Joint Syllabus in Intensive Care Medicine

Hong Kong College of Anaesthesiologists
Hong Kong College of Physicians
Hong Kong Society of Critical Care Medicine

PREFACE

The Intensive Care training program under the Hong Kong College of Anaesthesiologists (HKCA) and the Critical Care Medicine training program under the Hong Kong College of Physicians (HKCP) have been in place for over 2 decades. We have together trained over one hundred specialists under these programs and we are proud to say that the quality of our training has been comparable to international standard. Because of our different origins and evolution, there exist significant differences amongst the two programs. A survey performed by the Hong Kong Society of Critical Care Medicine, which involved not only medical practitioners working in intensive care units but those of other disciplines, supported the harmonisation of the two curricula[1]. With the support of the Hong Kong Academy of Medicine and the councils of the two colleges, the Joint Curriculum Workgroup in Intensive Care Medicine (JWGICM) was formed in 2018. The JWGICM reports to the councils of HKCP and HKCA through the Board of Critical Care Medicine (BOCCM) and the Board of Intensive Care Medicine (BOICM) respectively, and its missions are:

1. To ensure the similarity in standard of professional training under the two Boards;
2. To improve effectiveness of training in intensive care through application of principles of modern education;
3. To safeguard the sustainability of the new training curriculum.

The JWGICM decided that our training programs should be harmonised by both moving towards competency-based medical education (CBME). CBME is an approach to preparing specialists for practice that is fundamentally oriented to graduate outcome abilities and organised around competencies derived from an analysis of societal and patient needs. It de-emphasised time-based training and promises greater accountability, flexibility and learner-centredness [2]. This is an important paradigm shift from the existing practice which focuses on the process instead of the outcome of training.

In order to facilitate CBME, it is necessary to define the competencies of specialists in intensive care/critical care medicine so that both trainees and trainers understand the expected outcomes. The purpose of this syllabus is to fulfill that need. We would like to take this opportunity to acknowledge the European Society of Intensive Care Medicine for their generosity in granting us the right to use and modify the CoBaTrICE (Competency Based Training in Intensive Care Medicine in Europe) syllabus[3] to suit our local situation. The CoBaTrICE syllabus was developed through a vigorous process and is currently adopted by many European countries [4, 5]. We would also thank our colleagues in the Syllabus Review Taskforce who, under the leadership of Dr. George WY Ng, reviewed the syllabus meticulously and made a few essential modifications to ensure that it is applicable to Hong Kong.

Meaningful assessment of competence is critical for the implementation of effective CBME[6]. The BOCCM and BOICM are going to introduce workplace based assessment (WBA) as an educational tool to facilitate learning [7]. This syllabus is an indispensable resource in WBA. We hope this syllabus is the beginning of our long journey to link the two professional boards together and achieve the missions of the JWGICM.

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References

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Table of Contents

Domain	Competencies
1. Resuscitation and Initiation Management of the Acutely Ill Patient	
	1.1. Adopt a structured and timely approach to the recognition, assessment and stabilization of the acutely ill patient with disordered physiology 1.2. Manage cardiopulmonary resuscitation 1.3. Manage the patient post-resuscitation 1.4. Triage and prioritise patients appropriately, including timely admission to ICU 1.5. Assess and provide initial management of the trauma patient 1.6. Assess and provide initial management of the patient with burns 1.7. Describe the management of mass casualties
2. Diagnosis: Assessment, Investigation, Monitoring and Data Interpretation	
	2.1. Obtain a history and perform an accurate clinical examination 2.2. Undertake timely and appropriate investigations 2.3. Describe indications for echocardiography (transthoracic /trans oesophageal) 2.4. Perform electrocardiography (ECG) and interpret the results 2.5. Obtain appropriate microbiological samples and interpret results 2.6. Obtain and interpret results from blood gas samples 2.7. Interpret clinical imaging 2.8. Monitor and respond to trends in physiological variables
3. Disease Management	
	Acute Disease 3.1. Manage the care of the critically ill patient with specific acute medical conditions ***CHRONIC DISEASE*** 3.2. Identify the implications of concomitant chronic and co-morbid diseases in the acutely ill patients, and incorporate a long-term perspective in their management ***ORGAN SYSTEM FAILURE*** 3.3. Recognise and manage the patient with circulatory failure 3.4. Recognise and manage the patient with, or at risk of, acute renal failure 3.5. Recognise and manage the patient with, or at risk of, acute liver failure 3.6. Recognise and manage the patient with neurological impairment 3.7. Recognise and manage the patient with acute gastrointestinal failure 3.8. Recognise and manage the patient with acute lung injury syndromes (ALI/ARDS) 3.9. Recognise and manage the septic patient 3.10. Recognise and manage the patient following intoxication with drugs or environmental toxin 3.11. Recognise life-threatening maternal peripartum complications and manage care

	under supervision
4. Therapeutic Interventions and Organ System Support in Single or Multiple Organ Failure	
	4.1. Prescribe drugs and therapies safely 4.2. Manage antimicrobial drug therapy 4.3. Administer blood and blood products safely 4.4. Use fluids and vasoactive/inotropic drugs to support circulation 4.5. Describe the use of mechanical assist devices to support the circulation 4.6. Initiate, manage and wean patient from invasive and non-invasive ventilatory support 4.7. Initiate, manage, and wean patient from renal replacement therapy 4.8. Recognise and manage electrolyte, glucose and acid-base disturbances 4.9. Co-ordinate and provide nutritional assessment and support 4.10. Use of hyperbaric oxygen therapy
5. Practical Procedures	
	Respiratory System 5.1. Administer oxygen using a variety of administrative devices 5.2. Perform fibreoptic laryngoscopy under supervision 5.3. Perform emergency airway management 5.4. Perform difficult and failed airway management according to local protocols 5.5. Perform endotracheal suction 5.6. Perform fibreoptic bronchoscopy and BAL in the intubated patient under supervision 5.7. Perform percutaneous tracheostomy under supervision 5.8. Perform thoracocentensis via a chest drain ***Cardiovascular System*** 5.9. Perform peripheral venous catheterization 5.10. Perform arterial catheterisation 5.11. Describe ultrasound techniques for vascular localization 5.12. Perform central venous catheterisation 5.13. Perform defibrillation and cardioversion 5.14. Perform cardiac pacing (transvenous or transthoracic) 5.15. Describe how to perform pericardiocentesis 5.16. Demonstrate a method for measuring cardiac output and derived haemodynamic variables ***Central Nervous System*** 5.17. Perform lumbar puncture (intradural/"spinal") under supervision 5.18. Manage the administration of analgesia via an epidural catheter

	Gastrointestinal System 5.19. Perform nasogastric tube placement 5.20. Perform abdominal paracentesis 5.21. Describe Sengstaken tube (or equivalent) placement 5.22. Describe indications for, and safe conduct of gastroscopy ***Genitourinary System*** 5.23. Perform urinary catheterisation
6. Perioperative Care	
	6.1. Manage the pre-post-operative care of the high risk surgical patient 6.2. Manage the care of the patient following cardiac surgery under supervision 6.3. Manage the care of the patient following craniotomy under supervision 6.4. Manage the care of the patient following solid organ transplantation under supervision 6.5. Manage the pre- and post-operative care of the trauma patient under supervision
7. Comfort and Recovery	
	7.1. Identify and attempt to minimize the physical and psychosocial consequences of critical illness for patients and families 7.2. Manage the assessment, prevention and treatment of pain and delirium 7.3. Manage sedation and neuromuscular blockade 7.4. Communicate the continuing care requirements of patients at ICU discharge to health care professionals, patients and relatives 7.5. Manage the safe and timely discharge of patients from the ICU
8. End of Life Care	
	8.1. Manage the process of withholding or withdrawing treatment with the multidisciplinary team 8.2. Discuss end of life care with patients and their families/surrogates 8.3. Manage palliative care of the critically ill patient 8.4. Perform brain-stem death testing 8.5. Manage the physiological support of the organ donor
9. Professionalism	
	Communication Skills 9.1. Communicate effectively with patients and relatives 9.2. Communicate effectively with members of the health care team 9.3. Maintain accurate and legible records/documentation

	Professional Relationships with Patients and Relatives 9.4. Involve patients (or their surrogates if applicable) in decisions about care and treatment 9.5. Demonstrate respect of cultural and religious beliefs and an awareness of their impact on decision making 9.6. Respect privacy, dignity, confidentiality and legal constraints on the use of patient data ***Professional Relationship*** 9.7. Collaborate and consult; promote team-working 9.8. Ensure continuity of care through effective hand-over of clinical information 9.9. Support clinical staff outside the ICU to enable the delivery of effective care 9.10. Appropriately supervise, and delegate to others, the delivery of patient care ***Self-Governance*** 9.11. Takes responsibility for safe patient care 9.12. Formulate clinical decisions with respect for ethical and legal principles 9.13. Seeks learning opportunities and integrates new knowledge into clinical practice 9.14. Participate in multidisciplinary teaching 9.15. Participate in research or audit under supervision
10. Transport	
	10.1. Undertakes transport of the mechanically ventilated critically ill patient outside the ICU
11. Patient Safety and Health Systems Management	
	11.1. Lead a daily multidisciplinary ward round 11.2. Comply with local infection control measures 11.3. Identify environmental hazards and promote safety for patients and staff 11.4. Identify and minimize risk of critical incidents and adverse events, including complications of critical illness 11.5. Organise a case conference 11.6. Critically appraise and apply guidelines, protocols and care bundles 11.7. Describe commonly used scoring systems for assessment of severity of illness, casemix and workload 11.8. Demonstrate an understanding of the managerial and administrative responsibilities of the ICM specialist

DOMAIN 1: RESUSCITATION & INITIAL MANAGEMENT OF THE ACUTELY ILL PATIENT

1.1 Adopt a structured and timely approach to the recognition, assessment and stabilization of the acutely ill patient with disordered physiology

KNOWLEDGE
Early warning signs of impending critical illness Causes of cardio-respiratory arrest, identification of patients at risk and corrective treatment of reversible causes Clinical signs associated with critical illness, their relative importance and interpretation Clinical severity of illness and indications when organ dysfunctions or failure are an immediate threat to life Recognition of life threatening changes in physiological parameters Measures of adequacy of tissue oxygenation Treatment algorithms for common medical emergencies Immediate management of acute coronary syndromes Methods for securing vascular access rapidly Surface anatomy: structures in the antecubital fossa; large veins and anterior triangle of the neck; large veins of the leg and femoral triangle Techniques for effective fluid resuscitation Treatment strategies for abnormalities of fluid, electrolyte, acid-base and glucose balance Indications for and methods of ventilatory support Basic and complex cardiac arrhythmias - recognition and management (pharmacological and electrical) Peri-arrest arrhythmias and the principles of their management (bradycardia, broad complex tachycardia, atrial fibrillation, narrow complex tachycardia) Indications for not starting resuscitation or ceasing an initiated attempt Relevance of prior health status in determining risk of critical illness and outcomes Triage and management of competing priorities Criteria for admission to, and discharge from ICU - factors influencing intensity and site of care (ward, high dependency unit (HDU), intensive care unit (ICU)) Indications for and basic interpretation of chest radiographs: range of normal features on a chest x-ray; collapse, consolidation, infiltrates (including ALI/ARDS), pneumothorax, pleural effusion, pericardial effusion, position of cannula, tubes or foreign bodies, airway compression, cardiac silhouette, mediastinal masses Principles of oxygen therapy and use of oxygen administration devices (see 5.1) Principles of emergency airway management (see 5.3)

SKILLS & BEHAVIOURS
Consider legal and ethical issues: patient autonomy, appropriateness of resuscitation and ICU admission. Conduct a primary survey: obtain relevant information rapidly and accurately

Recognise signs and symptoms of impending cardiac arrest Assess conscious level, status of airway and cervical spine, and conduct careful systems review Order and prioritise appropriate investigations Use emergency monitoring equipment Monitor vital physiological functions as indicated Recognise and rapidly respond to adverse trends in monitored parameters Recognise and manage choking / obstructed airway Implement emergency airway management, oxygen therapy and ventilation as indicated Demonstrate emergency relief of tension pneumothorax Obtain vascular access sufficient to manage acute haemorrhage, rapid fluid infusion and monitor cardiovascular variables Initiate emergency cardiac pacing Respond to an emergency in a positive, organised and effective manner; able to direct the resuscitation team Participate in timely discussion and regular review of 'do not resuscitate' orders and treatment limitation decisions Professional and reassuring approach - generates confidence and trust in patients and their relatives Examine and plan care for the confused patient Perform a comprehensive secondary survey; integrate history with clinical examination to form a differential diagnosis Assess, predict and manage circulatory shock Prescribe appropriate analgesia Lead, delegate and supervise others appropriately according to experience and role Recognise and manage emergencies; seek assistance appropriately

ATTITUDES
Rapid response and resuscitation Appreciate the importance of timely institution of organ-system support Recognise the need for supportive care for all organ systems whether failing / injured or not Clear in explanations to patient, relatives and staff Consult and take into account the views of referring clinicians; promote their participation in decision making where appropriate Establishes trusting relationships with and demonstrates compassionate care of patients and their relatives Patient safety is paramount Determination to provide best and most appropriate care possible regardless of environment Appreciate the importance of ensuring physiological safety as a primary aim Recognise personal limitations, seek and accept assistance or supervision (knows how, when and who to ask)

1.2 Manage Cardiopulmonary Resuscitation

KNOWLEDGE
Causes of cardio-respiratory arrest, identification of patients at risk and corrective treatment of reversible causes
Recognition of life threatening changes in physiological parameters
Causes and recognition of acute airway obstruction
Methods for securing vascular access rapidly
Cardiopulmonary resuscitation
The modification of resuscitation techniques in the special circumstances of hypothermia, immersion and submersion, poisoning, pregnancy, electrocution, anaphylaxis, acute severe asthma and trauma
Risks to the rescuer during resuscitation & methods to minimise these
Basic and complex cardiac arrhythmias - recognition and management (pharmacological and electrical)
Treatment (algorithm i.e. ACLS guideline or equivalent) of patients in ventricular fibrillation (VF) and pulseless ventricular tachycardia (VT)
Treatment (algorithm) of patients with non-VT/VF rhythms (asystole / PEA)
Indications, doses and actions of primary drugs used in the management of a cardiac arrest (including special precautions and contraindications)
Tracheal route for drug administration: indications, contraindications, dosage Indications, dosages and actions of drugs used in the peri-arrest period
Defibrillation: principles of monophasic & biphasic defibrillators; mechanism, indications, complications, modes and methods (manual and automated external defibrillators (AED))
Electrical safety: conditions which predispose to the occurrence of macro-shock / micro-shock; physical dangers of electrical currents; relevant standards regarding safe use of electricity in patient care; basic methods to reduce electrical hazards.
Indications and methods of cardiac pacing in the peri-arrest setting
Effect of cardiorespiratory arrest on body systems
Audit of outcome after cardiac arrest
Indications for not starting resuscitation or ceasing an initiated attempt
Legal and ethical issues relating to the use of the recently dead for practical skills training, research and organ donation
Principles of oxygen therapy and use of oxygen administration devices (see 5.1)
Principles of emergency airway management (see 5.3)

SKILLS & BEHAVIOURS
Consider legal and ethical issues: patient autonomy, appropriateness of resuscitation and ICU admission
Conduct a primary survey: obtain relevant information rapidly and accurately
Recognise signs and symptoms of impending cardiac arrest
Use emergency monitoring equipment
Monitor vital physiological functions as indicated
Check & assemble resuscitation equipment

Demonstrate advanced life support skills (ALS standard or equivalent) Use a defibrillator safely Initiate routine investigations during resuscitation to exclude reversible problems (e.g. hyperkalaemia) Recognise and manage choking / obstructed airway Implement emergency airway management, oxygen therapy and ventilation as indicated Demonstrate emergency relief of tension pneumothorax Act appropriately as a member or leader of the team (according to skills & experience) Respond to an emergency in a positive, organised and effective manner; able to direct the resuscitation team Support relatives witnessing an attempted resuscitation Participate in timely discussion and regular review of 'do not resuscitate' orders and treatment limitation decisions Protect a potentially unstable cervical spine Lead, delegate and supervise others appropriately according to experience and role Recognise and manage emergencies; seek assistance appropriately

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 1 - Please refer to competence 1.1 or the aggregate syllabus at the end of this section.

1.3 Manages the Patient Post-Resuscitation

KNOWLEDGE
Causes of cardio-respiratory arrest, identification of patients at risk and corrective treatment of reversible causes Recognition of life threatening changes in physiological parameters Measures of adequacy of tissue oxygenation Techniques for effective fluid resuscitation Treatment strategies for abnormalities of fluid, electrolyte, acid-base and glucose balance Indications for and methods of ventilatory support Basic and complex cardiac arrhythmias - recognition and management (pharmacological and electrical) Peri-arrest arrhythmias and the principles of their management (bradycardia, broad complex tachycardia, atrial fibrillation, narrow complex tachycardia) Indications, dosages and actions of drugs used in the peri-arrest period Indications and methods of cardiac pacing in the peri-arrest setting Effect of cardio-respiratory arrest on body systems Principles and application of therapeutic hypothermia Criteria for admission to, and discharge from ICU - factors influencing intensity and site of care (ward, high dependency unit (HDU), intensive care unit (ICU)) Principles of oxygen therapy and use of oxygen administration devices (see 5.1)

SKILLS & BEHAVIOURS
Recognise signs and symptoms of impending cardiac arrest

Assess conscious level, status of airway and cervical spine, and conduct careful systems review Order and prioritise appropriate investigations Use emergency monitoring equipment Monitor vital physiological functions as indicated Recognise and rapidly respond to adverse trends in monitored parameters Obtain vascular access sufficient to manage acute haemorrhage, rapid fluid infusion and monitor cardiovascular variables Implement emergency airway management, oxygen therapy and ventilation as indicated Demonstrate emergency relief of tension pneumothorax Respond to an emergency in a positive, organised and effective manner; able to direct the resuscitation team Participate in timely discussion and regular review of 'do not resuscitate' orders and treatment limitation decisions Consider the need for stabilisation before transfer Professional and reassuring approach - generates confidence and trust in patients and their relatives Assess, predict and manage circulatory shock Lead, delegate and supervise others appropriately according to experience and role Recognise and manage emergencies; seek assistance appropriately

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 1 - Please refer to competence 1.1 or the aggregate syllabus at the end of this section.

1.4 Triage and Prioritise Patients Appropriately, Including Timely Admission to ICU

KNOWLEDGE
Early warning signs of impending critical illness Causes of cardio-respiratory arrest, identification of patients at risk and corrective treatment of reversible causes Clinical signs associated with critical illness, their relative importance and interpretation Clinical severity of illness and indications when organ dysfunctions or failure are an immediate threat to life Recognition of life threatening changes in physiological parameters Indications for not starting resuscitation or ceasing an initiated attempt Relevance of prior health status in determining risk of critical illness and outcomes Triage and management of competing priorities Criteria for admission to, and discharge from ICU - factors influencing intensity and site of care (ward, high dependency unit (HDU), intensive care unit (ICU))

SKILLS & BEHAVIOURS
Consider legal and ethical issues: patient autonomy, appropriateness of resuscitation and ICU admission.

Obtain relevant information rapidly and accurately
Recognise signs and symptoms of impending cardiac arrest
Assess conscious level, status of airway and cervical spine, and conduct careful systems review
Recognise and rapidly respond to adverse trends in monitored parameters
Respond to an emergency in a positive, organised and effective manner; able to direct the resuscitation team
Participate in timely discussion and regular review of 'do not resuscitate' orders and treatment limitation decisions
Assess and communicate effectively the risks and benefits of intensive care admission
Discuss treatment options with a patient or relatives before ICU admission
Take decisions to admit, discharge or transfer patients
Determine when the patient's needs exceed local resources or specialist expertise (requirement for transfer)
Explain life-sustaining therapies, in clear language, and describe the expected outcome of such therapies in view of the patient's goals and wishes.
Professional and reassuring approach - generate confidence and trust in patients and their relatives
Lead, delegate and supervise others appropriately according to experience and role
Recognise and manage emergencies; seek assistance appropriately

ATTITUDES

The attitudes required for this competence are the same for all competencies in Domain 1 - Please refer to competence 1.1 or the aggregate syllabus at the end of this section.

1.5 Assess and Provide Initial Management of the Trauma Patient

KNOWLEDGE

Performance and interpretation of a primary and secondary survey
Environmental hazards & injuries: hypo- and hyperthermia, near-drowning, electrocution, radiations, chemical injuries, electrical safety/micro shock
Effects and acute complications of severe trauma on organs and organ systems:

- Respiratory - thoracic trauma; acute lung injury; tension pneumothorax
- Cardiovascular - hypovolaemic shock; cardiac tamponade
- Renal - acute renal failure; rhabdomyolysis
- Neurological - altered consciousness; traumatic brain injury; post-anoxic brain injury; coup and contra- coup injuries; intracranial haemorrhage and infarction; spinal cord injury
- Gastrointestinal - abdominal trauma; abdominal tamponade; rupture of liver or spleen
  Musculoskeletal system - soft tissue injury; short term complications of fractures; fat embolism; crush injury & compartment syndromes; maxillofacial injuries

Management guideline of trauma patients (e.g. ATLS or equivalent)
Relevance of mechanism of injury to clinical presentation
Secondary insults that potentiate the primary injury
Immediate specific treatment of life-threatening injury

Methods for securing vascular access rapidly
Surface anatomy: structures in the antecubital fossa; large veins and anterior triangle of the neck; large veins of the leg and femoral triangle
Intraosseous cannulation
Causes, recognition and management of shock states
Techniques for effective fluid resuscitation
Principles of blood and blood component therapy; principles of massive transfusion
Indications for and methods of ventilatory support
Recognition of life threatening changes in physiological parameters
Triage and management of competing priorities
Management of cervical spine injuries
Management of pelvic injuries
Management of severe acute haemorrhage and blood transfusion; correction of coagulation disorders and haemoglobinopathies
Methods for assessing neurological function e.g. Glasgow Coma Scale
Principles of management of closed head injury; coup and contra-coup injuries; methods of preventing 'secondary insult' to the brain; recognition and immediate management of raised intracranial pressure
Principles, including indications, limitations and therapeutic modalities of basic radiological methods, CT scanning, MRI, ultrasound, angiography and radionucleotide studies in the critically ill patient
Indications for and basic interpretation of chest radiographs: range of normal features on a chest x-ray; collapse, consolidation, infiltrates (including ALI/ARDS), pneumothorax, pleural effusion, pericardial effusion, position of cannula, tubes or foreign bodies, airway compression, cardiac silhouette, mediastinal masses
Principles of outcome prediction / prognostic indicators and treatment intensity scales; limitations of scoring systems in predicting individual patient outcome
Principles of oxygen therapy and use of oxygen administration devices (see 5.1)
Principles of emergency airway management (see 5.3)
Indications of surgical method to obtain vascular access (see 5.11)

SKILLS & BEHAVIOURS

Conduct a primary survey: obtain relevant information rapidly and accurately
Assess and document Glasgow Coma Scale (GCS)
Recognise signs and symptoms of impending cardiac arrest
Obtain vascular access sufficient to manage acute haemorrhage, rapid fluid infusion and monitor cardiovascular variables
Implement emergency airway management, oxygen therapy and ventilation as indicated
Perform a comprehensive secondary survey; integrate history with clinical examination to form a differential diagnosis
Assess conscious level, status of airway and cervical spine, and conduct careful systems review
Prioritise the order of investigations and interventions for individual injuries according to their threat to life
Protect a potentially unstable cervical spine

Assess, predict and manage circulatory shock Monitor vital physiological functions as indicated Demonstrate emergency relief of tension pneumothorax Determine when the patient's needs exceed local resources or specialist expertise (requirement for transfer) Prescribe appropriate analgesia Professional and reassuring approach - generates confidence and trust in patients and their relatives Lead, delegate and supervise others appropriately according to experience and role

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 1 - Please refer to competence 1.1 or the aggregate syllabus at the end of this section.

1.6 Assess and Provide Initial Management of the Patient with Burns

KNOWLEDGE
Triage and management of competing priorities Performance and interpretation of a primary and secondary survey Environmental hazards & injuries: hypo- and hyperthermia, near-drowning, electrocution, radiations, chemical injuries, electrical safety/micro shock Relevance of mechanism of injury to clinical presentation Pathophysiology and medical/surgical management of the phases of a burn injury Calculation of area burned Principles of calculation of fluid losses & fluid resuscitation in the burned patient Treatment strategies for abnormalities of fluid, electrolyte, acid-base and glucose balance Causes, recognition and management of shock states Methods for securing vascular access rapidly Surgical techniques to obtain vascular access (see 5.11) Surface anatomy: structures in the antecubital fossa; large veins and anterior triangle of the neck; large veins of the leg and femoral triangle Techniques for effective fluid resuscitation Signs, symptoms and causes of renal failure (acute / chronic / acute on chronic) and indications for intervention Respiratory complications of burn injuries (smoke inhalation, airway burns) - detection and management Principles of oxygen therapy and use of oxygen administration devices (see 5.1) Causes and recognition of acute airway obstruction Management of difficult or failed airway management (see 5.4) Indications for and methods of ventilatory support Recognition and management of acute disturbances in thermoregulation The environmental control necessary for optimal care of the burned patient Prevention of infection in the burned patient

Management of skin graft Burn-related compartment syndrome and escharotomy Principles of outcome prediction / prognostic indicators and treatment intensity scales; limitations of scoring systems in predicting individual patient outcome

SKILLS & BEHAVIOURS
Conduct a primary survey: obtain relevant information rapidly and accurately Recognise signs and symptoms of impending cardiac arrest Assess conscious level, status of airway and cervical spine, and conduct careful systems review Monitor vital physiological functions as indicated Implement emergency airway management, oxygen therapy and ventilation as indicated Obtain vascular access sufficient to manage acute haemorrhage, rapid fluid infusion and monitor cardiovascular variables Assess, predict and manage circulatory shock Assess burn severity and prescribe initial fluid resuscitation Estimate burn wound mortality from published data tables Prescribe appropriate analgesia Describe the endpoints of burn resuscitation and preferred fluids Identify or describe risk factors for airway compromise in the burned patient Identification and management of carbon monoxide poisoning Determine when the patient's needs exceed local resources or specialist expertise (requirement for transfer) Professional and reassuring approach - generates confidence and trust in patients and their relatives Lead, delegate and supervise others appropriately according to experience and role Recognise and manage emergencies; seek assistance appropriately

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 1 - Please refer to competence 1.1 or the aggregate syllabus at the end of this section.

1.7 Describe the Management of Mass Casualties

KNOWLEDGE
Organisational principles for the coordination and management of mass casualties Local major incident plan - the role of the ICU in hospital/community disaster plans Communication tasks and personal role in major incident / accident plan Triage and management of competing priorities Triage methods in use locally Characteristics and clinical presentations associated with major incidents caused by natural or civilian disasters, infection epidemics or terrorist attack Relevance of mechanism of injury to clinical presentation Environmental hazards & injuries: hypo- and hyperthermia, near-drowning, electrocution, radiations,

chemical injuries, electrical safety/micro shock Decontamination procedures Principles of crisis management, conflict resolution, negotiation and debriefing Psychological support for patients and relatives Management of public relations and information Principles of internal hospital communication Alternative forms of external communication

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 1 - Please refer to competence 1.1 or the aggregate syllabus at the end of this section.

AGGREGATE SYLLABUS

DOMAIN 1: RESUSCITATION & INITIAL MANAGEMENT OF THE ACUTELY ILL PATIENT

KNOWLEDGE

Early warning signs of impending critical illness

Causes of cardio-respiratory arrest, identification of patients at risk and corrective treatment of reversible causes

Clinical signs associated with critical illness, their relative importance and interpretation

Clinical severity of illness and indications when organ dysfunctions or failure are an immediate threat to life

Recognition of life threatening changes in physiological parameters

Measures of adequacy of tissue oxygenation

Causes, recognition and management of:

- Acute chest pain
- Tachypnoea & dyspnoea
- Upper and lower airway obstruction
- Pulmonary oedema
- Pneumothorax (simple & tension)
- Hypoxaemia
- Hypotension
- Shock states
- Anaphylactic and anaphylactoid reactions
- Hypertensive emergencies
- Acute confusional states and altered consciousness
- Acute seizures / convulsions
- Oliguria & anuria
- Acute disturbances in thermoregulation
- Acute abdominal pain

Treatment algorithms for common medical emergencies Immediate management of acute coronary syndromes

Methods for assessing neurological function e.g. Glasgow Coma Scale Methods for securing vascular access rapidly

Surface anatomy: structures in the antecubital fossa; large veins and anterior triangle of the neck; large veins of the leg and femoral triangle

Intraosseous cannulation

Techniques for effective fluid resuscitation

Principles of blood and blood component therapy; principles of massive transfusion

Treatment strategies for abnormalities of fluid, electrolyte, acid-base and glucose balance

Cardiopulmonary resuscitation

The modification of resuscitation techniques in the special circumstances of hypothermia, immersion and submersion, poisoning, pregnancy, electrocution, anaphylaxis, acute severe asthma and trauma

Risks to the rescuer during resuscitation & methods to minimise these

Indications for and methods of ventilatory support

Basic and complex cardiac arrhythmias - recognition and management (pharmacological and electrical)

Indications, doses and actions of primary drugs used in the management of a cardiac arrest (including special precautions and contraindications)

Tracheal route for drug administration: indications, contraindications, dosage Indications, dosages and actions of drugs used in the peri-arrest period

Cardiac arrhythmias and the principles of their management (treatment algorithm): Peri-arrest

arrhythmias (bradycardia, broad complex tachycardia, atrial fibrillation, narrow complex tachycardia); ventricular fibrillation (VF) and pulse-less ventricular tachycardia (VT); Non-VF / VT rhythms (asystole / PEA)

Defibrillation: principles of monophasic & biphasic defibrillators; mechanism, indications, complications, modes and methods (manual and automated external defibrillators (AED))

Electrical safety: conditions which predispose to the occurrence of macro-shock / micro-shock; physical dangers of electrical currents; relevant standards regarding safe use of electricity in patient care; basic methods to reduce electrical hazards.

