises changes in intracranial and cerebral perfusion pressure which are life threatening, differentiates real change from artefact, and responds appropriately
- f) Understands the risks and benefits of intracranial pressure measurement
- g) Safely and efficiently manages an intracranial pressure monitor

## Laboratory Investigations Relevant to Intensive Care Practice

### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Explain the principles, range and reliability of the common laboratory tests relevant to intensive care practice and order them appropriately.
- b) Explain the indications for the investigations

*The expert trainee is able to also:*

- a) Describe the causes of abnormality and sources of error
- b) Explain the concepts of sensitivity and specificity, and predictive value or likelihood ratio of the investigation as related to a specific disease
- c) Explain how rapidly some investigations can change in a critically ill patient and that a single normal result is not as significant as identifying trends
- d) Recognise changes which are significant and are potentially life threatening
- e) Respond appropriately to the result obtained
- f) Use results to assist in diagnosis and management
- g) Obtain repeat or follow up investigations as needed

## Organ Imaging

### Plain x-rays (e.g. chest x-ray [CXR])

### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Explain the indications for a CXR in ICU patients
- b) Describe the limitations of mobile CXRs in ICU patients
- c) Describe the range of normal features on the CXR
- d) Interpret a wide range of normal and abnormal CXRs
- e) Explain and interpret the effect of projection, position, penetration and other factors on the image quality and radiological signs

*The expert trainee is able to also:*

- a) Recognise abnormalities, especially those which may be life threatening, and respond appropriately
- b) Propose a differential diagnosis based on the abnormalities observed
- c) Relate the abnormalities to the clinical situation
- d) Consult with the radiologist and undertakes further investigations when indicated

## CT scanning, MRI, ultrasound, angiography and radionuclide studies

### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Explain the indications for the procedure in ICU patients

- b) Describe the limitations of the procedure in ICU patients
- c) Explain the risks and benefits of the procedure (including transport)
- d) Recognise common abnormalities in the ICU patient

*The expert trainee is able to also:*

- a) Act upon the result and seek specialist (e.g. radiological) help to define more complicated problems
- b) Propose a differential diagnosis based on the abnormalities observed
- c) Relate the abnormality to the clinical situation
- d) Undertake further consultation/investigation when indicated

## **Diagnostic ECG**

### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Explain the principles of diagnostic electrocardiography.
- b) Describe the indications for an ECG
- c) Explain the limitations of the ECG
- d) Interpret a wide range of abnormal ECGs

*The expert trainee is able to also:*

- a) Explain the usefulness of specific leads in resolving difficult diagnostic issues (V4R - right ventricular infarction, oesophageal lead - SVT vs. VT)
- b) Interpret abnormalities correctly
- c) Recognise changes needing urgent intervention
- d) Undertake appropriate treatment

## **Respiratory Function Tests**

### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe the physical principles of respiratory function tests
- b) Describe the indication for ordering and order the tests appropriately

*The expert trainee is able to also:*

- a) Interpret the various tests and explain abnormalities correctly
- b) Undertake appropriate treatment
- c) Undertake further consultation/investigation where indicated

## **EEG and Evoked Potentials**

### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Explain the principles of EEG and evoked potential recording
- b) Describe the indications for EEG and SSEPs or BSEPs

*The expert trainee is able to also:*

- a) Explain the limitations of EEG and evoked potentials
- b) Be guided by expert opinion in interpretation
- c) Undertake appropriate treatment

### **Selection of Apparatus**

#### **Enabling Competencies:**

*The expert trainee is able to:*

- a) Explain a need for the apparatus
- b) Obtain an estimate of initial cost, availability of servicing and ongoing costs
- c) Verify its accuracy against a known "gold standard" where appropriate
- d) Seek expert opinion where necessary to verify its safety, reliability and that it meets recognised standards
- e) Demonstrate its ease of use and acceptance by staff
- f) Understand its limitations
- g) Assign a priority to the need for the apparatus

### **Electrical Safety**

#### **Enabling Competencies:**

*The expert trainee is able to:*

- a) Explain the difference between macro-shock and micro-shock and the conditions which predispose to their occurrence
- b) Describe the physical dangers of electrical currents
- c) Explain the relevant standards document dealing with the safe use of electricity in patient care
- d) Describe the basic methods by which electrical hazards are reduced
- e) Seek expert help in ensuring that the Intensive Care Unit and all electrical equipment used in patient care conforms with and is maintained to the relevant safety standard

### **Ionising Radiation**

#### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe the hazards associated with ionising radiation
- b) Seek expert opinion in limiting these hazards

### **Computer Applications**

*The novice trainee is able to:*

- a) Define areas where computer applications might be helpful

- b) Use computers for searches, data recording, communication and record keeping

*The expert trainee is able to also:*

- a) Seek expert opinion on establishing computer services
- b) Use computers for research, data analysis and EBM

### **1.3 PRE-INTENSIVE CARE UNIT, EXTRAMURAL CARE**

#### **1.3.1 THE DETERIORATING PATIENT OUTSIDE ICU (Early Warning Systems, Medical Emergency Team or Rapid Response Team)**

##### **Introduction**

It is important that all critically ill patients have access to the best care no matter their location. Patients who are admitted to ICU from the wards after deteriorating have a worse prognosis than those from other areas. Their deterioration may have been predicted by “tracking” key observations and prevented by “triggering” an early emergency response. The longer patients are in hospital before admission to ICU the higher their mortality.

An appropriate emergency response requires (i) generation of triggering protocols, (ii) education of ward staff and (iii) organisation and supervision of a specialised team capable of providing a rapid response and solutions to acute medical and surgical problems in a cooperative manner.

##### **Key Competency:**

The intensive care specialist explains the importance of recognising the deteriorating patient in the ward and organises, supervises and leads a rapid response team.

##### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Define the role and rationale for the rapid response team
- b) Describe an appropriate system for triggering the rapid response team
- c) Describe the possible problems of caring for a critically ill patient in a non-ICU environment
- d) Explain the priorities of caring for a patient with undifferentiated diagnosis in a non-ICU environment, assessing and simultaneously resuscitating as per 1.2.1
- e) Play an effective role as junior member of the rapid response team, communicating effectively with the team leader and other members
- f) Treat the ward staff with respect and empathy

*The expert trainee is able to also:*

- a) Effectively lead the rapid response team and assist the priority areas of supporting the patients airway, breathing and circulation whilst pursuing the cause for the trigger
- b) Establish a plan of management for the patient which provides appropriate care, placement, follow up and communication of care plan
- c) Assist in the education and organisation of the afferent and efferent limbs of the rapid response team.

#### **1.3.2 CARDIOPULMONARY RESUSCITATION (CPR)**

##### **Introduction**

Cardiopulmonary resuscitation of a critically ill or injured patient may be required within the hospital, in the Intensive Care Unit, emergency department or in a hospital ward or department or outside the hospital, whilst on a patient retrieval or attendance at a disaster scene. An organised and rapid response is vital. The intensive care specialist is expected to lead, train and organise CPR and apply the principles of resuscitation for respiratory or cardiorespiratory arrest in patients of all ages.

