

Fellowship in Critical Care Medicine

Regulations and Syllabus

2021



JSS Academy of Higher Education and Research

(Established under section 3 of UGC Act, 1956)

JSS Medical Institutions Campus,
Sri Shivarathreeshwara Nagar, Mysore - 570 015,

Programmes Offered:

Fellowship in Critical Care

Goals:

To produce quality critical care physicians who will practice evidence based and ethical treatment of critically ill patients.

General Objectives & outcomes

1. To impart training in critical care (theory & practical aspects).
2. Hands on experience on dealing with critically ill patients.
3. Training in research methodology in critical care medicine.

At the end of the fellowship training the student should be

1. A quality workforce for the institute and the nation in the treatment of critically ill patients.
2. A physician who will be better trained to handle emergencies in their primary specialities.
3. A part of the pool of critical care physicians trained in research

Components of the course curriculum:

The major components of the fellowship curriculum shall be:

- Theoretical knowledge
- Practical skills
- Diagnostic and analytical skills
- Project skills.
- Attitudes including communication skills.
- Training in research methodology.
- Self- learning modes- Seminars, Assignments, group discussions, Journal club presentations.

Regulations

1. Courses offered

Fellowship in Critical Care Medicine (FCCM)

2. Eligibility for Admission

Candidates for the admission to the Fellowship in Critical Care Medicine program in Category 1 shall be required to have any one of the following qualifications.

- i. M.D. General Medicine.
- ii. M.D / DNB Anaesthesia.
- iii. M.D/ DNB Pulmonary Medicine/Respiratory Medicine/ Thoracic Medicine.
- iv. M.D / DNB Emergency Medicine.

Candidates for the admission to the Fellowship in Critical Care Medicine program in Category 2 shall be required to have any one of the following qualifications.

- i. Diploma in Anaesthesiology.
- ii. Diploma in Pulmonary Medicine/Respiratory Medicine/ Thoracic Medicine.
- iii. Diploma in Emergency Medicine.

3. Duration of the course

The period of the certified study and training for the Fellowship in Critical Care Medicine course shall be one calendar year of 12 months for Category 1 students.

The period of the certified study and training for the Fellowship in Critical Care Medicine course shall be one calendar year of 18 months for Category 2 students.

No exemption shall be given from this period of study and training for any other experience gained prior to the admission to the course except in special situations of training abroad recognized and accepted by the Medical Council of India.

4. Medium of instruction

The medium of instruction & examination shall be in English.

5. Method of Training

Training includes involvement in theory classes, practical skills, and research work. Self-learning modes like seminars, assignments, group discussions and journal club presentations will also be included in training methodology.

6. Attendance

No candidate shall be permitted to appear for the examination unless he/she has put in 90 % attendance during his / her period of study and training in the affiliated institution. He/she should produce the necessary certificates of study, attendance, and progress from the head of the department. Candidates admitted after 30th January / July shall take their examination in next semester only, after the completion of 12/ 18 months of the course whichever is applicable.

7. Monitoring Progress of Studies:

A) FORMATIVE ASSESSMENT

Formative assessment will be done continually to assess medical knowledge, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

For Category 1 students-

One Internal Assessment test will be conducted for hundred marks each in theory and practicals in each semester covering all domains of learning and feedback will be provided for the improvement of the student. Average of two internal assessments in theory and practical examinations separately will be considered for final internal assessment marks. A candidate should get minimum 50% IA marks separately to be eligible for final JSS AHER examinations.

For Category 2 students-

One Internal Assessment test will be conducted for hundred marks each in theory and practical examinations in each semester covering all domains of learning and feedback will be provided for the improvement of the student. Average of three internal assessments in theory and practical's separately will be considered for final internal assessment marks. A candidate should get minimum 50% IA marks separately to be eligible for final JSSAHER examinations

The candidates who have failed in examination shall be given an internal assessment improvement test and the best marks shall be submitted to JSSAHER when called for.

B) SUMMATIVE ASSESSMENT

There shall be a university examination at the end of the Course.

The examination will consist of

- 1) Written papers
- 2) Clinical and
- 3) OSCE stations

The Written examination shall consist of the following 2 papers of 3hrs duration each on core competencies alone.

Paper I domains 1-5 of core competencies

Paper II domains 6-11 of core competencies

Clinical Examination: 1 long case and 1 short case

Long case- is defined as neurological/ multi organ dysfunction / poly trauma / cardiorespiratory / post-transplant patient

Short case – weaning / liver failure / renal failure / burns / surgical patient

ICU Rounds – at least 1 hour per candidate for long case and 30 minutes for short case. Candidates to be taken on ICU rounds and given all available investigation and imaging results for a comprehensive evaluation.

Candidate shall be evaluated at 5 OSCE stations

Station 1- Arterial Blood Gas Analysis by Boston, Copenhagen and Stewart methods

Station 2- Adult Cardiac Life Support and Adult Trauma Life Support

Station 3 -Mechanical Ventilation and renal replacement therapy

Station 4 – Hemodynamic assessment

Station 5 - Counselling

C) Project Work

During the program, every candidate must perform a prospective study on the selected topic under the guidance and supervision of a recognised fellowship teacher. This is aimed to train the fellowship student in research methods and techniques. It includes identification of a problem, formulation of a hypothesis, search, review of literature, getting acquainted with recent advances, designing a research study, collection of data, critical analysis, and comparison of results and drawing conclusions.

The suggested time schedule for project work is:

- Identification and selection of topic for project – 1st month of the course
- Preparation of synopsis and submission of the synopsis for ethical clearance in second month per the dates notified by the ethical committee. Such synopsis will be reviewed, and the project topic will be registered by the JSS Academy of Higher Education and Research. No change in the project topic or guide shall be made without prior approval of the JSSAHER.
- The project work should start from third month onwards.

Submission of Project Report

Four copies of the project report shall be submitted to the controller of examination of the JSSAHER two months before seventh month.

The Project should be written under the following headings

- i. Introduction
- ii. Aims of Objectives of study
- iii. Review of Literature
- iv. Material and Methods
- v. Results
- vi. Discussion
- vii. Conclusion
- viii. Summary
- ix. References
- x. Tables
- xi. Annexure

A co-guide may be included provided the work requires substantial contribution from a sister department or from another medical institution recognized for teaching/training by JSS Academy of Higher Education and Research.