Indications and methods of cardiac pacing in the peri-arrest setting

Effect of cardio-respiratory arrest on body systems

Principles and application of therapeutic hypothermia

Audit of outcome after cardiac arrest

Indications for not starting resuscitation or ceasing an initiated attempt

Legal and ethical issues relating to the use of the recently dead for practical skills training, research and organ donation

Relevance of prior health status in determining risk of critical illness and outcomes

Triage and management of competing priorities

Criteria for admission to, and discharge from ICU - factors influencing intensity and site of care (ward, high dependency unit (HDU), intensive care unit (ICU))

Performance and interpretation of a primary and secondary survey

Environmental hazards & injuries: hypo- and hyperthermia, near-drowning, electrocution, radiations, chemical injuries, electrical safety/micro shock

Relevance of mechanism of injury to clinical presentation

Effects and acute complications of severe trauma on organs and organ systems:

- Respiratory - thoracic trauma; acute lung injury; tension pneumothorax
- Cardiovascular - hypovolaemic shock; cardiac tamponade
- Renal - acute renal failure; rhabdomyolysis
- Neurological - altered consciousness; traumatic brain injury; post-anoxic brain injury; coup and contra- coup injuries; intracranial haemorrhage and infarction; spinal cord injury
- Gastrointestinal - abdominal trauma; abdominal tamponade; rupture of liver or spleen
  Musculoskeletal system - soft tissue injury; short term complications of fractures; fat embolism; crush injury & compartment syndromes; maxillofacial injuries

Secondary insults that potentiate the primary injury

Immediate specific treatment of life-threatening injury

Management of cervical spine injuries

Principles of management of closed head injury; coup and contra-coup injuries; methods of preventing 'secondary insult' to the brain; recognition and immediate management of raised intracranial pressure

Management of severe acute haemorrhage and blood transfusion; correction of coagulation disorders and haemoglobinopathies

Principles, including indications, limitations and therapeutic modalities of basic radiological methods, CT scanning, MRI, ultrasound, angiography and radio nucleotide studies in the critically ill patient

Indications for and basic interpretation of chest radiographs: range of normal features on a chest x-ray;

collapse, consolidation, infiltrates (including ALI/ARDS), pneumothorax, pleural effusion, pericardial effusion, position of cannulae, tubes or foreign bodies, airway compression, cardiac silhouette, mediastinal masses Principles of outcome prediction / prognostic indicators and treatment intensity scales; limitations of scoring systems in predicting individual patient outcome Pathophysiology and medical/surgical management of the phases of a burn injury Calculation of area burned Principles of calculation of fluid losses & fluid resuscitation in the burned patient Respiratory complications of burn injuries (smoke inhalation, airway burns) - detection and management Burn-related compartment syndrome and escharotomy The environmental control necessary for optimal care of the burned patient Recognition and management of acute disturbances in thermoregulation Prevention of infection in the burned patient Organisational principles for the coordination and management of mass casualties Characteristics and clinical presentations associated with major incidents caused by natural or civilian disasters, infection epidemics or terrorist attack Local major incident plan - the role of the ICU in hospital/community disaster plans Communication tasks and personal role in major incident / accident plan Principles of internal hospital communication Management of public relations and information Alternative forms of external communication Triage methods in use locally Decontamination procedures Principles of crisis management, conflict resolution, negotiation and debriefing Psychological support for patients and relatives Principles of oxygen therapy and use of oxygen administration devices (see 5.1) Principles of emergency airway management (see 5.3) Management of difficult or failed airway management (see 5.4) Surgical techniques to obtain vascular access (see 5.11)

SKILLS & BEHAVIOURS
Consider legal and ethical issues: patient autonomy, appropriateness of resuscitation and ICU admission Conduct a primary survey: obtain relevant information rapidly and accurately Recognise signs and symptoms of impending cardiac arrest Assess conscious level, status of airway and cervical spine, and conduct careful systems review Order and prioritise appropriate investigations Use emergency monitoring equipment Monitor vital physiological functions as indicated Recognise and rapidly respond to adverse trends in monitored parameters Check & assemble resuscitation equipment

Demonstrate advanced life support skills (ALS standard or equivalent) Use a defibrillator safely Initiate routine investigations during resuscitation to exclude reversible problems (e.g. hyperkalaemia) Recognise and manage choking / obstructed airway Implement emergency airway management, oxygen therapy and ventilation as indicated Demonstrate emergency relief of tension pneumothorax Obtain vascular access sufficient to manage acute haemorrhage, rapid fluid infusion and monitor cardiovascular variables Initiate emergency cardiac pacing Act appropriately as a member or leader of the team (according to skills & experience) Respond to an emergency in a positive, organised and effective manner; able to direct the resuscitation team Support relatives witnessing an attempted resuscitation Participate in timely discussion and regular review of 'do not resuscitate' orders and treatment limitation decisions Assess and communicates effectively the risks and benefits of intensive care admission Discuss treatment options with a patient or relatives before ICU admission Take decisions to admit, discharge or transfer patients Consider the need for stabilisation before transfer Determine when the patient's needs exceed local resources or specialist expertise (requirement for transfer) Explain life-sustaining therapies, in clear language, and describe the expected outcome of such therapies in view of the patient's goals and wishes. Professional and reassuring approach - generates confidence and trust in patients and their relatives Assess and document Glasgow Coma Scale (GCS) Examine and plan care for the confused patient Perform a comprehensive secondary survey; integrate history with clinical examination to form a differential diagnosis Prioritise the order of investigations and interventions for individual injuries according to their threat to life Protect a potentially unstable cervical spine Assess, predict and manage circulatory shock Assess burn severity and prescribe initial fluid resuscitation Estimate burn wound mortality from published data tables Describe the endpoints of burn resuscitation and preferred fluids Prescribe appropriate analgesia Identify or describe risk factors for airway compromise in the burned patient Identification and management of carbon monoxide poisoning Lead, delegate and supervise others appropriately according to experience and role Recognise and manage emergencies; seek assistance appropriately

ATTITUDES
Rapid response to resuscitation

Appreciate the importance of timely institution of organ-system support Recognise the need for supportive care for all organ systems whether failing / injured or not Clear in explanations to patient, relatives and staff Consult and take into account the views of referring clinicians; promote their participation in decision making where appropriate Establish trusting relationships with and demonstrates compassionate care of patients and their relatives

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

2.1 Obtain a History and Perform an Accurate Clinical Examination

KNOWLEDGE
Clinical signs associated with critical illness, their relative importance and interpretation
Importance and principles of obtaining an accurate history of the current condition, comorbidities and previous health status using appropriate sources of information
Sources and methods of obtaining clinical information
Relevance of prior health status in determining risk of critical illness and outcomes
Significance and impact of co-morbid disease on the presentation of acute illness
Impact of drug therapy on organ-system function

SKILLS & BEHAVIOURS
Professional and reassuring approach - generates confidence and trust in patients and their relatives
Examine patients, elicit and interpret clinical signs (or relevant absence of clinical signs) in the ICU environment
Obtain relevant information from the patient, relatives and other secondary sources
Listen effectively
Acquire, interpret, synthesize, record, and communicate (written and verbal) clinical information
Develop a working, and limited differential diagnosis based on presenting clinical features
Recognise impending organ system dysfunction
Integrate history with clinical examination to create a diagnostic and therapeutic plan Document investigations undertaken, results and action taken
Recognise changes in intracranial and cerebral perfusion pressure which are life threatening Interpret data from scoring or scaling systems to assess pain and sedation
Assess and document Glasgow Coma Scale (GCS)
Interpret chest x-rays in a variety of clinical contexts

ATTITUDES
Consult, communicate and collaborate effectively with patients, relatives and the health care team
Promote respect for patient privacy, dignity and confidentiality
Avoid extensive invasive procedures or monitoring which cannot be adequately interpreted at the bedside
Minimise patient discomfort in relation to monitoring devices
Respond rapidly to acute changes in monitored variables
Ensure safe and appropriate use of equipment
Support other staff in the correct use of devices
Consider patient comfort during procedures / investigations
Avoid unnecessary tests
Demonstrate compassionate care of patients and relatives

Desire to minimise patient distress Recognise personal limitations, seeks and accepts assistance or supervision (knows how, when and who to ask)

2.2 Undertake Timely and Appropriate Investigations

KNOWLEDGE
Indications for and the selection of suitable methods of monitoring or investigation taking into account their accuracy, convenience, reliability, safety, cost and relevance to the patient's condition. Sensitivity and specificity of the investigation as related to a specific disease Appropriate use of laboratory tests to confirm or refute a clinical diagnosis Indications, limitations and basic interpretation of laboratory investigations of blood and other body fluids (e.g. urine, CSF, pleural and ascitic fluids): - Haematology - Immunology - Cytology - Blood grouping and x-matching - Urea, creatinine, glucose, electrolytes and lactate - Liver function tests - Drug levels in blood or plasma - Tests of endocrine function (diabetes, thyroid disorders, adrenal failure) - Blood gas samples (arterial, venous and mixed venous) - Microbiological surveillance and clinical sampling Principles, indications, limitations and basic interpretation of: - Respiratory function tests - Intrathoracic pressure (oesophageal pressure) - Diagnostic bronchoscopy - Diagnostic ECG - Fluid input-output monitoring - Focused USG lungs and abdomen - Viscoelastic tests of coagulation - Echocardiography - Basic principles of ultrasound and the Doppler - Electroencephalogram (EEG) and evoked potentials - Intra-abdominal pressure monitoring Invasive & non-invasive systems available for measuring cardiac output and derived haemodynamic variables, principles involved and the type and site of placement of the monitoring device Principles, including indications, limitations and therapeutic modalities of basic radiological methods, CT scanning, MRI, ultrasound, angiography and radio nucleotide studies in the critically ill patient Risks to patient and staff of radiological procedures and precautions to minimise risk

SKILLS & BEHAVIOURS
Recognise impending organ system dysfunction Acquire, interpret, synthesize, record, and communicate (written and verbal) clinical information Develop a working, and limited differential diagnosis based on presenting clinical features Order and prioritise appropriate investigations Evaluate benefits and risks related to specific investigations Interpret laboratory results in the context of the patient's condition Identify abnormalities requiring urgent intervention Recognise significant changes and the need for repeated testing (i.e. that a single normal result is not as significant as identifying trends of change by repeated testing where indicated) Document investigations undertaken, results and action taken Undertake further consultation / investigation when indicated Obtain and interpret data from ECG (3- and 12-lead) Lead, delegate and supervise others appropriately according to experience and role

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 2 - Please refer to competence 2.1 or the aggregate syllabus at the end of this section.

2.3 Describe Indications for Echocardiography (Transthoracic/ Transoesophageal)

KNOWLEDGE
Anatomy and physiology of the heart and cardiovascular system Clinical signs associated with critical illness, their relative importance and interpretation Basic principles of ultrasound and the Doppler effect Principles, indications and limitations of echocardiography Sensitivity and specificity of the investigation as related to a specific disease Basic interpretation of echocardiography - ventricular function, filling status, valve abnormality, size of the heart, any akinetic or dyskinetic segments, pericardial effusion with or without evidence of tamponade

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 2 - Please refer to competence 2.1 or the aggregate syllabus at the end of this sect

2.4 Perform Electrocardiography (ECG) and Interpret the Results

KNOWLEDGE
Anatomy and physiology of the heart and cardiovascular system Principles of ECG monitoring (heart rate, rhythm, conduction, ST segment change & QT interval) - indications, limitations and techniques. Advantages and disadvantages of different lead configurations

Indications and limitations of diagnostic ECG Sensitivity and specificity of the investigation as related to a specific disease Importance of clinical history and signs in making diagnosis

SKILLS & BEHAVIOURS
Obtain and interpret data from ECG (3- and 12-lead) Identify deviations from normal range and interpret these in the context of the clinical circumstances Identify abnormalities requiring urgent intervention Differentiate real change from artefact & respond appropriately Document investigations undertaken, results and action taken

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 2 - Please refer to competence 2.1 or the aggregate syllabus at the end of this section.

2.5 Obtain Appropriate Microbiological Samples and Interpret Results

KNOWLEDGE
Epidemiology and prevention of infection in the ICU Types of organisms - emergence of resistant strains, mode of transfer, opportunistic and nosocomial infections; difference between colonisation & infection Requirements for microbiological surveillance and clinical sampling Indications for microbiological sampling and interpretation of microbiological test results Sensitivity and specificity of the investigation as related to a specific disease Methods and routes of obtaining samples - associated indications and complications

SKILLS & BEHAVIOURS
Order and prioritise appropriate investigations Obtain blood cultures using aseptic techniques Interpret laboratory results in the context of the patient's condition Integrate clinical findings with results of investigations Communicate and collaborate effectively with all laboratory staff Assemble clinical and laboratory data, logically compare all potential solutions to the patient's problems, prioritise them and establish a clinical management plan Document investigations undertaken, results and action taken Undertake further consultation / investigation when indicated

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 2 - Please refer to competence 2.1 or the aggregate syllabus at the end of this section.

2.6 Obtain and Interpret Results from Blood Gas

KNOWLEDGE
Methods and routes of obtaining samples - associated indications and complications Preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc.) Principles of aseptic technique and aseptic handling of invasive medical devices Indications for and interpretation of arterial blood gas samples Indications for and interpretation of venous blood gas samples Pre-analytical errors of arterial blood gas sampling (choice of sample site, sampling device, heparin, mixing, storage and transport) Homeostatic regulation of acid base balance and buffer ions (e.g. Na^+, K^+, Ca^{++}, Cl^-, HCO_3^-, Mg^{++}, PO_4^-) Respiratory physiology: gas exchange, O_2 and CO_2 transport, hypoxia, hypo- and hypercarbia, functions of haemoglobin in oxygen carriage and acid-base balance Renal physiology: regulation of fluid and electrolyte balance Clinical measurement: pH, pCO_2, pO_2, SaO_2, FiO_2, CO_2 production, oxygen consumption, respiratory quotient Sensitivity and specificity of the investigation as related to a specific disease Importance of clinical history and signs in making diagnosis

SKILLS & BEHAVIOURS
Obtain blood gas samples using aseptic techniques Interpret data from an arterial blood gas sample Interpret data from a central or mixed venous blood gas sample Identify deviations from normal range and interpret these in the context of the clinical circumstances Identify abnormalities requiring urgent intervention Confirm adequate oxygenation and control of $PaCO_2$ and pH Undertake further consultation / investigation when indicated Lead, delegate and supervise others appropriately according to experience and role

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 2 - Please refer to competence 2.1 or the aggregate syllabus at the end of this section.

2.7 Interpret Clinical Imagings

KNOWLEDGE
Principles, including indications, limitations and therapeutic modalities of basic radiological methods, CT scanning, MRI, ultrasound, angiography and radio nucleotide studies in the critically ill patient Risks to patient and staff of radiological procedures and precautions to minimise risk Indications for and limitations of investigations Sensitivity and specificity of the investigation as related to a specific disease Effect of projection, position, penetration and other factors on the image quality Indications for and basic interpretation of chest radiographs: range of normal features on a chest x-ray;

collapse, consolidation, infiltrates (including ALI/ARDS), pneumothorax, pleural effusion, pericardial effusion, position of cannulae, tubes or foreign bodies, airway compression, cardiac silhouette, mediastinal masses

Importance of clinical history and signs in making diagnosis

Basic interpretation of radiological investigations:

- Neck films
- X-rays of abdominal fluid levels / free air
- X-rays of long bone, skull, vertebral and rib fractures
- CT or MRI scans of head demonstrating fractures / haemorrhage
- Ultrasound of the abdomen (liver, spleen, large abdominal vessels, kidney, urinary bladder)

SKILLS & BEHAVIOURS

Communicate effectively with radiological colleagues to plan, perform and interpret test results

Integrate clinical findings with results of investigations.

Interpret chest x-rays in a variety of clinical contexts

Identify abnormalities requiring urgent intervention

Identify deviations from normal range and interpret these in the context of the clinical circumstances

Communicate effectively with radiological colleagues to plan, perform and interpret test results

Undertake further consultation / investigation when indicated

ATTITUDES

The attitudes required for this competence are the same for all competencies in Domain 2 - Please refer to competence 2.1 or the aggregate syllabus at the end of this section.

2.8 Monitor and Respond to Trends in Physiological Variables

KNOWLEDGE

Indications, contraindications and complications associated with monitoring and monitoring devices; advantages and disadvantages of different monitoring systems / modalities taking into account their accuracy, convenience, reliability, safety, cost and relevance to the patient's condition

Interpretation of information from monitoring devices, and identification of common causes of error; principles of monitoring trends of change and their significance

Recognition of life threatening changes in physiological parameters

Hazards of inappropriate monitoring including misuse of alarms; principles of disconnection monitors

Principles of invasive pressure monitoring devices: components & functions of an electro-manometer system (catheter, tubing, transducer, amplifier and display unit); zero and calibration techniques; dynamics of the system - natural frequency and damping

Principles of haemodynamic monitoring - invasive & non-invasive methods, indications and limitations, physiological parameters and waveform interpretation

Invasive and non-invasive systems available for measuring cardiac output and derived haemodynamic variables, principles involved and the type and site of placement of the monitoring device

Interpretation of, relationships between, sources of error and limitations of measured and derived

cardiovascular variables including pressure, flow, volume and gas transport
Methods for measuring temperature
Principles, indications and limitations of pulse oximetry
Principles of ECG monitoring (heart rate, rhythm, conduction, ST segment change & QT interval) - indications, limitations and techniques.
Advantages and disadvantages of different lead configurations
Principles of monitoring ventilation - significance of respiratory rate, tidal volume, minute volume, mean, peak, end expiratory and plateau pressure, intrinsic and extrinsic PEEP, inspired oxygen concentration, arterial blood gas and acid base status; relationship between mode of ventilation and choice of parameters monitored; airflow and airway pressure waveforms
Physical principles, indications and limitations of end tidal CO_2 monitoring, and relationship between end tidal CO_2 and arterial pCO_2 in various clinical circumstances
Methods for assessing pain and sedation
Methods for assessing neurological function
Systems available for intracranial pressure monitoring - indications, principles, type and site of placement of the monitoring device, data collection and trouble-shooting
Indications and techniques of jugular bulb oximetry
Principles, indications and limitations of intra-abdominal pressure monitoring
Intrathoracic pressure (oesophageal pressure) measurements
Principles of fluid input-output monitoring

SKILLS & BEHAVIOURS

Monitor vital physiological functions as indicated
Obtain and accurately record data from monitors
Differentiate real change from artefact & respond appropriately
Set and interpret data from ventilator alarms
Identify deviations from normal range and interpret these in the context of the clinical circumstances
Recognise and rapidly respond to adverse trends in monitored parameters
Recognise patterns in trends - early diagnosis and outcome prediction
Review the need for continued monitoring regularly
Use emergency monitoring equipment
Obtain and interpret data from:
- Invasive and non-invasive arterial blood pressure measurement
    - ECG / EKG (3 and 12 lead)
    - Central venous catheters
    - Pulmonary artery catheters or oesophageal Doppler
    - Pulse oximetry
    - FVC, spirometry and peak flow measurement
    - Inspired and expired gas monitoring for O_2, CO_2 and NO
    - Intracranial pressure monitoring
    - Regional oximetry monitoring

Set monitor alarms appropriately

Interpret data from scoring or scaling systems to assess pain and sedation Assess and document Glasgow Coma Scale (GCS) Recognise changes in intracranial and cerebral perfusion pressure which are life threatening

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 2 - Please refer to competence 2.1 or the aggregate syllabus at the end of this section.

AGGREGATE SYLLABUS

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

KNOWLEDGE
Importance and principles of obtaining an accurate history of the current condition, comorbidities and previous health status using appropriate sources of information Clinical signs associated with critical illness, their relative importance and interpretation Sources and methods of obtaining clinical information Relevance of prior health status in determining risk of critical illness and outcomes Significance and impact of co-morbid disease on the presentation of acute illness Impact of drug therapy on organ-system function Indications for and the selection of suitable methods of monitoring or investigation taking into account their accuracy, convenience, reliability, safety, cost and relevance to the patient's condition. Sensitivity and specificity of the investigation as related to a specific disease Appropriate use of laboratory tests to confirm or refute a clinical diagnosis Methods and routes of obtaining samples - associated indications and complications Indications, limitations and basic interpretation of laboratory investigations of blood and other body fluids (e.g. urine, CSF, pleural and ascitic fluids): - Haematology - Immunology - Cytology - Blood grouping and x-matching - Urea, creatinine, glucose, electrolytes and lactate - Liver function tests - Drug levels in blood or plasma - Tests of endocrine function (diabetes, thyroid disorders, adrenal failure) - Blood gas samples (arterial, venous and mixed venous) - Microbiological surveillance and clinical sampling Types of organisms - emergence of resistant strains, mode of transfer, opportunistic and nosocomial infections; difference between colonisation & infection Universal precautions and preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc.) Principles of aseptic technique and aseptic handling of invasive medical devices Local patterns of bacterial resistance and antibiotic policy; difference between contamination, colonisation and infection Interpretation of information from monitoring devices, and identification of common causes of error; principles of monitoring trends of change and their significance Hazards of inappropriate monitoring including misuse of alarms; principles of disconnection monitors Principles of invasive pressure monitoring devices: components & functions of an electro-manometer system (catheter, tubing, transducer, amplifier and display unit); zero and calibration techniques; dynamics of the system - natural frequency and damping Anatomy and physiology of the heart and cardiovascular system

Principles of haemodynamic monitoring - invasive & non-invasive methods, indications & limitations, physiological parameters and waveform interpretation

Recognition of life threatening changes in physiological parameters

Invasive & non-invasive systems available for measuring cardiac output and derived haemodynamic variables, principles involved and the type and site of placement of the monitoring device

Interpretation of, relationships between, sources of error and limitations of measured and derived cardiovascular variables including pressure, flow, volume and gas transport

Methods for measuring temperature

Principles, indications and limitations of pulse oximetry

Principles of ECG monitoring (heart rate, rhythm, conduction, ST segment change & QT interval) - indications, limitations and techniques. Advantages and disadvantages of different lead configurations

Clinical measurement: pH, pCO_2, pO_2, SaO_2, FiO_2, CO_2 production, oxygen consumption, respiratory quotient

Principles of monitoring ventilation - significance of respiratory rate, tidal volume, minute volume, mean, peak, end expiratory and plateau pressure, intrinsic and extrinsic PEEP, inspired oxygen concentration, arterial blood gas and acid base status; relationship between mode of ventilation and choice of parameters monitored; airflow and airway pressure waveforms

Physical principles, indications and limitations of end tidal CO_2 monitoring, and relationship between end tidal CO_2 and arterial pCO_2 in various clinical circumstances

Pre-analytical errors of arterial blood gas sampling (choice of sample site, sampling device, heparin, mixing, storage and transport)

Homeostatic regulation of acid base balance and buffer ions (e.g. Na^+, K^+, Ca^{++}, Cl^-, HCO_3^-, Mg^{++}, PO_4^-)

Respiratory physiology: gas exchange, O_2 and CO_2 transport, hypoxia, hypo- and hypercarbia, functions of haemoglobin in oxygen carriage and acid-base balance

Renal physiology: regulation of fluid and electrolyte balance

Methods for assessing pain and sedation

Methods for assessing neurological function e.g. Glasgow Coma Scale

Systems available for intracranial pressure monitoring - indications, principles, type and site of placement of the monitoring device, data collection and trouble-shooting

Indications and techniques of jugular bulb oximetry

Principles, including indications, limitations and therapeutic modalities of basic radiological methods, CT scanning, MRI, ultrasound, angiography and radio nucleotide studies in the critically ill patient

Risks to patient and staff of radiological procedures and precautions to minimise risk

Indications for and basic interpretation of chest radiographs: range of normal features on a chest x-ray; collapse, consolidation, infiltrates (including ALI/ARDS), pneumothorax, pleural effusion, pericardial effusion, position of cannulae, tubes or foreign bodies, airway compression, cardiac silhouette, mediastinal masses

Effect of projection, position, penetration and other factors on the image quality

Basic interpretation of radiological investigations:

- Neck and thoracic inlet films
- X-rays of abdominal fluid levels / free air

- X-rays of long bone, skull, vertebral and rib fractures
- CT or MRI scans of head demonstrating fractures / haemorrhage
- Ultrasound of the abdomen (liver, spleen, large abdominal vessels, kidney, urinary bladder)
- Echocardiography (ventricular function, filling status, valve abnormality, size of the heart, any akinetic or dyskinetic segments, pericardial effusion with or without evidence of tamponade)

Principles, indications, limitations and basic interpretation of:

- Respiratory function tests
- Diagnostic bronchoscopy
- Diagnostic ECG
- Echocardiography
- Electroencephalogram (EEG) and evoked potentials
- Intra-abdominal pressure monitoring
- Fluid input-output monitoring
- Focused USG lungs and abdomen
- Viscoelastic tests of coagulation
- Basic principles of ultrasound and the Doppler effect

SKILLS & BEHAVIOURS

Examine patients, elicit and interpret clinical signs (or relevant absence of clinical signs) in the ICU environment

Obtain relevant information from the patient, relatives and other secondary sources

Professional and reassuring approach - generates confidence and trust in patients and their relatives

Listen effectively

Integrate history with clinical examination to create a diagnostic and therapeutic plan

Acquire, interpret, synthesize, record, and communicate (written and verbal) clinical information

Develop a working, and limited differential diagnosis based on presenting clinical features Recognise impending organ system dysfunction

Order and prioritise appropriate investigations

In emergency situations, confirm or refute early diagnoses before data collection / analysis is complete - make contingency plans based on these diagnoses to combat further threats to the patient's life

Integrate clinical findings with results of investigations

Interpret laboratory results in the context of the patient's condition

Evaluate benefits and risks related to specific investigations

Monitor vital physiological functions as indicated

Obtain and accurately record data from monitors

Set monitor alarms appropriately

Differentiate real change from artefact & respond appropriately

Identify deviations from normal range and interpret these in the context of the clinical circumstances

Recognise and rapidly respond to adverse trends in monitored parameters

Recognise patterns in trends - early diagnosis and outcome prediction

Review the need for continued monitoring regularly

Use emergency monitoring equipment

Obtain and interpret data from:

- Invasive and non-invasive arterial blood pressure measurement
- ECG (3 and 12 lead)
- Central venous catheters
- Pulmonary artery catheters or oesophageal Doppler
- Pulse oximetry
- FVC, spirometry and peak flow measurement
- Inspired and expired gas monitoring for O_2, CO_2 and NO
- Intracranial pressure monitoring
- Regional oximetry monitoring

Set and interpret data from ventilator alarms

Obtain blood gas samples using aseptic techniques; interpret data from arterial, central venous or mixed venous samples

Confirm adequate oxygenation and control of $PaCO_2$ and pH

Obtain blood cultures using aseptic techniques

Interpret chest x-rays in a variety of clinical contexts

Interpret data from scoring or scaling systems to assess pain and sedation

Assess and document Glasgow Coma Scale (GCS)

Recognise changes in intracranial and cerebral perfusion pressure which are life threatening Identify abnormalities requiring urgent intervention

Recognise significant changes and the need for repeated testing (i.e. that a single normal result is not as significant as identifying trends of change by repeated testing where indicated)

Document investigations undertaken, results and action taken

Assemble clinical and laboratory data, logically compare all potential solutions to the patient's problems, prioritise them and establish a clinical management plan

Undertake further consultation / investigation when indicated

Communicate effectively with radiological colleagues to plan, perform and interpret test results

Communicate and collaborate effectively with all laboratory staff

ATTITUDES

Consult, communicate and collaborate effectively with patients, relatives and the health care team

Promote respect for patient privacy, dignity and confidentiality

Avoid extensive invasive procedures or monitoring which cannot be adequately interpreted at the bedside

Minimise patient discomfort in relation to monitoring devices

Respond rapidly to acute changes in monitored variables

Ensure safe and appropriate use of equipment

Support other staff in the correct use of devices

Consider patient comfort during procedures / investigations

Avoid unnecessary tests

Demonstrate compassionate care of patients and relatives

	Desire to minimise patient distress

DOMAIN 3: DISEASE MANAGEMENT

ACUTE DISEASE

3.1 Manage the Care of the Critically Ill Patient with Specific Acute Medical Conditions

	KNOWLEDGE
	Pathophysiology, diagnosis and management of commonly encountered acute medical conditions including: ***Respiratory Disorders***: the unprotected airway; pneumonia, lung or lobar collapse, asthma, chronic obstructive airways disease, pulmonary oedema, acute lung injury (ALI) and acute respiratory distress syndrome (ARDS) and their causative factors; pulmonary haemorrhage, pulmonary embolus, pleural effusion, pneumothorax (simple and tension); upper and lower airway obstruction including epiglottitis, respiratory muscle disorders. ***Cardiovascular Disorders***: shock states (anaphylactic, cardiogenic, hypovolaemic, septic); crescendo or unstable angina; acute myocardial infarction; left ventricular failure; cardiomyopathies; valvular heart disease; vaso-occlusive diseases; pulmonary hypertension; right ventricular failure; cor pulmonale; malignant hypertension; cardiac tamponade; common arrhythmias and conduction disturbances, pacing box failure ***Neurological Disorders***: acute confusional states and coma; post-anoxic brain damage; intracranial haemorrhage and infarction; sub-arachnoid haemorrhage; cerebro-vascular accidents; convulsions and status epilepticus; meningitis and encephalitis; medical causes of raised intracranial pressure; acute neuromuscular diseases causing respiratory difficulty (e.g. Guillain-Barre, myasthenia gravis, malignant hyperpyrexia); critical illness polyneuropathy, motor neuropathy and myopathy ***Renal and Genito-Urinary Disorders***: urological sepsis; acute renal failure; chronic renal failure; renal manifestations of systemic disease including vasculitides; nephrotoxic drugs and monitoring; rhabdomyolysis ***Gastrointestinal Disorders***: peptic/stress ulceration; upper GI haemorrhage; diarrhoea and vomiting; acute pancreatitis; cholecystitis; jaundice; acute and chronic liver failure; fulminant hepatic failure; paracetamol (acetaminophen)-induced liver injury; inflammatory bowel diseases; peritonitis; ascites; mesenteric infarction; perforated viscus; bowel obstruction & pseudo-obstruction; abdominal trauma; intra- abdominal hypertension & compartment syndrome; short-bowel syndrome; rupture of liver or spleen. ***Haematological and Oncological Disorders***: disseminated intravascular coagulation (DIC) and other coagulation disorders, hemolytic syndromes, acute and chronic anemia, immune disorders. Lymphoproliferative disorders. High risk groups: the immunosuppressed or immune-incompetent patient, chemotherapy, agranulocytosis and bone marrow transplant patients. Massive blood transfusion. ***Infections*****:** pyrexia and hypothermia; organ-specific signs of infection including haematogenous (venous catheter-related, endocarditis, meningococcal disease), urological, pulmonary, abdominal (peritonitis, diarrhoea), skeletal (septic arthritis) soft tissue and neurological. Pyometra. Septic abortion. Organisms causing specific infections: Gram positive and Gram negative bacteria, fungi,

protozoa, viruses; nosocomial infections

Metabolic Disorders: electrolyte disorders; acid-base disorders; fluid-balance disorders; thermoregulation and associated disorders

Endocrine Disorders: critical illness-induced hyperglycaemia; diabetes mellitus; over- and under-activity of thyroid; adrenal and pituitary disorders; sepsis-induced relative adrenal insufficiency; endocrine emergencies

Treatment algorithms for common medical emergencies

Definitive / long term management of commonly encountered acute medical conditions

Diagnosis and management of other acute medical conditions until appropriate specialist assistance is available

Multi-system effects of acute medical conditions and implications for clinical management

Indications and contraindications for treatment; circumstances when treatment is unnecessary or futile

Therapies available for the treatment of commonly encountered medical conditions, their efficacy and potential side-effects

Concept of risk: benefit ratio and cost effectiveness of therapies

Complications of the disease processes; effects of disease and its treatments on other organ systems

Effects of concomitant treatment and/or co-morbid conditions on an individual patient's response to treatment

Principles of outcome prediction / prognostic indicators and treatment intensity scales; limitations of scoring systems in predicting individual patient outcome

Long term effects of acute medical conditions and late complications

Risk factors, recognition and assessment of single or multiple organ failure

SKILLS & BEHAVIOURS

Acquire, interpret, synthesize, record, and communicate (written and verbal) clinical information

Develop a working, and limited differential diagnosis based on presenting clinical features

Recognise and diagnose commonly encountered acute medical conditions (according to national case mix)

Order and prioritise appropriate investigations

Establish a management plan based on clinical and laboratory information

Critically appraise the evidence for and against specific therapeutic interventions or treatments

Prioritise therapy according to the patient's needs

Consider potential interactions when prescribing drugs & therapies

Identify and manage chronic co-morbid disease

Define targets of therapy and review efficacy at regular intervals

Consider modifying diagnosis and/or therapy if goals are not achieved

Lead, delegate and supervise others appropriately according to experience and role

Recognise and manage emergencies; seek assistance appropriately

ATTITUDES

Demonstrates compassionate care of patients and relatives Appreciates the importance of timely institution of organ-system support Appreciates the differences between organ system support and specific treatment Enquiring mind, undertakes critical analysis of published literature Adopts a problem solving approach Desire to minimise patient distress Consults, communicates and collaborates effectively with patients, relatives and the health care team Recognises personal limitations, seeks and accepts assistance or supervision (knows how, when and who to ask)

CHRONIC DISEASE

3.2 Identify the Implications of Concomitant Chronic and Co-Morbid Diseases in Acutely Ill Patients, and Incorporate a Long-term Perspective in their Management

KNOWLEDGE
Pathophysiology, diagnosis and management of commonly encountered chronic medical conditions including: ***Respiratory Disorders*:** asthma; chronic obstructive airways disease; pulmonary fibrosis; pulmonary thromboembolic disease; respiratory muscle disorders ***Cardiovascular Disorders***: hypertension; angina; chronic heart failure (LVF / RVF); veno-occlusive disorders; cardiomyopathies; valvular heart disease and prosthetic valves; pulmonary hypertension; cor pulmonale; common arrhythmias and conduction disturbances; peripheral vascular disease ***Neurologic Disorders***: cerebro-vascular accidents (CVA / stroke); epilepsy; dementia; neuropathy and myopathy ***Renal Disorders***: chronic renal failure; renal manifestations of systemic disease including vasculitides; nephrotoxic drugs ***Gastrointestinal Disorders*:** chronic pancreatitis; chronic liver failure; cirrhosis; inflammatory bowel diseases ***Haematological Disorders***: coagulation disorders, hemolytic syndromes, platelet disorders; chronic anaemia, immune disorders, malignancy including complications of chemotherapy and radiotherapy ***Endocrine Disorders***: diabetes; thyroid, adrenal and pituitary disorders ***Psychiatric Disorders***: depression; psychosis Causes and consequences of decompensation in chronic organ failure; diagnosis and management of acute- on-chronic organ failure Effects of concomitant treatment and/or co-morbid conditions on an individual patient's response to treatment Impact of occupational and environmental exposures, socio-economic factors, and life style factors on critical illness Principles of outcome prediction / prognostic indicators and treatment intensity scales; limitations of scoring systems in predicting individual patient outcome

SKILLS & BEHAVIOURS
Identify and manage chronic co-morbid disease Identify and evaluate requirements for continuation of chronic treatments during and after the acute illness Consider potential interactions when prescribing drugs & therapies Evaluate the impact of chronic disease and prior health on outcomes Take chronic health factors into account when determining suitability for intensive care

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 3 - Please refer to competence 3.1 or the aggregate syllabus at the end of this section.

ORGAN SYSTEM FAILURE

3.3 Recognise and Manage the Patient with Circulatory Failure

KNOWLEDGE
Risk factors, recognition and assessment of circulatory failure Causes, recognition and management of associated disorders: ***Cardiovascular Disorders***: shock states (anaphylactic, cardiogenic, hypovolaemic, septic); hypotension and hypertension; crescendo or unstable angina; acute myocardial infarction; left ventricular failure; cardiomyopathies; valvular heart disease; vaso-occlusive diseases; pulmonary hypertension; circulatory effects of pulmonary embolism & tension pneumothorax; right ventricular failure; cor pulmonale; malignant hypertension; cardiac tamponade; common arrhythmias and conduction disturbances; pacing box failure; cardiac arrest ***Renal Disorders***: oliguria and anuria; polyuria; acute renal failure Indications and contraindications for treatment; circumstances when treatment is unnecessary or futile Complications of specific therapies, their incidence and management Effect of circulatory failure and its treatment on other organ systems Effects of concomitant treatment and/or co-morbid conditions on an individual patient's response to treatment Use of fluids and vasoactive / inotropic / anti-arrhythmic drugs to support the circulation (see 4.4) Use of mechanical assist devices to support the circulation (see 4.4) Cardiopulmonary resuscitation Principles of outcome prediction / prognostic indicators and treatment intensity scales; limitations of scoring systems in predicting individual patient outcome

SKILLS & BEHAVIOURS
Identify patients at risk of developing circulatory failure

Measure and interpret haemodynamic variables (including derived variables) Optimise myocardial function Assess, predict and manage circulatory shock Develop a working, and limited differential diagnosis based on presenting clinical features Order and prioritise appropriate investigations Establish a management plan based on clinical and laboratory information Critically appraise the evidence for and against specific therapeutic interventions or treatments Implement emergency airway management, oxygen therapy and ventilation as indicated Demonstrate emergency relief of tension pneumothorax Use fluids and vasoactive / inotropic drugs to support the circulation (see 4.4) Consider potential interactions when prescribing drugs & therapies Define targets of therapy and review efficacy at regular intervals Consider modifying diagnosis and/or therapy if goals are not achieved Lead, delegate and supervise others appropriately according to experience and role Recognise and manage emergencies; seek assistance appropriately

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 3 - Please refer to competence 3.1 or the aggregate syllabus at the end of this section.