## **Cardiopulmonary Resuscitation**

### **Key Competency:**

The novice trainee explains that the time to basic life support and defibrillation are critical variables in the probability of survival from cardiac arrest and describes and performs the algorithms for management of arrest scenarios and the expert trainee participates in and supervises cardiac arrest management in a range of settings and clinical situations as team member or leader.

### **Enabling Competencies**

*The novice trainee is able to:*

- a) Describe the causes of cardio-respiratory arrest
- b) Recognise symptoms and signs of impending/present cardiac arrest
- c) Explain the effects of cardio-respiratory arrest on body systems
- d) Describe a plan of management for cardiac arrests due to shockable (ventricular fibrillation and pulseless ventricular tachycardia) and non-shockable rhythms (including asystole and pulseless electrical activity)
- e) Demonstrate techniques to clear and maintain the airway, the use of mouth-to-mask ventilation, and the use of self-inflating hand held resuscitators on patients and models
- f) Describe the principles and demonstrate techniques of external cardiac compression
- g) Demonstrate combined ventilation and external cardiac compression in one person and two person rescue
- h) Describe the indications and demonstrate the operation of external defibrillators (manual and automated [shock advisory])
- i) Demonstrate techniques of access to the circulation
- j) Diagnose cardiac arrhythmias
- k) Describe anti-arrhythmic therapy in a cardiac arrest situation
- l) Describe the latest protocols of the Australian Resuscitation Council for management of cardiorespiratory arrest (see website: [www.resus.org.au](http://www.resus.org.au))

*The expert trainee is able to also:*

- a) Seek and identify the cause in individual cases (especially the rapidly reversible causes)
- b) Recognise and treat complications and sequelae of cardiopulmonary resuscitation
- c) Counsel partners, relatives or guardians of patients during and after cardiac arrest
- d) Respond to an emergency in a positive, organised and effective manner, and direct the resuscitation team
- e) Describe the indications to start and stop cardiopulmonary resuscitation
- f) Manage the patient post resuscitation

## **Organisation of Cardiac Arrest Response**

### **Key Competency:**

The expert trainee explains the organisation required for an effective cardiopulmonary resuscitation service within a hospital and participates in a hospital response to internal and external emergencies.

*The expert trainee is able to:*

- a) Explain the requirement for all areas within a hospital to have suitable equipment immediately available
- b) Describe the appropriate equipment for areas within a hospital
- c) Describe the requirement for attendance of appropriate personnel at the site of cardio-respiratory arrest
- d) Explain the design and equipment requirements for a resuscitation facility
- e) Explain the processes in organisation, training of personnel and procurement of equipment for disaster preparedness or to respond to an in hospital emergency.

## **Training of Medical and Other Staff**

### **Key Competency:**

The expert trainee assists in the training of medical, nursing and paramedical personnel.

*The expert trainee is able to:*

- a) Teach techniques of cardiopulmonary resuscitation to different personnel
- b) Describe the problems of resuscitation and crisis management which confront non-medical personnel

## **1.3.3 TRANSPORT OF CRITICALLY ILL PATIENTS**

### **Introduction**

Transport of critically ill patients is required in a number of circumstances, pre-hospital, intra-hospital for diagnostic and/or therapeutic interventions and inter-hospital for specialised diagnostic procedures and/or therapy that is only available in tertiary Intensive Care Units. Transport may be required on an emergency or semi-elective basis. The principle governing transport of critically ill patients is to maximise safety and at the same time to maintain or improve the patient's clinical status during retrieval.

## Organisation and Operation of Retrieval Services

### **Key Competency:**

The novice trainee describes the principles, problems and risks involved with transport of critically ill patients and assists in their application in hospital. The expert trainee applies this knowledge to ensure appropriate and safe transport of critically ill patients by supervising, teaching or participating in the transport in diverse settings. The expert trainee explains the College Policy Document IC-10: *Minimum Standards for Transport of Critically Ill Patients* (2010) and PS39: *Minimum Standards for Intra-hospital Transport of Critically Ill Patients* (2003)

### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe the principles underlying safe transport of critically ill patients of all ages
- b) Explain the importance of prior planning and organisation of retrieval services
- c) Explain the requirement for stabilization and support of the critically ill patient before transport is commenced
- d) Describe the importance of communication between referring, transporting and receiving staff
- e) Explain the need for specially designed equipment

*The expert trainee is able to also:*

- a) Describe the special equipment for transport taking into consideration size, weight, battery life, durability and performance under conditions of transport
- b) Describe the importance of communication between referring, transporting and receiving staff
- c) Explain how to select and train appropriate staff based on patient need
- d) Describe the advantages and disadvantages of road ambulance, fixed and rotary wing aircraft including the problems associated with altitude, noise, vibration, acceleration and deceleration
- e) Explain how to select the mode of transport based on clinical requirements, distance, vehicle availability and environmental conditions
- f) Describe the importance of pre-transport consultation and advice, especially when lengthy delays are anticipated
- g) Explain the potential mental and physical trauma to the patient and the traumatic effects of family dislocation
- h) Describe the operation of a networked retrieval service
- i) Explain the need for complete documentation of the patient's clinical condition, before during and after transport, and of relevant medical conditions, therapy delivered, environmental factors and logistical difficulties encountered
- j) Explain the need for regular audit of all aspects of retrieval and application of Quality Improvement principles
- k) Participate in safe transport of critically ill patients in diverse circumstances
- l) Explain the adaptation and application of general retrieval principles where appropriate to pre, intra and inter-hospital transport

### 1.3.4 Outreach, Follow-up and Continuing Care outside ICU

#### **Introduction**

Patients discharged to the ward following ICU admission have many continuing problems, which are within the knowledge base and expertise of the intensive care specialist (e.g. physical, medical and psychological problems). These patients may also deteriorate following discharge and require readmission to ICU. It is therefore important to follow the progress of these patients in the wards or after discharge from hospital to prevent deterioration or treat continuing morbidity. Specific expertise may also facilitate earlier hospital discharge (e.g. tracheostomy care and facilitation of decannulation) and return to normal activity.

#### **Key Competency:**

The expert trainee describes the consequences of severe illness, explains the importance of following the ICU patient in the ward and organises, supervises and leads a follow-up team.

#### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Define the role of the follow-up team
- b) Describe the medium and long term consequences of severe illness
- c) Play an effective role as junior member of the follow-up team, communicating effectively with the team leader and other members
- d) Communicate clearly with the ward staff and patients showing respect and empathy

*The expert trainee is able to also:*

- a) Effectively lead the team in detecting and treating deterioration, assisting in care within the expertise of the ICU team
- b) Establish a plan of management for the patient which provides safe care
- c) Assist in the education and organisation of the follow-up team.