Project Evaluation: Every month student shall present the progress of the project and monitored by the respective guide. The project work shall be presented during the final examination and carries 100 marks. It shall be evaluated by the examiners appointed by the JSS Academy of Higher Education and Research. Approval of the project work is an essential precondition for a candidate to appear for the final examination.

D) Maintenance of Logbook

1. Every fellowship candidate shall maintain a record of skills he / she has acquired during the three years training period certified by the various Heads of Departments in which he/she has undergone training.
2. The Department shall scrutinize the Log Book once in every three months.
3. At the end of the course, the candidate should summarize the contents and get the Log Book Certified by the Head of the Department.
4. The Log book should be submitted at the time of practical Examination for the scrutiny of the Board of Examiners.

E) Seminars & Journal clubs & Classes:

Students are expected to actively participate in the departmental seminars and journal clubs. A record should be maintained for each student with the list of seminars and paper presented in journal club by each student. This list should be included in the final log book. The candidates should also be required to participate in the teaching and training programme of undergraduate and postgraduate (MD) students.

8. A. Subjects and hours of teaching for theory & Clinical training

Category 1 Core competencies only

Domains	Credits	Semester
1. Resuscitation and initial management of the acutely ill patient	7	1st semester
2. Diagnosis: assessment, investigation, monitoring and data interpretation	10	
3. Disease management 1) Acute disease 2) Co-morbid disease 3) Organ system failure	11	
4. Therapeutic interventions / organ system support in single or multiple organ failure	9	
5. Practical procedures 1) Respiratory system 2) Cardiovascular system 3) Central nervous system 4) Gastrointestinal system 5) Renal / Genitourinary system	24	
6. Peri-operative care	5	2nd semester
7. Comfort and recovery	5	
8. End of life care	5	
9. Transport	1	
10. Patient safety and health systems management	8	
11. Professionalism	15	

1) Communication skills 2) Professional relationships with patients and relatives 3) Professional relationships with colleagues 4) Self governance		
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Category 2

Non-core competencies for CAT 2 only- relevant to critical care medicine:

- Applied Anatomy,
- Applied physiology and biochemistry,
- Applied pharmacology,
- Research methodology,
- Physics and clinical measurement.
- Theory classes only- 2 credits for each section additional 10 credits

Domains	Credits	Semester
1. Resuscitation and initial management of the acutely ill patient	7	1 st semester
2. Diagnosis: assessment, investigation, monitoring and data interpretation	10	
3. Disease management 4) Acute disease 5) Co-morbid disease 6) Organ system failure	11	
4. Therapeutic interventions / organ system support in single or multiple organ failure	9	
5. Practical procedures 6) Respiratory system 7) Cardiovascular system 8) Central nervous system 9) Gastrointestinal system 10) Renal / Genitourinary system	24	
6. Peri-operative care	5	2 nd semester
7. Comfort and recovery	5	
8. End of life care	5	
9. Transport	1	
10. Patient safety and health systems management	8	
11. Professionalism 5) Communication skills 6) Professional relationships with patients and relatives 7) Professional relationships with colleagues 8) Self governance	15	

9. Schedule of Examination

The JSSAHER examination for core papers will be held at the end of each semester both in theory and practical examination separately. Examination for the non- core examination will not be conducted.

The examination will consist of

- 1) Written papers – theory examination
- 2) Clinical and OSCE stations- practical examination

The internal assessment

written examination shall consist of 1 paper pertaining to the syllabus of the respective semester of 3hrs duration.

1st Internal Assessment

Paper I domains 1-5 at the end of semester 1 for category 1 students and semester 2 for category 2 students.

2nd Internal Assessment

Paper II domains 6-11 at the end of semester 2 for category 1 students and semester 3 for category 2 students.

Clinical Examination: ICU Rounds – at least 1 hour per candidate; candidates to be taken on ICU rounds and given all available investigation and imaging results for a comprehensive evaluation. Candidate shall be evaluated at 5 OSCE stations

OSCE stations consisting of

Station	Topic	Internal Assessment (I.A)
1	ABG Analysis by Boston, Copenhagen and Stewart methods	1 st I. A
2	ACLS and ATLS	
3	Mechanical Ventilation and renal replacement therapy	2 nd I.A
4	Hemodynamics	
5	Counselling	

Theory Examination: – 3 hours paper, 100 marks for each paper.

Pattern of theory question paper

Theory			
Type of Questions	Number of Questions	Marks for each question	Total
Essay	10	10	100
Total Marks			100

Examination schedule:

First Semester- JSSAHER Examination				
Theory Examination				
Category	subjects	IA	Final Exam	Total
Paper 1	Domains 1-5	100	100	200
Paper 2	Domains 6-11	100	100	200
Practicals				
Module1	Long case	100	100	200
Module2	Short case	100	100	200
OSCE stations				
		Theory	Practicals	total
Station 1	ABG Analysis by Boston, Copenhagen and Stewart methods	25	25	50
Station 2	ACLS	25	25	50
Station 3	Mechanical Ventilation	25	25	50
Station 4	Hemodynamics	25	25	50
Station 5	Counselling	25	25	50

11.Appointment of examiners for examination

There shall be at least two examiners in theory and practical examination. Any Staff with M.D Degree with

- a) 1 year of training in critical care and 3 years of teaching experience
- b) 2 years of training in critical care and 1 year of teaching experience
- c) D.M / DNB in critical care medicine

12. Criteria for declaring as pass in JSSAHER examination

Candidate should secure minimum 50% marks in each theory paper including IA marks and Practicals including IA Marks separately to declare pass.

Theory and practical examinations shall be considered as separate course. If a candidate passes in practicals examination but fails in theory paper, such candidate is exempted from reappearing for practicals but shall have to appear for theory paper in which subject paper candidate in has failed the subsequent examinations or vice versa.

A candidate securing less than 50% of marks as described above shall be declared to have failed in the examination. Failed candidate may appear in subsequent examination upon payment of examination fee to the JSSAHER.

A successful candidate is awarded pass class irrespective of the percentage, as these marks will be considered while awarding the class at the end of second semester.

13. Grading of performance

a) Letter grades and grade points allocations

Based on the performances, each student shall be awarded a final letter grade at the end of the semester for each course. The letter grades and their corresponding grade points are given in the Table below.