3.4 Recognise and Manage the Patient with, or at risk of, Acute Renal Failure

KNOWLEDGE
Signs, symptoms and causes of renal failure (acute / chronic / acute on chronic) and indications for intervention Distinguishing features of acute versus chronic renal failure and implications for management Causes and complications of renal failure - methods to prevent or treat these Investigation of impaired renal function Causes, recognition and management of associated disorders: ***Renal and Genito-Urinary Disorders***: oliguria and anuria; polyuria; urological sepsis; acute renal failure; chronic renal failure; renal manifestations of systemic disease including vasculitides; nephrotoxic drugs and monitoring; rhabdomyolysis ***Cardiovascular Disorders***: hypotension and hypertension (including hypertensive emergencies); shock (cardiogenic, hypovolaemic, septic, anaphylactic); common arrhythmias and conduction disturbances. ***Metabolic Disorders***: electrolyte disorders; acid-base disorders; fluid balance disorders Indications and contraindications for treatment; circumstances when treatment is unnecessary or futile Range of therapeutic interventions available to support organ function and treat the underlying causes Effects of concomitant treatment and/or co-morbid conditions on an individual patient's response to treatment Indications, complications and selection of renal replacement therapies (continuous and intermittent) Effect of renal failure and its treatment on other organ systems

Nephrotoxic drugs and adjustment of drug doses in renal impairment/failure Indications for and basic interpretation of drug levels in blood or plasma Urinary catheterisation techniques: transurethral and suprapubic Principles of outcome prediction / prognostic indicators and treatment intensity scales; limitations of scoring systems in predicting individual patient outcome

SKILLS & BEHAVIOURS
Acquire, interpret, synthesize, record, and communicate (written and verbal) clinical information Identify patients at risk of developing renal failure Identify and avoid factors contributing to impaired renal function Perform aseptic urinary catheterisation: male and female (see 5.24) Develop a working, and limited differential diagnosis based on presenting clinical features Order and prioritise appropriate investigations Establish a management plan based on clinical and laboratory information Critically appraise the evidence for and against specific therapeutic interventions or treatments Consider potential interactions when prescribing drugs & therapies Initiate, manage and wean patients from renal replacement therapy (see 4.7) Define targets of therapy and review efficacy at regular intervals Consider modifying diagnosis and/or therapy if goals are not achieved Lead, delegate and supervise others appropriately according to experience and role Recognise and manage emergencies; seek assistance appropriately

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 3 - Please refer to competence 3.1 or the aggregate syllabus at the end of this section.

3.5 Recognise and Manage the Patient with, or at risk of, Acute Liver Failure

KNOWLEDGE
Functions of the liver - biosynthetic, immunologic, and detoxification Signs and symptoms of acute liver failure and assessment of severity Causes and complications of acute and acute-on-chronic liver failure, their prevention and management Investigation of impaired hepatic function Causes, recognition and management of associated disorders: ***Gastrointestinal Disorders***: Abdominal pain and distension; peptic ulceration and upper GI haemorrhage; diarrhoea and vomiting; pancreatitis; jaundice; acute and chronic liver failure; fulminant hepatic failure; paracetamol (acetaminophen)-induced liver injury; rupture of liver or spleen ***Cardiovascular Disorders***: hypotension and hypertension (including hypertensive emergencies); shock (cardiogenic, hypovolaemic, septic, anaphylactic); common arrhythmias and conduction disturbances. ***Neurological Disorders***: acute confusional states and coma; post-anoxic brain damage; convulsions; encephalopathy; raised intracranial pressure

Haematological Disorders: coagulation and fibrinolytic pathways and their associated disorders; disseminated intravascular coagulation (DIC); hemolytic syndromes, acute anaemia; complications of massive blood transfusion

Metabolic Disorders: electrolyte disorders; acid-base disorders; fluid-balance disorders; thermoregulation and associated disorders

Causes, recognition and management of HELLP syndrome

Pathogenesis of multiple organ dysfunction (MODS) and the inflammatory response in relation to organ system dysfunction

Indications and contraindications for treatment; circumstances when treatment is unnecessary or futile

Effect of liver failure and its treatment on other organ systems

Supportive therapy for the failing liver including extracorporeal liver support and indications for emergency liver transplantation

Methods for assessing neurological function e.g. Glasgow Coma Scale

Principles of cerebral perfusion pressure, cerebral oxygenation and the methods by which they may be optimised

Factors and therapies which may influence intracranial and cerebral perfusion pressure

Principles of measurement of jugular venous saturation, cerebral Doppler velocities and cerebral blood flow.

Principles, indications and limitations of electroencephalogram (EEG) and evoked potentials

Hepatotoxic drugs and adjustment of drug doses in hepatic impairment / failure Indications for and basic interpretation of drug levels in blood or plasma

Principles of blood glucose control: indications, methods, monitoring of safety & efficacy

Principles and techniques for insertion of gastro-oesophageal balloon tamponade tube (e.g. Sengstaken- Blakemore)

Indications for transcutaneous & trans-jugular liver biopsies and trans-jugular intrahepatic portosystemic shunt (TIPSS)

Principles of outcome prediction / prognostic indicators and treatment intensity scales; limitations of scoring systems in predicting individual patient outcome

SKILLS & BEHAVIOURS

Identify patients at risk of acute liver failure

Interpret laboratory tests of liver function

Recognise impending organ system dysfunction

Order and prioritise appropriate investigations

Critically appraise the evidence for and against specific therapeutic interventions or treatments

Establish a management plan based on clinical and laboratory information

Consider potential interactions when prescribing drugs & therapies

Define targets of therapy and review efficacy at regular intervals

Consider modifying diagnosis and/or therapy if goals are not achieved

Implement emergency airway management, oxygen therapy and ventilation as indicated

Examine and plan care for the confused patient

Assess and document Glasgow Coma Scale (GCS) Take prompt action to reduce acutely elevated intracranial pressure Obtain and interpret data from intracranial pressure monitoring Manage cardiorespiratory physiology to minimise rises in intracranial pressure Identify and manage coagulopathies Prevent, identify and manage hyper / hypoglycaemia Prevent, identify and treat hyponatraemia Perform abdominal paracentesis (see 5.21) Determine when the patient's needs exceed local resources or specialist expertise (requirement for transfer) Lead, delegate and supervise others appropriately according to experience and role Recognise and manage emergencies; seek assistance appropriately.

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 3 - Please refer to competence 3.1 or the aggregate syllabus at the end of this section.

3.6 Recognise and Manage the Patient with Neurological Impairment

KNOWLEDGE
Signs and symptoms of neurological impairment The toxic, metabolic, structural, and infectious causes of altered consciousness Investigation of impaired neurological function; methods for assessing neurological function (e.g. Glasgow Coma Scale) Indications for urgent imaging of the brain and neurosurgical consultation Principles, indications and limitations of electroencephalogram (EEG) and evoked potentials Causes, recognition and management of associated disorders: ***Neurological Disorders*:** acute confusional states and coma; post-anoxic brain damage; intracranial haemorrhage and infarction; sub-arachnoid haemorrhage; cerebro-vascular accidents; convulsions and status epilepticus; meningitis and encephalitis; medical causes of raised intracranial pressure; acute neuromuscular diseases causing respiratory difficulty (e.g. Guillain-Barre, myasthenia gravis, malignant hyperpyrexia); critical illness polyneuropathy, motor neuropathy and myopathy ***Metabolic Disorders***: electrolyte disorders; acid-base disorders; fluid-balance disorders; thermoregulation and associated disorders Signs and symptoms of acute airway insufficiency and acute respiratory failure; indications for intervention in the patient with neurological impairment Indications and contraindications for treatment; circumstances when treatment is unnecessary or futile Effect of impaired neurological function and its support and treatment on other organ systems Effects of concomitant treatment and/or co-morbid conditions on an individual patient's response to treatment Principles of cerebral perfusion pressure, cerebral oxygenation and the methods by which they may be optimised

Factors and therapies which may influence intracranial and cerebral perfusion pressure
Etiology and management of raised intracranial pressure (ICP)
Systems available for intracranial pressure monitoring - indications, principles, type and site of placement of the monitoring device, data collection and trouble-shooting
Cerebral spinal fluid (CSF) drainage for raised ICP
Principles of management of closed head injury Coup and contra-coup injuries
Methods of preventing the 'second insult' to the brain
Management of vasospasm
Indications, contraindications and complications of lumbar puncture (see 5.18)
Principles of measurement of jugular venous saturation, cerebral Doppler velocities and cerebral blood flow.
Application of techniques to treat or induce hypo/hyperthermia
Principles of outcome prediction / prognostic indicators and treatment intensity scales; limitations of scoring systems in predicting individual patient outcome

SKILLS & BEHAVIOURS

Identify patients at risk of neurological impairment
Identify and avoid factors contributing to neurological impairment
Examine and plan care for the confused patient
Assess and document Glasgow Coma Scale (GCS)
Develop a working, and limited differential diagnosis based on presenting clinical features
Order and prioritise appropriate investigations
Establish a management plan based on clinical and laboratory information
Consider potential interactions when prescribing drugs & therapies
Define targets of therapy and review efficacy at regular intervals
Consider modifying diagnosis and/or therapy if goals are not achieved
Undertake or assist in the insertion and maintenance of an intracranial pressure monitor
Obtain and interpret data from intracranial pressure monitoring
Recognise changes in intracranial and cerebral perfusion pressure which are life threatening
Take prompt action to reduce acutely elevated intracranial pressure
Manage cardiorespiratory physiology to minimise rises in intracranial pressure
Perform a lumbar puncture under supervision (see 5.18)
Prevent, identify and treat hyponatraemia
Determine when the patient's needs exceed local resources or specialist expertise (requirement for transfer)
Lead, delegate and supervise others appropriately according to experience and role
Recognise and manage emergencies; seek assistance appropriately

ATTITUDES

The attitudes required for this competence are the same for all competencies in Domain 3 - Please refer to competence 3.1 or the aggregate syllabus at the end of this section.

3.7 Recognise and Manage the Patient with Acute Gastrointestinal Failure

KNOWLEDGE
Signs and symptoms of gastrointestinal dysfunction (obstruction, ischemia, perforation, dysmotility) Causes and complications of gastrointestinal failure Effects of critical illness and treatments on gastric emptying Investigation of acute gastrointestinal dysfunction Causes, recognition and management of associated disorders: ***Gastrointestinal Disorders***: Abdominal pain and distension; stress/peptic ulceration and upper GI haemorrhage; lower GI bleeding; diarrhoea and vomiting; pancreatitis; jaundice; cholecystitis; inflammatory bowel diseases; peritonitis; mesenteric infarction; perforated viscus; bowel obstruction; ascites; intra- abdominal hypertension & compartment syndrome; short-bowel syndrome ***Metabolic Disorders***: electrolyte disorders; acid-base disorders; fluid-balance disorders; thermoregulation and associated disorders Indications and contraindications for treatment; circumstances when treatment is unnecessary or futile Indications for urgent imaging and surgical consultation Effects of impaired gastrointestinal function and its treatment on other organ systems Effects of concomitant treatment and/or co-morbid conditions on an individual patient's response to treatment Factors and therapies which may influence intra-abdominal pressure; etiology and management of raised intra-abdominal pressure Principles and techniques for insertion of gastro-oesophageal balloon tamponade tube (e.g. Sengstaken-Blakemore) Principles of nutritional assessment and support (see 4.9) Principles of outcome prediction / prognostic indicators and treatment intensity scales; limitations of scoring systems in predicting individual patient outcome

SKILLS & BEHAVIOURS
Identify and avoid factors contributing to gastrointestinal dysfunction Identify patients at risk of gastrointestinal dysfunction Prevent, identify and manage hyper / hypoglycaemia Develop a working, and limited differential diagnosis based on presenting clinical features Order and prioritise appropriate investigations Establish a management plan based on clinical and laboratory information Consider potential interactions when prescribing drugs & therapies Define targets of therapy and review efficacy at regular intervals Consider modifying diagnosis and/or therapy if goals are not achieved Lead, delegate and supervise others appropriately according to experience and role Recognise and manage emergencies; seek assistance appropriately

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 3 - Please

refer to competence 3.1 or the aggregate syllabus at the end of this section.

3.8 Recognise and Manage the Patient with Acute Lung Injury Syndromes (ALI/ARDS)

KNOWLEDGE
Signs and symptoms of acute airway insufficiency and acute respiratory failure, and indications for intervention Causes of respiratory failure, their prevention and management Pathogenesis of acute lung injury (ALI / ARDS) Pathogenesis of multiple organ dysfunction (MODS) and the inflammatory response in relation to organ system dysfunction Causes, recognition and management of associated disorders: ***Respiratory Disorders***: tachypnoea, dyspnoea, pneumonia, lung or lobar collapse, pulmonary oedema, acute lung injury (ALI) and acute respiratory distress syndrome (ARDS) and their causative factors; pulmonary haemorrhage, pulmonary embolus, pleural effusion, pneumothorax (simple and tension), near- drowning ***Metabolic Disorders***: acid-base disorders; fluid balance disorders Indications for and basic interpretation of chest radiographs: range of normal features on a chest x-ray; collapse, consolidation, infiltrates (including ALI/ARDS), pneumothorax, pleural effusion, pericardial effusion, position of cannulae, tubes or foreign bodies, airway compression, cardiac silhouette, mediastinal masses Indications for and methods of invasive and non-invasive mechanical ventilation Modes of mechanical ventilation - indications, contraindications & expected results of each mode (CMV, IRV, PRVC, HFOV, SIMV, PS, CPAP, BiPAP, NIV) Initial set-up and modification of ventilator settings according to the condition or response of the patient Potential adverse effects and complications of respiratory support and methods to minimise these Ventilator associated pneumonia: definition, pathogenesis and prevention Detection and management of haemo/pneumothorax (simple and tension) Lung protective ventilation for acute lung injury (ALI) Pharmacological and non-pharmacological adjunct therapies for ALI Principles of weaning from mechanical ventilation and factors which may inhibit weaning Principles of extra-corporeal membrane oxygenation (ECMO) Concept of risk: benefit ratio and cost effectiveness of therapies Principles of outcome prediction/prognostic indicators and treatment intensity scales; limitations of scoring systems in predicting individual patient outcome

SKILLS & BEHAVIOURS
Identify patients at risk of acute lung injury (ALI / ARDS) Identify and avoid factors contributing to acute lung injury Acquire, interpret, synthesize, record, and communicate (written and verbal) clinical information Develop a working, and limited differential diagnosis based on presenting clinical features Implement

emergency airway management, oxygen therapy and ventilation as indicated Select the appropriate type and mode of ventilation for an individual patient Order and prioritise appropriate investigations Establish a management plan based on clinical and laboratory information Critically appraise the evidence for and against specific therapeutic interventions or treatments Consider potential interactions when prescribing drugs & therapies Define targets of therapy and review efficacy at regular intervals Consider modifying diagnosis and/or therapy if goals are not achieved Plan, implement, review and adapt lung protective approach during mechanical ventilation Plan, perform and review lung recruitment manoeuvres Perform thoracocentesis and manage intercostal drains (see 5.8) Lead, delegate and supervise others appropriately according to experience and role Recognise and manage emergencies; seek assistance appropriately

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 3 - Please refer to competence 3.1 or the aggregate syllabus at the end of this section.

3.9 Recognise and Manage the Septic Patient

KNOWLEDGE
Pathogenesis, definitions and diagnostic criteria of sepsis, severe sepsis, septic shock and systemic inflammatory response syndrome (SIRS) Occult indicators of sepsis Causes, recognition and management of sepsis-induced organ dysfunction; multi-system effects of sepsis and their impact on clinical management Infection and its relation to the inflammatory response Sepsis mediators Pathogenesis of multiple organ dysfunction (MODS) and the inflammatory response in relation to organ system dysfunction Causes, recognition and management of associated disorders: ***Infections*:** pyrexia and hypothermia; organ-specific signs of infection including haematogenous (venous catheter-related, endocarditis, meningococcal disease), urological, pulmonary, abdominal (peritonitis, diarrhoea), skeletal (septic arthritis) soft tissue and neurological. Pyometra. Septic abortion. Organisms causing specific infections: Gram positive and Gram negative bacteria, fungi, protozoa, viruses; nosocomial infections Evidence based guidelines: sepsis care bundles - rationale and indications; principles of early goal-directed therapy Indications and contraindications for treatment; circumstances when treatment is unnecessary or futile Effects of concomitant treatment and/or co-morbid conditions on an individual patient's response to treatment

Techniques for effective fluid resuscitation
Use of fluids and vasoactive / inotropic / anti-arrhythmic drugs to support the circulation (see 4.4)
Local patterns of bacterial resistance and antibiotic policy; difference between contamination, colonisation and infection
Indications, complications, interactions, selection, monitoring, and efficacy of common antimicrobial drugs (antibacterial, antifungal, antiviral, antiprotozoal, antihelmintics)
Safe use of therapies which modify the inflammatory response
Principles of blood glucose control: indications, methods, monitoring of safety & efficacy
Detection and management of adrenocortical dysfunction
Concept of risk:benefit ratio and cost effectiveness of therapies
Prognostic implications of multiple systems dysfunction or failure

SKILLS & BEHAVIOURS
Implement emergency airway management, oxygen therapy and ventilation as indicated
Assess, predict and manage circulatory shock
Resuscitate a patient with septic shock using appropriate monitoring, fluid therapy and vasoactive agents
Use fluids and vasoactive / inotropic drugs to support the circulation (see 4.4)
Manage antimicrobial drug therapy (see 4.2)
Obtain and interpret results of microbiological tests (see 2.5)
Develop a working, and limited differential diagnosis based on presenting clinical features
Order and prioritise appropriate investigations
Establish a management plan based on clinical and laboratory information
Critically appraise the evidence for and against specific therapeutic interventions or treatments
Consider potential interactions when prescribing drugs & therapies
Define targets of therapy and review efficacy at regular intervals
Consider modifying diagnosis and/or therapy if goals are not achieved
Prevent, identify and manage hyper/hypoglycaemia
Lead, delegate and supervise others appropriately according to experience and role
Recognise and manage emergencies; seek assistance appropriately

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 3 - Please refer to competence 3.1 or the aggregate syllabus at the end of this section.

3.10 Recognise and Manage the Patient Following Intoxication with Drugs or Environmental Toxins

KNOWLEDGE
Signs and symptoms of acute intoxication associated with common intoxicants
Multi-system effects of acute intoxication and implications for clinical management
General supportive therapy and specific antidotes pertinent to individual intoxicants

Specific management of poisoning with aspirin, paracetamol/acetaminophen, paraquat, carbon monoxide, alcohol, ecstasy, tricyclic and quadricyclic antidepressants
Strategies to reduce absorption and enhance elimination (haemodialysis, haemoperfusion, gastric lavage and charcoal therapy)
Pharmacology of common intoxicants
Indications for and basic interpretation of drug levels in blood or plasma Indications and complications of hyperbaric oxygenation
Causes, recognition and management of associated disorders:
Respiratory Disorders: smoke, inhalation or burned airway damage; carbon monoxide poisoning
Cardiovascular Disorders: drug induced arrhythmias and conduction disturbances
Neurological Disorders: drug induced neurological impairment
Renal Disorders: nephrotoxic drugs - monitoring & adjustment of drug doses in renal impairment / failure; rhabdomyolysis
Metabolic Disorders: electrolyte disorders; acid-base disorders; fluid-balance disorders; thermoregulation and associated disorders
Gastrointestinal Disorders: drug induced liver injury; hepatotoxic drugs and adjustment of drug doses in hepatic impairment / failure; fulminant hepatic failure
Haematological Disorders: drug induced coagulopathy
Indications and contraindications for treatment; circumstances when treatment is unnecessary or futile
Effects of concomitant treatment and/or co-morbid conditions on an individual patient's response to treatment
Management of acute liver failure (see 3.5)
Services available to patients and families to provide emotional or psychiatric support
Principles of outcome prediction / prognostic indicators and treatment intensity scales; limitations of scoring systems in predicting individual patient outcome

SKILLS & BEHAVIOURS

Acquire, interpret, synthesize, record, and communicate (written and verbal) clinical information
Develop a working, and limited differential diagnosis based on presenting clinical features
Order and prioritise appropriate investigations
Establish a management plan based on clinical and laboratory information
Critically appraise the evidence for and against specific therapeutic interventions or treatments
Interpret laboratory tests of liver function
Consider potential interactions when prescribing drugs & therapies
Define targets of therapy and review efficacy at regular intervals
Consider modifying diagnosis and/or therapy if goals are not achieved
Assess and document Glasgow Coma Scale (GCS)
Implement emergency airway management, oxygen therapy and ventilation as indicated Identify patients at risk of developing renal failure
Identify patients at risk of acute liver failure
Identify and manage coagulopathies

Examine and plan care for the confused patient Determine when the patient's needs exceed local resources or specialist expertise (requirement for transfer) Lead, delegate and supervise others appropriately according to experience and role Recognise and manage emergencies; seek assistance appropriately

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 3 - Please refer to competence 3.1 or the aggregate syllabus at the end of this section.

3.11 Recognise Life-Threatening Maternal Peripartum Complications and Manage Care Under Supervision

KNOWLEDGE
Physiological changes associated with a normal pregnancy and delivery Cardiopulmonary resuscitation of the pregnant patient Pathophysiology, identification and management of peripartum complications: pre-eclampsia and eclampsia; HELLP syndrome; amniotic fluid embolism; ante-partum and post-partum haemorrhage; ectopic pregnancy; septic abortion Risks and avoidance of pulmonary aspiration in pregnant patients Methods of avoiding aorto-caval compression Risk factors, identification and management of venous thromboembolism Causes, recognition and management of associated disorders: ***Cardiovascular Disorders***: peripartum cardiomyopathy; pulmonary hypertension ***Haematological Disorders***: coagulation and fibrinolytic pathways and their associated disorders; disseminated intravascular coagulation (DIC); hemolytic syndromes, acute anaemia; complications of massive blood transfusion ***Metabolic Disorders***: electrolyte disorders; acid-base disorders; fluid-balance disorders; thermoregulation and associated disorders Indications and contraindications for treatment; circumstances when treatment is unnecessary or futile Effects of concomitant treatment and/or co-morbid conditions on an individual patient's response to treatment Identification of unexpected concurrent pregnancy in a critically ill woman Awareness of the psychological impact of separation on the family Principles of outcome prediction / prognostic indicators and treatment intensity scales; limitations of scoring systems in predicting individual patient outcome

SKILLS & BEHAVIOURS
Seek appropriate support and supervision in order to provide optimal patient care Liaise with obstetric and midwifery services Recognise and manage emergencies; seek assistance appropriately

Manage pregnancy induced hypertension Identify and manage coagulopathies Develop a working, and limited differential diagnosis based on presenting clinical features Order and prioritise appropriate investigations Establish a management plan based on clinical and laboratory information Critically appraise the evidence for and against specific therapeutic interventions or treatments Consider potential interactions when prescribing drugs & therapies Define targets of therapy and review efficacy at regular intervals Consider modifying diagnosis and/or therapy if goals are not achieved

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 3 - Please refer to competence 3.1 or the aggregate syllabus at the end of this section.

AGGREGATE SYLLABUS

DOMAIN 3: DISEASE MANAGEMENT

KNOWLEDGE
Pathophysiology, diagnosis and management of commonly encountered acute and chronic medical conditions including: ***Respiratory Disorders***: the unprotected airway; pneumonia, lung or lobar collapse, asthma, chronic obstructive airways disease, pulmonary oedema, acute lung injury (ALI) and acute respiratory distress syndrome (ARDS) and their causative factors; pulmonary haemorrhage, pulmonary embolus, pleural effusion, pneumothorax (simple and tension); upper and lower airway obstruction including epiglottitis, respiratory muscle disorders; pulmonary fibrosis; pulmonary thrombo-embolic disease ***Cardiovascular Disorders***: shock states (anaphylactic, cardiogenic, hypovolaemic, septic); crescendo / unstable / chronic angina; acute myocardial infarction; left ventricular failure; chronic heart failure; cardiomyopathies; valvular heart disease and prosthetic valves; vaso-occlusive diseases; pulmonary hypertension; right ventricular failure; cor pulmonale; malignant hypertension; cardiac tamponade; common arrhythmias and conduction disturbances, pacing box failure; peripheral vascular disease ***Neurological Disorders***: acute confusional states and coma; post-anoxic brain damage; intracranial haemorrhage and infarction; sub-arachnoid haemorrhage; cerebro-vascular accidents (CVA / stroke); convulsions and status epilepticus; meningitis and encephalitis; medical causes of raised intracranial pressure; acute neuromuscular diseases causing respiratory difficulty (e.g. Guillain-Barre, myasthenia gravis, malignant hyperpyrexia); critical illness polyneuropathy, motor neuropathy and myopathy; cerebro- vascular accidents (CVA / stroke); dementia

Renal and Genito-Urinary Disorders: urological sepsis; acute renal failure; chronic renal failure; renal manifestations of systemic disease including vasculitides; nephrotoxic drugs and monitoring; rhabdomyolysis

Gastrointestinal Disorders: peptic/stress ulceration; upper GI haemorrhage; diarrhoea and vomiting; pancreatitis; cholecystitis; jaundice; acute and chronic liver failure; fulminant hepatic failure; paracetamol (acetaminophen)-induced liver injury; cirrhosis; inflammatory bowel diseases; peritonitis; ascites; mesenteric infarction; perforated viscus; bowel obstruction & pseudo-obstruction; abdominal trauma; intra- abdominal hypertension & compartment syndrome; short-bowel syndrome; rupture of liver or spleen.

Haematological and Oncological Disorders: disseminated intravascular coagulation (DIC) and other coagulation disorders, hemolytic syndromes, acute and chronic anaemia, immune disorders; lymphoproliferative disorders. High risk groups: the immunosuppressed or immune-incompetent patient, chemotherapy, agranulocytosis and bone marrow transplant patients. Massive blood transfusion. Malignancy including complications of chemotherapy and radiotherapy

Infections: pyrexia and hypothermia; organ-specific signs of infection including haematogenous (venous catheter-related, endocarditis, meningococcal disease), urological, pulmonary, abdominal (peritonitis, diarrhoea), skeletal (septic arthritis) soft tissue and neurological. Pyometra. Septic abortion. Organisms causing specific infections: Gram positive and Gram negative bacteria, fungi, protozoa, viruses; nosocomial infections

Metabolic Disorders: electrolyte disorders; acid-base disorders; fluid-balance disorders; thermoregulation and associated disorders

Endocrine Disorders: critical illness-induced hyperglycaemia; diabetes mellitus; over- and under-activity of thyroid; adrenal and pituitary disorders; sepsis-induced relative adrenal insufficiency; endocrine emergencies

Treatment algorithms for common medical emergencies

Diagnosis and management of other acute medical conditions until appropriate specialist assistance is available

Definitive / long term management of commonly encountered acute medical conditions Investigation of impaired organ function

Range of therapeutic interventions available to support organ function and treat the underlying causes

Multi-system effects of acute medical conditions and implications for clinical management

Indications and contraindications for treatment; circumstances when treatment is unnecessary or futile

Therapies available for the treatment of commonly encountered medical conditions, their efficacy and potential side-effects

Complications of specific therapies, their incidence and management

Concept of risk:benefit ratio and cost effectiveness of therapies

Complications of the disease processes; effects of disease and its treatments on other organ systems

Effects of concomitant treatment and/or co-morbid conditions on an individual patient's response to treatment

Impact of occupational and environmental exposures, socio-economic factors, and life style factors on

critical illness
Principles of outcome prediction / prognostic indicators and treatment intensity scales; limitations of scoring systems in predicting individual patient outcome
Causes and consequences of decompensation in chronic organ failure; diagnosis and management of acute- on-chronic organ failure
Long term effects of acute medical conditions and late complications
Pathogenesis of multiple organ dysfunction (MODS) and the inflammatory response in relation to organ system dysfunction
Risk factors, recognition and assessment of single or multiple organ failure
Cardiopulmonary resuscitation
Techniques for effective fluid resuscitation
Use of fluids and vasoactive / inotropic / anti-arrhythmic drugs to support the circulation (see 4.4)
Use of mechanical assist devices to support the circulation (see 4.4)
Indications, complications, interactions, selection, monitoring, and efficacy of common antimicrobial drugs (antibacterial, antifungal, antiviral, antiprotozoal, antihelmintics)
Local patterns of bacterial resistance and antibiotic policy; difference between contamination, colonisation and infection
Safe use of therapies which modify the inflammatory response
Principles of management of closed head injury
Coup and contra-coup injuries
Methods of preventing the 'second insult' to the brain
Methods for assessing neurological function e.g. Glasgow Coma Scale
Principles of cerebral perfusion pressure, cerebral oxygenation and the methods by which they may be optimised
Factors and therapies which may influence intracranial and cerebral perfusion pressure
Application of techniques to treat or induce hypo/hyperthermia
Systems available for intracranial pressure monitoring - indications, principles, type and site of placement of the monitoring device, data collection and trouble-shooting
Cerebral spinal fluid (CSF) drainage for raised ICP
Indications, contraindications and complications of lumbar puncture (see 5.18)
Management of vasospasm
Principles of measurement of jugular venous saturation, cerebral Doppler velocities and cerebral blood flow.
Principles, indications and limitations of electroencephalogram (EEG) and evoked potentials
Indications for urgent imaging of the brain and neurosurgical consultation
Functions of the liver - biosynthetic, immunologic, and detoxification
Signs and symptoms of acute liver failure and assessment of severity
Causes and complications of acute and acute-on-chronic liver failure, their prevention and management
Supportive therapy for the failing liver including extracorporeal liver support and indications for emergency liver transplantation
Principles and techniques for insertion of gastro-oesophageal balloon tamponade tube (e.g.