## **2. COMMUNICATOR**

### **2.1 PRINCIPLES OF COMMUNICATION: WITH PATIENTS, FAMILIES, SIGNIFICANT OTHERS AND COLLEAGUES**

#### **Introduction**

The ability to communicate effectively is an essential attribute of the expert trainee. Such communication is particularly important when it involves patients and their families as it facilitates the relationships and exchanges that occur with the staff. It aids shared decision-making and helps to establish rapport and trust and aids information delivery and formulation of the diagnosis. Communicating effectively with colleagues facilitates teamwork and patient care.

#### **Key Competency:**

The expert trainee explains the role of communication skills in the effective functioning of an Intensive Care Unit, teaches these skills and uses appropriate skills when communicating in a variety of roles. The trainee accesses relevant resources to develop communication skills to an appropriate level.

#### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe the need for effective communication with patients and/or their families as well as colleagues
- b) Explain the principles of proper communication, verbal and non-verbal, and the value of silence
- c) Explain the principles of family meetings (site, introduction, information gathering, explanation, discussion, update, plan, review)
- d) Communicate effectively with patients and relatives in ICU using active listening and appropriate language, adapting style to various contexts
- e) Develop rapport, trust and empathetic relationships with patients and families
- f) Accurately elicit and synthesise relevant information from patients and families and other available sources eg neighbours, ambulance officers and police
- g) Accurately convey relevant information and explanations to patients and families
- h) Respect patient confidentiality, privacy and autonomy

*The expert trainee is able to also:*

- a) Encourage discussion, questions and interaction in meetings with patients and families
- b) Show ability to read verbal and non-verbal cues from others
- c) Apply the principles of open disclosure
- d) Identify and analyse problems to be addressed after a family or patient meeting, including the culture, context, concerns and responses
- e) Describe the problems associated with difficult or stressful conditions (e.g. death [including brain death], withdrawal of therapy, and organ donation)
- f) Effectively address challenging communication issues such as obtaining informed consent, delivering bad or catastrophic news, addressing anger, addressing requests for inappropriate therapy, confusion and misunderstanding
- g) Effectively communicate with complex families and angry colleagues
- h) Recognise where miscommunication has occurred and take steps to seek help and address it
- i) Use appropriate resources (e.g. books, videos, courses etc.) to assist in the development of personal communication skills

## **2.2 CULTURAL COMPETENCE**

### **Introduction**

ICU doctors work with culturally diverse groups. They need to be competent in dealing with patients and families of cultures different to their own. Culture affects the way individuals understand health and illness, access health services, respond to interventions and communicate with services.

Cultural competence facilitates developing trusting relationships, gaining information from patients and families, improving relationships with patients and families, helping negotiate differences, increasing compliance with treatment and increasing patient satisfaction.

**Key Competency:**

The expert trainee is able to effectively communicate with and understand the needs, values and beliefs of patients and families from diverse cultures, taking these into account in caring for the patient.

**Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe the existence and importance of cultural diversity
- b) Describe that culture may relate to gender, race, personal traits, religion and country of origin
- c) Describe how cultural diversity influences trust, communication, response to interventions and satisfaction
- d) Respect different cultures
- e) Describe the rights of patients and families to be treated with respect
- f) Describe the rights of patients and families to privacy
- g) Describe the rights of patients and families to be provided with services which take into account their needs, values and beliefs
- h) Describe the importance of cultural competence

*The expert trainee is able to also:*

- a) Explain how his/her own culture will affect his/her interactions, decisions and actions and be aware of his/her own culture
- b) Not impose own culture and values on others
- c) Challenge cultural bias of others
- d) Not accept stereotypes
- e) Develop rapport with members of other cultures and elicit cultural issues which may impact on management
- f) Explore potential conflict among the cultural and legal environment and the individual's needs
- g) Work effectively with interpreters and seek assistance to better understand other cultures when required

## **2.3 PROFESSIONAL COMMUNICATION: PRESENTATION SKILLS AND HANDOVER**

### **Introduction**

The ability to communicate effectively is an essential attribute of the expert trainee. Such communication is particularly important when it involves other ICU staff (other specialists, junior medical staff, nurses and paramedical staff), referring or consulting medical staff from outside the ICU and hospital ward staff. Effectively and accurately conveying medical information between professionals is important in all aspects of ICU practice, particularly in clinical care of patients, handover, education and consultation. It requires a respect for others and their role in the hospital.

**Key Competency:**

The expert trainee is accurate and concise in relaying information about patients. The doctor confirms information and assures its reliability and consistency. The accuracy of written or electronic records is paramount and checked regularly. The trainee is able to deliver effective educational presentations to diverse audiences.

**Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe the importance of communication between medical and non-medical colleagues
- b) Describe the importance of accurate handover and clinical records
- c) Record accurate, structured and comprehensive clinical information in medical records and provide accurate verbal information
- d) Communicate effectively with peers and other staff using the principles of teamwork
- e) Give short presentations to peers on clinical topics utilising audio-visual aids to facilitate message transfer

*The expert trainee is able to also:*

- a) Supervise accurate clinical information in medical records and ensure accurate verbal information is relayed
- b) Give effective presentations to diverse medical para-medical groups on clinical topics utilising audio-visual aids to facilitate message transfer

## **2.4 END OF LIFE CARE**

### **Introduction**

The care of patients who are dying is a prominent part of intensive care medicine and a major issue for healthcare workers.

**Key Competency:**

The expert trainee manages the process of limiting, withholding or withdrawing treatment in conjunction and collaboration with the patient, the significant others and other medical teams. The trainee manages palliative care of the critically ill patient.

**Enabling Competencies:**

*The novice trainee is able to:*

- a) Recognise that the primary goal of medical treatment is to benefit the patient by restoring or maintaining the patient's health, maximising benefit and minimising harm.
- b) Recognise that the application of medical technology can at times cause unnecessary and excessive suffering for patients and their families with little or no benefit.
- c) Recognise that it may be appropriate in varying circumstances to withdraw treatment and focus on promoting patient comfort when ICU therapies are of no benefit to the patient

*The expert trainee is able to also:*

- a) Take into account the opinion of the patient, the nature and probability of potential outcomes and the costs to the patient of pain, suffering, loss of dignity and loss of identity when withholding or withdrawing treatment.
- b) Recognise that competent adults are entitled to withdraw consent to treatment and that it is the responsibility of the medical team to fully inform the patient when making decisions.

- c) Achieve medical consensus and assent from significant others before implementing end of life decisions by negotiating an agreement
- d) Implement an alternate care or comfort care plan, which focuses on relief of suffering, when death is imminent

## 2.5 ORGAN DONATION

### **Introduction**

Organ donation is an important process, which provides quality of life and survival benefit for recipients with end-stage organ failure. The expert trainee plays a crucial role in the appropriate and ethical practice of organ donation against a backdrop of significant emotional stress to donor families.