Table: Letter grades and grade points equivalent to percentage of marks and performances

Percentage of Marks obtained	Letter Grade	Grade Point	Performance
90.00 – 100	O	10	Outstanding
80.00 – 89.99	A	9	Excellent
70.00 – 79.99	B	8	Good
60.00 – 69.99	C	7	Fair
50.00 – 59.99	D	6	Satisfactory
Less than 50	F	0	Fail
Absent	AB	0	Fail

A candidate who remains absent for any end semester examination shall be assigned a letter grade of AB and a corresponding grade point of zero. He/she should reappear for the said evaluation/examination in due course.

b) The Semester Grade Point Average (SGPA)

The performance of a student in a semester is indicated by a number called ‘Semester Grade Point Average’ (SGPA). The SGPA is the weighted average of the grade points obtained in all the domains by the student during the semester. For example, a category 1 student takes five domains (Theory/Practical) in the first semester with credits C₁, C₂, C₃, C₄ and C₅ and the student’s grade points in these courses are G₁, G₂, G₃, G₄ and G₅, respectively, and then students’ SGPA is equal to:

$$C_1G_1 + C_2G_2 + C_3G_3 + C_4G_4 + C_5G_5$$

$$\text{SGPA} = \frac{\text{-----}}{C_1 + C_2 + C_3 + C_4 + C_5}$$

The SGPA is calculated to two decimal points. It should be noted that, the SGPA for any semester shall take into consideration the F and ABS grade awarded in that semester. For example, if a learner has a F or ABS grade in course 4, the SGPA shall then be computed as:

$$\text{SGPA} = \frac{C_1G_1 + C_2G_2 + C_3* \text{ZERO} + C_4G_4 + C_5G_5}{C_1 + C_2 + C_3 + C_4 + C_5}$$

c) Cumulative Grade Point Average (CGPA)

The CGPA is calculated with the SGPA of all the two semesters to two decimal points and is indicated in the final grade report card/final transcript showing the grades of all semesters. The CGPA shall reflect the failed status in case of F grade(s), till the semester(s) is/are passed. When the semester(s) is/are passed by obtaining a pass grade on subsequent examination(s) the CGPA shall only reflect the new grade and not the failure grades earned earlier. The CGPA is calculated as:

$$\text{CGPA} = \frac{C_1S_1 + C_2S_2}{C_1 + C_2}$$

where C_1 , C_2 is the total number of credits for semester I and II and S_1 and S_2 is the SGPA of semester I and II.

14. Declaration of Class:

The class shall be awarded on the basis of CGPA as follows:

First Class with Distinction	= CGPA of 7.50 and above
First Class	= CGPA of 6.00 to 7.49
Second Class	= CGPA of 5.00 to 5.99
Pass Class	= CGPA of 4.00 to 4.99

15. Carry over system: No carryover system is allowed

16. Award of Degree: A candidate who has passed all the examinations of all semesters shall be eligible for the award of the FCCM degree.

17. Award of Ranks/Medals: Ranks and medals shall be awarded on the basis of final CGPA. However, candidates who fail in one or more semester during the programme shall not be eligible for the award of ranks.

18. Duration for completion of the course of study

The duration for the completion of the course shall be fixed as double the actual duration of the course and the students have to pass within the said period, otherwise they have to get fresh Registration.

19. Revaluation / Retotalling of answer papers

There is no provision for revaluation of the answer papers of failed candidates in any examination. However, the failed candidates can apply for retotalling.

20. Re-admission after break of study

Candidate who seeks re-admission to the course after break of study has to get the approval from the JSSAHER by paying a condonation fee.

No condonation is allowed for the candidate who has more than 2 years of break up period and he/she has to rejoin the course by paying the required fees.

SYLLABUS

DOMAINS

- 1:** Resuscitation and initial management of the acutely ill patient
- 2:** Diagnosis: assessment, investigation, monitoring and data interpretation
- 3:** Disease management

- ◆ Acute disease
 - ◆ Co-morbid disease
 - ◆ Organ system failure
- 4: Therapeutic interventions / organ system support in single or multiple organ failure
- 5: Practical procedures
- ◆ Respiratory system
 - ◆ Cardiovascular system
 - ◆ Central nervous system
 - ◆ Gastrointestinal system
 - ◆ Renal / Genitourinary system
- 6: Peri-operative care
- 7: Comfort and recovery
- 8: End of life care
- 9: Transport
- 10: Patient safety and health systems management
- 11: Professionalism
- ◆ Communication skills
 - ◆ Professional relationships with patients and relatives
 - ◆ Professional relationships with colleagues
 - ◆ Self governance

DOMAIN	COMPETENCE STATEMENT	
1. RESUSCITATION & INITIAL MANAGEMENT OF THE ACUTELY ILL PATIENT	1.1	Adopts a structured and timely approach to the recognition, assessment and stabilisation of the acutely ill patient with disordered physiology
	1.2	Manages cardiopulmonary resuscitation
	1.3	Manages the patient post-resuscitation
	1.4	Triages and prioritises patients appropriately, including timely admission to ICU
	1.5	Assesses and provides initial management of the trauma patient
	1.6	Assesses and provides initial management of the patient with burns
	1.7	Describes the management of mass casualties
2. DIAGNOSIS: ASSESSMENT, INVESTIGATION, MONITORING AND DATA INTERPRETATION	2.1	Obtains a history and performs an accurate clinical examination
	2.2	Undertakes timely and appropriate investigations
	2.3	Describes indications for echocardiography (transthoracic / transoesophageal)
	2.4	Performs electrocardiography (ECG / EKG) and interprets the results
	2.5	Obtains appropriate microbiological samples and interprets results
	2.6	Obtains and interprets the results from blood gas samples
	2.7	Interprets chest x-rays
	2.8	Liaises with radiologists to organise and interpret clinical imaging
	2.9	Monitors and responds to trends in physiological variables
	2.10	Integrates clinical findings with laboratory investigations to form a differential diagnosis
3. DISEASE MANAGEMENT	ACUTE DISEASE	
	3.1	Manages the care of the critically ill patient with specific acute medical conditions
	CHRONIC DISEASE	
	3.2	Identifies the implications of chronic and co-morbid disease in the acutely ill patient
	ORGAN SYSTEM FAILURE	
	3.3	Recognises and manages the patient with circulatory failure
	3.4	Recognises and manages the patient with, or at risk of, acute renal failure
	3.5	Recognises and manages the patient with, or at risk of, acute liver failure
	3.6	Recognises and manages the patient with neurological impairment
	3.7	Recognises and manages the patient with acute gastrointestinal failure
	3.8	Recognises and manages the patient with acute lung injury syndromes (ALI / ARDS)
	3.9	Recognises and manages the septic patient
	3.10	Recognises and manages the patient following intoxication with drugs or environmental toxins
	3.11	Recognises life-threatening maternal peripartum complications and manages care under supervision
4. THERAPEUTIC INTERVENTIONS / ORGAN SYSTEM SUPPORT IN SINGLE OR MULTIPLE ORGAN FAILURE	4.1	Prescribes drugs and therapies safely
	4.2	Manages antimicrobial drug therapy
	4.3	Administers blood and blood products safely
	4.4	Uses fluids and vasoactive / inotropic drugs to support the circulation
	4.5	Describes the use of mechanical assist devices to support the circulation
	4.6	Initiates, manages, and weans patients from invasive and non-invasive ventilatory support
	4.7	Recognises and manages electrolyte, glucose and acid-base disturbances
	4.8	Co-ordinates and provides nutritional assessment and support