Sengstaken- Blakemore)
Etiology and management of raised intracranial pressure (ICP)
Hepatotoxic drugs and adjustment of drug doses in hepatic impairment / failure
Indications for transcutaneous & trans-jugular liver biopsies and trans-jugular intrahepatic portosystemic shunt (TIPSS)
Principles of blood glucose control: indications, methods, monitoring of safety & efficacy
Causes and complications of renal failure - methods to prevent or treat these
Signs, symptoms and causes of renal failure (acute / chronic / acute on chronic) and indications for intervention
Distinguishing features of acute versus chronic renal failure and implications for management
Investigation of impaired renal function
Indications, complications and selection of renal replacement therapies (continuous and intermittent)
Nephrotoxic drugs and adjustment of drug doses in renal impairment/failure
Urinary catheterisation techniques: transurethral and suprapubic
Factors and therapies which may influence intra-abdominal pressure; etiology and management of raised intra-abdominal pressure
Principles of nutritional assessment and support (see 4.9)
Signs and symptoms of acute airway insufficiency and acute respiratory failure, and indications for intervention
Causes of respiratory failure, their prevention and management
Indications for and methods of invasive and non-invasive mechanical ventilation
Modes of mechanical ventilation - indications, contraindications & expected results of each mode (CMV, IRV, PRVC, HFOV, SIMV, PS, CPAP, BiPAP, NIV)
Initial set-up and modification of ventilator settings according to the condition or response of the patient
Lung protective ventilation for acute lung injury (ALI)
Pharmacological and non-pharmacological adjunct therapies for ALI
Detection and management of haemo/pneumothorax (simple and tension)
Principles of weaning from mechanical ventilation and factors which may inhibit weaning
Potential adverse effects and complications of respiratory support and methods to minimise these
Indications for and basic interpretation of chest radiographs: range of normal features on a chest x-ray; collapse, consolidation, infiltrates (including ALI/ARDS), pneumothorax, pleural effusion, pericardial effusion, position of cannulae, tubes or foreign bodies, airway compression, cardiac silhouette, mediastinal masses
Ventilator associated pneumonia: definition, pathogenesis and prevention
Principles of extra-corporeal membrane oxygenation (ECMO)
Pathogenesis, definitions and diagnostic criteria of sepsis, severe sepsis, septic shock and systemic inflammatory response syndrome (SIRS)
Occult indicators of sepsis
Causes, recognition and management of sepsis-induced organ dysfunction; multi-system effects of sepsis and their impact on clinical management
Prognostic implications of multiple systems dysfunction or failure

Evidence based guidelines: sepsis care bundles - rationale and indications; principles of early goal-directed therapy Signs and symptoms of acute intoxication associated with common intoxicants Multi-system effects of acute intoxication and implications for clinical management General supportive therapy and specific antidotes pertinent to individual intoxicants Specific management of poisoning with aspirin, paracetamol/acetaminophen, paraquat, carbon monoxide, alcohol, ecstasy, tricyclic and quadricyclic antidepressants Strategies to reduce absorption and enhance elimination (haemodialysis, haemoperfusion, gastric lavage and charcoal therapy) Pharmacology of common intoxicants Indications for and basic interpretation of drug levels in blood or plasma Indications and complications of hyperbaric oxygenation Services available to patients and families to provide emotional or psychiatric support Physiological changes associated with a normal pregnancy and delivery Pathophysiology, identification and management of peripartum complications: pre-eclampsia and eclampsia; HELLP syndrome; amniotic fluid embolism; ante-partum and post-partum haemorrhage; ectopic pregnancy; septic abortion Risks and avoidance of pulmonary aspiration in pregnant patients Methods of avoiding aorto-caval compression Cardiopulmonary resuscitation of the pregnant patient Identification of unexpected concurrent pregnancy in a critically ill woman Awareness of the psychological impact of separation on the family

SKILLS & BEHAVIOURS
Recognise and diagnose commonly encountered acute medical conditions (according to national case mix) Acquire, interpret, synthesize, record, and communicate (written and verbal) clinical information Develop a working, and limited differential diagnosis based on presenting clinical features Recognise impending organ system dysfunction Order and prioritise appropriate investigations Establish a management plan based on clinical and laboratory information Critically appraise the evidence for and against specific therapeutic interventions or treatments Prioritise therapy according to the patient's needs Consider potential interactions when prescribing drugs & therapies Identify and manage chronic co-morbid disease Identify and evaluate requirements for continuation of chronic treatments during and after the acute illness Take chronic health factors into account when determining suitability for intensive care Evaluate the impact of chronic disease and prior health on outcomes Define targets of therapy and review efficacy at regular intervals Consider modifying diagnosis and/or therapy if goals are not achieved Optimise myocardial function

Use fluids and vasoactive/inotropic drugs to support the circulation (see 4.4)
Identify and avoid factors contributing to impaired renal function
Identify patients at risk of developing renal failure
Initiate, manage and wean patients from renal replacement therapy (see 4.7)
Perform aseptic urinary catheterisation: male and female (see 5.24)
Identify patients at risk of acute liver failure
Interpret laboratory tests of liver function
Prevent, identify and manage hyper/hypoglycaemia
Identify and manage coagulopathies
Examine and plan care for the confused patient
Assess and document Glasgow Coma Scale (GCS)
Recognise changes in intracranial and cerebral perfusion pressure which are life threatening
Take prompt action to reduce acutely elevated intracranial pressure
Undertake or assist in the insertion and maintenance of an intracranial pressure monitor
Obtain and interpret data from intracranial pressure monitoring
Manage cardiorespiratory physiology to minimise rises in intracranial pressure
Prevent, identify and treat hyponatraemia
Implement emergency airway management, oxygen therapy and ventilation as indicated
Demonstrate emergency relief of tension pneumothorax
Perform thoracocentesis and manage intercostal drains (see 5.8)
Select the appropriate type and mode of ventilation for an individual patient
Plan, implement, review and adapt lung protective approach during mechanical ventilation
Plan, perform and review lung recruitment manoeuvres
Assess, predict and manage circulatory shock
Measure and interpret haemodynamic variables (including derived variables)
Resuscitate a patient with septic shock using appropriate monitoring, fluid therapy and vasoactive agents
Manage antimicrobial drug therapy (see 4.2)
Obtain and interpret results of microbiological tests (see 2.5)
Perform a lumbar puncture under supervision (see 5.18)
Perform abdominal paracentesis (see 5.21)
Liaise with obstetric and midwifery services
Manage pregnancy induced hypertension
Determine when the patient's needs exceed local resources or specialist expertise (requirement for transfer)
Lead, delegate and supervise others appropriately according to experience and role
Recognise and manage emergencies; seek assistance appropriately

ATTITUDES
Demonstrate compassionate care of patients and relatives
Appreciate the importance of timely institution of organ-system support
Appreciate the differences between organ system support and specific treatment

	Enquiring mind, undertake critical analysis of published literature Adopt a problem solving approach Desire to minimise patient distress Consult, communicate and collaborate effectively with patients, relatives and the health care team Recognise personal limitations, seeks and accepts assistance or supervision (know how, when and who to ask)

DOMAIN 4: THERAPEUTIC INTERVENTIONS & ORGAN SYSTEM SUPPORT IN SINGLE OR MULTIPLE ORGAN FAILURE

4.1 Prescribe Drugs and Therapies Safely

	KNOWLEDGE
	Mode of action of drugs (see basic sciences) Pharmacokinetics & pharmacodynamics (see basic sciences) **Systemic Pharmacology**: indications, contraindications, effects and interactions of commonly used drugs including: - hypnotics, sedatives and intravenous anaesthetic agents - simple & opioid analgesics; opioid antagonists - non-steroidal anti-inflammatory agents - neuromuscular blocking agents (depolarising & non-depolarising) & anti-cholinesterases - drugs acting on the autonomic nervous system (inotropes, vasodilators, vasoconstrictors, antiarrhythmics) - respiratory stimulants and bronchodilators - anti-hypertensives - anti-convulsants - anti-diabetic agents - diuretics - antibiotics (antibacterial, antifungal, antiviral, antiprotozoal, antihelmintics) - corticosteroids and hormone preparations - drugs influencing gastric secretion & motility; antiemetic agents - local anaesthetic agents - immunosuppressants - antihistamines - antidepressants - anticoagulants - plasma volume expanders Adverse effects and interactions of drugs and their management Recognition and management of serious adverse reactions and anaphylaxis Local policies and procedures governing the prescription of drugs and therapies Indications for and basic interpretation of drug levels in blood or plasma Impact of drug therapy on organ-system function Effects of concomitant treatment and/or co-morbid conditions on an individual patient's response to treatment Prophylactic therapies and indications for their use Concept of risk: benefit ratio and cost effectiveness of therapies Complications of specific therapies, their incidence and management Circumstances when treatment is unnecessary Effect of critical illness upon homeostatic mechanisms and causes of homeostatic disturbances

Physiology of fluid, electrolyte, acid-base and glucose control
Treatment strategies for abnormalities of fluid, electrolyte, acid-base and glucose balance
Principles of blood glucose control: indications, methods, monitoring of safety & efficacy
Methods to assess and monitor intravascular volume and state of hydration using clinical signs and modern technology
Fluid therapies: components, physical properties, distribution and clearance of commonly used fluids; indications, contraindications and complications of their administration
Theoretical advantages and disadvantages of crystalloid and colloid solutions
The pathogenesis and management of anaemia, thrombocytopenia, neutropenia and pancytopenia
Principles of blood and blood component therapy; principles of massive transfusion
Distinguishing features of acute versus chronic respiratory failure and implications for management
Principles of oxygen therapy and use of oxygen administration devices (see 5.1)
Safe prescribing of oxygen; manifestations of pulmonary oxygen toxicity
Nephrotoxic drugs and adjustment of drug doses in renal impairment/failure
Indications, limitations, methods, and complications of enteral and parenteral nutritional techniques
Risk of bleeding: indications, contraindications, monitoring and complications of therapeutic anticoagulants, thrombolytic and anti-thrombolytic agents
Nutritional formulations: indications, complications and their management

SKILLS & BEHAVIOURS
Prioritise therapy according to the patient's needs
Establish a management plan based on clinical and laboratory information
Consider potential interactions when prescribing drugs & therapies
Consider risk-benefit and cost-benefit of alternative drugs & therapies
Critically appraise the evidence for and against specific therapeutic interventions or treatments
Set realistic goals for therapy (independently or in collaboration with other teams)
Define targets of therapy and review efficacy at regular intervals
Consider modifying diagnosis and/or therapy if goals are not achieved
Recognise when treatment is unnecessary or futile
Administer intravenous drugs (prepare, select route and mode of administration and document)
Prescribe appropriate antimicrobial therapy based on history, examination and preliminary investigations
Choose appropriate fluid, volume, rate and method of administration
Consider and exclude unknown pathology if goals of fluid therapy are not achieved (e.g. continued bleeding)
Identify and avoid factors contributing to impaired renal function
Prescribe and manage anticoagulation therapy
Prescribe an appropriate standard enteral feeding regimen
Lead, delegate and supervise others appropriately according to experience and role

ATTITUDES
Appreciate the importance of timely institution of organ-system support

Appreciate the differences between organ system support and specific treatment Recognise the need for supportive care for all organ systems whether failing / injured or not Respond rapidly to acute changes in monitored variables Consult, communicate and collaborate effectively with patients, relatives and the health care team Demonstrate compassionate care of patients and relatives Desire to minimise patient distress Respect the ideas and beliefs of the patient and their family and their impact on decision making (does not impose own views) Respect the expressed wishes of competent patients Lead, delegate and supervise others appropriately according to experience and role Recognise personal limitations, seeks and accepts assistance or supervision (know how, when and who to ask)

4.2 Manage Antimicrobial Drug Therapy

KNOWLEDGE
Epidemiology and prevention of infection in the ICU Types of organisms - emergence of resistant strains, mode of transfer, opportunistic and nosocomial infections; difference between contamination, colonisation & infection Risk factors for nosocomial infection and infection control measures to limit its occurrence Requirements for microbiological surveillance and clinical sampling Local patterns of bacterial resistance and antibiotic policy Indications, complications, interactions, selection, monitoring, and efficacy of common antimicrobial drugs (antibacterial, antifungal, antiviral, antiprotozoal, antihelmintics) Principles of prescribing initial empirical therapy and modification/refinement with further clinical and microbiological information Safe use of therapies which modify the inflammatory response Indications for and basic interpretation of drug levels in blood or plasma Impact of drug therapy on organ-system function Effects of concomitant treatment and/or co-morbid conditions on an individual patient's response to treatment Prophylactic therapies and indications for their use Circumstances when treatment is unnecessary Causes of regurgitation and vomiting; prevention and management of pulmonary aspiration Ventilator associated pneumonia: definition, pathogenesis and prevention Techniques for preventing gastrointestinal microbial translocation Risks of inappropriate antimicrobial therapy on the patient and the environment

SKILLS & BEHAVIOURS
Collaborate with microbiologists/infectious diseases clinicians to link clinical, laboratory and local (hospital/regional) microbiological data Establish a management plan based on clinical and laboratory information

Critically appraise the evidence for and against specific therapeutic interventions or treatments
Prescribe appropriate antimicrobial therapy based on history, examination and preliminary investigations
Administer intravenous drugs (prepare, select route and mode of administration and document)
Set realistic goals for therapy (independently or in collaboration with other teams)
Define targets of therapy and review efficacy at regular intervals
Consider modifying diagnosis and/or therapy if goals are not achieved
Recognise when treatment is unnecessary or futile

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 4 - Please refer to competence 4.1 or the aggregate syllabus at the end of this section.

4.3 Administer Blood and Blood Products Safely

KNOWLEDGE
Pathophysiological effects of altered intravascular volume
Indications for and basic interpretation of haematological tests
The pathogenesis and management of anaemia, thrombocytopenia, neutropenia and pancytopenia
Indications for and basic interpretation of blood grouping and x-matching
Indications for, contraindication, risks and alternatives to blood transfusion
Local protocols which govern the ordering, storage & verification procedures, monitoring during administration of blood products and reporting of adverse incidents
Principles of blood and blood component therapy; principles of massive transfusion
Infections from contaminated blood / body fluids; strategy if contaminated (e.g. needle stick injury)
Coagulation and fibrinolytic pathways, and their associated disorders; clinical and laboratory evaluation of haemostasis
Risk of bleeding: indications, contraindications, monitoring and complications of therapeutic anticoagulants, thrombolytic and anti-thrombolytic agents
Recognition and management of serious adverse reactions and anaphylaxis
Principles of plasma exchange

SKILLS & BEHAVIOURS
Obtain informed consent/assent from the patient where appropriate
Identify and correct haemostatic and coagulation disorders
Order, check, verify and administer blood products according to local protocols
Establish a management plan based on clinical and laboratory information
Define targets of therapy and review efficacy at regular intervals
Consider modifying diagnosis and/or therapy if goals are not achieved
Recognise when treatment is unnecessary or futile
Lead, delegate and supervise others appropriately according to experience and role
Recognise and manage emergencies; seek assistance appropriately

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 4 - Please refer to competence 4.1 or the aggregate syllabus at the end of this section.

4.4 Use Fluids and Vasoactive/Inotropic Drugs to Support Circulation

KNOWLEDGE
Physiology and pathophysiology of the heart and circulation
Pathophysiological effects of altered intravascular volume
Fluid therapies: components, physical properties, distribution and clearance of commonly used fluids; indications, contraindications and complications of their administration
Mechanisms of assessment of response to fluid
Theoretical advantages and disadvantages of crystalloid and colloid solutions
Indications for, contraindication, risks and alternatives to blood transfusion
Principles of haemodynamic monitoring - invasive & non-invasive methods, indications & limitations, physiological parameters and waveform interpretation
Invasive & non-invasive systems available for measuring cardiac output and derived haemodynamic variables, principles involved and the type and site of placement of the monitoring device
Indications, limitations and complications of techniques of measurement of cardiac output (e.g. pulmonary artery catheters, oesophageal Doppler, PiCCO, LiDCO) and action to prevent them
Pathophysiology, detection and management of shock states according to aetiology and in response to physiological data
Integration of data from clinical examination and haemodynamic monitoring to characterise haemodynamic derangements
Pathophysiology and treatment of cardiac failure
Indications and contraindications, limitations and complications of inotropic/vasoactive drug therapy
Interactions between inotropic agents and concomitant therapies and/or co-morbid diseases (e.g. ischaemic heart disease)
Receptor-specific effects of inotropic and vasopressor agents; effects of critical illness and concomitant therapies on receptor function (e.g. down-regulation)

SKILLS & BEHAVIOURS
Measure and interpret haemodynamic variables (including derived variables)
Establish a management plan based on clinical and laboratory information
Choose appropriate fluid, volume, rate and method of administration
Administer and monitor response to repeated fluid challenges
Consider and exclude unknown pathology if goals of fluid therapy are not achieved (e.g. continued bleeding)
Resuscitate a patient with septic shock using appropriate monitoring, fluid therapy and vasoactive agents

Select an appropriate inotrope / vasopressor - dose, physiological endpoint, rate and route of administration Administer intravenous drugs (prepare, select route and mode of administration and document) Use infusion pumps to administer drugs and fluids Define targets of therapy and review efficacy at regular intervals Recognise and manage emergencies; seek assistance appropriately

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 4 - Please refer to competence 4.1 or the aggregate syllabus at the end of this section.

4.5 Describe the Use of Mechanical Assist Devices to Support the Circulation

KNOWLEDGE
Pathophysiology and treatment of cardiac failure Prophylactic therapies and indications for their use Principles and techniques of cardiac pacing Principles of right and left ventricular assist devices Indications, contraindications, complications and basic principles of intra-aortic counter pulsation balloon pump Principles of extra-corporeal membrane oxygenation (ECMO) Principles of haemodynamic monitoring - invasive & non-invasive methods, indications & limitations, physiological parameters and waveform interpretation Invasive & non-invasive systems available for measuring cardiac output and derived haemodynamic variables, principles involved and the type and site of placement of the monitoring device Integration of data from clinical examination and haemodynamic monitoring to characterise haemodynamic derangements Pathophysiology, detection and management of shock states according to aetiology and in response to physiological data

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 4 - Please refer to competence 4.1 or the aggregate syllabus at the end of this section.

4.6 Initiate, Manage and Wean Patients from Invasive and Non-Invasive Ventilatory Support

KNOWLEDGE
Causes of respiratory failure, their prevention and management Principles of oxygen therapy and use of oxygen administration devices (see 5.1)

Signs and symptoms of acute airway insufficiency and acute respiratory failure, and indications for intervention

Distinguishing features of acute versus chronic respiratory failure and implications for management

Principles of emergency airway management (see 5.3)

Indications for and methods of invasive and non-invasive mechanical ventilation

Principles of continuous positive airways pressure (CPAP) and positive end-expiratory pressure (PEEP) and CPAP & PEEP delivery systems

Modes of mechanical ventilation - indications, contraindications & expected results of each mode (CMV, IRV, PRVC, HFOV, SIMV, PS, CPAP, BiPAP, NIV)

Operation of at least one positive pressure ventilator, one non-invasive ventilator, and a constant positive airway pressure (CPAP) device

A systematic approach to checking ventilator, breathing circuit and monitoring devices

Initial set-up and modification of ventilator settings according to the condition or response of the patient

Principles of monitoring ventilation - significance of respiratory rate, tidal volume, minute volume, mean, peak, end expiratory and plateau pressure, intrinsic and extrinsic PEEP, inspired oxygen concentration, arterial blood gas and acid base status; relationship between mode of ventilation and choice of parameters monitored; airflow and airway pressure waveforms

Measures of adequacy of tissue oxygenation

Measurement and interpretation of pulmonary mechanics during mechanical ventilation

Potential adverse effects and complications of respiratory support and methods to minimise these

Causes of regurgitation and vomiting; prevention and management of pulmonary aspiration

Ventilator associated pneumonia: definition, pathogenesis and prevention

Techniques for preventing gastrointestinal microbial translocation

Prophylactic therapies and indications for their use

Safe prescribing of oxygen; manifestations of pulmonary oxygen toxicity

Causes of lung injury in ventilated patients; effects and clinical manifestations of pulmonary barotrauma

Effect of ventilation upon cardiovascular and oxygen delivery parameters, other organ function and how these effects can be monitored (heart-lung interactions)

Principles of physiotherapy in the ICU

Principles of weaning from mechanical ventilation and factors which may inhibit weaning

Indications and contraindications to tracheostomy (percutaneous and surgical) and minitracheostomy

Management of and complications associated with tracheostomy tubes

Principles of extra-corporeal membrane oxygenation (ECMO)

SKILLS & BEHAVIOURS

Establish a management plan based on clinical and laboratory information

Select the appropriate type and mode of ventilation for an individual patient

Identify and correct ventilator mis-assembly and disconnections

Stabilise a patient on a constant positive airway pressure (CPAP) device

Stabilise a patient on a non-invasive ventilator (NIV)

Stabilise a patient on a positive pressure ventilator
Interpret data from an arterial blood gas sample
Confirm adequate oxygenation and control of $PaCO_2$ and pH
Set and interpret data from ventilator alarms
Construct, monitor and review a weaning plan
Define targets of therapy and review efficacy at regular intervals
Consider modifying diagnosis and/or therapy if goals are not achieved
Lead, delegate and supervise others appropriately according to experience and role
Recognise and manage emergencies; seek assistance appropriately

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 4 - Please refer to competence 4.1 or the aggregate syllabus at the end of this section.

4.7 Initiate, Manage and Wean Patient from Renal Replacement Therapy

KNOWLEDGE
Physiology of fluid, electrolyte, acid-base and glucose control
Signs, symptoms and causes of renal failure (acute / chronic / acute on chronic) and indications for intervention
Investigation of impaired renal function
Distinguishing features of acute versus chronic renal failure and implications for management
Indications, complications and selection of renal replacement therapies (continuous and intermittent)
Placement & management of invasive devices necessary for renal replacement therapy (e.g. temporary haemodialysis catheter)
Principles of haemofiltration, haemodialysis, peritoneal dialysis, haemoperfusion and plasmapheresis
Function and operation of continuous haemodiafiltration devices (key components & trouble-shooting)
Fluid therapies: components, physical properties, distribution and clearance of commonly used fluids; indications, contraindications and complications of their administration
Effects of concomitant treatment and/or co-morbid conditions on an individual patient's response to treatment
Indications for and interpretation of fluid balance charts
Nephrotoxic drugs and adjustment of drug doses in renal impairment/failure
Effect of renal failure and its treatment on other organ systems

SKILLS & BEHAVIOURS
Prioritise therapy according to the patient's needs
Establish a management plan based on clinical and laboratory information
Critically appraise the evidence for and against specific therapeutic interventions or treatments
Consider risk-benefit and cost-benefit of alternative drugs & therapies
Set realistic goals for therapy (independently or in collaboration with other teams)

Supervise the provision of continuous renal replacement therapy
Set appropriate exchange and fluid balances for renal replacement therapies
Define targets of therapy and review efficacy at regular intervals
Modify fluid and electrolyte therapy according to clinical features and fluid balance charts
Prescribe and manage anticoagulation therapy
Prevent hypokalaemia
Identify and correct haemostatic and coagulation disorders
Consider modifying diagnosis and/or therapy if goals are not achieved
Identify and avoid factors contributing to impaired renal function
Recognise when treatment is unnecessary or futile
Lead, delegate and supervise others appropriately according to experience and role

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 4 - Please refer to competence 4.1 or the aggregate syllabus at the end of this section.

4.8 Recognise and Manage Electrolyte, Glucose and Acid-Base Disturbances

KNOWLEDGE
Effect of critical illness upon homeostatic mechanisms and causes of homeostatic disturbances
Physiology of fluid, electrolyte, acid-base and glucose control
Pathophysiological consequences, signs and symptoms of disordered fluid, electrolyte, acid-base and glucose balance
Treatment strategies for abnormalities of fluid, electrolyte, acid-base and glucose balance
Signs, symptoms and causes of renal failure (acute / chronic / acute on chronic) and indications for intervention
Patterns of nutritional impairment; consequences of starvation and malnutrition
Principles of blood glucose control: indications, methods, monitoring of safety & efficacy
Fluid therapies: components, physical properties, distribution and clearance of commonly used fluids; indications, contraindications and complications of their administration

SKILLS & BEHAVIOURS
Establish a management plan based on clinical and laboratory information
Critically appraise the evidence for and against specific therapeutic interventions or treatments
Correct electrolyte disorders (e.g. hyperkalaemia, hyponatraemia)
Institute and manage a regimen to control blood glucose within safe limits
Identify and avoid factors contributing to impaired renal function
Confirm adequate oxygenation and control of $PaCO_2$ and pH
Identify and treat underlying causes for a metabolic acidosis
Define targets of therapy and review efficacy at regular intervals
Consider modifying diagnosis and/or therapy if goals are not achieved
Recognise when treatment is unnecessary or futile

Recognise and manage emergencies; seek assistance appropriately

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 4 - Please refer to competence 4.1 or the aggregate syllabus at the end of this section.

4.9 Co-ordinate and Provide Nutritional Assessment and Support

KNOWLEDGE
Principles of metabolism: nutrients - carbohydrates, fats, proteins, vitamins and minerals; metabolic pathways, lactate metabolism, energy production and enzymes; metabolic rate; hormonal control of metabolism - regulation of plasma glucose; physiological alterations in starvation, obesity and stress response. Pathophysiological consequences, signs and symptoms of disordered fluid, electrolyte, acid-base and glucose balance Methods to assess nutritional status and basal energy expenditure Patterns of nutritional impairment; consequences of starvation and malnutrition Fluid & caloric requirements in the critically ill patient including electrolytes, vitamins, trace elements and principles of immunonutrition Nutritional formulations: indications, complications and their management Indications, limitations, methods, and complications of enteral and parenteral nutritional techniques Gastrointestinal physiology: gastric function; secretions; gut motility, sphincters and reflex control; nausea and vomiting; digestive functions Principles of nasogastric cannulation in the intubated and non-intubated patient Alternative routes for enteral feeding: indications, contraindications and complications of post-pyloric and percutaneous feeding tube placement Prevention of stress ulceration Gut motility: effects of drugs, therapy and disease Prokinetics: indications, contraindications, complications and selection Causes of regurgitation and vomiting; prevention and management of pulmonary aspiration Antiemetics: indications, contraindications, complications and selection Prevention and management of constipation and diarrhoea Techniques for preventing gastrointestinal microbial translocation Principles of blood glucose control: indications, methods, monitoring of safety & efficacy

SKILLS & BEHAVIOURS
Establish a management plan (independently or in collaboration with the clinical dietician) Prescribe an appropriate standard enteral feeding regimen Identify surgical and other contraindications to enteral feeding Prescribe and supervise safe administration of a standard / customized parenteral (TPN) preparation Institute and manage a regimen to control blood glucose within safe limits Manage the transition from parenteral to enteral nutrition

Set realistic goals for therapy (independently or in collaboration with other teams) Collaborate with nursing staff / clinical dietician in monitoring safe delivery of enteral and parenteral nutrition Define targets of therapy and review efficacy at regular intervals Consider modifying diagnosis and/or therapy if goals are not achieved Liaise with clinical dieticians / medical team to plan feeding regimens after discharge from the ICU

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 4 - Please refer to competence 4.1 or the aggregate syllabus at the end of this section.

4.10 Use of Hyperbaric Oxygen Therapy

KNOWLEDGE
Principle of hyperbaric oxygen therapy (HBOT) Diving related physiology Hyperbaric pathophysiology Outline the indications for hyperbaric oxygen therapy in the critically ill patient How to prepare the patient and the staff Potential risks/ complications associated with HBOT How to resuscitate a critically ill patient that is receiving HBOT

SKILLS & BEHAVIOURS
Establish a management plan in collaboration with other specialists in hyperbaric oxygen Aware of the local safety checklist and treatment protocol of HBOT Recognize and identify critical issues before, during and after HBOT Define targets of therapy and review efficacy of prescription at regular intervals Collaborate with medical staff, nursing staff, and technical staff in provide safe delivery of HBOT Recognise and manage emergencies; seek assistance appropriately Critically appraise the evidence for and against of using hyperbaric oxygen for different disease entities

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 4 - Please refer to competence 4.1 or the aggregate syllabus at the end of this section.

AGGREGATE SYLLABUS

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

	KNOWLEDGE
	Mode of action of drugs (see basic sciences) Pharmacokinetics & pharmacodynamics (see basic sciences) **Systemic pharmacology**: - indications, contraindications, effects and interactions of commonly used drugs including: - hypnotics, sedatives and intravenous anaesthetic agents - simple & opioid analgesics; opioid antagonists - non-steroidal anti-inflammatory agents - neuromuscular blocking agents (depolarising & non-depolarising) & anti-cholinesterases - drugs acting on the autonomic nervous system (inotropes, vasodilators, vasoconstrictors, antiarrhythmics) - respiratory stimulants and bronchodilators - anti-hypertensives - anti-convulsants - anti-diabetic agents - diuretics - antibiotics (antibacterial, antifungal, antiviral, antiprotozoal, antihelmintics) - corticosteroids and hormone preparations - drugs influencing gastric secretion & motility; antiemetic agents - local anaesthetic agents - immunosuppressants - antihistamines - antidepressants - anticoagulants - plasma volume expanders Adverse effects and interactions of drugs and their management Recognition and management of serious adverse reactions and anaphylaxis Local policies and procedures governing the prescription of drugs and therapies Indications for and basic interpretation of drug levels in blood or plasma Impact of drug therapy on organ-system function Effects of concomitant treatment and/or co-morbid conditions on an individual patient's response to treatment Prophylactic therapies and indications for their use Concept of risk: benefit ratio and cost effectiveness of therapies Complications of specific therapies, their incidence and management Circumstances when treatment is unnecessary Principles of prevention of multiple organ failure Epidemiology and prevention of infection in the ICU

Types of organisms - emergence of resistant strains, mode of transfer, opportunistic and nosocomial infections; difference between contamination, colonisation & infection
Risk factors for nosocomial infection and infection control measures to limit its occurrence
Local patterns of bacterial resistance and antibiotic policy
Indications, complications, interactions, selection, monitoring, and efficacy of common antimicrobial drugs (antibacterial, antifungal, antiviral, antiprotozoal, antihelmintics)
Requirements for microbiological surveillance and clinical sampling
Safe use of therapies which modify the inflammatory response
Interpret data from an arterial blood gas sample
Effect of critical illness upon homeostatic mechanisms and causes of homeostatic disturbances
Physiology of fluid, electrolyte, acid-base and glucose control
Methods to assess and monitor intravascular volume and state of hydration using clinical signs and modern technology
Pathophysiological consequences, signs and symptoms of disordered fluid, electrolyte, acid-base and glucose balance
Treatment strategies for abnormalities of fluid, electrolyte, acid-base and glucose balance
Fluid therapies: components, physical properties, distribution and clearance of commonly used fluids; indications, contraindications and complications of their administration
Indications for and interpretation of fluid balance charts
Theoretical advantages and disadvantages of crystalloid and colloid solutions
Indications for and basic interpretation of haematological tests
Indications for and basic interpretation of blood grouping and x-matching
The pathogenesis and management of anaemia, thrombocytopenia, neutropenia and pancytopenia
Indications for, contraindication, risks and alternatives to blood transfusion
Local protocols which govern the ordering, storage & verification procedures, monitoring during administration of blood products and reporting of adverse incidents
Principles of blood and blood component therapy; principles of massive transfusion
Infections from contaminated blood / body fluids; strategy if contaminated (e.g. needle stick injury)
Coagulation and fibrinolytic pathways, and their associated disorders; clinical and laboratory evaluation of haemostasis
Principles of plasma exchange
Pathophysiology, detection and management of shock states according to aetiology and in response to physiological data
Principles of haemodynamic monitoring - invasive & non-invasive methods, indications & limitations, physiological parameters and waveform interpretation
Invasive & non-invasive systems available for measuring cardiac output and derived haemodynamic variables, principles involved and the type and site of placement of the monitoring device
Indications, limitations and complications of techniques of measurement of cardiac output (e.g. pulmonary artery catheters, oesophageal Doppler, PiCCO, LiDCO) and action to prevent them
Integration of data from clinical examination and haemodynamic monitoring to characterise haemodynamic derangements
Receptor-specific effects of inotropic and vasopressor agents; effects of critical illness and concomitant

therapies on receptor function (e.g. down-regulation)
Indications and contraindications, limitations and complications of inotropic/vasoactive drug therapy
Interactions between inotropic agents and concomitant therapies and/or co-morbid diseases (e.g. ischaemic heart disease)
Pathophysiology and treatment of cardiac failure
Principles of right and left ventricular assist devices
Principles and techniques of cardiac pacing
Indications, contraindications, complications and basic principles of intra-aortic counter-pulsation balloon pump
Risk of bleeding: indications, contraindications, monitoring and complications of therapeutic anticoagulants, thrombolytic and anti-thrombolytic agents
Causes of respiratory failure, their prevention and management
Principles of oxygen therapy and use of oxygen administration devices (see 5.1)
Signs and symptoms of acute airway insufficiency and acute respiratory failure, and indications for intervention
Distinguishing features of acute versus chronic respiratory failure and implications for management
Principles of emergency airway management (see 5.3)
Indications for and methods of invasive and non-invasive mechanical ventilation
Principles of continuous positive airways pressure (CPAP) and positive end-expiratory pressure (PEEP) and CPAP & PEEP delivery systems
Modes of mechanical ventilation - indications, contraindications & expected results of each mode (CMV, IRV, PRVC, HFOV, SIMV, PS, CPAP, BiPAP, NIV)
Operation of at least one positive pressure ventilator, one non-invasive ventilator, and a constant positive airway pressure (CPAP) device
A systematic approach to checking ventilator, breathing circuit and monitoring devices
Initial set-up and modification of ventilator settings according to the condition or response of the patient
Principles of monitoring ventilation - significance of respiratory rate, tidal volume, minute volume, mean, peak, end expiratory and plateau pressure, intrinsic and extrinsic PEEP, inspired oxygen concentration, arterial blood gas and acid base status; relationship between mode of ventilation and choice of parameters monitored; airflow and airway pressure waveforms
Measures of adequacy of tissue oxygenation
Measurement and interpretation of pulmonary mechanics during mechanical ventilation
Potential adverse effects and complications of respiratory support and methods to minimise these
Ventilator associated pneumonia: definition, pathogenesis and prevention
Safe prescribing of oxygen; manifestations of pulmonary oxygen toxicity
Causes of lung injury in ventilated patients; effects and clinical manifestations of pulmonary barotrauma
Effect of ventilation upon cardiovascular and oxygen delivery parameters, other organ function and how these effects can be monitored (heart-lung interactions)
Principles of physiotherapy in the ICU
Principles of weaning from mechanical ventilation and factors which may inhibit weaning

Indications and contraindications to tracheostomy (percutaneous and surgical) and minitracheostomy
Management of and complications associated with tracheostomy tubes
Principles of extra-corporeal membrane oxygenation (ECMO)
Signs, symptoms and causes of renal failure (acute/chronic/acute on chronic) and indications for intervention
Investigation of impaired renal function
Distinguishing features of acute versus chronic renal failure and implications for management
Indications, complications and selection of renal replacement therapies (continuous and intermittent)
Placement & management of invasive devices necessary for renal replacement therapy (e.g. temporary haemodialysis catheter)
Principles of haemofiltration, haemodialysis, peritoneal dialysis, haemoperfusion and plasmapheresis
Function and operation of continuous haemodiafiltration devices (key components & trouble-shooting)
Effect of renal failure and its treatment on other organ systems
Nephrotoxic drugs and adjustment of drug doses in renal impairment/failure
Patterns of nutritional impairment; consequences of starvation and malnutrition
Methods to assess nutritional status and basal energy expenditure
Fluid & caloric requirements in the critically ill patient including electrolytes, vitamins, trace elements and principles of immunonutrition
Indications, limitations, methods, and complications of enteral and parenteral nutritional techniques
Nutritional formulations: indications, complications and their management
Principles of nasogastric cannulation in the intubated and non-intubated patient
Alternative routes for enteral feeding: indications, contraindications and complications of post-pyloric and percutaneous feeding tube placement
Prevention of stress ulceration
Gut motility: effects of drugs, therapy and disease
Causes of regurgitation and vomiting; prevention and management of pulmonary aspiration
Prevention and management of constipation and diarrhoea
Techniques for preventing gastrointestinal microbial translocation
Principles of blood glucose control: indications, methods, monitoring of safety & efficacy
Principle of hyperbaric oxygen therapy (HBOT)
Indications and potential risks/ complications for HBOT
Fitness to receive hyperbaric oxygen therapy
How to prepare the patient and the staff
How to resuscitate a critically ill patient that is receiving HBOT

SKILLS & BEHAVIOURS
Prioritise therapy according to the patient's needs
Establish a management plan based on clinical and laboratory information
Consider potential interactions when prescribing drugs & therapies
Consider risk-benefit and cost-benefit of alternative drugs & therapies
Obtain informed consent/assent from the patient where appropriate