### **Key Competency:**

The intensive care specialist ethically and sensitively manages the process of cadaveric organ donation. Follows the ANZICS Recommendations Concerning Brain Death and Organ Donation

### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Recognise that the intensive care specialist's first responsibility is to the ICU patient and to maintain that patient's rights and dignity
- b) Familiarise self with the local legal requirements for certification of brain death and organ donation
- c) Identify the potential donor as a critically ill patient receiving ventilator support in an intensive care unit after an acute brain injury

*The expert trainee is able to also:*

- a) Respect the wishes of the patient regarding organ donation
- b) Explain the prerequisites for, and performs, Brain Death testing
- c) Communicate sensitively and effectively with the patient's family and significant others, the multidisciplinary ICU team and other medical teams
- d) Explain and address common misconceptions surrounding organ donation
- e) Provide the patient's family with a thorough explanation of the illness, the brain injury and the concept of brain death before any discussion of organ donation
- f) Describe and manage the physiological support of the organ donor

### 3. COLLABORATOR (TEAM WORKER)

#### Introduction

Teamwork is essential to the functioning of an ICU. Team support adds to the skills of other members of a team and the effectiveness of the team is greater than the sum effectiveness of the individuals. Poor teamwork is a causal factor in many adverse events. Good teamwork increases staff morale, satisfaction and efficiency. In a crisis teams may come together spontaneously and roles, communication and tasks need to be rapidly clarified.

#### **Key Competency:**

The expert trainee works with and leads a multidisciplinary team. The trainee supports and supervises that team with empathy and focus on the patients under the care of the team.

#### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe the importance of teamwork in the ICU environment and that collaboration is at the core of intensive care practice
- b) Describe and respect the roles, skills and responsibilities of team members
- c) Work effectively and sympathetically with peers and non-medical team members
- d) Participate effectively in a multidisciplinary healthcare team
- e) Communicate effectively with the team
- f) Support the team

*The expert trainee is able to also:*

- a) Lead a team effectively
- b) Explain the needs of individual team members
- c) Support individual team members
- d) Communicate effectively with all individuals in the team
- e) Explain the principles of crisis resource management, feedback and debriefing
- f) Recognise a poorly functioning team and analyse causes of the problems and solutions

### 3.2 NEGOTIATION

#### Introduction

Negotiation is a ubiquitous skill and form of collaboration that allows parties with differing needs, backgrounds and agenda to find common ground and satisfactory results for each party.

#### **Key Competency:**

The expert trainee uses negotiation skills to understand the needs of other parties and find solutions which prevent conflict and provide proper use of resources, safe patient care and effective teamwork.

#### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Demonstrate a respectful attitude to and understanding of other professional's perspectives
- b) Understand the needs and backgrounds that other professionals bring to a negotiation

*The expert trainee is able to also:*

- a) Respect and acknowledge differences, misunderstandings and limitations in self and other professionals that may interfere with effective teamwork, collaboration or negotiation
- b) Use the principles of negotiation to achieve appropriate results for each party in difficult discussions
- c) Use the principles of negotiation to prevent conflict
- d) Reflect on interpersonal communication, negotiation and collaboration and strive to improve own skills

### **3.3 CONFLICT RESOLUTION**

#### **Introduction**

Conflict may occur in the ICU in diverse circumstances and involve colleagues, administrators, allied health professionals, patients and families in differing combinations and permutations. The environment of high stress, high risk, differing values, beliefs and culture and high workload make conflict more likely. Interpersonal and end-of-life issues are common sources of conflict.

#### **Key Competency:**

The intensive care specialist is able to anticipate sources of conflict, prevent escalation of conflict and effectively use available resources to defuse conflict.

#### **Enabling Competencies:**

*The expert trainee is able to:*

- a) Describe the sources of conflict in an ICU environment
- b) Describe the personality traits of self and others and how they may be associated with conflict
- c) Explain the potential for conflict between the interests of the individual and the interests of the community
- d) Explain the principles of conflict resolution
- e) Use the principles of conflict resolution to resolve conflict

## 4. MANAGER (LEADER)

### 4.1 ADMINISTRATION

#### Introduction

In addition to acquisition of clinical skills (problem solving, procedural, therapy), the trainee becomes familiar with the broader activities of an ICU specialist. These relate to the efficient running of a unit (administration, organisation, staffing, design and equipment), leadership, change management and the need for clinical audit and quality improvement programmes. Unit practice must be conducted according to ethical principles and fulfil medico legal requirements. Participation in hospital committees, the organisation of scientific meetings, and the activities of professional organisations, societies and colleges are also desirable.

#### Administrative Responsibilities of an Intensive Care Specialist

##### Key Competency:

The expert trainee describes the clinical and non-clinical roles of an intensive care specialist and explains how such activities contribute to the efficiency of the Intensive Care Unit, the profile of intensive care within the hospital and to the quality of patient management. The intensive care specialist contributes to a range of unit and hospital activities and supports others in their roles.

##### Enabling Competencies:

*The expert trainee is able to:*

- a) Describe the leadership role and the characteristics of good leadership
- b) Lead the daily multidisciplinary ward round
- c) Explain the duties of an intensive care specialist and the director of the department
- d) Describe the principles of administration and management
- e) Describe the principles of change management
- f) Critically analyse, and where appropriate facilitate, the adoption of guidelines, protocols and care bundles.
- g) Assist with ensuring unit compliance with infection control protocols.
- h) Refer to the appropriate standards and know the physical requirements of Intensive Care Unit design
- i) Identify occupational and safety hazards and adopts measures to reduce them.
- j) Recognise impaired performance in self and in professional colleagues
- k) Describe the principles of complaint resolution and dealing with anger in self and others
- l) Contribute to professional meetings and understand their rules, structure and etiquette
- m) Describe the basic principles involved in organising a scientific meeting
- n) Explain the ethical and legal implications of intensive care practice

### 4.2 LEADERSHIP

#### Introduction

All senior doctors are expected to lead at various times. The expert trainee will frequently face situations in ICU, hospital wards and the Emergency Department, which require specific leadership skills. Leadership is learnt and may be described as the process of constructively influencing an organised group, e.g. ICU multidisciplinary team or ICU department, in goal setting and achievement of those goals.

**Key Competency:**

The expert trainee leads a multidisciplinary team effectively and supports the department leader, constructively influencing decisions, disseminating knowledge and managing conflict.

**Enabling Competencies:**

*The novice trainee is able to:*

- a) Identify the important determinants of effective leadership
- b) Explain the difference between leadership and management

*The expert trainee is able to also:*

- a) Explain that the role of a leader is situational and context dependent e.g. ward round, trauma team, hospital meeting
- b) Explain that the role of the leader requires knowledge and emotional intelligence, including self-awareness, empathy and communication
- c) Explain that a good leader has clear vision, trust from the team, is organised, delegates appropriately and communicates effectively
- d) Describe the leadership roles and opportunities for ICU staff in the hospital and wider community

## **4.2 QUALITY ASSURANCE AND IMPROVEMENT**

**Introduction**

There are many aspects of quality management in ICU. Quality domains are varied and vitally important to ICU practice and patient outcome. They include safety (freedom from harm), effectiveness (use of evidence based therapy), efficiency (eliminating waste), patient centredness (taking account of the patient's real needs), timeliness (care provided when needed) and equitability (care independent of wealth, race, religion or gender).