DOMAIN	COMPETENCE STATEMENT	
5. PRACTICAL PROCEDURES	RESPIRATORY SYSTEM	
	5.1	Administers oxygen using a variety of administration devices
	5.2	Performs fiberoptic laryngoscopy under supervision
	5.3	Performs emergency airway management
	5.4	Performs difficult and failed airway management according to local protocols
	5.5	Performs endotracheal suction
	5.6	Performs fiberoptic bronchoscopy and BAL in the intubated patient under supervision
	5.7	Performs percutaneous tracheostomy under supervision
	5.8	Performs thoracocentesis via a chest drain
	CARDIOVASCULAR SYSTEM	
	5.9	Performs peripheral venous catheterisation
	5.10	Performs arterial catheterisation
	5.11	Describes a method for surgical isolation of vein / artery
	5.12	Describes ultrasound techniques for vascular localisation
	5.13	Performs central venous catheterisation
	5.14	Performs defibrillation and cardioversion
	5.15	Performs cardiac pacing (transvenous or transthoracic)
	5.16	Describes how to perform pericardiocentesis
	5.17	Demonstrates a method for measuring cardiac output and derived haemodynamic variables
	CENTRAL NERVOUS SYSTEM	
	5.18	Performs lumbar puncture (intradural / 'spinal') under supervision
	5.19	Manages the administration of analgesia via an epidural catheter
	GASTROINTESTINAL SYSTEM	
	5.20	Performs nasogastric tube placement
	5.21	Performs abdominal paracentesis
	5.22	Describes Sengstaken tube (or equivalent) placement
	5.23	Describes indications for, and safe conduct of gastroscopy
	GENITOURINARY SYSTEM	
	5.24	Performs urinary catheterisation
6. PERI-OPERATIVE CARE	6.1	Manages the pre- and post-operative care of the high risk surgical patient
	6.2	Manages the care of the patient following cardiac surgery under supervision
	6.3	Manages the care of the patient following craniotomy under supervision
	6.4	Manages the care of the patient following solid organ transplantation under supervision
	6.5	Manages the pre- and post-operative care of the trauma patient under supervision
7. COMFORT & RECOVERY	7.1	Identifies and attempts to minimise the physical and psychosocial consequences of critical illness for patients and families
	7.2	Manages the assessment, prevention and treatment of pain and delirium
	7.3	Manages sedation and neuromuscular blockade
	7.4	Communicates the continuing care requirements of patients at ICU discharge to health care professionals, patients and relatives
	7.5	Manages the safe and timely discharge of patients from the ICU
8. END OF LIFE CARE	8.1	Manages the process of withholding or withdrawing treatment with the multidisciplinary team
	8.2	Discusses end of life care with patients and their families / surrogates
	8.3	Manages palliative care of the critically ill patient
	8.4	Performs brain-stem death testing
	8.5	Manages the physiological support of the organ donor

DOMAIN	COMPETENCE STATEMENT	
9. TRANSPORT	9.1	Undertakes transport of the mechanically ventilated critically ill patient outside the ICU
10. PATIENT SAFETY AND HEALTH SYSTEMS MANAGEMENT	10.1	Leads a daily multidisciplinary ward round
	10.2	Complies with local infection control measures
	10.3	Identifies environmental hazards and promotes safety for patients & staff
	10.4	Identifies and minimises risk of critical incidents and adverse events, including complications of critical illness
	10.5	Organises a case conference
	10.6	Critically appraises and applies guidelines, protocols and care bundles
	10.7	Describes commonly used scoring systems for assessment of severity of illness, case mix and workload
	10.8	Demonstrates an understanding of the managerial & administrative responsibilities of the ICM specialist
11. PROFESSIONALISM	COMMUNICATION SKILLS	
	11.1	Communicates effectively with patients and relatives
	11.2	Communicates effectively with members of the health care team
	11.3	Maintains accurate and legible records / documentation
	PROFESSIONAL RELATIONSHIPS WITH PATIENTS AND RELATIVES	
	11.4	Involves patients (or their surrogates if applicable) in decisions about care and treatment
	11.5	Demonstrates respect of cultural and religious beliefs and an awareness of their impact on decision making
	11.6	Respects privacy, dignity, confidentiality and legal constraints on the use of patient data
	PROFESSIONAL RELATIONSHIPS WITH PATIENTS AND RELATIVES	
	11.7	Collaborates and consults; promotes team-working
	11.8	Ensures continuity of care through effective hand-over of clinical information
	11.9	Supports clinical staff outside the ICU to enable the delivery of effective care
	11.10	Appropriately supervises, and delegates to others, the delivery of patient care
	SELF GOVERNANCE	
	11.11	Takes responsibility for safe patient care
	11.12	Formulates clinical decisions with respect for ethical and legal principles
	11.13	Seeks learning opportunities and integrates new knowledge into clinical practice
	11.14	Participates in multidisciplinary teaching
	11.15	Participates in research or audit under supervision

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

1.1 ADOPTS A STRUCTURED AND TIMELY APPROACH TO THE RECOGNITION, ASSESSMENT AND STABILISATION 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

Causes, recognition and management of:

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

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 cannulae, 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

Considers 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

ATTITUDES

Rapid response and resuscitation

Appreciates the importance of timely institution of organ-system support

Recognises 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

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

1.2 MANAGES 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) 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 (inc. 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

Considers 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.

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

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

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.