	Critically appraise the evidence for and against specific therapeutic interventions or treatments
	Set realistic goals for therapy (independently or in collaboration with other teams)
	Define targets of therapy and review efficacy at regular intervals
	Consider modifying diagnosis and/or therapy if goals are not achieved
	Recognise when treatment is unnecessary or futile
	Administer intravenous drugs (prepare, select route and mode of administration and document)
	Use infusion pumps to administer drugs and fluids
	Prescribe appropriate antimicrobial therapy based on history, examination and preliminary investigations
	Collaborate with microbiologists / infectious diseases clinicians to link clinical, laboratory and local (hospital / regional / national) microbiological data
	Choose appropriate fluid, volume, rate and method of administration
	Administer and monitor response to repeated fluid challenges
	Consider and exclude unknown pathology if goals of fluid therapy are not achieved (e.g. continued bleeding)
	Select an appropriate inotrope / vasopressor - dose, physiological endpoint, rate and route of administration
	Order, check, verify and administer blood products according to local protocols
	Identify and correct haemostatic and coagulation disorders
	Resuscitate a patient with septic shock using appropriate monitoring, fluid therapy and vasoactive agents
	Measure and interpret haemodynamic variables (including derived variables)
	Identify and treat underlying causes for a metabolic acidosis
	Select the appropriate type and mode of ventilation for an individual patient
	Identify and correct ventilator misassembly and disconnections
	Stabilise a patient on a constant positive airway pressure (CPAP) device
	Stabilise a patient on a non-invasive ventilator (NIV)
	Stabilise a patient on a positive pressure ventilator
	Confirm adequate oxygenation and control of $PaCO_2$ and pH
	Set and interpret data from ventilator alarms
	Construct, monitor and review a weaning plan
	Identify and avoid factors contributing to impaired renal function
	Supervise the provision of continuous renal replacement therapy
	Set appropriate exchange and fluid balances for renal replacement therapies
	Modify fluid and electrolyte therapy according to clinical features and fluid balance charts
	Prescribe and manage anticoagulation therapy
	Correct electrolyte disorders (e.g. hyperkalaemia, hyponatraemia)
	Prevent hypokalaemia
	Institute and manage a regimen to control blood glucose within safe limits
	Prescribe an appropriate standard enteral feeding regimen
	Identify surgical and other contraindications to enteral feeding
	Prescribe and supervise safe administration of a standard / customized parenteral (TPN) preparation

Collaborate with nursing staff / clinical dietician in monitoring safe delivery of enteral and parenteral nutrition Liaise with clinical dieticians / medical team to plan feeding regimens after discharge from the ICU Aware of the local safety checklist and treatment protocol of HBOT Recognize and identify critical issues before, during and after HBOT Institute and manage the hyperbaric oxygen treatment in a safe environment Collaborate with medical staff, nursing staff, and technical staff in provide safe delivery of HBOT Recognise and manage emergencies; seek assistance appropriately

ATTITUDES
Appreciate the importance of timely institution of organ-system support Appreciate the differences between organ system support and specific treatment Recognise the need for supportive care for all organ systems whether failing / injured or not Respond rapidly to acute changes in monitored variables Consult, communicate and collaborate effectively with patients, relatives and the health care team Demonstrate compassionate care of patients and relatives Desire to minimise patient distress Respect the ideas and beliefs of the patient and their family and their impact on decision making (does not impose own views) Respect the expressed wishes of competent patients Lead, delegate and supervise others appropriately according to experience and role Recognise personal limitations, seeks and accepts assistance or supervision (knows how, when and who to ask)

DOMAIN 5: PRACTICAL PROCEDURES

Respiratory System

5.1 Administer Oxygen Using a Variety of Administration Devices

KNOWLEDGE
Signs, symptoms and causes of acute airway insufficiency and indications for intervention
Methods of maintaining a clear airway
Respiratory physiology: gaseous exchange; pulmonary ventilation: volumes, flows, dead space; mechanics of ventilation: ventilation/perfusion abnormalities; control of breathing, acute and chronic ventilatory failure, effect of oxygen therapy
Indications, contraindications and complications of oxygen therapy
Indications for specific monitoring to ensure patient safety during an intervention / procedure
Environmental hazards associated with storage and use of oxygen; strategies to promote safety
Storage and use of oxygen, nitric oxide (NO), compressed air and helium, including use of gas cylinders
Use of pipeline gas and suction systems
Principles of pressure regulators, flowmeters, vaporizers and breathing systems
Indications for and operation of fixed and variable performance oxygen therapy equipment, humidification and nebulising devices
Indications and complications of hyperbaric oxygenation
Indications for different modes of ventilation and operation of at least one positive pressure ventilator, one non-invasive ventilator, and a constant positive airway pressure (CPAP) device
Methods of sterilisation and cleaning or disposal of equipment
Principles of emergency airway management (see 5.3)

SKILLS & BEHAVIOURS
Select appropriate equipment or device to deliver oxygen therapy
Check pipelines; check and change portable cylinders
Support ventilation using bag and mask
Recognise and institute appropriate oxygen therapy in the management of medical emergencies; seek assistance as appropriate

ATTITUDES
Recognise personal limitations, seeks and accepts assistance or supervision (knows how, when and who to ask)
Consider patient comfort during procedures / investigations
Desire to minimise patient distress
Accept personal responsibility for the prevention of cross infection and self-infection
Lead, delegate and supervise others appropriately according to experience and role
Support other staff in the correct use of devices
Promote respect for patient privacy, dignity and confidentiality

5.2 Performs Fibreoptic Laryngoscopy Under Supervision

KNOWLEDGE
Anatomy and bronchoscopic appearance of the upper and lower airways
Airway management in special circumstances, (head injury, full stomach, upper airway obstruction, shock, cervical spine injury)
Indications for and principles of fibreoptic intubation; use of fibreoptic intubation with airway adjuncts
Appropriate use of drugs to facilitate airway control
Patient selection - indications, contraindications and potential complications of the procedure/intervention
Universal precautions and preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc.)
Methods and routes of insertion - associated indications and complications
Detection of potential physiological alterations during the procedure
Complications of the technique, how to prevent/recognise them and initiate appropriate treatment
Methods of sterilisation and cleaning or disposal of equipment
Safety and maintenance of flexible fibreoptic endoscopes
Principles of emergency airway management (see 5.3)
Accurately assess the airway for potential difficulties with airway management

SKILLS & BEHAVIOURS
Seek appropriate supervision - discuss the patient and procedure with supervisor prior to undertaking it
Choose a safe environment to undertake airway management (or optimise environment as circumstances allow)
Prepare equipment, patient and staff prior to undertaking the procedure
Obtain informed consent/assent from the patient where appropriate
Choose an appropriate route / method of insertion and position the patient accordingly
Undertake appropriate investigation to confirm correct placement of device or exclude complications
Sterilise, clean or dispose of equipment appropriately

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 5 - Please refer to competence 5.1 or the aggregate syllabus at the end of this section

5.3 Perform Emergency Airway Management

KNOWLEDGE

Signs, symptoms and causes of acute airway insufficiency and indications for intervention
Methods of maintaining a clear airway
Anatomy and bronchoscopic appearance of the upper and lower airways
Patient selection - indications, contraindications and potential complications of the procedure /intervention
Indications, selection and insertion of oral (Guedel's) airways, nasopharyngeal airways and laryngeal mask airways (LMA)
Tracheal intubation: selection of tube type, diameter & length; indications and techniques; methods to confirm correct placement of a tracheal tube
Universal precautions and preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc.)
Appropriate use of drugs to facilitate airway control
Monitoring during sedation/induction of anaesthesia for endotracheal intubation
Causes of regurgitation and vomiting; prevention and management of pulmonary aspiration
Cricoid pressure: indications and safe provision
Detection of potential physiological alterations during the procedure
Airway management in special circumstances, (head injury, full stomach, upper airway obstruction, shock, cervical spine injury)
Principles of oxygen therapy and use of oxygen administration devices (see 5.1)
Management of difficult or failed airway management (see 5.4)
Principles of endotracheal suctioning (see 5.5)
Management and use of the device once in situ necessary to minimise the risks of complications
Indications and technique for removal
Methods of sterilisation and cleaning or disposal of equipment

SKILLS & BEHAVIOURS
Prioritise tasks and procedures
Choose a safe environment to undertake airway management (or optimise environment as circumstances allow)
Select appropriate equipment or device & use resources efficiently
Prepare equipment, patient and staff prior to undertaking the procedure
Obtain informed consent/assent from the patient where appropriate
Choose an appropriate route/method of insertion and position the patient accordingly
Use protective clothing (gloves/mask/gown/drapes) as indicated
Perform the procedure in a manner which minimise the risks of complications
Undertake appropriate investigation to confirm correct placement of device or exclude complications
Sterilise, clean or dispose of equipment appropriately
Accurately assess the airway for potential difficulties with airway management
Optimise the patient's position for airway management
Maintain a clear airway using oral/nasal airways
Support ventilation using bag and mask
Insert and check correct placement of laryngeal mask airway

Select appropriate tracheal tube type, size and length
Perform intubation and verify correct placement of tube
Manage and minimise cardiovascular and respiratory changes during and after intubation
Apply an end-tidal CO_2 detector post-intubation and interpret a capnograph trace
Demonstrate rapid sequence induction of anaesthesia/cricoid pressure
Perform cuff leak test
Perform extubation
Change an orotracheal tube
Recognise and manage emergencies; seek assistance appropriately

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 5 - Please refer to competence 5.1 or the aggregate syllabus at the end of this section.

5.4 Perform Difficult and Failed Airway Management According to Local Protocols

KNOWLEDGE
Anatomy and bronchoscopic appearance of the upper and lower airways
Principles of emergency airway management (see 5.3)
Airway management in special circumstances, (head injury, full stomach, upper airway obstruction, shock, cervical spine injury)
Principles of oxygen therapy and use of oxygen administration devices (see 5.1)
Appropriate use of drugs to facilitate airway control
Management of difficult intubation and failed intubation (local algorithm or protocol)
Indications and principles of fibreoptic laryngoscopy (see 5.2)
Indications and methods of securing an emergency surgical airway
Anatomical landmarks for cricothyrotomy/tracheostomy/mini-tracheotomy
Indications and techniques for needle and surgical crycothyroidotomy
Indications and contraindications to tracheostomy (percutaneous and surgical) and minitracheostomy

SKILLS & BEHAVIOURS
Accurately assess the airway for potential difficulties with airway management
Prepare equipment for difficult or failed intubation
Optimise the patient's position for airway management
Demonstrate failed intubation drill (according to local algorithm or protocol)
Maintain a clear airway using oral/nasal airways
Support ventilation using bag and mask
Demonstrate minitracheotomy or needle crico-thyoidotomy
Recognise and manage emergencies; seek assistance appropriately

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 5 - Please

refer to competence 5.1 or the aggregate syllabus at the end of this section.

5.5 Perform Endotracheal Suction

KNOWLEDGE
Signs, symptoms and causes of acute airway insufficiency and indications for intervention
Methods of maintaining a clear airway
Anatomy and bronchoscopic appearance of the upper and lower airways
Principles of endotracheal suctioning
Patient selection - indications, contraindications and potential complications of the procedure / intervention
Universal precautions and preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc.)
Principles of aseptic technique and aseptic handling of invasive medical devices
Detection of potential physiological alterations during the procedure
Indications for specific monitoring to ensure patient safety during an intervention / procedure
Complications of the technique, how to prevent/recognise them and initiate appropriate treatment
Consequences of the procedure during ventilation
Methods of sterilisation and cleaning or disposal of equipment
Principles of oxygen therapy and use of oxygen administration devices (see 5.1)

SKILLS & BEHAVIOURS
Select appropriate equipment or device & use resources efficiently
Prepare equipment, patient and staff prior to undertaking the procedure
Choose an appropriate route / method of insertion and position the patient accordingly
Obtain informed consent/assent from the patient where appropriate
Use protective clothing (gloves / mask / gown / drapes) as indicated
Perform endotracheal suction (via oral / nasal / tracheostomy tube)
Perform the procedure in a manner which minimise the risks of complications
Sterilise, clean or dispose of equipment appropriately
Recognise and manage emergencies; seek assistance appropriately

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 5 - Please refer to competence 5.1 or the aggregate syllabus at the end of this section.

5.6 Perform Fibreoptic Bronchoscopy and BAL in the Intubated Patient Under Supervision

KNOWLEDGE
Signs, symptoms and causes of acute airway insufficiency and indications for intervention
Principles of emergency airway management (see 5.3)

Anatomy and bronchoscopic appearance of the upper and lower airways
Patient selection - indications, contraindications and potential complications of the procedure /intervention
Appropriate use of drugs to facilitate airway control
Principles of aseptic technique and aseptic handling of invasive medical devices
Universal precautions and preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc.)
Complications of the technique, how to prevent/recognise them and initiate appropriate treatment
Detection of potential physiological alterations during the procedure
Indications for specific monitoring to ensure patient safety during an intervention/procedure
Methods of bronchoscopy via an endotracheal tube
Methods of bronchoscopic broncho-alveolar lavage (BAL) in an intubated patient
Detection and management of haemo/pneumothorax (simple and tension)
Safety and maintenance of flexible fibreoptic endoscopes

SKILLS & BEHAVIOURS
Seek appropriate supervision - discuss the patient and procedure with supervisor prior to undertaking it
Identify relevant anatomical landmarks
Prepare equipment, patient and staff prior to undertaking the procedure
Choose an appropriate route / method of insertion and position the patient accordingly
Obtain informed consent/assent from the patient where appropriate
Undertake bronchoscopy to assess tube position
Undertake bronchoscopy to perform bronchoalveolar lavage
Performs the procedure in an aseptic manner (scrubs, gowns, gloves, drapes & sterile field)
Perform the procedure in a manner which minimise the risks of complications
Sterilise, clean or dispose of equipment appropriately
Recognise and manage emergencies; seek assistance appropriately

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 5 - Please refer to competence 5.1 or the aggregate syllabus at the end of this section.

5.7 Perform Percutaneous Tracheostomy Under Supervision

KNOWLEDGE
Indications and contraindications to tracheostomy (percutaneous and surgical) and minitracheostomy
Anatomical landmarks for cricothyrotomy/tracheostomy/mini-tracheotomy
Techniques for percutaneous and surgical tracheotomy
Complications of the technique, how to prevent/recognise them and initiate appropriate treatment
Selection of tracheal tube type, diameter and length
Appropriate use of drugs to facilitate airway control

Universal precautions and preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc.) Principles of aseptic technique and aseptic handling of invasive medical devices Detection of potential physiological alterations during the procedure Indications for specific monitoring to ensure patient safety during an intervention / procedure Causes of regurgitation and vomiting; prevention and management of pulmonary aspiration Methods of sterilisation and cleaning or disposal of equipment Management and use of the device once in situ necessary to minimise the risks of complications Management of and complications associated with tracheostomy tubes Indications and technique for removal Principles of emergency airway management (see 5.3) Principles of endotracheal suctioning (see 5.5) Principles of oxygen therapy and use of oxygen administration devices (see 5.1)

SKILLS & BEHAVIOURS
Identify patients requiring tracheostomy; discuss indications and contraindications for percutaneous tracheostomy Seek appropriate supervision - discuss the patient and procedure with supervisor prior to undertaking it Change a tracheostomy tube electively Manage anaesthesia and control the airway during initial tracheostomy tube insertion in the intensive care unit (ICU) Prioritise tasks and procedures Select appropriate equipment or device & use resources efficiently Prepare equipment, patient and staff prior to undertaking the procedure Obtain informed consent/assent from the patient where appropriate Select appropriate tracheal tube type, size and length Identify relevant anatomical landmarks Choose an appropriate route / method of insertion and position the patient accordingly Performs the procedure in an aseptic manner (scrubs, gowns, gloves, drapes & sterile field) Perform the procedure in a manner which minimise the risks of complications Undertake appropriate investigation to confirm correct placement of device or exclude complications Manage and minimise cardiovascular and respiratory changes during and after intubation Sterilise, clean or dispose of equipment appropriately Recognise and manage emergencies; seek assistance appropriately Describe how to de-cannulate a tracheostomy, and management of tracheostomy wound

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 5 - Please refer to competence 5.1 or the aggregate syllabus at the end of this section.

5.8 Perform Thoracentesis via a Chest Drain

KNOWLEDGE
Detection and management of haemo/pneumothorax (simple and tension)
Anatomical landmarks for intrapleural drains
Insertion and management of chest drains and air exclusion devices
Patient groups at risk who may require chest drain placement under ultrasound or CT guidance
Universal precautions and preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc.)
Principles of aseptic technique and aseptic handling of invasive medical devices
Methods and routes of insertion - associated indications and complications
Detection of potential physiological alterations during the procedure
Complications of the technique, how to prevent/recognise them and initiate appropriate treatment
Consequences of the procedure during ventilation
Indications for specific monitoring to ensure patient safety during an intervention / procedure
Management and use of the device once in situ necessary to minimise the risks of complications
Indications and technique for removal
Methods of sterilisation and cleaning or disposal of equipment

SKILLS & BEHAVIOURS
Demonstrate emergency relief of tension pneumothorax
Demonstrate aseptic insertion of an intrapleural chest drain and connection to a one-way seal device
Prioritise tasks and procedures
Select appropriate equipment or device & use resources efficiently
Prepare equipment, patient and staff prior to undertaking the procedure
Obtain informed consent/assent from the patient where appropriate
Choose an appropriate route / method of insertion and position the patient accordingly
Perform the procedure in a manner which minimize the risks of complications
Performs the procedure in an aseptic manner (scrubs, gowns, gloves, drapes & sterile field)
Undertake appropriate investigation to confirm correct placement of device or exclude complications
Sterilise, clean or dispose of equipment appropriately
Recognise and manage emergencies; seek assistance appropriately

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 5 - Please refer to competence 5.1 or the aggregate syllabus at the end of this section.

Cardiovascular System

5.9 Perform Peripheral Venous Catheterisation

KNOWLEDGE
Surface anatomy: structures in the antecubital fossa; large veins and anterior triangle of the neck;

large veins of the leg and femoral triangle Principles, routes and techniques of peripheral venous cannulation Methods for securing vascular access rapidly Patient selection - indications, contraindications and potential complications of the procedure /intervention Universal precautions and preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc.) Principles of aseptic technique and aseptic handling of invasive medical devices Management and use of the device once in situ necessary to minimise the risks of complications Indications, contraindications and complications of peripheral intravenous infusion / injection Indications and technique for removal Methods of sterilisation and cleaning or disposal of equipment Methods for surgical isolation of a vein or artery (see 5.11)

SKILLS & BEHAVIOURS
Obtain informed consent/assent from the patient where appropriate Insert peripheral cannulae via different routes Select appropriate equipment or device & use resources efficiently Prepare equipment, patient and staff prior to undertaking the procedure Choose an appropriate route / method of insertion and position the patient accordingly Perform the procedure in a manner which minimise the risks of complications Use protective clothing (gloves / mask / gown / drapes) as indicated Confirm correct placement and exclude complications Sterilise, clean or dispose of equipment appropriately Establish peripheral venous access appropriate for resuscitation in major haemorrhage

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 5 - Please refer to competence 5.1 or the aggregate syllabus at the end of this section.

5.10 Perform Arterial Catheterisation

KNOWLEDGE
Surface anatomy: arteries of the arms and legs Patient selection - indications, contraindications and potential complications of the procedure/ intervention Principles of arterial catheterisation Methods and routes of insertion - associated indications and complications Allen's test - application & limitations Complications of the technique, how to prevent/recognise them and initiate appropriate treatment Universal precautions and preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc.)

Principles of aseptic technique and aseptic handling of invasive medical devices Ultrasound techniques for vascular localisation (see 5.12) Management and use of the device once in situ necessary to minimise the risks of complications Recognition and management of inadvertent intra-arterial injection of harmful substances Indications and technique for removal

SKILLS & BEHAVIOURS
Insert arterial catheters by different routes Obtain informed consent/assent from the patient where appropriate Select appropriate equipment or device & use resources efficiently Prepare equipment, patient and staff prior to undertaking the procedure Choose an appropriate route / method of insertion and position the patient accordingly Perform the procedure in a manner which minimise the risks of complications Performs the procedure in an aseptic manner (scrubs, gowns, gloves, drapes & sterile field) Minimise blood loss related to clinical investigations and procedures Undertake appropriate investigation to confirm correct placement of device or exclude complications Sterilise, clean or dispose of equipment appropriately

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 5 - Please refer to competence 5.1 or the aggregate syllabus at the end of this section.

5.11 Describe Ultrasound Techniques for Vascular Localisation

KNOWLEDGE
Surface anatomy: structures in the antecubital fossa; large veins and anterior triangle of the neck; large veins of the leg and femoral triangle; arteries of the arms and legs Basic principles of ultrasound and the Doppler effect Methods for securing vascular access rapidly Patient selection - indications, contraindications and potential complications of the procedure/ intervention Principles, routes and techniques of peripheral and central venous cannulation Principles of arterial catheterisation Universal precautions and preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc.)

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 5 - Please refer to competence 5.1 or the aggregate syllabus at the end of this section.

5.12 Perform Central Venous Catheterisation

KNOWLEDGE
Surface anatomy: structures in the antecubital fossa; large veins and anterior triangle of the neck; large veins of the leg and femoral triangle
Methods for securing vascular access rapidly
Indications, contraindications and complications of central venous infusion/injection
Principles, routes and techniques of central venous cannulation
Patient selection - indications, contraindications and potential complications of the procedure/ intervention
Principles of aseptic technique and aseptic handling of invasive medical devices
Universal precautions and preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc.)
Detection of potential physiological alterations during the procedure
Complications of the technique, how to prevent/recognise them and initiate appropriate treatment
Indications for specific monitoring to ensure patient safety during an intervention / procedure
Chest x-ray interpretation (see 2.7)
Detection and management of haemo/pneumothorax (simple and tension)
Management and use of the device once in situ necessary to minimise the risks of complications
Indications and technique for removal
Methods of sterilisation and cleaning or disposal of equipment
Describe how to manage a tunneled central venous catheter (e.g. for parenteral nutrition)
Ultrasound techniques for vascular localisation (see 5.12)

SKILLS & BEHAVIOURS
Obtain informed consent/assent from the patient where appropriate
Insert central venous catheters by different routes
Select appropriate equipment or device & use resources efficiently
Prepare equipment, patient and staff prior to undertaking the procedure
Choose an appropriate route / method of insertion and position the patient accordingly
Performs the procedure in an aseptic manner (scrubs, gowns, gloves, drapes & sterile field)
Minimise blood loss related to clinical investigations and procedures
Perform the procedure in a manner which minimise the risks of complications
Undertake appropriate investigation to confirm correct placement of device or exclude complications
Sterilise, clean or dispose of equipment appropriately
Recognise and manage emergencies; seek assistance appropriately

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 5 - Please refer to competence 5.1 or the aggregate syllabus at the end of this section.

5.13 Perform Defibrillation and Cardioversion

KNOWLEDGE

Principles of ECG monitoring (heart rate, rhythm, conduction, ST segment change & QT interval) - indications, limitations and techniques. Advantages and disadvantages of different lead configurations Basic and complex cardiac arrhythmias - recognition and management (pharmacological and electrical) Patient selection - indications, contraindications and potential complications of the procedure/ intervention Treatment (algorithm) of patients in ventricular fibrillation (VF) and pulseless ventricular tachycardia (VT) Defibrillation: principles of monophasic & biphasic defibrillators; mechanism, indications, complications, modes and methods (manual and automated external defibrillators (AED)) Electrical safety: conditions which predispose to the occurrence of macro-shock/micro-shock; physical dangers of electrical currents; relevant standards regarding safe use of electricity in patient care; basic methods to reduce electrical hazards. Detection of potential physiological alterations during the procedure Complications of the technique, how to prevent/recognise them and initiate appropriate treatment Principles of emergency airway management (see 5.3)

SKILLS & BEHAVIOURS
Prioritise tasks and procedures Prepare equipment, patient and staff prior to undertaking the procedure Perform the procedure in a manner which minimise the risks of complications Recognise and manage emergencies; seek assistance appropriately Obtain and interpret data from ECG (3- and 12-lead) Use manual external defibrillators Use automated external defibrillators (AED)

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 5 - Please refer to competence 5.1 or the aggregate syllabus at the end of this section.

5.14 Perform Cardiac Pacing (Transvenous or Transthoracic)

KNOWLEDGE
Principles and techniques of cardiac pacing Patient selection - indications, contraindications and potential complications of the procedure/ intervention Principles of ECG monitoring (heart rate, rhythm, conduction, ST segment change & QT interval) - indications, limitations and techniques. Advantages and disadvantages of different lead configurations Basic and complex cardiac arrhythmias - recognition and management (pharmacological and electrical) Surface anatomy: structures in the antecubital fossa; large veins and anterior triangle of the neck; large veins of the leg and femoral triangle

Methods for securing vascular access rapidly Principles, routes and techniques of peripheral and central venous cannulation Principles of emergency airway management (see 5.3) Principles of aseptic technique and aseptic handling of invasive medical devices Universal precautions and preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc.) Detection of potential physiological alterations during the procedure Complications of the technique, how to prevent/recognise them and initiate appropriate treatment Detection and acute management of cardiac tamponade Detection and management of haemo/pneumothorax (simple and tension) Insertion and management of chest drains and air exclusion devices Principles of defibrillation and cardioversion (see 5.14) Management and use of the device once in situ necessary to minimise the risks of complications Indications and technique for removal

SKILLS & BEHAVIOURS
Prepare equipment, patient and staff prior to undertaking the procedure Choose an appropriate route / method of insertion and position the patient accordingly Perform the procedure in a manner which minimise the risks of complications Use protective clothing (gloves / mask / gown / drapes) as indicated Undertake appropriate investigation to confirm correct placement of device or exclude complications Recognise and manage emergencies; seek assistance appropriately Insert a temporary pacing wire Establish & review pacing box settings Demonstrate emergency percutaneous pericardial aspiration Demonstrate emergency relief of tension pneumothorax

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 5 - Please refer to competence 5.1 or the aggregate syllabus at the end of this section.

5.15 Describe How to Perform Pericardiocentesis

KNOWLEDGE
Detection and acute management of cardiac tamponade Anatomical landmarks and technique for percutaneous pericardial aspiration Patient selection - indications, contraindications and potential complications of the procedure/ intervention Methods and routes of insertion - associated indications and complications Universal precautions and preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc.) Principles of aseptic technique and aseptic handling of invasive medical devices

Detection of potential physiological alterations during the procedure
Complications of the technique, how to prevent/recognise them and initiate appropriate treatment
Principles of ECG monitoring (heart rate, rhythm, conduction, ST segment change & QT interval) - indications, limitations and techniques.
Advantages and disadvantages of different lead configurations
Principles and basic interpretation of echocardiography (see 2.3)
Treatment (algorithm) of patients in ventricular fibrillation (VF) and pulseless ventricular tachycardia (VT)
Principles of defibrillation and cardioversion (see 5.14)
Principles of emergency airway management (see 5.3)

ATTITUDES

The attitudes required for this competence are the same for all competencies in Domain 5 - Please refer to competence 5.1 or the aggregate syllabus at the end of this section.

5.16 Demonstrate a Method for Measuring Cardiac Output and Derived Haemodynamic Variables

KNOWLEDGE

Principles of haemodynamic monitoring - invasive & non-invasive methods, indications & limitations, physiological parameters and waveform interpretation
Zero and calibration techniques for invasive pressure monitoring
Invasive & non-invasive systems available for measuring cardiac output and derived haemodynamic variables, principles involved and the type and site of placement of the monitoring device
Interpretation of, relationships between, sources of error and limitations of measured and derived cardiovascular variables including pressure, flow, volume and gas transport
Indications, limitations and complications of techniques of measurement of cardiac output (e.g. pulmonary artery catheters, oesophageal Doppler, PiCCO, LiDCO) and action to prevent them
Patient selection - indications, contraindications and potential complications of the procedure / intervention
Universal precautions and preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc.)
Principles of aseptic technique and aseptic handling of invasive medical devices
Detection of potential physiological alterations during the procedure
Complications of the technique, how to prevent/recognise them and initiate appropriate treatment
Management and use of the device once in situ necessary to minimise the risks of complications
Indications and technique for removal

SKILLS & BEHAVIOURS

Prepare equipment for intravascular pressure monitoring
Obtain and interpret data from central venous catheters
Obtain and interpret data from a pulmonary artery catheter, oesophageal Doppler or alternative

cardiac output measurement technique Undertake appropriate investigation to confirm correct placement of device or exclude complications Measure and interpret haemodynamic variables (including derived variables) Perform the procedure in a manner which minimise the risks of complications Recognise and manage emergencies; seek assistance appropriately

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 5 - Please refer to competence 5.1 or the aggregate syllabus at the end of this section.

Central Nervous System

5.17 Perform Lumbar Puncture (Intradural/'Spinal') Under Supervision

KNOWLEDGE
Indications for lumbar puncture and CSF sampling; laboratory analysis of CSF samples Patient selection - indications, contraindications and potential complications of the procedure/ intervention Universal precautions and preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc.) Principles of aseptic technique and aseptic handling of invasive medical devices Methods and routes of insertion - associated indications and complications Detection of potential physiological alterations during the procedure Complications of the technique, how to prevent/recognise them and initiate appropriate treatment Methods of sterilisation and cleaning or disposal of equipment

SKILLS & BEHAVIOURS
Seek appropriate supervision - discuss the patient and procedure with supervisor prior to undertaking it Select appropriate equipment or device & use resources efficiently Prepare equipment, patient and staff prior to undertaking the procedure Choose an appropriate route / method of insertion and position the patient accordingly Identify relevant anatomical landmarks Perform the procedure in an aseptic manner (scrubs, gowns, gloves, drapes & sterile field) Perform the procedure in a manner which minimises the risks of complications Sterilise, clean or dispose of equipment appropriately Recognise and manage emergencies; seek assistance appropriately

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 5 - Please refer to competence 5.1 or the aggregate syllabus at the end of this section.

5.18 Manage the Administration of Analgesia via an Epidural Catheter

KNOWLEDGE
Physiological effects of pain and anxiety
Recognition and methods of assessment of pain
Recognize complications of epidural anaesthesia and describe initial appropriate treatment
Contraindications, methods, and complications of epidural catheter removal

SKILLS & BEHAVIOURS
Proper assessment of epidural block

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 5 - Please refer to competence 5.1 or the aggregate syllabus at the end of this section

Gastrointestinal System

5.19 Perform Nasogastric Tube Placement

KNOWLEDGE
Patient selection - indications, contraindications and potential complications of the procedure/ intervention
Principles of nasogastric cannulation in the intubated and non-intubated patient
Causes of regurgitation and vomiting; prevention and management of pulmonary aspiration
Universal precautions and preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc.)
Methods and routes of insertion - associated indications and complications
Detection of potential physiological alterations during the procedure
Complications of the technique, how to prevent/recognise them and initiate appropriate treatment
Management and use of the device once in situ necessary to minimise the risks of complications
Indications and technique for removal
Alternative routes for enteral feeding: indications, contraindications and complications of post-pyloric and percutaneous feeding tube placement

SKILLS & BEHAVIOURS
Obtain informed consent/assent from the patient where appropriate
Insert a nasogastric tube in an intubated and non-intubated patient
Select appropriate equipment or device & use resources efficiently
Prepare equipment, patient and staff prior to undertaking the procedure
Choose an appropriate route / method of insertion and position the patient accordingly
Identify relevant anatomical landmarks

Perform the procedure in a manner which minimise the risks of complications Undertake appropriate investigation to confirm correct placement of device or exclude complications Sterilise, clean or dispose of equipment appropriately

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 5 - Please refer to competence 5.1 or the aggregate syllabus at the end of this section.

5.20 Perform Abdominal Paracentesis

KNOWLEDGE
Anatomy of the abdominal wall; landmarks for abdominal paracentesis and abdominal drainage catheters Indications, contraindications, complications and technique of abdominal paracentesis Principles of peritoneal lavage Patient selection - indications, contraindications and potential complications of the procedure/ intervention Universal precautions and preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc.) Principles of aseptic technique and aseptic handling of invasive medical devices Methods and routes of insertion - associated indications and complications Detection of potential physiological alterations during the procedure Indications for specific monitoring to ensure patient safety during an intervention/procedure Complications of the technique, how to prevent/recognise them and initiate appropriate treatment Management and use of the device once in situ necessary to minimise the risks of complications Indications and technique for removal Methods of sterilisation and cleaning or disposal of equipment

SKILLS & BEHAVIOURS
Obtain informed consent/assent from the patient where appropriate Select appropriate equipment or device & use resources efficiently Prepare equipment, patient and staff prior to undertaking the procedure Choose an appropriate route/method of insertion and position the patient accordingly Identify relevant anatomical landmarks Insert an abdominal drain Use protective clothing (gloves/mask/gown/drapes) as indicated Perform the procedure in a manner which minimise the risks of complications Undertake appropriate investigation to confirm correct placement of device or exclude complications Sterilise, clean or dispose of equipment appropriately Recognise and manage emergencies; seek assistance appropriately

ATTITUDES

The attitudes required for this competence are the same for all competencies in Domain 5 - Please refer to competence 5.1 or the aggregate syllabus at the end of this section.

5.21 Describe Sengstaken Tube (or Equivalent) Placement

KNOWLEDGE
Patient selection - indications, contraindications and potential complications of the procedure/ intervention
Principles and techniques for insertion of gastro-oesophageal balloon tamponade tube (e.g. Sengstaken-Blakemore)
Universal precautions and preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc.)
Methods and routes of insertion - associated indications and complications
Detection of potential physiological alterations during the procedure
Complications of the technique, how to prevent/recognise them and initiate appropriate treatment
Management and use of the device once in situ necessary to minimise the risks of complications
Indications and technique for removal
Principles of emergency airway management (see 5.3)

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 5 - Please refer to competence 5.1 or the aggregate syllabus at the end of this section.