**Key Competency:**

The expert trainee is able to organise a quality improvement program and run its components to ensure delivery of all quality domains. The trainee will undertake clinical audit and perform effective quality improvement activities including Morbidity and Mortality review, Case Conferences, Root Cause Analysis, Incident Monitoring and Adverse Event Assessment and ensure that the information gathered is used effectively to prevent subsequent events.

**Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe the need for and importance of clinical audit (e.g. mortality reviews, complications etc.) and review other clinical indicators
- b) Describe the sources of medical error
- c) Describe the purpose and process of other quality improvement activities such as evidence based practice, best practice guidelines, bench marking and critical pathways
- d) Assist with data collection and clinical audit

*The expert trainee is able to:*

- a) Recognise the need for clinical audit and quality improvement activities not to be threatening or punitive to individuals
- b) Undertake clinical audit and lead effective quality improvement activities.

- c) Describe how medical error may be reduced and an effective culture engendered
- d) Encourage others to participate in clinical audit and quality improvement activities
- e) Comply with CICM recommendations for quality improvement activities (see Policy Document IC-8 *Quality Assurance*)

### 4.3 RESOURCE MANAGEMENT

#### **Introduction**

Health resources are finite and require effective and efficient management to ensure maximum benefit to the hospital and community. Management includes securing maximum resources available and the efficient use of the resources.

#### **Key Competency:**

The expert trainee explains that the resources of an ICU are many, diverse and valuable. They include personnel, equipment, structures and intellectual property. They require maintenance and careful acquisition.

#### **Enabling Competencies:**

*The novice trainee is able to:*

Explain that the role of the intensive care specialist goes beyond the care of individual patients and involves many aspects of resource management including organisation, purchasing, financial planning, rostering, strategic planning and committee work.

*The expert trainee is able to also:*

- a) Explain the basic principles of departmental budgeting, financial management and resource utilisation
- b) Explain the factors that determine the optimum staff establishment for specialist and junior medical staff, nurses, paramedical and secretarial staff
- c) Describe the process for selecting, ordering and maintaining equipment
- d) Describe the processes for attracting, selecting, appraising and encouraging effective staff

### 4.4 EQUIPMENT ASSESSMENT

#### **Introduction**

Equipment has vital functions in ICU. It may be single-use, disposable, multi-use or structural and 'permanent'. Equipment is varied and can be used for resuscitation, life support, acquisition and storage of information, accommodation and transport of patients. Efficient purchase requires rigorous assessment and planning of requirement.

#### **Key Competency:**

The expert trainee is able to use and assess a broad range of equipment for diverse purposes in ICU. The assessment process is equipment and role specific and includes questions of risks, advantages, disadvantages, compatibility, labelling, usability, cost, evidence of benefit, durability, usage and safety.

#### **Enabling Competencies:**

*The novice trainee is able to:*

Explain the strategic role of the intensive care specialist in assessing, planning and purchasing equipment.

*The expert trainee is able to also:*

- a) Explain criteria for assessment of a range of equipment
- b) Explain the risks of inadequate equipment assessment
- c) Assess examples of disposable, multi-use and permanent equipment by a range of criteria

## 5. HEALTH ADVOCATE

### 5.1 PATIENT

#### **Key Competency:**

The expert trainee uses expertise and influence to advance the health and wellbeing of individual patients beyond the care of the specific critical illness. Individuals need the expertise of intensive care specialists to address their general health issues.

#### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Identify the important determinants of health affecting patients including occupational and environmental exposures, socio-economic factors and lifestyle factors
- b) Contribute effectively to the improved health of individual patients
- c) Assist individual patients in navigating the healthcare system and accessing health care and resources

*The expert trainee is able to also:*

- a) Understand the importance of medico-legal and insurance considerations for critically ill patients and their families
- b) Advocate for patients in their dealings with other health professionals
- c) Advocate for patients who are unable to advocate for themselves

### 5.2 COMMUNITY

#### **Key Competency:**

The expert trainee explains that intensive care specialists use their expertise and influence to advance the health and wellbeing of communities and populations beyond the walls of the ICU by public advocacy and committee membership and that their focus is on the interests and needs of society.

#### **Enabling Competencies:**

*The novice trainee is able to:*

- a) Describe in general the healthcare system and the structure, function and financing of ICUs within the local and national system
- b) Identify the determinants of health in the population served
- c) Identify the needs of intensive care patients within the community

*The expert trainee is able to also:*

- a) Communicate to the general population critical care issues and their impact on the maintenance and improvement of health care
- b) Describe the professional issues involved in health advocacy including altruism, social justice, autonomy, integrity and idealism
- c) Actively promote risk reduction and patient safety
- d) Explain how the intensive care specialty should respond to the needs of the community in general

- e) Explain the potential role of the intensivist in improving the standard of health care in the community

## 6. SCHOLAR (EDUCATOR)

### 6.1 RESEARCH & EVIDENCE BASED PRACTICE IN INTENSIVE CARE

#### Introduction

The expert trainee evaluates the medical literature as a basis for continuing education, maintenance of professional standards and continuous quality improvement of patient care. The expert trainee contributes to the development of new knowledge and undertakes and fosters high quality clinical research. For this to be achieved, an extensive knowledge of scientific processes and ethics is required.

#### Teaching and Learning through Research

##### Key Competency:

The expert trainee explains and uses the “scientific approach” and Evidence Based Medicine in continuing education and educational activities.

##### Enabling Competencies:

*The novice trainee is able to:*

Describe the steps involved in both hypothesis generated research (e.g., evaluation of a therapeutic agent) and observational research

*The expert trainee is able to also:*

- a) Demonstrate the expertise to appraise levels of evidence for diagnostic tests, therapy, interventions and prognosis including integrative literature (systematic reviews, meta-analyses, practice guidelines and economic analyses)
- b) Explain the vulnerability of patients and relatives to hope provided by unproven therapy and develop a collaborative approach to deal with requests for therapies with limited scientific basis in a professional manner
- c) Explain the importance of good record keeping in research
- d) Describe ethical considerations in research involving human or animal subjects
- e) Prepare a protocol, involved in both hypothesis generated research (e.g., evaluation of a therapeutic agent) and observational research

#### The Scientific Method

##### Identifying the need for investigation

##### Key Competency:

The expert trainee describes the difference between those patterns of practice, which have a sound scientific basis and those that may require further objective assessment and seeks to advance knowledge.

### **Enabling Competencies:**

*The novice trainee is able to:*

Identify observations, which are unusual or unexplained and worthy of investigation

### **Formulating the hypothesis**

#### **Key Competency:**

The expert trainee describes and uses the process of advancing a theoretical explanation for an observation.