1.4 TRIAGES AND PRIORITISES 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 (HCU), intensive care unit (ICU))

SKILLS & BEHAVIOURS

Considers 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
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 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
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
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 ASSESSES AND PROVIDES 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

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 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 radionuclide 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

Principles of oxygen therapy and use of oxygen administration devices (see 5.1)

Principles of emergency airway management (see 5.3)

Surgical techniques 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

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.

1.6 ASSESSES AND PROVIDES 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
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.

1.7 DESCRIBES 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.

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

2.1 OBTAINS A HISTORY AND PERFORMS 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

Consults, communicates and collaborates effectively with patients, relatives and the health care team
Promotes respect for patient privacy, dignity and confidentiality
Avoids extensive invasive procedures or monitoring which can not be adequately interpreted at the bedside
Minimises patient discomfort in relation to monitoring devices
Responds rapidly to acute changes in monitored variables
Ensures safe and appropriate use of equipment
Supports other staff in the correct use of devices
Considers patient comfort during procedures / investigations
Avoids unnecessary tests
Demonstrates compassionate care of patients and relatives
Desire to minimise patient distress
Recognises personal limitations, seeks and accepts assistance or supervision (knows how, when and who to ask)

2.2 UNDERTAKES 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
- Diagnostic bronchoscopy
- Diagnostic ECG (EKG)
- Echocardiography
- Electroencephalogram (EEG) and evoked potentials -
- Intrathoracic pressure (oesophageal pressure) measurements
- Fluid input-output monitoring
- Basic principles of ultrasound and the Doppler effect

Intra-abdominal pressure monitoring

Invasive & non-invasive systems available for measuring cardiac output and derived haemodynamic variables, the 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 (ie. 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.

2.3 DESCRIBES 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.

2.4 PERFORMS ELECTROCARDIOGRAPHY (ECG / EKG) AND INTERPRETS 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.

2.5 OBTAINS APPROPRIATE MICROBIOLOGICAL SAMPLES AND INTERPRETS 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
Universal precautions and preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc.)
Local patterns of bacterial resistance and antibiotic policy; difference between contamination, colonisation and infection
Appropriate use of laboratory tests to confirm or refute a clinical diagnosis
Indications for lumbar puncture and CSF sampling; laboratory analysis of CSF samples

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
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.

2.6 OBTAINS AND INTERPRETS RESULTS FROM BLOOD GAS SAMPLES

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

Methods and routes of obtaining samples - 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

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.

2.7 INTERPRETS CHEST X-RAYS

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

SKILLS & BEHAVIOURS

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.

2.8 LIAISES WITH RADIOLOGISTS TO ORGANISE AND INTERPRET CLINICAL IMAGING

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
Chest x-ray interpretation (see 2.7)
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)

SKILLS & BEHAVIOURS

Communicate effectively with radiological colleagues to plan, perform and interpret test results
Integrate clinical findings with results of investigations
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.

2.9 MONITORS AND RESPONDS 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 electromanometer 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 & limitations, physiological parameters and waveform interpretation

Invasive & non-invasive systems available for measuring cardiac output and derived haemodynamic variables, the 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 CO₂ monitoring, and relationship between end tidal CO₂ and arterial pCO₂ in various clinical circumstances

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, 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 O₂, CO₂ and NO
- Intracranial pressure monitoring
- Jugular bulb catheters and S_jO₂ 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

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.

2.10 INTEGRATES CLINICAL FINDINGS WITH LABORATORY INVESTIGATIONS TO FORM A DIFFERENTIAL DIAGNOSIS

KNOWLEDGE

Clinical signs associated with critical illness, their relative importance and interpretation
Sources and methods of obtaining clinical information
Significance and impact of co-morbid disease on the presentation of acute illness
Importance of clinical history and signs in making diagnosis
Impact of drug therapy on organ-system function
Sensitivity and specificity of the investigation as related to a specific disease
Appropriate use of laboratory tests to confirm or refute a clinical diagnosis
Interpretation of information from monitoring devices, and identification of common causes of error; principles of monitoring trends of change and their significance

SKILLS & BEHAVIOURS

Obtain relevant information from the patient, relatives and other secondary sources
Examine patients, elicit and interpret clinical signs (or relevant absence of clinical signs) in the ICU environment
Acquire, interpret, synthesize, record, and communicate (written and verbal) clinical information
Develop a working, and limited differential diagnosis based on presenting clinical features
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
Identify abnormalities requiring urgent intervention
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 and collaborate effectively with all laboratory staff

ATTITUDES

The attitudes required for this competence are the same for all competencies in Domain 2 - Please refer to competence 2.1.

DOMAIN 3: DISEASE MANAGEMENT

ACUTE DISEASE

3.1 MANAGES 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 immunoincompetent 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)

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
- 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)

3.2 IDENTIFIES THE IMPLICATIONS OF CHRONIC AND CO-MORBID DISEASE IN THE ACUTELY ILL PATIENT

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

NEUROLOGICAL 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 AND ONCOLOGICAL 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.

3.3 RECOGNISES AND MANAGES 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.

3.4 RECOGNISES AND MANAGES 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.

3.5 RECOGNISES AND MANAGES 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 & transjugular liver biopsies and transjugular 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.

3.6 RECOGNISES AND MANAGES 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.

3.7 RECOGNISES AND MANAGES 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.

3.8 RECOGNISES AND MANAGES 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.

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-

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.

3.9 RECOGNISES AND MANAGES 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.

3.10 RECOGNISES AND MANAGES 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
HAEMATOLOGY: 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.

3.11 RECOGNISES LIFE-THREATENING MATERNAL PERIPARTUM COMPLICATIONS AND MANAGES 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.

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

4.1 PRESCRIBES 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

Appreciates the importance of timely institution of organ-system support
 Appreciates the differences between organ system support and specific treatment
 Recognises the need for supportive care for all organ systems whether failing / injured or not
 Responds rapidly to acute changes in monitored variables
 Consults, communicates and collaborates effectively with patients, relatives and the health care team
 Demonstrates compassionate care of patients and relatives
 Desire to minimise patient distress
 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
 Lead, delegate and supervise others appropriately according to experience and role
 Recognises personal limitations, seeks and accepts assistance or supervision (knows how, when and who to ask)

4.2 MANAGES 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 / national) 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.

4.3 ADMINISTERS BLOOD AND BLOOD PRODUCTS SAFELY

KNOWLEDGE

Pathophysiological effects of altered intravascular volume
Indications for and basic interpretation of haematological tests (including coagulation and sickle 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.