5.22 Describe Indications for, and Safe Conduct of Gastroscopy

KNOWLEDGE
Patient selection - indications, contraindications and potential complications of the procedure/ intervention
Principles of nasogastric cannulation in the intubated and non-intubated patient
Alternative routes for enteral feeding: indications, contraindications and complications of post-pyloric and percutaneous feeding tube placement
Causes of regurgitation and vomiting; prevention and management of pulmonary aspiration
Methods of maintaining a clear airway
Appropriate use of drugs to facilitate the procedure
Universal precautions and preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc.)
Detection of potential physiological alterations during the procedure
Indications for specific monitoring to ensure patient safety during an intervention/procedure
Complications of the technique, how to prevent/recognise them and initiate appropriate treatment
Safety and maintenance of flexible fibreoptic endoscopes
Use of pipeline gas and suction systems

Principles of emergency airway management (see 5.3)

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 5 - Please refer to competence 5.1 or the aggregate syllabus at the end of this section.

Genitourinary System

5.23 Perform Urinary Catheterisation

KNOWLEDGE
Anatomy of the genitourinary system and anatomical landmarks for suprapubic urinary catheters
Urinary catheterisation techniques: transurethral and suprapubic
Urinary catheterisation in pelvic trauma: indications, contraindications and techniques
Patient selection - indications, contraindications and potential complications of the procedure/ intervention
Universal precautions and preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc.)
Principles of aseptic technique and aseptic handling of invasive medical devices
Detection of potential physiological alterations during the procedure
Complications of the technique, how to prevent/recognise them and initiate appropriate treatment
Methods of sterilisation and cleaning or disposal of equipment
Management and use of the device once in situ necessary to minimise the risks of complications
Indications and technique for removal

SKILLS & BEHAVIOURS
Obtain informed consent/assent from the patient where appropriate
Select appropriate equipment or device & use resources efficiently
Prepare equipment, patient and staff prior to undertaking the procedure
Choose an appropriate route/method of insertion and position the patient accordingly
Use protective clothing (gloves/mask/gown/drapes) as indicated
Identify relevant anatomical landmarks
Perform aseptic urinary catheterisation: male and female
Perform the procedure in a manner which minimise the risks of complications
Confirm correct placement and exclude complications

Sterilise, clean or dispose of equipment appropriately

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 5 - Please refer to competence 5.1 or the aggregate syllabus at the end of this section.

	KNOWLEDGE
	Generic
	Patient selection - indications, contraindications and potential complications of the procedure/ intervention
	Universal precautions and preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc.)
	Principles of aseptic technique and aseptic handling of invasive medical devices
	Methods and routes of insertion - associated indications and complications
	Appropriate use of drugs to facilitate the procedure
	Detection of potential physiological alterations during the procedure
	Indications for specific monitoring to ensure patient safety during an intervention/procedure
	Complications of the technique, how to prevent/recognise them and initiate appropriate treatment
	Methods of sterilisation and cleaning or disposal of equipment
	Management and use of the device once in situ necessary to minimise the risks of complications
	Indications and technique for removal

	Respiratory System
	Anatomy and bronchoscopic appearance of the upper and lower airways
	Signs, symptoms and causes of acute airway insufficiency and indications for intervention
	Methods of maintaining a clear airway
	Indications, selection and insertion of oral (Guedel's) airways, nasopharyngeal airways and laryngeal mask airways (LMA)
	Tracheal intubation: selection of tube type, diameter & length; indications and techniques; methods to confirm correct placement of a tracheal tube
	Appropriate use of drugs to facilitate airway control
	Monitoring during sedation/induction of anaesthesia for endotracheal intubation
	Airway management in special circumstances, (head injury, full stomach, upper airway obstruction, shock, cervical spine injury)
	Causes of regurgitation and vomiting; prevention and management of pulmonary aspiration
	Cricoid pressure: indications and safe provision
	Management of difficult intubation and failed intubation (local algorithm or protocol)
	Indications for and principles of fibreoptic intubation; use of fibreoptic intubation with airway adjuncts
	Indications and methods of securing an emergency surgical airway
	Anatomical landmarks for cricothyroidotomy/tracheostomy/mini-tracheotomy
	Indications and techniques for needle and surgical cricothyroidotomy
	Indications and contraindications to tracheostomy (percutaneous and surgical) and mini-tracheostomy
	Techniques for percutaneous and surgical tracheotomy
	Manage anaesthesia and control the airway during initial tracheostomy tube insertion in the intensive care unit (ICU)

Management of and complications associated with tracheostomy tubes
Principles of endotracheal suctioning
Consequences of the procedure during ventilation
Indications, contraindications and complications of oxygen therapy
Environmental hazards associated with storage and use of oxygen; strategies to promote safety
Use of pipeline gas and suction systems
Storage and use of oxygen, nitric oxide (NO), compressed air and helium, including use of gas cylinders
Principles of pressure regulators, flow meters, vaporizers and breathing systems
Indications for and operation of fixed and variable performance oxygen therapy equipment, humidification and nebulising devices
Respiratory physiology: gaseous exchange; pulmonary ventilation: volumes, flows, dead space; mechanics of ventilation: ventilation/perfusion abnormalities; control of breathing, acute and chronic ventilatory failure, effect of oxygen therapy
Indications for different modes of ventilation and operation of at least one positive pressure ventilator, one non-invasive ventilator, and a constant positive airway pressure (CPAP) device
Indications and complications of hyperbaric oxygenation
Methods of bronchoscopy via an endotracheal tube
Methods of bronchoscopic broncho-alveolar lavage (BAL) in an intubated patient
Safety and maintenance of flexible fibreoptic endoscopes
Detection and management of haemo/pneumothorax (simple and tension)
Anatomical landmarks for intrapleural drains
Insertion and management of chest drains and air exclusion devices
Patient groups at risk who may require chest drain placement under ultrasound or CT guidance

Cardiovascular System
Surface anatomy: structures in the antecubital fossa; large veins and anterior triangle of the neck; large veins of the leg and femoral triangle; arteries of the arms and legs
Methods for securing vascular access rapidly
Principles, routes and techniques of peripheral and central venous cannulation
Principles and techniques for surgical isolation of a vein or artery
Methods for insertion of a tunnelled central venous catheter (e.g. for parenteral nutrition)
Indications, contraindications, and complications of peripheral intravenous infusion/injection and central venous infusion/injection
Principles of arterial catheterisation
Allen's test - application & limitations
Recognition and management of inadvertent intra-arterial injection of harmful substances
Principles of haemodynamic monitoring - invasive & non-invasive methods, indications & limitations, physiological parameters and waveform interpretation
Zero and calibration techniques for invasive pressure monitoring
Invasive & non-invasive systems available for measuring cardiac output and derived haemodynamic variables, principles involved and the type and site of placement of the monitoring device
Interpretation of, relationships between, sources of error and limitations of measured and derived

cardiovascular variables including pressure, flow, volume and gas transport Indications, limitations and complications of techniques of measurement of cardiac output (e.g. pulmonary artery catheters, oesophageal Doppler, PiCCO, LiDCO) and action to prevent them Principles of ECG monitoring (heart rate, rhythm, conduction, ST segment change & QT interval) - indications, limitations and techniques. Advantages and disadvantages of different lead configurations Basic and complex cardiac arrhythmias - recognition and management (pharmacological and electrical) Principles and techniques of cardiac pacing Treatment (algorithm) of patients in ventricular fibrillation (VF) and pulseless ventricular tachycardia (VT) Defibrillation: principles of monophasic & biphasic defibrillators; mechanism, indications, complications, modes and methods (manual and automated external defibrillators (AED)) Electrical safety: conditions which predispose to the occurrence of macro-shock / micro-shock; physical dangers of electrical currents; relevant standards regarding safe use of electricity in patient care; basic methods to reduce electrical hazards. Basic principles of ultrasound and the Doppler effect Principles and basic interpretation of echocardiography (see 2.3) Detection and acute management of cardiac tamponade Anatomical landmarks and technique for percutaneous pericardial aspiration

Central Nervous System
Physiological effects of pain and anxiety Recognition and methods of assessment of pain Pharmacokinetics, pharmacodynamics, indications and complications of opiates and local anaesthetic agents Indications, contraindications, methods and complications of epidural catheterisation Indications, contraindications and complications of epidural infusion/injection; principles of safe epidural drug administration Contraindications, methods and complications of epidural catheter removal Indications for lumbar puncture and CSF sampling; laboratory analysis of CSF samples

Gastrointestinal System
Principles of nasogastric cannulation in the intubated and non-intubated patient Principles and techniques for insertion of gastro-oesophageal balloon tamponade tube (e.g. Sengstaken-Blakemore) Anatomy of the abdominal wall; landmarks for abdominal paracentesis and abdominal drainage catheters Principles of peritoneal lavage Indications, contraindications, complications and technique of abdominal paracentesis Alternative routes for enteral feeding: indications, contraindications and complications of post-pyloric and percutaneous feeding tube placement

Genitourinary System
Anatomy of the genitourinary system and anatomical landmarks for suprapubic catheterisation
Urinary catheterisation techniques: transurethral and suprapubic
Urinary catheterisation in pelvic trauma: indications, contraindications and techniques

SKILLS & BEHAVIOURS
Generic
Prioritise tasks and procedures
Select appropriate equipment or device & use resources efficiently
Prepare equipment, patient and staff prior to undertaking the procedure
Obtain informed consent/assent from the patient where appropriate
Use drugs as indicated to facilitate the procedure
Choose an appropriate route / method of insertion and position the patient accordingly
Identify relevant anatomical landmarks
Use protective clothing (gloves / mask / gown / drapes) as indicated
Perform the procedure in a manner which minimise the risks of complications
Undertake appropriate investigation to confirm correct placement of device or exclude complications
Sterilise, clean or dispose of equipment appropriately
Recognise and manage emergencies; seek assistance appropriately

Respiratory System
Accurately assess the airway for potential difficulties with airway management
Choose a safe environment to undertake airway management (or optimise environment as circumstances allow)
Optimise the patient's position for airway management
Maintain a clear airway using oral/nasal airways
Support ventilation using bag and mask
Insert and check correct placement of laryngeal mask airway
Select appropriate tracheal tube type, size and length
Perform intubation and verify correct placement of tube
Manage and minimise cardiovascular and respiratory changes during and after intubation
Apply an end-tidal CO_2 detector post-intubation and interpret a capnograph trace
Demonstrate rapid sequence induction of anaesthesia/cricoid pressure
Change an orotracheal tube
Perform extubation
Prepare equipment for difficult or failed intubation
Demonstrate failed intubation drill (according to local algorithm or protocol)
Demonstrate minitracheotomy or needle cricothyroidotomy
Change a tracheostomy tube electively
Identify patients requiring tracheostomy; discuss indications and contraindications for percutaneous tracheostomy
Perform endotracheal suction (via oral/nasal/tracheostomy tube)

Check pipelines; check and change portable cylinders
Undertake bronchoscopy to assess tube position
Undertake bronchoscopy to perform bronchoalveolar lavage
Demonstrate aseptic insertion of an intrapleural chest drain and connection to a one-way seal device
Demonstrate emergency relief of tension pneumothorax

	Cardiovascular System
	Insert peripheral cannulae via different routes
	Establish peripheral venous access appropriate for resuscitation in major haemorrhage
	Chest x-ray interpretation (see 2.7)
	Insert central venous catheters by different routes
	Describe a method for tunnelled intravenous catheterisation
	Minimise blood loss related to clinical investigations and procedures
	Insert arterial catheters by different routes
	Distinguish between arterial and venous blood samples
	Prepare equipment for intravascular pressure monitoring
	Measure and interpret haemodynamic variables (including derived variables)
	Obtain and interpret data from central venous catheters
	Obtain and interpret data from a pulmonary artery catheter, oesophageal Doppler or alternative cardiac output measurement technique
	Obtain and interpret data from ECG (3- and 12-lead)
	Insert a temporary pacing wire
	Demonstrate emergency percutaneous pericardial aspiration
	Establish & review pacing box settings
	Use manual external defibrillators
	Use automated external defibrillators (AED)

	Gastrointestinal System
	Insert a nasogastric tube in an intubated and non-intubated patient
	Insert an abdominal drain

	Genitourinary System
	Perform aseptic urinary catheterisation: male and female

	ATTITUDES
	Recognise personal limitations, seeks and accepts assistance or supervision (knows how, when and who to ask)
	Consider patient comfort during procedures/investigations
	Desire to minimise patient distress
	Accept personal responsibility for the prevention of cross infection and self-infection
	Lead, delegate and supervise others appropriately according to experience and role

	Support other staff in the correct use of devices Promote respect for patient privacy, dignity and confidentiality

DOMAIN 6: PERIOPERATIVE CARE

6.1 Manage the Pre- and Post-Operative Care of the High Risk Surgical Patient

	KNOWLEDGE
	Factors determining perioperative risk Indications for, and interpretation of pre-operative investigations Dangers of emergency anaesthesia & surgery Effect of gastric contents and dehydration on perioperative risk Anaesthetic risk factors complicating recovery: suxamethonium apnoea, anaphylaxis, malignant hyperpyrexia, difficult airway Criteria for admission to, and discharge from ICU - factors influencing intensity and site of care (ward, high dependency unit (HDU), intensive care unit (ICU)) Perioperative implications of current drug therapy Consent and assent in the competent and non-competent patient Implications for postoperative care of common acute and chronic medical conditions (see 3.1 & 3.2) Indications and choice of agent for antibiotic prophylaxis Indications for and methods of perioperative anti-thrombotic treatment Recognition, assessment and management of acute pain Implications of type of anaesthesia (general/regional/local) for perioperative care Implications of type / site of surgery for postoperative management and potential complications within the first 24 hours of surgery Assessment and management of commonly encountered perioperative conditions & complications including: ***Respiratory***: Interpretation of symptoms and signs of respiratory insufficiency in the surgical patient; the unprotected airway; upper and lower airway obstruction including laryngeal trauma & oedema; pneumonia, collapse or consolidation, pulmonary infiltrates including acute lung injury (ALI) and the acute respiratory distress syndrome (ARDS) and their causative factors; pulmonary oedema; pleural effusion, haemo/pneumothorax (simple and tension); use of chest drains; factors affecting patients following thoracotomy, lung resection, oesophagectomy, cardiac surgery and thymectomy. ***Cardiovascular***: Interpretation of symptoms and signs of cardiovascular insufficiency in the surgical patient; recognition of bleeding; management of hypo/hypertension; operative risk factors in patients with ischaemic heart disease; pulmonary embolus; cardiac tamponade; surgery for acquired and congenital cardiac disease; management of patients following cardiac surgery (coronary grafting, valve replacement) and aortic surgery (arch, thoracic, abdominal); heart and heart-lung transplantation ***Renal***: Causes of perioperative oliguria and anuria; prevention and management of acute renal failure; rhabdomyolysis; consequences of nephrectomy, ileal conduits; management post-renal transplantation ***Neurological***: causes of post-operative confusion, stroke (CVA), coma and raised intracranial pressure; determinants of cerebral perfusion and oxygenation; prevention of secondary brain injury; perioperative management of patients with neuropathies and myopathies; intracranial pressure monitoring; intracerebral haemorrhage; spinal cord injury & ischaemia; brachial plexus injury;

complications of neuromuscular blockade

Gastrointestinal: Interpretation of abdominal pain and distension; peptic ulceration and upper GI haemorrhage; diarrhoea, vomiting and ileus; peritonitis; intestinal ischaemia; perforation; abdominal hypertension; pancreatitis; jaundice; cholecystitis; management of the pre- and post-liver transplant patient; perioperative nutrition; post-operative nausea & vomiting

Haematological and Oncological: Care of the immunosuppressed or immune-incompetent patient; complications of chemotherapy; management of severe acute haemorrhage and blood transfusion; correction of coagulation disorders and haemoglobinopathies.

Sepsis and Infection: fever and hypothermia; postoperative hypoperfusion and impaired oxygen delivery; wound infection; opportunistic and nosocomial infection; perioperative infection risk and prophylactic antibiotics; necrotising fasciitis; peritonitis; intestinal ischaemia; antibiotic selection and prescribing

Musculo-skeletal: principles and management of external fixators and casts; perioperative positioning; pressure area care; compartment syndromes; paralysed patients; principles of salvage surgery

SKILLS & BEHAVIOURS

Optimise high-risk surgical patients before surgery: consider site of care and management plan

Consider the impact of long-term and chronic treatment on acute surgical care

Communicate the risk of surgery to patients and family

Accurately assess the airway for potential difficulties with airway management

Ensure the necessary resources are available for safe post-operative care

Identify pre-operative health status and intercurrent disease, medications, allergies and their interaction with the nature of anaesthetic and surgery

Obtain relevant information from the patient, relatives and other secondary sources

Interpret pre-operative investigations, intra-operative findings and events/complications, and respond to them appropriately

Assess conscious level and conduct a careful systems review

Select & determine adequacy and route of administration of analgesia

Document, monitor and manage fluid balance, circulating volume, drains, systemic oxygen supply

Identify life-threatening cardiorespiratory complications; manage hypovolaemia and impaired oxygen delivery

Manage post-operative hypo and hypertension

Differentiate and manage tension pneumothorax, cardiac tamponade & pulmonary embolus

Manage post-operative stridor

Lead, delegate and supervise others appropriately according to experience and role

Recognise and manage perioperative emergencies and seek assistance appropriately

Establish a plan for postoperative management

ATTITUDES

Recognises personal limitations, seeks and accepts assistance or supervision (knows how, when and who to ask)

Consults, communicates and collaborates effectively with anaesthesiologist, surgeon, nursing staff, other professionals, patients and relatives where appropriate Desire to minimise patient distress Attention to and control of pain

6.2 Manage the Care of the Patient Following Cardiac Surgery Under Supervision

KNOWLEDGE
Factors determining perioperative risk Importance of preoperative health status on postoperative outcomes Indications for, and interpretation of pre-operative investigations Dangers of emergency anaesthesia & surgery Criteria for admission to, and discharge from ICU - factors influencing intensity and site of care (ward, high dependency unit (HDU), intensive care unit (ICU)) Perioperative implications of current drug therapy Implications for postoperative care of common acute and chronic medical conditions (see 3.1 & 3.2) Implications of type of anaesthesia (general/regional/local) for perioperative care Implications of type / site of surgery for postoperative management and potential complications within the first 24 hours of surgery Surgical interventions in patients with cardiac disease, perioperative management of the cardiovascular surgery patient and potential complications occurring within 24 hours of cardiac surgery Management of cyanosis, hypo- and hypertension, hypothermia and shivering Recognition, assessment and management of acute pain Indications for and methods of perioperative anti-thrombotic treatment Assessment and management of commonly encountered perioperative conditions & complications including: ***Respiratory***: Interpretation of symptoms and signs of respiratory insufficiency in the surgical patient; pneumonia, collapse or consolidation, pulmonary infiltrates including acute lung injury (ALI) and the acute respiratory distress syndrome (ARDS) and their causative factors; pulmonary oedema; pleural effusion, haemo/pneumothorax (simple and tension); use of chest drains; factors affecting patients following cardiac surgery. ***Cardiovascular***: Interpretation of symptoms and signs of cardiovascular insufficiency in the surgical patient; recognition of bleeding; management of hypo/hypertension; pulmonary embolus; cardiac tamponade; surgery for congenital and acquired cardiac disease; management of patients following cardiac surgery (coronary grafting, valve replacement) and aortic surgery (arch, thoracic, abdominal); heart and heart-lung transplantation; principles of cardiac pacing ***Renal***: Causes of perioperative oliguria and anuria; prevention and management of acute renal failure ***Neurological***: stroke (CVA); causes of post-operative confusion. ***Gastrointestinal***: post-operative alterations in gut motility; perioperative nutrition; post-operative nausea & vomiting

***Haematological*:** management of severe acute haemorrhage and blood transfusion; correction of coagulation disorders and haemoglobinopathies.
Metabolic and Hormonal: Blood glucose control; perioperative management of electrolyte disorders
Sepsis and Infection: fever and hypothermia; postoperative hypoperfusion and impaired oxygen delivery; wound infection; opportunistic and nosocomial infection; perioperative infection risk and prophylactic antibiotics; intestinal ischaemia; antibiotic selection and prescribing

SKILLS & BEHAVIOURS

Seek appropriate support and supervision in order to provide optimal patient care
Consider the impact of long-term and chronic treatment on acute surgical care
Identify pre-operative health status and intercurrent disease, medications, allergies and their interaction with the nature of anaesthetic and surgery
Obtain relevant information from the patient, relatives and other secondary sources
Interpret pre-operative investigations, intra-operative findings and events/complications, and respond to them appropriately
Assess conscious level and conduct a careful systems review
Select & determine adequacy and route of administration of analgesia
Document, monitor and manage fluid balance, circulating volume, drains, systemic oxygen supply
Establish a plan for postoperative management
Identify life-threatening cardiorespiratory complications; manage hypovolaemia and impaired oxygen delivery
Differentiate and manage tension pneumothorax, cardiac tamponade & pulmonary embolus
Recognise and manage perioperative emergencies and seek assistance appropriately

ATTITUDES

The attitudes required for this competence are the same for all competencies in Domain 6 - Please refer to competence 6.1 or the aggregate syllabus at the end of this section.

6.3 Manage the Care of the Patient Following Craniotomy Under Supervision

KNOWLEDGE

Factors determining perioperative risk
Importance of preoperative health status on postoperative outcomes
Indications for, and interpretation of pre-operative investigations
Criteria for admission to, and discharge from ICU - factors influencing intensity and site of care (ward, high dependency unit (HDU), intensive care unit (ICU))
Perioperative implications of current drug therapy
Implications for postoperative care of common acute and chronic medical conditions (see 3.1 & 3.2)
Implications of type of anaesthesia (general/regional/local) for perioperative care
Major neurosurgical procedures, peri-operative management of the patient undergoing major neurosurgery, and potential complications occurring within 24 hours of surgery

Recognition, assessment and management of acute pain
Indications for and methods of perioperative anti-thrombotic treatment
Assessment and management of commonly encountered perioperative conditions & complications including:
Respiratory: Interpretation of symptoms and signs of respiratory insufficiency in the surgical patient
Cardiovascular: Interpretation of symptoms and signs of cardiovascular insufficiency in the surgical patient; management of hypo/hypertension
Renal: Causes of perioperative oliguria and anuria; prevention and management of acute renal failure
***Neurological*:** causes of post-operative confusion, stroke (CVA), coma and raised intracranial pressure; determinants of cerebral perfusion and oxygenation; prevention of secondary brain injury; intracranial pressure monitoring; therapeutic correction of raised intracranial pressure; intracerebral haemorrhage, contusion and oedema
Gastrointestinal: post-operative alterations in gut motility; perioperative nutrition; post-operative nausea & vomiting
Metabolic and Hormonal: Blood glucose control; perioperative management of electrolyte disorders
Sepsis and Infection: fever and hypothermia; postoperative hypoperfusion and impaired oxygen delivery; wound infection; opportunistic and nosocomial infection; perioperative infection risk and prophylactic antibiotics; intestinal ischaemia; antibiotic selection and prescribing

SKILLS & BEHAVIOURS
Seek appropriate support and supervision in order to provide optimal patient care
Consider the impact of long-term and chronic treatment on acute surgical care
Identify pre-operative health status and intercurrent disease, medications, allergies and their interaction with the nature of anaesthetic and surgery
Obtain relevant information from the patient, relatives and other secondary sources
Interpret pre-operative investigations, intra-operative findings and events/complications, and respond to them appropriately
Assess conscious level and conduct a careful systems review
Select & determine adequacy and route of administration of analgesia
Document, monitor and manage fluid balance, circulating volume, drains, systemic oxygen supply
Monitor and manipulate cerebral perfusion pressure (CPP)
Establish a plan for postoperative management
Recognise and manage perioperative emergencies and seek assistance appropriately

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 6 - Please refer to competence 6.1 or the aggregate syllabus at the end of this section.

6.4 Manage the Care of the Patient Following Solid Organ Transplantation Under Supervision

KNOWLEDGE

Factors determining perioperative risk

Importance of preoperative health status on postoperative outcomes

Indications for, and interpretation of pre-operative investigations

Criteria for admission to, and discharge from ICU - factors influencing intensity and site of care (ward, high dependency unit (HDU), intensive care unit (ICU))

Perioperative implications of current drug therapy

Implications for postoperative care of common acute and chronic medical conditions (see 3.1 & 3.2)

Implications of type of anaesthesia (general/regional/local) for perioperative care

Implications of type / site of surgery for postoperative management and potential complications within the first 24 hours of surgery

Solid organ-specific transplantation (heart-lung, liver, renal): peri-operative considerations, pharmacological management, post-operative care and potential complications

Immunosuppression and rejection

Indications for and methods of perioperative anti-thrombotic treatment

Recognition, assessment and management of acute pain

Assessment and management of commonly encountered perioperative conditions & complications including:

***Respiratory*:** Interpretation of symptoms and signs of respiratory insufficiency in the surgical patient; pneumonia, collapse or consolidation, pulmonary infiltrates including acute lung injury (ALI) and the acute respiratory distress syndrome (ARDS) and their causative factors; pulmonary oedema; pleural effusion, haemo/pneumothorax (simple and tension); use of chest drains; factors affecting patients following heart-lung transplantation.

Cardiovascular: Recognition of bleeding; interpretation of symptoms and signs of cardiovascular insufficiency in the surgical patient; management of hypo/hypertension; pulmonary embolus; management of patients following heart and heart-lung transplantation

Renal: Causes of perioperative oliguria and anuria; prevention and management of acute renal failure; management post-renal transplantation

Neurological: stroke (CVA); causes of post-operative confusion.

Gastrointestinal: post-operative alterations in gut motility; perioperative nutrition; post-operative nausea & vomiting; management of the post-liver transplant patient.

Haematological and Oncological: Care of the immunosuppressed or immune-incompetent patient; complications of chemotherapy; management of severe acute haemorrhage and blood transfusion; correction of coagulation disorders and haemoglobinopathies.

Metabolic and Hormonal: Blood glucose control; perioperative management of electrolyte disorders

***Sepsis and Infection*:** fever and hypothermia; postoperative hypoperfusion and impaired oxygen delivery; wound infection; opportunistic and nosocomial infection; perioperative infection risk and prophylactic antibiotics; intestinal ischaemia; antibiotic selection and prescribing

SKILLS & BEHAVIOURS

Seek appropriate support and supervision in order to provide optimal patient care

Consider the impact of long-term and chronic treatment on acute surgical care

Identify pre-operative health status and intercurrent disease, medications, allergies and their interaction with the nature of anaesthetic and surgery Obtain relevant information from the patient, relatives and other secondary sources Interpret pre-operative investigations, intra-operative findings and events/complications, and respond to them appropriately Assess conscious level and conduct a careful systems review Select & determine adequacy and route of administration of analgesia Document, monitor and manage fluid balance, circulating volume, drains, systemic oxygen supply Establish a plan for postoperative management Review and monitor perioperative immunosuppressive therapy Identify life-threatening cardiorespiratory complications; manage hypovolaemia and impaired oxygen delivery Recognise and manage perioperative emergencies and seek assistance appropriately

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 6 - Please refer to competence 6.1 or the aggregate syllabus at the end of this section.

6.5 Manage the Pre- and Post-Operative Care of the Trauma Patient Under Supervision

KNOWLEDGE
Factors determining perioperative risk Importance of preoperative health status on postoperative outcomes Indications for, and interpretation of pre-operative investigations Dangers of emergency anaesthesia & surgery Criteria for admission to, and discharge from ICU - factors influencing intensity and site of care (ward, high dependency unit (HDU), intensive care unit (ICU)) Perioperative implications of current drug therapy Consent and assent in the competent and non-competent patient Implications for postoperative care of common acute and chronic medical conditions (see 3.1 & 3.2) Indications for and methods of perioperative anti-thrombotic treatment Recognition, assessment and management of acute pain Implications of type of anaesthesia (general/regional/local) for perioperative care Implications of type / site of surgery for postoperative management and potential complications within the first 24 hours of surgery Assessment and management of commonly encountered perioperative conditions & complications including: ***Respiratory***: Interpretation of symptoms and signs of respiratory insufficiency in the trauma patient; pneumonia, collapse or consolidation, pulmonary infiltrates including acute lung injury (ALI) and acute respiratory distress syndrome (ARDS) and their causative factors; pulmonary contusion; pulmonary oedema; pleural effusion, haemo/pneumothorax (management of simple and tension); use of chest drains.

***Cardiovascular*:** Interpretation of symptoms and signs of cardiovascular insufficiency in the trauma patient including cardiac contusion and tamponade; management of hypo/hypertension

Renal: Causes of perioperative oliguria and anuria; rhabdomyolysis; prevention and management of acute renal failure

Neurological: causes of post-operative confusion, stroke (CVA), coma and raised intracranial pressure; determinants of cerebral perfusion and oxygenation; prevention of secondary brain injury; intracranial pressure monitoring; therapeutic correction of raised intracranial pressure; intracerebral haemorrhage, contusion and oedema

Gastrointestinal: Interpretation of abdominal pain and distension; intestinal ischaemia; abdominal hypertension; risk factors, monitoring and management of abdominal compartment syndrome; perioperative nutrition; post-operative nausea and vomiting

Haematological: management of severe acute haemorrhage and blood transfusion; correction of coagulation disorders and haemoglobinopathies.

Metabolic and Hormonal: Blood glucose control; perioperative management of electrolyte disorders

Sepsis and Infection: fever and hypothermia; postoperative hypoperfusion and impaired oxygen delivery; wound infection; opportunistic and nosocomial infection; perioperative infection risk and prophylactic antibiotics; necrotising fasciitis; peritonitis; intestinal ischaemia; antibiotic selection and prescribing

Musculo-skeletal: principles and management of external fixators and casts; perioperative positioning; pressure area care; compartment syndromes; paralysed patients; principles of salvage surgery

SKILLS & BEHAVIOURS

Seek appropriate support and supervision in order to provide optimal patient care

Consider the impact of long-term and chronic treatment on acute surgical care

Identify pre-operative health status and intercurrent disease, medications, allergies and their interaction with the nature of anaesthetic and surgery

Communicate the risk of surgery to patients and family

Obtain relevant information from the patient, relatives and other secondary sources

Interpret pre-operative investigations, intra-operative findings and events/complications, and respond to them appropriately

Conduct a secondary survey following ATLS (or equivalent) principles

Assess conscious level and conduct a careful systems review

Select & determine adequacy and route of administration of analgesia

Document, monitor and manage fluid balance, circulating volume, drains, systemic oxygen supply

Establish a plan for postoperative management including plans for further surgery

Describe the risk period for use of depolarizing neuromuscular blocking agents in patients undergoing repeated surgical procedures

Identify life-threatening cardiorespiratory complications; manage hypovolaemia and impaired oxygen delivery

Recognise and manage perioperative emergencies and seek assistance appropriately

	ATTITUDES
	The attitudes required for this competence are the same for all competencies in Domain 6 - Please refer to competence 6.1 or the aggregate syllabus at the end of this section.

KNOWLEDGE
Factors determining perioperative risk Methods of optimising high risk surgical patients Importance of preoperative health status on postoperative outcomes Indications for, and interpretation of pre-operative investigations Dangers of emergency anaesthesia & surgery Effect of gastric contents and dehydration on perioperative risk Anaesthetic risk factors complicating recovery: suxamethonium apnoea, anaphylaxis, malignant hyperpyrexia, difficult airway Criteria for admission to, and discharge from ICU - factors influencing intensity and site of care (ward, high dependency unit (HDU), intensive care unit (ICU)) Perioperative implications of current drug therapy Consent and assent in the competent and non-competent patient Implications for postoperative care of common acute and chronic medical conditions (see 3.1 & 3.2) Implications of type of anaesthesia (general/regional/local) for perioperative care Implications of type / site of surgery for postoperative management and potential complications within the first 24 hours of surgery Assessment and management of commonly encountered perioperative conditions & complications including: ***Respiratory***: Interpretation of symptoms and signs of respiratory insufficiency in the surgical patient; the unprotected airway; upper and lower airway obstruction including laryngeal trauma & oedema; pneumonia, collapse or consolidation, pulmonary infiltrates including acute lung injury (ALI) and the acute respiratory distress syndrome (ARDS) and their causative factors; pulmonary oedema; pleural effusion, haemo/pneumothorax (simple and tension); use of chest drains; factors affecting patients following thoracotomy, lung resection, oesophagectomy, cardiac surgery and thymectomy ***Cardiovascular***: Interpretation of symptoms and signs of cardiovascular insufficiency in the surgical patient; recognition of bleeding; management of hypo/hypertension; operative risk factors in patients with ischaemic heart disease; pulmonary embolus; cardiac tamponade; surgery for acquired and congenital cardiac disease; abdominal aortic surgery; endovascular surgeries; management of patients following cardiac surgery (coronary grafting, valve replacement) and aortic surgery (arch, thoracic, abdominal); heart and heart-lung transplantation– ***Renal***: Causes of perioperative oliguria and anuria; prevention and management of acute renal failure; rhabdomyolysis; consequences of nephrectomy, ileal conduits; management post-renal transplantation ***Neurological***: causes of post-operative confusion, stroke (CVA), coma and raised intracranial pressure; determinants of cerebral perfusion and oxygenation; prevention of secondary brain injury; perioperative management of patients with neuropathies and myopathies; intracranial pressure monitoring; intracerebral haemorrhage; spinal cord injury & ischaemia; brachial plexus injury; complications of neuromuscular blockade

Gastrointestinal: Interpretation of abdominal pain and distension; peptic ulceration and upper GI haemorrhage; diarrhoea, vomiting and ileus; peritonitis; intestinal ischaemia; perforation; abdominal hypertension; pancreatitis; jaundice; cholecystitis; management of the pre- and post-liver transplant patient; perioperative nutrition; postoperative nausea & vomiting

Haematological and Oncological: Care of the immunosuppressed or immune-incompetent patient; complications of chemotherapy; management of severe acute haemorrhage and blood transfusion; correction of coagulation disorders and haemoglobinopathies.