### **Enabling Competencies:**

*The expert trainee is able to:*

- a) Use logical processes, based on acquired knowledge or experience to formulate a hypothesis
- b) Accesses information from the literature using electronic databases and retrieval tools
- c) Identify underlying scientific principles, which may govern the observed events

### **Reliability of proposed method in investigation**

#### **Key Competency:**

The expert trainee describes and uses the principles of experimental trial design and methods of measurement

### **Enabling Competencies:**

*The expert trainee is able to:*

- a) Explain concepts of validity, reproducibility and accuracy in the application of measurement techniques
- b) Seek out resources and assistance available locally
- c) Explain how to validate selected methods

### **Experimental Design**

#### **Writing a protocol and seeking advice**

#### **Key Competency:**

The expert trainee describes and uses the process required to develop a research protocol including using expert advice.

### **Enabling Competencies:**

*The expert trainee is able to:*

- a) Demonstrate ability to organise, or assist in organising, a written description of the proposed method of study. Seek advice from others with interest or expertise in the field of study
- b) Communicate and collaborate with other research staff

### **Statistical advice**

#### **Key Competency:**

The expert trainee explains the need to have sound statistical knowledge and/or advice before finalising a research proposal

**Enabling Competencies:**

*The expert trainee is able to:*

Explain the important relationship between sample size and the statistical power of the investigation.

**Ethical considerations**

**Key Competency:**

The expert trainee describes both the ethical principles involved in conducting research and the need for the Institutional Ethics Committee's approval of the proposed research.

**Enabling Competencies:**

*The novice trainee is able to:*

Explain the importance of Informed consent and protection of every subject's rights and autonomy, including explanation of potential risks, discomforts, benefits to the subject from participating in the study and the right to withdraw from the study without compromising care.

*The expert trainee is able to also:*

- a) Explain the importance of protection of the subject's confidentiality in research
- b) Explain the importance of medico legal implications of the proposed research
- c) Demonstrate the ability to organise, or assist in organising, a written application to the Institutional Ethics Committee for approval of the proposed investigation, method of study and research consent form
- d) Explain that only ethical research is research of good quality

**Obtaining and Using Resources**

**Key Competency:**

The expert trainee explains the process by which research funds are obtained and how to write a grant application.

**Enabling Competencies:**

*The expert trainee is able to:*

- a) Prepare or assists in preparing a grant application
- b) Explain the importance of interdisciplinary co-operation and sharing of scarce research resources, equipment and facilities

**Statistical Analysis**

**Choosing and applying appropriate statistical tests**

**Key Competency:**

The expert trainee describes the principles of statistical inference.

**Enabling Competencies:**

*The expert trainee is able to also:*

- a) Describe the importance of statistical concepts (e.g. distribution of data, comparisons of distributions and their tests, probability, confidence intervals, permitted departures from distributional assumptions, parametric and non-parametric statistical tests)
- b) Describe potential errors in interpretation and application of statistics

### **Interpretation of results**

#### **Key Competency:**

The expert trainee draws relevant conclusions from the data derived from the study.

#### **Enabling Competencies:**

*The expert trainee is able to:*

- a) Describe the limitations of investigations
- b) Describe what inference is reasonable from the results

### **Data Presentation**

#### **Key Competency:**

The expert trainee explains the principles and develops the skills of communicating data.

#### **Enabling Competencies:**

*The expert trainee is able to:*

- a) Prepare a manuscript for submission to a journal
  - Follow Uniform Requirements for Manuscripts submitted to Biomedical Journals and specific Guidelines for Authors
  - Submit or contribute materially to original work
- b) Prepare visual material
  - Explain principles and develop skills at communicating data and concepts using visual aids, in the lecture hall or on a poster
  - Prepare slides and posters of an acceptable standard
  - Recognise the limitations of visual aids
- c) Present papers and posters at meetings
  - Explain the principles and develop skills at communicating data and concepts in the lecture hall or on a poster
  - Present an original paper at a scientific meeting

## **6.2 TEACHING**

### **Introduction**

Teaching of medical colleagues and other health professionals is both a responsibility for the expert trainee and a continuing learning experience. The expert trainee demonstrates a lifelong commitment to dissemination, application and translation of medical knowledge into appropriate practice. An understanding of educational principles will support the process of continuing education throughout professional life.

#### **Key Competency:**

The expert trainee explains that teaching is an on-going right and responsibility and can use the principles of adult learning to be an efficient teacher.

### **Enabling Competencies:**

*The expert trainee is able to:*

- a) Use the principles of adult education to promote teaching
- b) Describes the value of educational objectives and can write objectives for personal needs and for an education programme
- c) Recognises and uses the teaching and learning opportunities arising from clinical experience
- d) Uses the opportunities for learning that arise from personal communication
- e) Describes the range and qualities of written and audio-visual material, interactive computer programmes and other software in order to make best use of their potential for learning
- f) Recognises that properly conducted research and a 'scientific attitude' are major contributors to teaching and learning
- g) Explains how evaluation can improve learning and teaching
- h) Explains the importance of certification examinations and knows how to assess validity and reliability of such processes

## **6.3 CLINICAL SUPERVISION and MENTORING**

### **Introduction**

Supervision of junior colleagues and other health professionals is both a responsibility for the expert trainee and a continuing learning experience. Supervision should be available at all times for doctors in training. The expert trainee demonstrates a commitment to reliable supervision not only in clinical situations but also in record keeping, audit and teaching of junior doctors.

The expert trainee explains that the mentor differs from the supervisor and that a mentor takes the role of a trusted friend or counsellor, but like a supervisor is usually a more experienced person.

### **Key Competency:**

The expert trainee explains that supervision is an on-going responsibility of senior doctors and a right of junior doctors and that mentoring aids in the development of the individuals involved and the team.

### **Enabling Competencies:**

*The expert trainee is able to:*

- a) Effectively supervise junior doctors in assessing, resuscitating and providing continuing care to critically ill patients
- b) Effectively supervise junior doctors in performing complex procedures in critically ill patients
- c) Be a mentor for junior doctors to advise them and serve as examples as they advance.
- d) Provide expertise to less experienced colleagues to help them advance their careers, enhance their education, and build their networks

## **6.4 LIFELONG LEARNING and REFLECTION**

### **Introduction**

Learning all aspects of the practice of intensive care medicine is fundamental to becoming a competent specialist. As the practice of intensive care medicine is incrementally changing

and the knowledge base rapidly increasing, it is important that learning, enquiry and reflection continue beyond training.

**Key Competency:**

The expert trainee explains that learning is an on-going right and responsibility and can use the principles of adult learning to be an efficient lifelong learner and facilitate learning by others. The trainee develops, implements and monitors a personal continuing education strategy.

**Enabling Competencies:**

*The novice trainee is able to:*

- a) Explain that learning is most effective when derived from experience of the learner and from active participation in the learning process
- b) Explain that when teaching or learning a problem-solving mode, rather than a solution giving mode, is required
- c) Describe the requirement for self-dependence rather than dependency on any expert
- d) Explain that objectives are best when they arise out of the interests and needs of the learner
- e) Explain that the relationship between learner and teacher should be characterised by mutual trust, acceptance and respect
- f) Explain that feedback from teacher and peers provides benefit and support
- g) Explain that the environment for learning needs to be physically comfortable
- h) Explain that humour and laughter may improve the learning climate in an appropriate context

*The expert trainee is able to also:*

- a) Facilitate the learning and enquiry of patients, families, students, trainees and other health professionals
- b) Use constructive and specific feedback to guide learning by others
- c) Fulfil the CPD/MOPS requirements of the College

## **7. PROFESSIONAL**

### **7.1 ETHICS AND THE LAW**

#### **Introduction**

An understanding of the principles of ethics and the local legal framework is essential for development and maintenance of the highest standards of practice, teaching and research in Intensive Care.