4.4 USES 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, the 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 (eg. 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.

4.5 DESCRIBES 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, the 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.

4.6 INITIATES, MANAGES AND WEANS 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 PaCO₂ 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.

4.7 RECOGNISES AND MANAGES 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 PaCO₂ 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.

4.8 CO-ORDINATES AND PROVIDES 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.

DOMAIN 5: PRACTICAL PROCEDURES

RESPIRATORY SYSTEM

5.1 ADMINISTERS 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

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

5.2 PERFORMS FIBROPTIC 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 fiberoptic intubation; use of fiberoptic 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 fiberoptic 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.

5.3 PERFORMS 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) 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 minimises 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 CO₂ detector post-intubation and interpret a capnograph trace

Demonstrate rapid sequence induction of anaesthesia / cricoid pressure

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.

5.4 PERFORMS 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 fiberoptic 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 cricothyroidotomy
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-thyroidotomy
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.

5.5 PERFORMS 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 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.

5.6 PERFORMS FIBREOPRIC 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 fiberoptic 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 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.

5.7 PERFORMS PERCUTANEOUS TRACHEOSTOMY UNDER SUPERVISION

KNOWLEDGE

Indications and contraindications to tracheostomy (percutaneous and surgical) and minitracheostomy
Anatomical landmarks for cricothyrotomy/tracheostomy/mini-tracheostomy
Techniques for percutaneous and surgical tracheostomy
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 minimises 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

ATTITUDES

The attitudes required for this competence are the same for all competencies in Domain 5 - Please refer to competence 5.1.

5.8 PERFORMS THORACOCENTESIS 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 minimises 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.

CARDIOVASCULAR SYSTEM

5.9 PERFORMS 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 minimises 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.

5.10 PERFORMS 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
Allens 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
Methods for surgical isolation of a vein or artery (see 5.11)
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 minimises 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.

5.11 DESCRIBES A METHOD FOR SURGICAL ISOLATION OF A VEIN / ARTERY

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
Methods for securing vascular access rapidly
Principles and techniques for surgical isolation of a vein or artery
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
Principles of aseptic technique and aseptic handling of invasive medical devices
Complications of the technique, how to prevent/recognise them and initiate appropriate treatment
Ultrasound techniques for vascular localisation (see 5.12)

ATTITUDES

The attitudes required for this competence are the same for all competencies in Domain 5 - Please refer to competence 5.1.

5.12 DESCRIBES 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.

5.13 PERFORMS 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

Methods for insertion of a tunnelled 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 minimises 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

Describe a method for tunnelled intravenous catheterisation

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 PERFORMS 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 minimises 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.

5.15 PERFORMS 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 minimises 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.

5.16 DESCRIBES 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.

5.17 DEMONSTRATES 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, the 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 minimises 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.

CENTRAL NERVOUS SYSTEM

5.18 PERFORMS LUMBAR PUNCTURE (INTRADURAL / 'SPINAL') UNDERSUPERVISION

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
Performs 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.

5.19 MANAGES THE ADMINISTRATION OF ANALGESIA VIA AN EPIDURAL CATHETER

KNOWLEDGE

Physiological effects of pain and anxiety
Recognition and methods of assessment of pain
Indications, contraindications, methods and complications of epidural catheterisation
Pharmacokinetics, pharmacodynamics, indications and complications of opiates and local anaesthetic agents
Principles of aseptic technique and aseptic handling of invasive medical devices
Indications, contraindications and complications of epidural infusion / injection; principles of safe epidural drug administration
Detection of potential physiological alterations during the procedure
Complications of the technique, how to prevent/recognise them and initiate appropriate treatment
Contraindications, methods and complications of epidural catheter removal

SKILLS & BEHAVIOURS

Select an appropriate epidural infusion regimen and titrate safely
Select & determine adequacy and route of administration of analgesia
Manage an established epidural infusion
Administer bolus analgesia via an epidural catheter
Minimise complications associated with opioid and non-opioid analgesics

ATTITUDES

The attitudes required for this competence are the same for all competencies in Domain 5 - Please refer to competence 5.1.

GASTROINTESTINAL SYSTEM

5.20 PERFORMS 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 minimises 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.

5.21 PERFORMS 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 minimises 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.

5.22 DESCRIBES 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.

5.23 DESCRIBES 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 fiberoptic 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.

GENITOURINARY SYSTEM

5.24 PERFORMS URINARY CATHETERISATION

KNOWLEDGE	<p>Anatomy of the genitourinary system and anatomical landmarks for suprapubic urinary catheters</p> <p>Urinary catheterisation techniques: transurethral and suprapubic</p> <p>Urinary catheterisation in pelvic trauma: indications, contraindications and techniques</p> <p>Patient selection - indications, contraindications and potential complications of the procedure / intervention</p> <p>Universal precautions and preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc.)</p> <p>Principles of aseptic technique and aseptic handling of invasive medical devices</p> <p>Detection of potential physiological alterations during the procedure</p> <p>Complications of the technique, how to prevent/recognise them and initiate appropriate treatment</p> <p>Methods of sterilisation and cleaning or disposal of equipment</p> <p>Management and use of the device once in situ necessary to minimise the risks of complications</p> <p>Indications and technique for removal</p>
SKILLS & BEHAVIOURS	<p>Obtain informed consent/assent from the patient where appropriate</p> <p>Select appropriate equipment or device & use resources efficiently</p> <p>Prepare equipment, patient and staff prior to undertaking the procedure</p> <p>Choose an appropriate route / method of insertion and position the patient accordingly</p> <p>Use protective clothing (gloves / mask / gown / drapes) as indicated</p> <p>Identify relevant anatomical landmarks</p> <p>Perform aseptic urinary catheterisation: male and female</p> <p>Perform the procedure in a manner which minimises the risks of complications</p> <p>Confirm correct placement and exclude complications</p> <p>Sterilise, clean or dispose of equipment appropriately</p>
ATTITUDES	<p>The attitudes required for this competence are the same for all competencies in Domain 5 - Please refer to competence 5.1.</p>

DOMAIN 6: PERI-OPERATIVE CARE

6.1 MANAGES THE PRE- AND POST-OPERATIVE CARE OF THE HIGH RISK SURGICAL PATIENT

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](#))
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
HAEMATOLOGY AND ONCOLOGY: Care of the immunosuppressed or immunoincompetent patient; complications of chemotherapy; management of severe acute haemorrhage and blood transfusion; correction of coagulation disorders and haemoglobinopathies.
METABOLIC & HORMONAL: Perioperative management of patients with diabetes; blood glucose control; hypo- and hyperadrenalism, 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

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

6.2 MANAGES 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
HAEMATOLOGY: management of severe acute haemorrhage and blood transfusion; correction of coagulation disorders and haemoglobinopathies.
METABOLIC & 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.