Metabolic and Hormonal: Perioperative management of patients with diabetes; blood glucose control; hypo- and hyper-adrenalism, surgery to thyroid, adrenal and pituitary glands; perioperative management of electrolyte disorders.

Sepsis and Infection: fever and hypothermia; postoperative hypoperfusion and impaired oxygen delivery; wound infection; opportunistic and nosocomial infection; perioperative infection risk and prophylactic antibiotics; necrotising fasciitis; peritonitis; intestinal ischaemia; antibiotic selection and prescribing

Musculo-skeletal: principles and management of external fixators and casts; perioperative positioning; pressure area care; compartment syndromes; paralysed patients; principles of salvage surgery

Recognition, assessment and management of acute pain

Indications and choice of agent for antibiotic prophylaxis

Indications for and methods of perioperative anti-thrombotic treatment

Surgical interventions in patients with cardiac disease, perioperative management of the cardiovascular surgery patient and potential complications occurring within 24 hours of cardio-vascular surgery

Major neurosurgical procedures, peri-operative management of the patient undergoing major neurosurgery, and potential complications occurring within 24 hours of surgery

Solid organ-specific transplantation (heart-lung, liver, renal): peri-operative considerations, pharmacological management, post-operative care and potential complications

Immunosuppression and rejection

SKILLS & BEHAVIOURS

Optimise high-risk surgical patients before surgery: consider site of care and management plan

Communicate the risk of surgery to patients and family

Consider the impact of long-term and chronic treatment on acute surgical care

Accurately assess the airway for potential difficulties with airway management

Ensure the necessary resources are available for safe post-operative care

Identify pre-operative health status and intercurrent disease, medications, allergies and their interaction with the nature of anaesthetic and surgery

Obtain relevant information from the patient, relatives and other secondary sources

Interpret pre-operative investigations, intra-operative findings and events/complications, and respond to them appropriately

Assess conscious level and conduct a careful systems review

Select & determine adequacy and route of administration of analgesia

Document, monitor and manage fluid balance, circulating volume, drains, systemic oxygen supply Establish a plan for postoperative management Recognise and manage perioperative emergencies and seek assistance appropriately Identify life-threatening cardiorespiratory complications; manage hypovolaemia and impaired oxygen delivery Manage post-operative hypo and hypertension Differentiate and manage tension pneumothorax, cardiac tamponade & pulmonary embolus Manage post-operative stridor Review and monitor perioperative immunosuppressive therapy Monitor and manipulate cerebral perfusion pressure (CPP) Describe the risk period for use of depolarizing neuromuscular blocking agents in patients undergoing repeated surgical procedures Lead, delegate and supervise others appropriately according to experience and role

ATTITUDES
Recognises personal limitations, seeks and accepts assistance or supervision (knows how, when and who to ask) Consults, communicates and collaborates effectively with anaesthesiologist, surgeon, nursing staff, other professionals, patients and relatives where appropriate Desire to minimise patient distress Attention to and control of pain

DOMAIN 7: COMFORT AND RECOVERY

7.1 Identify and Attempt to Minimise the Physical and Psychosocial Consequences of Critical Illness for Patients and Families

	KNOWLEDGE
	Common symptomatology following critical illness
	Causes and methods of minimising distress in patients
	The role of patient's relatives and their contribution to care
	Physiological effects of pain and anxiety
	Stress responses
	Recognition and methods of assessment of pain
	Principles of acute pain management
	Pharmacokinetics, pharmacodynamics, indications and complications of commonly used analgesic, hypnotic, and neuromuscular blocking drugs in patients with normal and abnormal organ system function
	Sleep deprivation and its consequences
	Causes and management of acute confusional states
	Sensory deprivation / sensory overload
	Environmental and drug-related psychopathology associated with critical illness (e.g. anxiety, sleep disorders, hallucinations, drug withdrawal)
	Post-traumatic stress disorders
	Relevance and methods to care for skin, mouth, eyes and bowels, and to maintain mobility and muscle strength in critically ill patients
	Methods of communicating with patients who are unable to speak
	Fluid & caloric requirements in the critically ill patient including electrolytes, vitamins, trace elements and principles of immunonutrition
	Methods to assess nutritional status and basal energy expenditure
	Causes, prevention and management of critical illness polyneuropathy, motor neuropathy, and myopathy
	Consequences of immobilisation and mobilisation techniques (including disuse atrophy, foot-drop, ectopic calcification)
	Prevention & management of pressure sores
	Principles of rehabilitation: physical and psychological
	Resources available to patients and relatives for education and support (e.g. societies, local groups, publications, referral to allied health care professionals)
	Methods to minimise potential psychological trauma to the patient and their family of transfer from the ICU (especially with regard to long term ICU patients)
	Common risk factors for post-ICU mortality or re-admission and their minimisation
	Impact of chronic illness post-ICU on socialisation and employment

SKILLS & BEHAVIOURS
Identify complications associated with critical illness
Work with colleagues and relatives to minimise patient distress
Anticipate the development of pain and/or anxiety and adopt strategies for its prevention or minimisation
Use analgesic, hypnotic and neuromuscular blocking drugs appropriately and safely
Propose and implement a plan to provide adequate sleep and rest in ICU patients
Communicate effectively with relatives who may be anxious, angry, confused, or litigious
Participate in the education of patients/families
Appropriate and timely referral to specialists / allied health professionals
Take decisions to admit, discharge or transfer patients
Follow-up patients after discharge to the ward

ATTITUDES
Appreciate that physical and psychological consequences of critical illness can have a significant and long lasting effect for both patients and their relatives
Desire to minimise patient distress
Establish trusting relationships with and demonstrate compassionate care of patients and their relatives
Seek to modify the stresses which the intensive care environment places upon patients, their relatives and members of staff
Acknowledge the consequences of the language used to impart information
Regard each patient as an individual
Respect the religious beliefs of the patient and is willing to liaise with a religious representative if requested by patient or family
Willingness to communicate with and support families / significant others
Early planning for rehabilitation
Recognise that intensive care is a continuum throughout the 'patient journey'
Promote appropriate and timely discharge from ICU
Foster effective communication and relationships with medical and nursing staff in other wards / departments
Recognise personal limitations, seeks and accepts assistance or supervision (knows how, when and who to ask)

7.2 Manage the Assessment, Prevention and Treatment of Pain and Delirium

KNOWLEDGE
Physiological effects of pain and anxiety
Stress responses
Causes and methods of minimising distress in patients Recognition and methods of assessment of pain
Principles of acute pain management
Pharmacokinetics, pharmacodynamics, indications and complications of commonly used analgesic,

hypnotic, and neuromuscular blocking drugs in patients with normal and abnormal organ system function Indications, contra-indications, methods and complications of regional analgesia in critical illness Patient-controlled analgesia Environmental and drug-related psychopathology associated with critical illness (e.g. anxiety, sleep disorders, hallucinations, drug withdrawal) Causes and management of acute confusional states Sleep deprivation and its consequences Relevance and methods to care for skin, mouth, eyes and bowels, and to maintain mobility and muscle strength in critically ill patients

SKILLS & BEHAVIOURS
Anticipate the development of pain and/or anxiety and adopt strategies for its prevention or minimisation Interpret data from scoring or scaling systems to assess pain and sedation Select & determine adequacy and route of administration of analgesia Use analgesic, hypnotic and neuromuscular blocking drugs appropriately and safely Minimise complications associated with opioid and non-opioid analgesics Propose and implement a plan to provide adequate sleep and rest in ICU patients Work with colleagues and relatives to minimise patient distress

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 7 - Please refer to competence 7.1 or the aggregate syllabus at the end of this section.

7.3 Manage Sedation and Neuromuscular Blockade

KNOWLEDGE
Physiological effects of pain and anxiety Causes and methods of minimising distress in patients Stress responses Causes and management of acute confusional states Recognition and assessment of anxiety Environmental and drug-related psychopathology associated with critical illness (e.g. anxiety, sleep disorders, hallucinations, drug withdrawal) Sensory deprivation / sensory overload Sleep deprivation and its consequences Pharmacokinetics, pharmacodynamics, indications and complications of commonly used analgesic, hypnotic, and neuromuscular blocking drugs in patients with normal and abnormal organ system function Methods of measuring depth of sedation; effects of over-sedation and strategies to avoid this Consequences of immobilisation and mobilisation techniques (including disuse atrophy, foot-drop, ectopic calcification)

Causes, prevention and management of critical illness polyneuropathy, motor neuropathy, and myopathy Prevention & management of pressure sores Relevance and methods to care for skin, mouth, eyes and bowels, and to maintain mobility and muscle strength in critically ill patients Post-traumatic stress disorders

SKILLS & BEHAVIOURS
Anticipate the development of pain and/or anxiety and adopt strategies for its prevention or minimisation Use analgesic, hypnotic and neuromuscular blocking drugs appropriately and safely Interpret data from scoring or scaling systems to assess pain and sedation Obtain and interpret data from a nerve stimulator to monitor the degree of neuromuscular blockade Identify complications associated with critical illness Propose and implement a plan to provide adequate sleep and rest in ICU patients Work with colleagues and relatives to minimise patient distress

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 7 - Please refer to competence 7.1 or the aggregate syllabus at the end of this section.

7.4 Communicate the Continuing Care Requirements of Patients at ICU Discharge to Health Care Professionals, Patients and Relatives

KNOWLEDGE
Criteria for admission to, and discharge from ICU - factors influencing intensity and site of care (ward, high dependency unit (HDU), intensive care unit (ICU)) Common symptomatology following critical illness Common risk factors for post-ICU mortality or re-admission and their minimisation Post-traumatic stress disorders Environmental and drug-related psychopathology associated with critical illness (e.g. anxiety, sleep disorders, hallucinations, drug withdrawal) Consequences of immobilisation and mobilisation techniques (including disuse atrophy, foot-drop, ectopic calcification) Causes, prevention and management of critical illness polyneuropathy, motor neuropathy, and myopathy Fluid & caloric requirements in the critically ill patient including electrolytes, vitamins, trace elements and principles of immunonutrition Methods to assess nutritional status and basal energy expenditure Principles of rehabilitation: physical and psychological Methods of communicating with patients who are unable to speak Causes and methods of minimising distress in patients Resources available to patients and relatives for education and support (e.g. societies, local groups, publications, referral to allied health care professionals)

Supportive services integral to the long term rehabilitation of critically ill patients (physiotherapy, occupational therapy, orthotics, social services). Impact of chronic illness post-ICU on socialisation and employment Methods for assessing or measuring quality of life Methods to minimise potential psychological trauma to the patient and their family of transfer from the ICU (especially with regard to long term ICU patients) Management of tracheostomy care and avoidance of complications outside the ICU Persistent vegetative state

SKILLS & BEHAVIOURS
Anticipate the development of pain and/or anxiety and adopt strategies for its prevention or minimisation Work with colleagues and relatives to minimise patient distress Appropriate and timely referral to specialists / allied health professionals Ensure effective information exchange before patient discharge from ICU Liaise with medical and nursing staff in other departments to ensure optimal communication and continuing care after ICU discharge Communicate effectively with relatives who may be anxious, angry, confused, or litigious Participate in the education of patients/families Follow-up patients after discharge to the ward

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 7 - Please refer to competence 7.1 or the aggregate syllabus at the end of this section.

7.5 Manage the Safe and Timely Discharge of Patients from the ICU

KNOWLEDGE
Common symptomatology following critical illness The role of patient's relatives and their contribution to care Criteria for admission to, and discharge from ICU - factors influencing intensity and site of care (ward, high dependency unit (HDU), intensive care unit (ICU)) Common risk factors for post-ICU mortality or re-admission and their minimisation Methods to minimise potential psychological trauma to the patient and their family of transfer from the ICU (especially with regard to long term ICU patients) Potential psychological impact of inter-hospital transfer and family dislocation Management of tracheostomy care and avoidance of complications outside the ICU

SKILLS & BEHAVIOURS
Anticipate the development of pain and/or anxiety and adopt strategies for its prevention or minimisation Work with colleagues and relatives to minimise patient distress Appropriate and timely referral to specialists / allied health professionals Identify discharge criteria for individual patients

Take decisions to admit, discharge or transfer patients Ensure effective information exchange before patient discharge from ICU Liaise with medical and nursing staff in other departments to ensure optimal communication and continuing care after ICU discharge Communicate effectively with relatives who may be anxious, angry, confused, or litigious Follow-up patients after discharge to the ward Change a tracheostomy tube electively

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 7 - Please refer to competence 7.1 or the aggregate syllabus at the end of this section.

AGGREGATE SYLLABUS

DOMAIN 7: COMFORT & RECOVERY

	KNOWLEDGE
	Common symptomatology following critical illness The role of patient's relatives and their contribution to care Causes and methods of minimising distress in patients Physiological effects of pain and anxiety Stress responses Recognition and methods of assessment of pain Recognition and assessment of anxiety Pharmacokinetics, pharmacodynamics, indications and complications of commonly used analgesic, hypnotic, and neuromuscular blocking drugs in patients with normal and abnormal organ system function Principles of acute pain management Patient-controlled analgesia Indications, contra-indications, methods and complications of regional analgesia in critical illness Methods of measuring depth of sedation; effects of over-sedation and strategies to avoid this Environmental and drug-related psychopathology associated with critical illness (e.g. anxiety, sleep disorders, hallucinations, drug withdrawal) Sensory deprivation / sensory overload Sleep deprivation and its consequences Consequences of immobilisation and mobilisation techniques (including disuse atrophy, foot-drop, ectopic calcification) Causes, prevention and management of critical illness polyneuropathy, motor neuropathy, and myopathy Fluid & caloric requirements in the critically ill patient including electrolytes, vitamins, trace elements and principles of immunonutrition. Methods to assess nutritional status and basal energy expenditure Prevention & management of pressure sores Relevance and methods to care for skin, mouth, eyes and bowels, and to maintain mobility and muscle strength in critically ill patients Causes and management of acute confusional states Methods of communicating with patients who are unable to speak Principles of rehabilitation: physical and psychological Supportive services integral to the long term rehabilitation of critically ill patients (physiotherapy, occupational therapy, orthotics, social services). Resources available to patients and relatives for education and support (e.g. societies, local groups, publications, referral to allied health care professionals Criteria for admission to, and discharge from ICU - factors influencing intensity and site of care (ward, high dependency unit (HDU), intensive care unit (ICU)) Potential psychological impact of inter-hospital transfer and family dislocation

Common risk factors for post-ICU mortality or re-admission and their minimization
Methods to minimize potential psychological trauma to the patient and their family of transfer from the ICU (especially with regard to long term ICU patients)
Post-traumatic stress disorders
Methods for assessing or measuring quality of life
Impact of chronic illness post-ICU on socialisation and employment
Management of tracheostomy care and avoidance of complications outside the ICU
Persistent vegetative state

SKILLS & BEHAVIOURS
Identify complications associated with critical illness
Work with colleagues and relatives to minimize patient distress
Anticipate the development of pain and/or anxiety and adopt strategies for its prevention or minimization
Interpret data from scoring or scaling systems to assess pain and sedation
Use analgesic, hypnotic and neuromuscular blocking drugs appropriately and safely
Select & determine adequacy and route of administration of analgesia
Minimise complications associated with opioid and non-opioid analgesics
Obtain and interpret data from a nerve stimulator to monitor the degree of neuromuscular blockade
Propose and implement a plan to provide adequate sleep and rest in ICU patients
Communicate effectively with families who may be anxious, angry, confused, or litigious
Participate in the education of patients/families
Appropriate and timely referral to specialists / allied health professionals
Identify discharge criteria for individual patients
Ensure effective information exchange before patient discharge from ICU
Take decisions to admit, discharge or transfer patients
Liaise with medical and nursing staff in other departments to ensure optimal communication and continuing care after ICU discharge
Change a tracheostomy tube electively
Follow-up patients after discharge to the ward
Lead, delegate and supervise others appropriately according to experience and role

ATTITUDES
Appreciate that physical and psychological consequences of critical illness can have a significant and long lasting effect for both patients and their relatives
Desire to minimise patient distress
Establish trusting relationships with and demonstrates compassionate care of patients and their relatives
Seek to modify the stresses which the intensive care environment places upon patients, their relatives and members of staff
Acknowledge the consequences of the language used to impart information
Regard each patient as an individual

	Respect the religious beliefs of the patient and is willing to liaise with a religious representative if requested by patient or family Willingness to communicate with and support families / significant others Early planning for rehabilitation Recognise that intensive care is a continuum throughout the 'patient journey' Promotes appropriate and timely discharge from ICU Foster effective communication and relationships with medical and nursing staff in other wards / departments Recognise personal limitations, seeks and accepts assistance or supervision (knows how, when and who to ask)

DOMAIN 8: END OF LIFE CARE

8.1 Manage the Process of Withholding or Withdrawing Treatment with the Multidisciplinary Team

KNOWLEDGE
Basic ethical principles: autonomy, beneficence, non-maleficence, justice
Ethical and legal issues in decision-making for the incompetent patient
Difference between euthanasia and allowing death to occur: doctrine of double effect
With-holding and withdrawing treatment: omission and commission
Decision-making processes for withholding and withdrawing life sustaining therapies including documentation and iterative review
The limitations of intensive care medicine - expectations of what can and cannot be achieved
Principles of delivering bad news to patients and families
Local resources available to support dying patients and their families, and how to access them
Bereavement: anticipating and responding to grief
Cultural and religious practices of relevance when caring for dying patients and their families
Principles of pain and symptom management
Procedure for withdrawing treatment and support
Responsibilities in relation to legal authorities for certifying death (e.g. coroner, procurator fiscal or equivalent), and reasons for referral
The value of autopsy (post-mortem) examination.
Procedure for completion of death certification

SKILLS & BEHAVIOURS
Recognise when treatment is unnecessary or futile
Discuss end of life decisions with members of the health care team
Willing and able to communicate and discuss issues pertaining to end of life with patients and relatives
Discuss treatment options with a patient or relatives before ICU admission
Participate in timely discussion and regular review of ‘do not resuscitate’ orders and treatment limitation decisions
Relieve distress in the dying patient
Withdraw life sustaining treatment or organ support
Aware of the emotional needs of self and others; seeks and offers support appropriately

ATTITUDES
Values clear decision-making and communication
Acknowledges the consequences of the language used to impart information
Willingness to communicate with and support families / significant others
Respects the ideas and beliefs of the patient and their family and their impact on decision making (does not impose own views)

Respects the expressed wishes of competent patients Respects the religious beliefs of the patient and is willing to liaise with a religious representative if requested by patient or family Offers psychological, social and spiritual support to patients, their relatives or colleagues as required Desire to support patient, family, and other staff members appropriately during treatment withdrawal Recognises personal limitations, seeks and accepts assistance or supervision (knows how, when and who to ask)

8.2 Discuss End of Life Care with Patients and Their Families/Surrogates

KNOWLEDGE
Basic ethical principles: autonomy, beneficence, non-maleficence, justice Ethical and legal issues in decision-making for the incompetent patient Difference between euthanasia and allowing death to occur: doctrine of double effect With-holding and withdrawing treatment: omission and commission Decision-making processes for withholding and withdrawing life sustaining therapies including documentation and iterative review The limitations of intensive care medicine - expectations of what can and cannot be achieved Principles of delivering bad news to patients and families Local resources available to support dying patients and their families, and how to access them Bereavement: anticipating and responding to grief Cultural and religious practices of relevance when caring for dying patients and their families Principles of pain and symptom management Causes and prognosis of vegetative states Causes of brain stem death Cultural and religious factors which may influence attitude to brain stem death and organ donation Responsibilities in relation to legal authorities for certifying death (e.g. coroner, procurator fiscal or equivalent), and reasons for referral The value of autopsy (post-mortem) examination. Procedure for completion of death certification

SKILLS & BEHAVIOURS
Recognise when treatment is unnecessary or futile Willing and able to communicate and discuss issues pertaining to end of life with patients and relatives Discuss treatment options with a patient or relatives before ICU admission Differentiate competent from incompetent statements by patients Participate in timely discussion and regular review of ‘do not resuscitate’ orders and treatment limitation decisions Participate in discussions with relatives about treatment limitation or withdrawal

Communicate effectively with relatives who may be anxious, angry, confused, or litigious Explain the concept of brain stem death and organ donation clearly Lead a discussion about end of life goals, preferences and decisions with a patient and/or their relatives Obtain consent/assent for treatment, research, autopsy or organ donation

ATTITUDES
he attitudes required for this competence are the same for all competencies in Domain 8 - Please refer to competence 8.1 or the aggregate syllabus at the end of this section.

8.3 Manage Palliative Care of the Critically Ill Patient

KNOWLEDGE
Basic ethical principles: autonomy, beneficence, non-maleficence, justice Ethical and legal issues in decision-making for the incompetent patient Difference between euthanasia and allowing death to occur: doctrine of double effect Principles of delivering bad news to patients and families Local resources available to support dying patients and their families, and how to access them Bereavement: anticipating and responding to grief Cultural and religious practices of relevance when caring for dying patients and their families Principles of pain and symptom management

SKILLS & BEHAVIOURS
Recognise when treatment is unnecessary or futile Willing and able to communicate and discuss issues pertaining to end of life with patients and relatives Discuss treatment options with a patient or relatives before ICU admission Differentiate competent from incompetent statements by patients Participate in timely discussion and regular review of ‘do not resuscitate’ orders and treatment limitation decisions Participate in discussions with relatives about treatment limitation or withdrawal Lead a discussion about end of life goals, preferences and decisions with a patient and/or their relatives Relieve distress in the dying patient Aware of the emotional needs of self and others; seeks and offers support appropriately

ATTITUDES
he attitudes required for this competence are the same for all competencies in Domain 8 - Please refer to competence 8.1 or the aggregate syllabus at the end of this section.

8.4 Perform Brain Stem Death Testing

KNOWLEDGE
Basic ethical principles: autonomy, beneficence, non-maleficence, justice Causes of brain stem death Legal aspects of brain stem death diagnosis Applied anatomy and physiology of the brain and nervous system including cerebral blood supply, base of skull, autonomic nervous system and cranial nerves Physiological changes associated with brain stem death Preconditions and exclusions for the diagnosis of brain stem death Clinical, imaging and electrophysiological tests to diagnose brain death Cultural and religious factors which may influence attitude to brain stem death and organ donation Responsibilities in relation to legal authorities for certifying death (e.g. coroner, procurator fiscal or equivalent), and reasons for referral

SKILLS & BEHAVIOURS
Perform and document tests of brain stem function Consult and confirm findings of brain stem function tests with colleagues as required by the policy in Hong Kong or as indicated Document pre-conditions and exclusions to brain stem death testing

ATTITUDES
he attitudes required for this competence are the same for all competencies in Domain 8 - Please refer to competence 8.1 or the aggregate syllabus at the end of this section.

8.5 Manage the Physiological Support of the Organ Donor

KNOWLEDGE
Basic ethical principles: autonomy, beneficence, non-maleficence, justice Causes of brain stem death Physiological changes associated with brain stem death Principles of management of the organ donor (according to Hong Kong policy) Common investigations and procedures undertaken in the ICU prior to organ harvesting Role of organ/tissue procurement authority in Hong Kong and procedures for referral Responsibilities and activities of transplant co-ordinators

SKILLS & BEHAVIOURS
Explain the concept of brain stem death and organ donation clearly Obtain consent/assent for treatment, research, autopsy or organ donation Liaise with organ donation coordinator to plan management of the organ donor Monitor vital physiological functions as indicated Recognise and rapidly respond to adverse trends in monitored parameters Aware of the emotional needs of self and others; seeks and offers support appropriately

	ATTITUDES
	The attitudes required for this competence are the same for all competencies in Domain 8 - Please refer to competence 8.1 or the aggregate syllabus at the end of this section.

AGGREGATE SYLLABUS

DOMAIN 8: END OF LIFE CARE

KNOWLEDGE
Basic ethical principles: autonomy, beneficence, non-maleficence, justice
Ethical and legal issues in decision-making for the incompetent patient
Difference between euthanasia and allowing death to occur, doctrine of double effect
Legal aspects of brain stem death diagnosis
With-holding and withdrawing treatment: omission and commission
Decision-making processes for withholding and withdrawing life sustaining therapies including documentation and iterative review
Principles of management of the organ donor
Physiological changes associated with brain stem death
Preconditions and exclusions for the diagnosis of brain stem death
Clinical, imaging and electrophysiological tests to diagnose brain death
Principles of delivering bad news to patients and families
Bereavement: anticipating and responding to grief
Principles of pain and symptom management
Procedure for withdrawing treatment and support
Causes and prognosis of vegetative states
Causes of brain stem death
Responsibilities in relation to legal authorities for certifying death (e.g. coroner, procurator fiscal or equivalent), and reasons for referral
Procedure for completion of death certification

SKILLS & BEHAVIOURS
Recognise when treatment is unnecessary or futile
Discuss end of life decisions with members of the health care team
Willing and able to communicate and discuss issues pertaining to end of life with patients and relatives
Differentiate competent from incompetent statements by patients
Discuss treatment options with a patient or relatives before ICU admission
Participate in timely discussion and regular review of ‘do not resuscitate’ orders and treatment limitation decisions
Participate in discussions with relatives about treatment limitation or withdrawal
Communicate effectively with relatives who may be anxious, angry, confused, or litigious
Lead a discussion about end of life goals, preferences and decisions with a patient and/or their relatives
Explain the concept of brain stem death and organ donation clearly
Obtain consent/assent for treatment, research, autopsy or organ donation
Withdraw life sustaining treatment or organ support
Relieve distress in the dying patient
Document pre-conditions and exclusions to brain stem death testing

Perform and document tests of brain stem function Consult and confirm findings of brain stem function tests with colleagues as required by local policy or as indicated Liaise with organ donation coordinator to plan management of the organ donor Monitor vital physiological functions as indicated Recognise and rapidly respond to adverse trends in monitored parameters Aware of the emotional needs of self and others; seeks and offers support appropriately Establish trusting relationships with and demonstrates compassionate care of patients and their relatives Integrity, honesty & respect for the truth underpin relationships with patients, relatives and colleagues Appreciate that the decision to withhold or withdraw treatment does not imply the termination of care Consult and take into account the views of referring clinicians; promote their participation in decision making where appropriate

ATTITUDES
Value clear decision-making and communication Acknowledge the consequences of the language used to impart information Willingness to communicate with and support families/significant others Respect the ideas and beliefs of the patient and their family and their impact on decision making (does not impose own views) Respect the expressed wishes of competent patients Respect the religious beliefs of the patient and is willing to liaise with a religious representative if requested by patient or family Offer psychological, social and spiritual support to patients, their relatives or colleagues as required Desire to support patient, family, and other staff members appropriately during treatment withdrawal Recognise personal limitations, seeks and accepts assistance or supervision (knows how, when and who to ask)

DOMAIN 9: PROFESSIONALISM

Communication Skills

9.1 Communicate Effectively with Patients and Relatives
9.2 Communicate Effectively with Members of the Health Care Team
9.3 Maintain Accurate and Legible Records/Documentation

KNOWLEDGE
Consent and assent in the competent and non-competent patient
Confidentiality and data protection - legal and ethical issues
Methods of effective communication of information (written; verbal etc.)
Principles of crisis management, conflict resolution, negotiation and debriefing
Principles of delivering bad news to patients and families
Strategies to communicate to the general population critical care issues and their impact on the maintenance and improvement of health care

SKILLS & BEHAVIOURS
Communicate with patients and relatives - give accurate information and re-iterate to ensure comprehension; clarify ambiguities
Discuss treatment options with a patient or relatives before ICU admission
Differentiate competent from incompetent statements by patients
Communicate effectively with relatives who may be anxious, angry, confused, or litigious
Obtain consent/assent for treatment, research, autopsy or organ donation
Use non-verbal communication appropriately
Use available opportunities and resources to assist in the development of personal communication skills
Communicate effectively with professional colleagues to obtain accurate information and plan care
Manage inter-personal conflicts which arise between different sectors of the organisation, professionals, patients or relatives
Acquire, interpret, synthesize, record, and communicate (written and verbal) clinical information
Listen effectively

ATTITUDES
Integrity, honesty & respect for the truth underpin relationships with patients, relatives and colleagues
Establish trusting relationships with and demonstrates compassionate care of patients and their relatives
Consult, communicate and collaborate effectively with patients, relatives and the health care team
Sensitive to the reactions and emotional needs of others
Approachable and accessible when on duty
Regard each patient as an individual
Willingness to communicate with and support families / significant others

Promote respect for patient privacy, dignity and confidentiality Acknowledge the consequences of the language used to impart information Recognise that communication is a two-way process

Professional Relationships with Patients and Relatives

9.4 Involve Patients (or their Surrogates If Applicable) in Decisions about Care and Treatment

9.5 Demonstrate Respect of Culture and Religious Beliefs and an Awareness of their Impact on Decision Making

9.6 Respect Privacy, Dignity, Confidentiality and Legal Constraints on the Use of Patient Data

KNOWLEDGE
Basic ethical principles: autonomy, beneficence, non-maleficence, justice Consent and assent in the competent and non-competent patient Ethical and legal issues in decision-making for the incompetent patient Confidentiality and data protection - legal and ethical issues Methods of effective communication of information (written; verbal etc.) Principles of crisis management, conflict resolution, negotiation and debriefing Principles of delivering bad news to patients and families Sources of information about different cultural and religious attitudes and beliefs to life threatening illness and death available to health care professionals. Impact of occupational and environmental exposures, socio-economic factors, and life style factors on critical illness

SKILLS & BEHAVIOURS
Communicate with patients and relatives - give accurate information and re-iterate to ensure comprehension; clarify ambiguities Involve patients in decisions about their care and treatment Discuss treatment options with a patient or relatives before ICU admission Differentiate competent from incompetent statements by patients Communicate effectively with relatives who may be anxious, angry, confused, or litigious Obtain consent/assent for treatment, research, autopsy or organ donation Professional and reassuring approach - generates confidence and trust in patients and their relatives Manage inter-personal conflicts which arise between different sectors of the organisation, professionals, patients or relatives Listen effectively

ATTITUDES
Integrity, honesty & respect for the truth underpin relationships with patients, relatives and colleagues Establish trusting relationships with and demonstrates compassionate care of patients and their

relatives Consult, communicate and collaborate effectively with patients, relatives and the health care team Sensitive to the reactions and emotional needs of others Assess, communicate with, and support patients and families confronted with critical illness Sensitive to patients' expectations and responses; considers their perspective in order to understand their conduct and attitudes Respect the cultural and religious beliefs of the patient; demonstrate an awareness of their impact on decision making Respect the expressed wishes of competent patients Regard each patient as an individual Desire to minimise patient distress Seek to modify the stresses which the intensive care environment places upon patients, their relatives and members of staff Willingness to communicate with and support families / significant others Promotes respect for patient privacy, dignity and confidentiality Acknowledge the consequences of the language used to impart information Recognise that communication is a two-way process

Professional Relationships with Members of the Health Care Team

9.7 Collaborate and Consult; Promote Teamworking

9.8 Ensure Continuity of Care Through Effective Hand-Over of Clinical Information

9.9 Support Clinical Staff Outside the ICU to Enable the Delivery of Effective Care

9.10 Appropriately Supervise, and Delegate to Others, the Delivery of Patient Care

KNOWLEDGE
Methods of effective communication of information (written; verbal etc.) Management of information Principles of crisis management, conflict resolution, negotiation and debriefing Principles of professional appraisal and constructive feedback

SKILLS & BEHAVIOURS
Act appropriately as a member or leader of the team (according to skills & experience) Lead, delegate and supervise others appropriately according to experience and role Communicate effectively with professional colleagues to obtain accurate information and plan care Collaborate with other team members to achieve common goals Consult and take into account the views of referring clinicians; promote their participation in decision making where appropriate Liaise with medical and nursing staff in other departments to ensure optimal communication and continuing care after ICU discharge Acquire, interpret, synthesize, record, and communicate (written and verbal) clinical information

Manage inter-personal conflicts which arise between different sectors of the organisation, professionals, patients or relatives
Participate appropriately in educational activities and teaching medical and non-medical members of the health care team
Contribute to professional meetings - understand their rules, structure and etiquette
Listen effectively
Respect, acknowledge & encourage the work of others

ATTITUDES

Integrity, honesty & respect for the truth underpin relationships with patients, relatives and colleagues
Consult, communicate and collaborate effectively with patients, relatives and the health care team
Sensitive to the reactions and emotional needs of others
Recognise personal limitations, seeks and accepts assistance or supervision (know how, when and who to ask)
Recognise impaired performance (limitations) in self and colleagues and takes appropriate action
Approachable and accessible when on duty
Recognise personal strengths and limitations as a consultant to other specialists
Desire to minimise patient distress
Adopt a problem solving approach
Foster effective communication and relationships with medical and nursing staff in other wards / departments
Seek to modify the stresses which the intensive care environment places upon patients, their relatives and members of staff
Accept responsibility for patient care and staff supervision
Promote respect for patient privacy, dignity and confidentiality
Recognise that communication is a two-way process
Generate enthusiasm amongst others
Desire and willingness to share knowledge
Contribute effectively to interdisciplinary team activities.
Participate in, and promote continuing education of members of the multi-disciplinary health care team