**Key Competency:**

The expert trainee delivers the highest quality care with integrity, honesty and compassion and applies knowledge of ethics and law effectively and with cultural competence. The novice trainee describes the concepts of patient autonomy, beneficence, non-maleficence and justice (as it applies to fair distribution of resources) and the expert trainee applies those ethical and legal principles in daily clinical practice.

**Enabling Competencies:**

*The novice trainee is able to:*

- a) Explain that patients or their guardians have the right to accept or reject a treatment being offered (with due regard to the principles of truthful disclosure and informed consent)
- b) Explain the issues and principles involved in withholding and withdrawing treatment, and the care of the dying patient
- c) Explain that the decision to withhold or withdraw treatment does not imply the termination of care

*The expert trainee is able to also:*

- a) Explain the ethics of resource allocation in the face of competing claims to care
- b) Explain the legal issues and principles involved in the diagnosis of brain death and the process of organ donation and can demonstrate understanding using role play
- c) Explain that when patients are involved in teaching, the principles of consent, privacy and non-maleficence must be maintained
- d) Explain the ethical and legal principles involved in conducting research and the need for Institutional Ethics Committee approval of the proposed research
- e) Describe that the well-being of the patient takes precedence over the interests of society or research
- f) Behave with integrity and honesty and accepts responsibility for his/her personal physical and mental health, especially where impairment of health affects patient care and professional conduct

## **7.2 PROFESSIONAL BEHAVIOUR**

### **Introduction**

An understanding of the norms of professional behaviour is essential for development and maintenance of the highest standards of practice, teaching and research in Intensive Care characterised by profession-led regulation and high personal standards of behaviour.

### **Key Competency:**

The expert trainee delivers the highest quality care with integrity, honesty and compassion.

### **Enabling Competencies**

*The novice trainee is able to:*

Describe the different behaviour patterns encountered in practice and explain the advantages of truly professional behaviour and the disadvantages of aberrant behaviour.

*The expert trainee is able to also:*

- a) Behave with integrity and honesty and accept responsibility for his/her personal physical and mental health, especially where impairment of health affects patient care and professional conduct.
- b) Demonstrate awareness of the mental and physical well-being of colleagues.

## APPENDIX 1: REPRESENTATIVE LIST OF MEDICAL, SURGICAL AND OBSTETRIC CONDITIONS

The novice trainee is able to describe how chronic disease and the ageing process may complicate acute medical and surgical conditions. The expert trainee will be able to also recognise, confirm the diagnosis of, explain the pathophysiology of, treat and prevent complications associated with the following conditions:

### Cardiovascular Disorders

Cardiogenic Shock  
Cardiac dysrhythmias  
Congestive cardiac failure  
Myocardial infarction and complications  
Cardiopulmonary arrest  
Cardiomyopathy, myocarditis  
Endocarditis (infective and non-)  
Valvular heart disease

Aortic disease (dissection, aneurysm, rupture) (thoracic and abdominal)

Pericardial disease (tamponade, constriction)  
Systemic/pulmonary hypertension  
Arterial embolus/thrombosis  
Peripheral arterial disease  
Deep vein thrombosis  
Pulmonary embolism  
Vena cava obstruction syndromes  
Postoperative care after coronary or valve surgery, or angioplasty

### Respiratory Disorders

Respiratory failure (type I and II)  
Acute Lung Injury/ARDS  
Airway obstruction (upper and lower)  
Pneumothorax  
Aspiration syndromes  
Fat embolism  
Pneumonia (community, nosocomial)  
Pneumonitis  
Collapsed lung or lobe  
Interstitial Lung Disease  
Chronic airway limitation

Massive haemoptysis  
Pulmonary haemorrhage syndromes  
Asthma and complications  
Pulmonary abscess  
Carcinoma of lung  
Pleural disease (e.g. empyema, effusion, pneumothorax, haemothorax)  
Tracheomalacia and stenosis  
Diseases of the diaphragm  
Bronchopleural fistula  
Postoperative care after thoracic surgery

### Renal Disorders

Acute renal failure  
Renovascular disease  
Renal/Urinary tract infection  
Urinary obstruction  
Glomerulonephritis  
Carcinoma of bladder and kidney

Nephrotic syndrome  
Tubular disorders (RTA, ATN)  
Nephrolithiasis  
Interstitial nephritis  
Renal Transplantation and complications

### Central Nervous and Neuromuscular Disorders

Acute vascular disorders  
-haemorrhage (subarachnoid, extradural, subdural, intracerebral, intraventricular)  
-thrombosis  
- embolism  
Infective disorders (meningitis, encephalitis)  
Global cerebral ischaemia

Brain death certification  
Persistent vegetative state  
Cerebral neoplasm (primary or secondary)  
Seizures  
Spinal cord disorders- paraplegia, quadriplegia  
Acute polyneuritis (e.g. Guillain Barre syndrome)

Critical illness neuropathy/myopathy  
Myasthenia gravis  
Toxic encephalopathy  
Chronic cerebrovascular insufficiency

Bulbar palsy  
Delirium (management and prevention)  
Psychiatric emergencies  
Care after major neurosurgery

### **Endocrine Disorders**

Diabetes mellitus and acute glucose handling disorders  
Hypothalamic-pituitary axis disorders  
Adrenal disorders  
-Conn's, Addison's  
-Pheochromocytoma

Complications of steroid therapy  
Acute thyroid disorders  
Hormonal responses to critical illness  
Obesity  
Care after pituitary, adrenal, thyroid and parathyroid surgery

### **Metabolic Disorders**

Metabolic response to stress, sepsis, starvation, surgery and trauma  
Electrolyte and acid-base disorders (including Na, K, Ca, Mg, PO<sub>4</sub>, Cl)

Malnutrition  
Re-feeding syndrome

### **Haematology**

Anaemia and polycythaemia  
Neutropaenia, leukopenia, thrombocytopaenia (ITP, HITTS)  
Neutrophilia, leukocytosis, thrombocytosis  
Disorders of coagulation + haemostasis (e.g. disseminated intravascular coagulation, fibrinolysis, thrombophilia)

Transfusion medicine: compatibility, matching, storage, massive transfusion, and transfusion reactions  
Bone Marrow Transplant  
TTP, HUS  
Massive transfusion  
Acute haemolytic disorders