6.3 MANAGES 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 & 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.

6.4 MANAGES 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.

HAEMATOLOGY AND ONCOLOGY: Care of the immunosuppressed or immunoincompetent patient; complications of chemotherapy; management of severe acute haemorrhage and blood transfusion; correction of coagulation disorders and haemoglobinopathies.

METABOLIC & 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.

6.5 MANAGES 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
HAEMATOLOGY: management of severe acute haemorrhage and blood transfusion; correction of coagulation disorders and haemoglobinopathies.
METABOLIC & 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.

DOMAIN 7: COMFORT AND RECOVERY

7.1 IDENTIFIES AND ATTEMPTS 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) Impact of staff-patient contact and environmental factors on patient stress 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 (eg 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 The implications for relatives of adopting a role as a carer at home 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 Participate in follow-up clinics / services where available
ATTITUDES
Appreciates 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 Establishes trusting relationships with and demonstrates compassionate care of patients and their relatives Seeks to modify the stresses which the intensive care environment places upon patients, their relatives and members of staff Acknowledges the consequences of the language used to impart information

Regards each patient as an individual

Respects 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

Recognises that intensive care is a continuum throughout the 'patient journey'

Promotes appropriate and timely discharge from ICU

Fosters effective communication and relationships with medical and nursing staff in other wards / departments

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

7.2 MANAGES 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.

7.3 MANAGES 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.

7.4 COMMUNICATES 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 (eg 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).

The implications for relatives of adopting a role as a carer at home

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

Long-term ventilation outside the ICU environment (eg. home ventilation)

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.

7.5 MANAGES 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
Long-term ventilation outside the ICU environment (eg. home ventilation)

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.

DOMAIN 8: END OF LIFE CARE

8.1 MANAGES 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 DISCUSSES 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

The attitudes required for this competence are the same for all competencies in Domain 8 - Please refer to competence 8.1.

8.3 MANAGES 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

The attitudes required for this competence are the same for all competencies in Domain 8 - Please refer to competence 8.1.

8.4 PERFORMS 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 electrophysiologic 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 local / national policy or as indicated
Document pre-conditions and exclusions to brain stem death testing

ATTITUDES

The attitudes required for this competence are the same for all competencies in Domain 8 - Please refer to competence 8.1.

8.5 MANAGES 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 national / local policy)
Common investigations and procedures undertaken in the ICU prior to organ harvesting
Role of national organ/tissue procurement authority 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 transplant co-ordinators (local organ donation authority) 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.



DOMAIN 9: TRANSPORT

9.1 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

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

Appreciates the importance of communication between referring, transporting and receiving staff

Anticipates and prevents problems during transfer

Desire to minimise patient distress

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



DOMAIN 10: PATIENT SAFETY AND HEALTH SYSTEMS MANAGEMENT

10.1 LEADS A DAILY MULTIDISCIPLINARY WARD ROUND

KNOWLEDGE

Roles of different members of the multidisciplinary team and local 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

Accepts responsibility for patient care and staff supervision
Recognises impaired performance (limitations) in self and colleagues and takes appropriate action
Recognises personal limitations, seeks and accepts assistance or supervision (knows how, when and who to ask)
Consults, communicates and collaborates effectively with patients, relatives and the health care team
Desire to minimise patient distress
Seeks to modify the stresses which the intensive care environment places upon patients, their relatives and members of staff
Establishes 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
Ensures effective information transfer
Adopts a problem solving approach
Enquiring mind, undertakes critical analysis of published literature

10.2 COMPLIES 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, national 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.

10.3 IDENTIFIES ENVIRONMENTAL HAZARDS AND PROMOTES 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

ATTITUDES

The attitudes required for this competence are the same for all competencies in Domain 11 - Please refer to competence 11.1.

10.4 IDENTIFIES AND MINIMISES 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.

10.5 ORGANISES 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.

10.6 CRITICALLY APPRAISES AND APPLIES 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 non-punitive 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.

10.7 DESCRIBES 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.

10.8 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 equal opportunities legislation

Principles of national / local 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

ATTITUDES

The attitudes required for this competence are the same for all competencies in Domain 11 - Please refer to competence 11.1.

DOMAIN 11: PROFESSIONALISM

COMMUNICATION SKILLS

11.1 COMMUNICATES EFFECTIVELY WITH PATIENTS AND RELATIVES

11.2 COMMUNICATES EFFECTIVELY WITH MEMBERS OF THE HEALTH CARE TEAM

11.3 MAINTAINS ACCURATE AND LEGIBLE RECORDS / DOCUMENTATION

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

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
Approachable and accessible when on duty
Regards each patient as an individual
Willingness to communicate with and support families / significant others
Promotes respect for patient privacy, dignity and confidentiality
Acknowledges the consequences of the language used to impart information
Recognises that communication is a two-way process

PROFESSIONAL RELATIONSHIPS WITH PATIENTS AND RELATIVES

11.4 INVOLVES PATIENTS (OR THEIR SURROGATES IF APPLICABLE) IN DECISIONS ABOUT CARE AND TREATMENT

11.5 DEMONSTRATES RESPECT OF CULTURAL AND RELIGIOUS BELIEFS AND AN AWARENESS OF THEIR IMPACT ON DECISION MAKING

11.6 RESPECTS PRIVACY, DIGNITY, CONFIDENTIALITY AND LEGAL CONSTRAINTS ON THE USE OF PATIENT DATA

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
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
Assesses, communicates with, and supports patients and families confronted with critical illness
Sensitive to patients' expectations and responses; considers their perspective in order to understand their conduct and attitudes
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
Regards each patient as an individual
Desire to minimise patient distress
Seeks 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
Acknowledges the consequences of the language used to impart information
Recognises that communication is a two-way process