Self-Governance

9.11 Take Responsibility for Safe Patient Care
9.12 Formulate Clinical Decisions with Respect for Ethical and Legal Principles
9.13 Seek Learning Opportunities and Integrates New Knowledge into Clinical Practice
9.14 Participate in Multidisciplinary Teaching
9.15 Participate in Research or Audit Under Supervision

KNOWLEDGE

Basic ethical principles: autonomy, beneficence, non-maleficence, justice Ethical and legal issues in decision-making for the incompetent patient Confidentiality and data protection - legal and ethical issues Management of information Methods of effective communication of information (written; verbal etc.) Principles of crisis management, conflict resolution, negotiation and debriefing Principles of professional appraisal and constructive feedback Principles of adult education and factors that promote learning Purpose and process of quality improvement activities such as evidence based practice, best practice guidelines & benchmarking and change management Methods of audit and translating findings into sustained change in practice Use of information technology to optimize patient care and life-long learning Electronic methods of accessing medical literature Identification and critical appraisal of literature; integration of findings into local clinical practice Principles of appraisal of evidence: levels of evidence; interventions; diagnostic tests; prognosis; integrative literature (meta-analyses, practice guidelines, decision & economic analyses) Principles of applied research and epidemiology necessary to evaluate new guidelines/ forms of therapy Principles of medical research: research questions; protocol design; power analysis, data collection, data analysis and interpretation of results; manuscript preparation and publication rules. Ethical principles involved in conducting research (including subject protection, consent, confidentiality and competing interests) and ethical approval processes in Hong Kong Ethical management of relationships with industry Requirements of ICM training at local and territorial level

SKILLS & BEHAVIOURS
Attentive to detail, punctual, reliable, polite and helpful Take decisions at a level commensurate with experience; accept the consequences of these decisions Lead, delegate and supervise others appropriately according to experience and role Collaborate with other team members to achieve common goals Contribute to departmental / ICU activities Participate in the processes of clinical audit, peer review and continuing medical education Propose realistic initiatives / projects to promote improvement Utilise personal resources effectively to balance patient care, learning needs, and outside activities. Develop, implement and monitor a personal continuing education plan including maintenance of a professional portfolio Use learning aids and resources to undertake self-directed learning Use electronic retrieval tools (e.g. PubMed) to access information from the medical & scientific literature Use a systematic approach to locate, appraise, and assimilate evidence from scientific studies relevant to a patient's health problem Participate appropriately in educational activities and teaching medical and non-medical members of

the health care team Demonstrate initiative in problem solving Listen effectively

ATTITUDES
Integrity, honesty & respect for the truth underpin relationships with patients, relatives and colleagues Take responsibility for his/her personal physical and mental health, especially where impairment may affect patient care and professional conduct Consult, communicate and collaborate effectively with patients, relatives and the health care team Recognise personal limitations, seeks and accepts assistance or supervision (know how, when and who to ask) Recognise impaired performance (limitations) in self and colleagues and takes appropriate action Participate in, and promotes continuing education of members of the multi-disciplinary health care team. Enquiring mind, undertakes critical analysis of published literature Recognise and use teaching and learning opportunities arising from clinical experiences, including errors Recognise personal strengths and limitations as a consultant to other specialists Recognise and manages circumstances where personal prejudices or biases may affect behaviour, including cultural, financial and academic aspects Accept responsibility for patient care and staff supervision Promote respect for patient privacy, dignity and confidentiality Well-being of the patient takes precedence over the needs of society or research Desire to contribute to the development of new knowledge Seek to recognise those changes in the specialty, medicine or society, which should modify their practice and adapt their skills accordingly. Desire and willingness to share knowledge

AGGREGATE SYLLABUS

DOMAIN 9: PROFESSIONALISM

KNOWLEDGE
Basic ethical principles: autonomy, beneficence, non-maleficence, justice
Consent and assent in the competent and non-competent patient
Confidentiality and data protection - legal and ethical issues
Management of information
Ethical and legal issues in decision-making for the incompetent patient
Principles of conflict resolution, negotiation and debriefing
Principles of delivering bad news to patients and families
Principles of professional appraisal and constructive feedback
Purpose and process of quality improvement activities such as evidence-based practice, best practice guidelines & benchmarking and change management
Methods of audit and translating findings into sustained change in practice
Identification and critical appraisal of literature; integration of findings into local clinical practice
Principles of appraisal of evidence: levels of evidence; interventions; diagnostic tests; prognosis; integrative literature (meta-analyses, practice guidelines, decision & economic analyses)
Principles of applied research and epidemiology necessary to evaluate new guidelines / forms of therapy
Ethical principles involved in conducting research (including subject protection, consent, confidentiality and competing interests) and local ethical approval processes
Ethical management of relationships with industry

SKILLS & BEHAVIOURS
Act appropriately as a member or leader of the team (according to skills & experience)
Communicate with patients and relatives - give accurate information and re-iterate to ensure comprehension; clarify ambiguities
Lead, delegate and supervise others appropriately according to experience and role
Discuss treatment options with a patient or relatives before ICU admission
Differentiate competent from incompetent statements by patients
Collaborate with other team members to achieve common goals
Communicate effectively with relatives who may be anxious, angry, confused, or litigious
Consult and consider the views of referring clinicians; promote their participation in decision making where appropriate
Obtain consent/assent for treatment, research, autopsy
Involve patients in decisions about their care and treatment
Liaise with medical and nursing staff in other departments to ensure optimal communication and continuing care after ICU discharge
Use non-verbal communication appropriately
Use available opportunities and resources to assist in the development of personal communication skills

Communicate effectively with professional colleagues to obtain accurate information and plan care
Participate appropriately in educational activities and teaching medical and non-medical members of the health care team
Manage inter-personal conflicts which arise between different sectors of the organization, professionals, patients or relatives
Contribute to professional meetings - understand their rules, structure and etiquette
Acquire, interpret, synthesize, record, and communicate (written and verbal) clinical information
Listen effectively (listening skills)
Respect, acknowledge & encourage the work of others
Attentive to detail, punctual, reliable, polite and helpful
Take decisions at a level commensurate with experience; accept the consequences of these decisions
Contribute to departmental / ICU activities
Participate in the processes of clinical audit, peer review and continuing medical education
Propose realistic initiatives / projects to promote improvement
Develop, implement and monitor a personal continuing education plan including maintenance of a professional portfolio
Use learning aids and resources to undertake self-directed learning
Access information from the medical & scientific literature
Use a systematic approach to locate, appraise, and assimilate evidence from scientific studies relevant to a patient's health problem
Demonstrate initiative in problem solving

ATTITUDES
Integrity, honesty & respect for the truth underpin relationships with patients, relatives and colleagues
Establishes trusting relationships with and demonstrates compassionate care of patients and their relatives
Consults, communicates and collaborates effectively with patients, relatives and the health care team
Sensitive to the reactions and emotional needs of others
Recognizes personal limitations, seeks and accepts assistance or supervision (knows how, when and who to ask)
Approachable and accessible when on duty
Recognizes impaired performance (limitations) in self and colleagues and takes appropriate action
Regards each patient as an individual
Assesses, communicates with, and supports patients and families confronted with critical illness
Willingness to communicate with and support families / significant others
Sensitive to patients' expectations and responses; considers their perspective in order to understand their conduct and attitudes
Recognizes personal strengths and limitations as a consultant to other specialists
Promotes respect for patient privacy, dignity and confidentiality
Respects the cultural and religious beliefs of the patient; demonstrate an awareness of their impact on decision making
Respects the expressed wishes of competent patients

	Adopts a problem-solving approach Desire to minimize patient distress Fosters effective communication and relationships with medical and nursing staff in other wards / departments Seeks to modify the stresses which the intensive care environment places upon patients, their relatives and members of staff Accepts responsibility for patient care and staff supervision Desire and willingness to share knowledge Contributes effectively to interdisciplinary team activities. Participates in, and promotes continuing education of members of the multi-disciplinary health care team. Takes responsibility for his/her personal physical and mental health, especially where impairment may affect patient care and professional conduct Enquiring mind, undertakes critical analysis of published literature Recognizes and uses teaching and learning opportunities arising from clinical experiences, including errors Recognizes and manages circumstances where personal prejudices or biases may affect behaviors, including cultural, financial and academic aspects Well-being of the patient takes precedence over the needs of society or research Desire and willingness to contribute to the development of new knowledge Seeks to recognize those changes in the specialty, medicine or society, which should modify their practice and adapt their skills accordingly.

DOMAIN 10: TRANSPORT

10.1 Undertakes Transport of the Mechanically Ventilated Critically Ill Patient Outside the ICU

KNOWLEDGE
Indications, risks and benefits of patient transfer (intra / inter hospital)
Criteria for admission to, and discharge from ICU - factors influencing intensity and site of care (ward, high dependency unit (HDU), intensive care unit (ICU))
Principles of safe patient transfer (before, during and after)
Strategies to manage the unique problems associated with patient transfer - limitations of space, personnel, monitoring & equipment
Advantages and disadvantages of road ambulance, fixed and rotary wing aircraft including problems associated with altitude, noise, lighting conditions, vibration, acceleration and deceleration
Selection of mode of transport based upon clinical requirements, distance, vehicle availability and environmental conditions
Determination of required number of physicians/nurses/others during transfer and the role of paramedical personnel
Selection and operation of transport equipment: size, weight, portability, power supply/battery life, oxygen availability, durability and performance under conditions of transport
Principles of monitoring under transport conditions
Physiology associated with air transport
Homeostatic interaction between patient and environment (e.g. thermoregulation, posture/ positioning)
Communication prior to and during transport
Operation of locally available retrieval services
Potential psychological impact of inter-hospital transfer and family dislocation

SKILLS & BEHAVIOURS
Determine when the patient's needs exceed local resources or specialist expertise (requirement for transfer)
Take decisions to admit, discharge or transfer patients
Communicate with referring and receiving institutions and teams
Check transfer equipment and plan transfers with personnel prior to departure
Select appropriate staff based upon patient need
Prepare patients prior to transfer; anticipate and prevent complications during transfer - maintain patient safety at all times
Adapt and apply general retrieval principles where appropriate to pre-, intra-, and inter-hospital transportation.
Consider the need for stabilisation before transfer
Undertake intra-hospital transfer of ventilated patients to theatre or for diagnostic procedures (e.g. CT)

Undertake inter-hospital transfers of patients with single or multiple organ failure Maintain comprehensive documentation of the patient's clinical condition before, during and after transport including relevant medical conditions, therapy delivered, environmental factors and logistical difficulties encountered Lead, delegate and supervise others appropriately according to experience and role

ATTITUDES
Appreciate the importance of communication between referring, transporting and receiving staff Anticipate and prevents problems during transfer Desire to minimise patient distress Recognise personal limitations, seeks and accepts assistance or supervision (knows how, when and who to ask)

N.B. There is only one competence in domain 10 therefore the aggregate syllabus is the same as above

DOMAIN 11: PATIENT SAFETY AND HEALTH SYSTEM MANAGEMENT

11.1 Lead a Daily Multidisciplinary Ward Round

KNOWLEDGE
Roles of different members of the multidisciplinary team and Hong Kong referral practices Triage and management of competing priorities
Principles of crisis management, conflict resolution, negotiation and debriefing
Confidentiality and data protection - legal and ethical issues

SKILLS & BEHAVIOURS
Lead, delegate and supervise others appropriately according to experience and role
Demonstrate initiative in problem solving
Acquire, interpret, synthesize, record, and communicate (written and verbal) clinical information
Confirm accuracy of clinical information provided by members of the health care team
Summarise a case history
Assemble clinical and laboratory data, logically compare all potential solutions to the patient's problems, prioritise them and establish a clinical management plan
Establish a management plan based on clinical and laboratory information
Consider potential interactions when prescribing drugs & therapies
Consider risk-benefit and cost-benefit of alternative drugs & therapies
Organise multidisciplinary care for groups of patients in the ICU
Collaborate with other team members to achieve common goals
Listen effectively
Professional and reassuring approach - generates confidence and trust in patients and their relatives

ATTITUDES
Accept responsibility for patient care and staff supervision
Recognise impaired performance (limitations) in self and colleagues and takes appropriate action
Recognise personal limitations, seeks and accepts assistance or supervision (knows how, when and who to ask)
Consult, communicate and collaborate effectively with patients, relatives and the health care team
Desire to minimise patient distress
Seek to modify the stresses which the intensive care environment places upon patients, their relatives and members of staff
Establish collaborative relations with other health care providers to promote continuity of patient care as appropriate
Consult and take into account the views of referring clinicians; promote their participation in decision making where appropriate
Ensure effective information transfer
Adopt a problem solving approach
Enquiring mind, undertakes critical analysis of published literature

11.2 Comply with Local Infection Control Measures

KNOWLEDGE
Epidemiology and prevention of infection in the ICU Types of organisms - emergence of resistant strains, mode of transfer, opportunistic and nosocomial infections; difference between contamination, colonisation & infection Risk of colonisation with potentially pathogenic micro-organisms and the factors associated with patient, staff, equipment and environmental colonisation Recognition of patient groups at high risk of developing infectious complications Autogenous infection: routes and methods of prevention Cross infection: modes of transfer and common agents Ventilator associated pneumonia: definition, pathogenesis and prevention Universal precautions and preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc.) Requirements for microbiological surveillance and clinical sampling Benefits and risks of different prophylactic antibiotic regimens Local patterns of bacterial resistance and antibiotic policy Principles of aseptic technique and aseptic handling of invasive medical devices Methods of sterilisation and cleaning or disposal of equipment Infections from contaminated blood / body fluids; strategy if contaminated (e.g. needle stick injury) Local policies and procedures relevant to practice Published standards of care at local, Hong Kong and international level (including consensus statements and care bundles)

SKILLS & BEHAVIOURS
Accept personal responsibility for the prevention of cross infection and self-infection Demonstrate routine application of infection control practices to all patients, particularly hand washing between patient contacts Use protective clothing (gloves / mask / gown / drapes) as indicated Apply methods to prevent autogenous infection (e.g. posture, mouth hygiene) Implement prophylactic regimens appropriately Prescribe antibiotics safely and appropriately

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 11 - Please refer to competence 11.1 or the aggregate syllabus at the end of this section.

11.3 Identify Environmental Hazards and Promote Safety for Patients and Staff

KNOWLEDGE
Principles of risk prevention
Physical requirements of ICU design
Staff safety: susceptibility to harmful physical, chemical and infectious hazards in the ICU
Environmental control of temperature, humidity, air changes and scavenging systems for waste gases and vapours
Measurement of gas and vapour concentrations, (oxygen, carbon dioxide, nitrous oxide, and volatile anaesthetic agents) - environmental safety
Hazards associated with ionising radiation and methods to limit these in the ICU
Electrical safety: conditions which predispose to the occurrence of macro-shock / micro-shock; physical dangers of electrical currents; relevant standards regarding safe use of electricity in patient care; basic methods to reduce electrical hazards.
Equipment requirements and selection: clinical need & priority; accuracy, reliability, safety and practical issues (ease of use, acceptance by staff)
Critical incident or error monitoring
Confidentiality and data protection - legal and ethical issues
Local policies and procedures relevant to practice
Published standards of care at local, national and international level (including consensus statements and care bundles)
Identification and critical appraisal of literature; integration of findings into local clinical practice
Epidemiology and prevention of infection in the ICU
Risk of colonisation with potentially pathogenic micro-organisms and the factors associated with patient, staff, equipment and environmental colonisation
Types of organisms - emergence of resistant strains, mode of transfer, opportunistic and nosocomial infections; difference between contamination, colonisation & infection
Cross infection: modes of transfer and common agents
Universal precautions and preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc.)
Requirements for microbiological surveillance and clinical sampling
Benefits and risks of different prophylactic antibiotic regimens
Methods of sterilisation and cleaning or disposal of equipment
Infections from contaminated blood / body fluids; strategy if contaminated (e.g. needle stick injury)

SKILLS & BEHAVIOURS
Maximise safety in everyday practice
Demonstrate routine application of infection control practices to all patients, particularly hand washing between patient contacts
Use protective clothing (gloves / mask / gown / drapes) as indicated
Seek expert help to ensure all equipment in the ICU conforms with and is maintained to the relevant safety standard

	Document adverse incidents in a timely, detailed and appropriate manner
	ATTITUDES
	The attitudes required for this competence are the same for all competencies in Domain 11 - Please refer to competence 11.1 or the aggregate syllabus at the end of this section.

11.4 Identify and Minimise the Risk of Critical Incidents and Adverse Events, Including Complications of Critical Illness

	KNOWLEDGE
	Common sources of error and factors which contribute to critical incidents / adverse events (ICU environment, personnel, equipment, therapy and patient factors) Principles of risk prevention Pathogenesis, risk factors, prevention, diagnosis and treatment of complications of ICU management including: nosocomial infection, ventilator associated pneumonia (VAP), ventilator associated lung injury - pulmonary barotrauma, pulmonary oxygen toxicity, thromboembolism (venous, arterial, pulmonary, intracardiac), stress ulceration, pain, malnutrition, critical illness poly-neuropathy, motor-neuropathy & myopathy Modification of treatment or therapy to minimise the risk of complications and appropriate monitoring to allow early detection of complications Risk of bleeding: indications, contraindications, monitoring and complications of therapeutic anticoagulants, thrombolytic and anti-thrombolytic agents Recognition of patient groups at high risk for developing complications Epidemiology and prevention of infection in the ICU Types of organisms - emergence of resistant strains, mode of transfer, opportunistic and nosocomial infections; difference between contamination, colonisation & infection Autogenous infection: routes and methods of prevention Universal precautions and preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc.) Requirements for microbiological surveillance and clinical sampling Local patterns of bacterial resistance and antibiotic policy Benefits and risks of different prophylactic antibiotic regimens Staff safety: susceptibility to harmful physical, chemical and infectious hazards in the ICU Factors that determine the optimum staff establishment for specialist and junior medical staff, nurses and allied professional and non-clinical ICU staff Methods of effective communication of information (written; verbal etc.) Confidentiality and data protection - legal and ethical issues Principles of crisis management, conflict resolution, negotiation and debriefing Equipment requirements and selection: clinical need & priority; accuracy, reliability, safety and practical issues (ease of use, acceptance by staff) Local process for ordering consumables and maintaining equipment Critical incident or error monitoring Purpose and process of quality improvement activities such as evidence based practice, best

practice guidelines & benchmarking and change management Local policies and procedures relevant to practice Published standards of care at local, national and international level (including consensus statements and care bundles) Purpose and methods of clinical audit (e.g. mortality reviews, complication rates) Identification and critical appraisal of literature; integration of findings into local clinical practice Professional responsibility and duty of care to patients placed at risk by the actions of fellow clinicians Plan of action / local procedures to be followed when a health care worker is noticed to be in distress, whether or not patients are considered to be at risk

SKILLS & BEHAVIOURS
Assemble clinical and laboratory data, logically compare all potential solutions to the patient's problems, prioritise them and establish a clinical management plan Consider potential interactions when prescribing drugs & therapies Record relevant clinical information accurately Confirm accuracy of clinical information provided by members of the health care team Monitor complications of critical illness Accept personal responsibility for the prevention of cross infection and self-infection Demonstrate routine application of infection control practices to all patients, particularly hand washing between patient contacts Aware of relevant guidelines and consensus statements and apply these effectively in every day practice under local conditions Implement and evaluate protocols and guidelines Participate in the processes of clinical audit, peer review and continuing medical education Demonstrate an interest in quality control, audit and reflective practice Manage inter-personal conflicts which arise between different sectors of the organisation, professionals, patients or relatives Inform colleagues, patients and relatives as applicable, of medical errors or adverse events in an honest and appropriate manner Document adverse incidents in a timely, detailed and appropriate manner Maximise safety in everyday practice

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 11 - Please refer to competence 11.1 or the aggregate syllabus at the end of this section.

11.5 Organise a Case Conference

KNOWLEDGE
Roles of different members of the multidisciplinary team and local referral practices Principles of crisis management, conflict resolution, negotiation and debriefing

SKILLS & BEHAVIOURS
Identify members of the health care team which require representation at a case conference Timely organisation - liaise with members of the health care team to identify a suitable time and place for a case conference to maximise attendance Identify necessary notes / investigations to support discussion during a case conference Summarise a case history Plan long-term multidisciplinary care for patients in the ICU Collaborate with other team members to achieve common goals

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 11 - Please refer to competence 11.1 or the aggregate syllabus at the end of this section.

11.6 Critically Appraise and Apply Guidelines, Protocols and Care Bundles

KNOWLEDGE
Purpose and process of quality improvement activities such as evidence based practice, best practice guidelines & benchmarking and change management Purpose and methods of clinical audit (e.g. mortality reviews, complication rates) Local policies and procedures relevant to practice Published standards of care at local, national and international level (including consensus statements and care bundles) Treatment algorithms for common medical emergencies Recent advances in medical research relevant to intensive care Identification and critical appraisal of literature; integration of findings into local clinical practice Electronic methods of accessing medical literature Principles of appraisal of evidence: levels of evidence; interventions; diagnostic tests; prognosis; integrative literature (meta-analyses, practice guidelines, decision & economic analyses) Principles of applied research and epidemiology necessary to evaluate new guidelines / forms of therapy Research methods (see basic sciences) Statistical concepts (see basic sciences)

SKILLS & BEHAVIOURS
Demonstrate an interest in quality control, audit and reflective practice Aware of relevant guidelines and consensus statements and apply these effectively in every day practice under local conditions Implement and evaluate protocols and guidelines Propose realistic initiatives / projects to promote improvement Use a systematic approach to locate, appraise, and assimilate evidence from scientific studies relevant to a patient's health problem

Use electronic retrieval tools (e.g. PubMed) to access information from the medical & scientific literature
Participate in the processes of clinical audit, peer review and continuing medical education
Recognise the need for clinical audit and quality improvement activities to be non-threatening and nonpunitive to individuals
Manage resistance to change in the ICU / hospital environment in order to optimize the outcome of a task

ATTITUDES

The attitudes required for this competence are the same for all competencies in Domain 11 - Please refer to competence 11.1 or the aggregate syllabus at the end of this section.

11.7 Describe Commonly Used Scoring Systems for Assessment of Severity of Illness, Case Mix and Workload

KNOWLEDGE

Principles of outcome prediction / prognostic indicators and treatment intensity scales; limitations of scoring systems in predicting individual patient outcome
Process and outcome measurement
Principles of general and organ-specific scoring systems and their usefulness in assessing likely outcome of an illness (e.g. Glasgow Coma Scale, APACHE II and III, PRISM, organ system failure scores, injury severity scores)
Influence of injury or illness being considered on the validity of a scoring system as a predictor of likely outcome (e.g. Glasgow Coma Score (GCS) in head injury versus drug overdose)
One general method for measuring severity of illness (severity scoring systems) Principles of case-mix adjustment
Principles of workforce planning
Factors that determine the optimum staff establishment for specialist and junior medical staff, nurses and allied professional and non-clinical ICU staff

ATTITUDES

The attitudes required for this competence are the same for all competencies in Domain 11 - Please refer to competence 11.1 or the aggregate syllabus at the end of this section.

11.8 Demonstrates an Understanding of the Managerial and Administrative Responsibilities of the ICM Specialist

KNOWLEDGE

Principles of local / national health care provision; strategic planning of the ICU service (structure, function, financing) within the wider health care environment
The non-clinical role of the ICU specialist and how these activities contribute to the efficacy of the

ICU, the profile of the ICU within the hospital and the quality of patient management Principles of administration and management Physical requirements of ICU design Principles of resource management; ethics of resource allocation in the face of competing claims to care Concept of risk:benefit ratio and cost effectiveness of therapies Difference between absolute requirement and possible benefit when applying expensive technology to critically ill patients Equipment requirements and selection: clinical need & priority; accuracy, reliability, safety and practical issues (ease of use, acceptance by staff) Local process for ordering consumables and maintaining equipment Principles of health economics, departmental budgeting, financial management and preparation of a business plan Factors that determine the optimum staff establishment for specialist and junior medical staff, nurses and allied professional and non-clinical ICU staff Principles of workforce planning Practical application of legislations related to ICU in Hong Kong Principles of Hong Kong health care legislation applicable to ICM practice Methods of effective communication of information (written; verbal etc.) Principles of crisis management, conflict resolution, negotiation and debriefing Principles of risk prevention Critical incident or error monitoring Purpose and process of quality improvement activities such as evidence based practice, best practice guidelines & benchmarking and change management Purpose and methods of clinical audit (e.g. mortality reviews, complication rates) Recent advances in medical research relevant to intensive care Identification and critical appraisal of literature; integration of findings into local clinical practice Electronic methods of accessing medical literature Principles of appraisal of evidence: levels of evidence; interventions; diagnostic tests; prognosis; integrative literature (meta-analyses, practice guidelines, decision & economic analyses) Local policies and procedures relevant to practice Published standards of care at local, national and international level (including consensus statements and care bundles)

SKILLS & BEHAVIOURS
Lead, delegate and supervise others appropriately according to experience and role Contribute to departmental / ICU activities Manage inter-personal conflicts which arise between different sectors of the organisation, professionals, patients or relatives Propose realistic initiatives / projects to promote improvement Document adverse incidents in a timely, detailed and appropriate manner

Manage resistance to change in the ICU / hospital environment in order to optimize the outcome of a task Respect, acknowledge & encourage the work of others Demonstrate an interest in quality control, audit and reflective practice

ATTITUDES
The attitudes required for this competence are the same for all competencies in Domain 11 - Please refer to competence 11.1 or the aggregate syllabus at the end of this section.

AGGREGATE SYLLABUS

DOMAIN 11: PATIENT SAFETY AND HEALTH SYSTEM MANAGEMENT

KNOWLEDGE

Principles of Hong Kong health care provision; strategic planning of the ICU service (structure, function, financing) within the wider health care environment.

The non-clinical role of the ICU specialist and how these activities contribute to the efficacy of the ICU, the profile of the ICU within the hospital and the quality of patient management.

Principles of administration and management.

Physical requirements of ICU design.

Principles of resource management; ethics of resource allocation in the face of competing claims to care.

Concept of risk: benefit ratio and cost effectiveness of therapies

Difference between absolute requirement and possible benefit when applying expensive technology to critically ill patients

Equipment requirements and selection: clinical need & priority; accuracy, reliability, safety and practical issues (ease of use, acceptance by staff)

Local process for ordering consumables and maintaining equipment.

Principles of health economics, departmental budgeting, financial management and preparation of a business plan

Factors that determine the optimum staff establishment for specialist and junior medical staff, nurses and allied professional and non-clinical ICU staff

Principles of workforce planning.

Practical application of legislations related to ICU in Hong Kong

Principles of Hong Kong health care legislation applicable to ICM practice

Methods of effective communication of information (written; verbal etc.)

Triage and management of competing priorities

Principles of crisis management, conflict resolution, negotiation and debriefing

Roles of different members of the multidisciplinary team and local referral practices

Purpose and process of quality improvement activities such as evidence based practice, best practice guidelines & benchmarking and change management

Purpose and methods of clinical audit (e.g. mortality reviews, complication rates)

Recent advances in medical research relevant to intensive care

Principles of appraisal of evidence: levels of evidence; interventions; diagnostic tests; prognosis; integrative literature (meta-analyses, practice guidelines, decision & economic analyses)

Electronic methods of accessing medical literature

Identification and critical appraisal of literature; integration of findings into local clinical practice

Research methods (see basic sciences)

Statistical concepts (see basic sciences)

Principles of applied research and epidemiology necessary to evaluate new guidelines / forms of therapy

Local policies and procedures relevant to practice

Treatment algorithms for common medical emergencies
Published standards of care at Hong Kong and international level (including consensus statements and care bundles)
Principles of risk prevention
Common sources of error and factors which contribute to critical incidents / adverse events (ICU environment, personnel, equipment, therapy and patient factors)
Critical incident or error monitoring
Recognition of patient groups at high risk for developing complications
Pathogenesis, risk factors, prevention, diagnosis and treatment of complications of ICU management including: nosocomial infection ventilator associated pneumonia (VAP) ventilator associated lung injury - pulmonary barotrauma pulmonary oxygen toxicity thromboembolism (venous, arterial, pulmonary, intracardiac) stress ulceration pain malnutrition critical illness poly-neuropathy, motor-neuropathy & myopathy
Risk of bleeding: indications, contraindications, monitoring and complications of therapeutic anticoagulants, thrombolytic and anti-thrombolytic agents
Modification of treatment or therapy to minimise the risk of complications and appropriate monitoring to allow early detection of complications
Epidemiology and prevention of infection in the ICU
Types of organisms - emergence of resistant strains, mode of transfer, opportunistic and nosocomial infections; difference between contamination, colonisation & infection
Risk of colonisation with potentially pathogenic micro-organisms and the factors associated with patient, staff, equipment and environmental colonization
Autogenous infection: routes and methods of prevention
Cross infection: modes of transfer and common agents
Universal precautions and preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc.)
Requirements for microbiological surveillance and clinical sampling
Local patterns of bacterial resistance and antibiotic policy
Benefits and risks of different prophylactic antibiotic regimens
Principles of aseptic technique and aseptic handling of invasive medical devices
Methods of sterilisation and cleaning or disposal of equipment
Infections from contaminated blood / body fluids; strategy if contaminated (e.g. needle stick injury)
Staff safety: susceptibility to harmful physical, chemical and infectious hazards in the ICU
Environmental control of temperature, humidity, air changes and scavenging systems for waste gases and vapours
Measurement of gas and vapour concentrations, (oxygen, carbon dioxide, nitrous oxide, and volatile anaesthetic agents) - environmental safety
Hazards associated with ionising radiation and methods to limit these in the ICU
Electrical safety: conditions which predispose to the occurrence of macro-shock / micro-shock; physical dangers of electrical currents; relevant standards regarding safe use of electricity in patient care; basic methods to reduce electrical hazards.
Confidentiality and data protection - legal and ethical issues

Professional responsibility and duty of care to patients placed at risk by the actions of fellow clinicians
Plan of action / local procedures to be followed when a health care worker is noticed to be in distress, whether or not patients are considered to be at risk
Principles of outcome prediction / prognostic indicators and treatment intensity scales; limitations of scoring systems in predicting individual patient outcome
Process and outcome measurement
Principles of general and organ-specific scoring systems and their usefulness in assessing likely outcome of an illness (e.g. Glasgow Coma Scale, APACHE II and III, PRISM, organ system failure scores, injury severity scores)
Influence of injury or illness being considered on the validity of a scoring system as a predictor of likely outcome (e.g. Glasgow Coma Score (GCS) in head injury versus drug overdose)
One general method for measuring severity of illness (severity scoring systems)
Principles of case-mix adjustment

SKILLS & BEHAVIOURS

Lead, delegate and supervise others appropriately according to experience and role
Respect, acknowledge & encourage the work of others
Listen effectively
Collaborate with other team members to achieve common goals
Manage inter-personal conflicts which arise between different sectors of the organisation, professionals, patients or relatives
Demonstrate initiative in problem solving
Propose realistic initiatives / projects to promote improvement
Contribute to departmental / ICU activities
Acquire, interpret, synthesize, record, and communicate (written and verbal) clinical information
Assemble clinical and laboratory data, logically compare all potential solutions to the patient's problems, prioritise them and establish a clinical management plan
Confirm accuracy of clinical information provided by members of the health care team
Consider risk-benefit and cost-benefit of alternative drugs & therapies
Consider potential interactions when prescribing drugs & therapies
Establish a management plan based on clinical and laboratory information
Aware of relevant guidelines and consensus statements and apply these effectively in every day practice under local conditions
Implement and evaluate protocols and guidelines
Use a systematic approach to locate, appraise, and assimilate evidence from scientific studies relevant to a patient's health problem
Use electronic retrieval tools (e.g. PubMed) to access information from the medical & scientific literature
Recognise the need for clinical audit and quality improvement activities to be non-threatening and non-punitive to individuals
Participate in the processes of clinical audit, peer review and continuing medical education
Manage resistance to change in the ICU / hospital environment in order to optimize the outcome of a

task Record relevant clinical information accurately Professional and reassuring approach - generates confidence and trust in patients and their relatives Organise multidisciplinary care for groups of patients in the ICU Plan long-term multidisciplinary care for patients in the ICU Identify members of the health care team which require representation at a case conference Timely organisation - liaise with members of the health care team to identify a suitable time and place for a case conference to maximise attendance Identify necessary notes / investigations to support discussion during a case conference Summarise a case history Accept personal responsibility for the prevention of cross infection and self-infection Demonstrate routine application of infection control practices to all patients, particularly hand washing between patient contacts Use protective clothing (gloves / mask / gown / drapes) as indicated Apply methods to prevent autogenous infection (e.g. posture, mouth hygiene) Implement prophylactic regimens appropriately Maximise safety in everyday practice Prescribe antibiotics safely and appropriately Demonstrate an interest in quality control, audit and reflective practice Seek expert help to ensure all equipment in the ICU conforms with and is maintained to the relevant safety standard Monitor complications of critical illness Document adverse incidents in a timely, detailed and appropriate manner Inform colleagues, patients and relatives as applicable, of medical errors or adverse events in an honest and appropriate manner

ATTITUDES
Accept responsibility for patient care and staff supervision Recognise impaired performance (limitations) in self and colleagues and takes appropriate action Recognise personal limitations, seeks and accepts assistance or supervision (knows how, when and who to ask) Consult, communicate and collaborate effectively with patients, relatives and the health care team Desire to minimise patient distress Seek to modify the stresses which the intensive care environment places upon patients, their relatives and members of staff Establish collaborative relations with other health care providers to promote continuity of patient care as appropriate Consult and take into account the views of referring clinicians; promote their participation in decision making where appropriate Ensure effective information transfer Adopt a problem solving approach Enquiring mind, undertakes critical analysis of published literature