### **Immunology, Rheumatology**

Severe drug reactions: TEN, Stevens –Johnson Syndrome  
Anaphylaxis  
Complications of transplantation (e.g. organ rejection)  
Immunosuppression  
Human immunodeficiency virus (HIV) infection and its complications  
Autoimmune connective tissue disease (e.g. Rheumatoid arthritis, systemic lupus erythematosus, polyarteritis nodosa, PMR)  
Non-immune connective tissue disease (e.g. CREST, Marfans Syndrome)  
Vasculitides

### **Oncology**

Tumour lysis syndrome  
The oncology patient in ICU (risk prediction, supportive care)

### **Gastrointestinal Disorders**

Oesophageal disease (e.g. rupture, cancer, obstruction, achalasia)  
Gastrointestinal bleeding (upper, lower)  
Paralytic ileus, gastric dilatation  
Ischaemia or infarction of gut

Bowel obstruction  
Inflammatory bowel disease  
Pseudo-membranous colitis, megacolon  
Peritonitis and intrabdominal sepsis

Post-operative GIT problems (e.g. leaking anastomosis, fistula, blind loop syndrome)  
Malabsorption  
Ascites  
Pancreatitis  
Hepatic and biliary disease

- acute hepatic failure
- chronic liver disease/portal hypertension
- jaundice
- calculous and acalculous cholecystitis
- cholangitis

Liver transplantation + complications

### **Infectious Disorders**

Serious Infections - (bacterial, viral, fungal, rickettsial and protozoal)

Specific system infections

- CNS: meningitis, encephalitis
- lung: tracheobronchitis, pneumonia
- soft tissue: necrotising fasciitis, cellulitis
- GIT: hepatitis, colitis, peritonitis

- GUT
- Tetanus
- Botulism
- Nosocomial infections
- Antibiotic resistance
- Toxic shock syndrome

### **Complications of Pregnancy and Gynaecological Disorders**

Peripartum endometritis  
Pelvic inflammatory disease  
Ectopic pregnancy

Eclampsia, pre-eclampsia  
Amniotic fluid embolism  
Obstetric haemorrhage

### **Dermatological Disorders**

Erythema multiformae

Toxic Epidermal Necrolysis

### **Trauma**

Hypovolaemic Shock  
Maxillofacial and airway injuries  
Chest injuries  
Aortic and myocardial injury  
Abdominal trauma  
Neurotrauma  
Acute spinal cord injury  
Pelvic injuries  
Long bone trauma, crush injury, compartment syndrome and rhabdomyolysis

### **Toxic, Chemical, Physical Injuries**

Drug overdose, common poisonings, and toxidromes  
Ingestion or inhalation of corrosive or toxic substances  
Burns  
Envenomation  
Electrical injury  
Decompression syndromes  
Altitude sickness  
Hyperthermia (including MH, SS, classical and exertional)  
Hypothermia  
Drowning episodes  
Air embolism

### **Perioperative care**

- Patients after **high-risk surgery** (complex or protracted with serious physiological perturbations)
- The **high-risk patient** (severe co-morbidities) after surgery
- **Risk prediction** and optimisation pre- and post-operatively

## **APPENDIX 2: REPRESENTATIVE LIST OF THERAPIES**

The expert trainee is able to explain the mode of action, indications, contraindications, safe use and prevention of complications of intensive care treatments. The expert trainee is able to use and supervise the use of these treatments including:

Universal precautions, isolation procedures, sterile precautions.

### **Fluid Therapy and nutrition**

- Crystalloid
- colloid
- enteral and parenteral nutrition
- blood transfusion
- blood component therapy

### **Drug Therapy**

- inotropic agents (catechol and non-catechol)
- vasoconstrictors
- anti-arrhythmics
- analgesics including narcotics, NSAIDs
- sedatives
- neuromuscular blockade
- antiulcer therapy
- bronchodilators
- antimuscarinics
- antihypertensives
- Antidotes to poisons
- Hyperosmolar therapies
- Anti-platelets medications, anticoagulants, (anti-)fibrinolytics
- antimicrobial agents (e.g. bacterial, viral, fungal, rickettsial)
- corticosteroids
- anticoagulants, thrombolytics, fibrinolytics
- procoagulants
- Anticonvulsants
- Antimicrobial agents
- Hormonal agents e.g. octreotide

### **Respiratory Therapy**

- oxygen therapy
- ventilation (non-invasive, invasive)
- weaning from ventilation
- humidification
- nebulisers
- suction systems
- Nitric Oxide, prostacyclin administration
- Helium
- tracheostomy care including facilitation of communication, swallowing and decannulation

### **Cardiac Support**

- use of inotropes, constrictors, dilators
- pacemaker insertion
- intra-aortic balloon pumping

## **Renal Replacement Therapy**

- CRRT (haemo (dia)-filtration) techniques
- haemodialysis
- peritoneal dialysis
- haemoperfusion

## **Analgesia and anaesthesia**

- Patient Controlled Analgesia
- TIVA for procedures
- spinal and epidural analgesia

## **Induced hypothermia**

### **APPENDIX 3: REPRESENTATIVE LIST OF PROCEDURES RELEVANT TO THE INTENSIVE CARE SPECIALIST**

The expert trainee has acquired a diverse range of skills, which need to be maintained, reviewed and supplemented as new techniques evolve. The expert trainee is able to carry out the commonly used procedures safely and explain the principles, indications, potential errors, contraindications and prevention of the complications. The trainee will be able to perform most of these procedures without supervision and teach and supervise safe techniques to junior doctors.

#### **Cardiopulmonary Resuscitation and airway support**

- Expired air resuscitation
- Bag-and-mask ventilation
- Uncomplicated endotracheal intubation with means to avoid complications
- Management of the difficult and un-intubatable airway
- Oral
- Nasal
- Bronchoscope aided
- Cricothyroidotomy
- Tracheostomy (Percutaneous)
- External chest compression
- Defibrillation/cardioversion

#### **Vascular Access in the routine and difficult patient**

- peripheral venous cannulation
- central venous cannulation (subclavian, jugular, femoral, PICC)
- radial and femoral arterial cannulation
- intraosseus

Basic general ultrasound (e.g. for vascular localisation, pleural fluid assessment)

Basic cardiac ultrasound (e.g. detection of RV dilation/dysfunction, significant LV dysfunction, pericardial effusion, estimate of volume status)

#### **Pleural drainage**

- needle or tube

Pericardiocentesis

Insertion of temporary pacing wire

Setting appropriate parameters for mechanical ventilation for the routine postoperative patient and difficult to ventilate patient

Fibreoptic laryngoscopy and bronchoscopy and BAL

Non-invasive monitoring of blood pressure, ECG and respiratory function

Invasive Monitoring via

-Right heart catheterisation (assessment of CVP, PAWP, cardiac output)

-PICCO and other continuous cardiac output monitoring devices

Insertion of epidural catheter

Insertion of nasogastric and nasojejunal tubes

Insertion of Sengstaken-Blakemore or other balloon tamponade tube

Lumbar puncture

Continuous EEG monitoring and BIS

Intra-abdominal pressure monitoring

Neuromuscular monitoring

Safe use of electrical equipment

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