PROFESSIONAL RELATIONSHIPS WITH MEMBERS OF THE HEALTH CARE TEAM

11.7 COLLABORATES AND CONSULTS; PROMOTES TEAMWORKING

11.8 ENSURES CONTINUITY OF CARE THROUGH EFFECTIVE HAND-OVER OF CLINICAL INFORMATION

11.9 SUPPORTS CLINICAL STAFF OUTSIDE THE ICU TO ENABLE THE DELIVERY OF EFFECTIVE CARE

11.10 APPROPRIATELY SUPERVISES, AND DELEGATES TO OTHERS, THE DELIVERY OF PATIENT CARE

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
Consults, communicates and collaborates effectively with patients, relatives and the health care team
Sensitive to the reactions and emotional needs of others
Recognises personal limitations, seeks and accepts assistance or supervision (knows how, when and who to ask)
Recognises impaired performance (limitations) in self and colleagues and takes appropriate action
Approachable and accessible when on duty
Recognises personal strengths and limitations as a consultant to other specialists
Desire to minimise patient distress
Adopts a problem solving approach
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
Promotes respect for patient privacy, dignity and confidentiality
Recognises that communication is a two-way process
Generates enthusiasm amongst others
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

SELF GOVERNANCE

11.11 TAKES RESPONSIBILITY FOR SAFE PATIENT CARE

11.12 FORMULATES CLINICAL DECISIONS WITH RESPECT FOR ETHICAL AND LEGAL PRINCIPLES

11.13 SEEKS LEARNING OPPORTUNITIES AND INTEGRATES NEW KNOWLEDGE INTO CLINICAL PRACTICE

11.14 PARTICIPATES IN MULTIDISCIPLINARY TEACHING

11.15 PARTICIPATES IN RESEARCH OR AUDIT UNDER SUPERVISION

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 national ethical approval processes
Ethical management of relationships with industry
Requirements of ICM training at local and national 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
Takes responsibility for his/her personal physical and mental health, especially where impairment may affect patient care and professional conduct
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)
Recognises impaired performance (limitations) in self and colleagues and takes appropriate action

Participates in, and promotes continuing education of members of the multi-disciplinary health care team.
Enquiring mind, undertakes critical analysis of published literature
Recognises and uses teaching and learning opportunities arising from clinical experiences, including errors
Recognises personal strengths and limitations as a consultant to other specialists
Recognises and manages circumstances where personal prejudices or biases may affect behaviour, including cultural, financial and academic aspects
Accepts responsibility for patient care and staff supervision
Promotes 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
Seeks 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

ANATOMY

RESPIRATORY SYSTEM:

Mouth, nose, pharynx, larynx, trachea, main bronchi, segmental bronchi, structure of bronchial tree: differences in the child

Airway and respiratory tract, blood supply, innervation and lymphatic drainage Pleura, mediastinum and its contents

Lungs, lobes, microstructure of lungs

Diaphragm, other muscles of respiration, innervation The thoracic inlet and 1st rib

Interpretation of a chest x-ray

CARDIOVASCULAR SYSTEM:

Heart, chambers, conducting system, blood and nerve supply Congenital deviations from normal anatomy

Pericardium

Great vessels, main peripheral arteries and veins Foetal and materno-foetal circulation

NERVOUS SYSTEM:

Brain and its subdivisions

Spinal cord, structure of spinal cord, major ascending and descending pathways

Spinal meninges, subarachnoid and extradural space, contents of extradural space. Cerebral blood supply CSF and its circulation

Spinal nerves, dermatomes Brachial plexus, nerves of arm Intercostal nerves

Nerves of abdominal wall Nerves of leg and foot Autonomic nervous system

Sympathetic innervation, sympathetic chain, ganglia and plexuses Parasympathetic innervation.

Stellate ganglion

Cranial nerves: base of skull: trigeminal ganglion Innervation of the larynx

Eye and orbit

VERTEBRAL COLUMN:

Cervical, thoracic, and lumbar vertebrae Interpretation of cervical spinal imaging in trauma Sacrum, sacral hiatus

Ligaments of vertebral column

Surface anatomy of vertebral spaces, length of cord in child and adult

SURFACE ANATOMY:

Structures in antecubital fossa

Structures in axilla: identifying the brachial plexus Large veins and anterior triangle of neck

Large veins of leg and femoral triangle Arteries of arm and leg

Landmarks for tracheostomy, cricothyrotomy

Abdominal wall (including the inguinal region): landmarks for suprapubic urinary and peritoneal lavage catheters

Landmarks for intrapleural drains and emergency pleurocentesis Landmarks for pericardiocentesis

ABDOMEN:

Gross anatomy of intra-abdominal organs

Blood supply to abdominal organs and lower body

PHYSIOLOGY & BIOCHEMISTRY

GENERAL:

Organisation of the human body and homeostasis

Variations with age

Function of cells; genes and their expression

Mechanisms of cellular and humoral defence

Cell membrane characteristics; receptors

Protective mechanisms of the body

Genetics & disease processes

BIOCHEMISTRY:

Acid base balance and buffers Ions e.g. Na^+ , K^+ , Ca^{++} , Cl^- , HCO_3^- , Mg^{++} , PO_4^- Cellular and intermediary metabolism; variations between organs
Enzymes

BODY FLUIDS:

Capillary dynamics and interstitial fluid
Oncotic pressure
Osmolarity: osmolality, partition of fluids across membranes
Lymphatic system
Special fluids: cerebrospinal, pleural, pericardial and peritoneal fluids

HAEMATOLOGY & IMMUNOLOGY:

Red blood cells: haemoglobin and its variants
Blood groups
Haemostasis and coagulation; pathological variations
White blood cells
Inflammation and its disorders
Immunity and allergy

MUSCLE:

Action potential generation and its transmission
Neuromuscular junction and transmission
Muscle types
Skeletal muscle contraction
Motor unit
Muscle wasting
Smooth muscle contraction: sphincters

HEART & CIRCULATION:

Cardiac muscle contraction
The cardiac cycle: pressure and volume relationships
Rhythmicity of the heart
Regulation of cardiac function; general and cellular
Control of cardiac output (including the Starling relationship)
Fluid challenge and heart failure
Electrocardiogram and arrhythmias
Neurological and humoral control of systemic blood pressures, blood volume and blood flow (at rest and during physiological disturbances e.g. exercise, haemorrhage and Valsalva manoeuvre)
Peripheral circulation: capillaries, vascular endothelium and arteriolar smooth muscle Autoregulation and the effects of sepsis and the inflammatory response on the peripheral vasculature
Characteristics of special circulations including: pulmonary, coronary, cerebral, renal, portal and foetal

RENAL TRACT:

Blood flow, glomerular filtration and plasma clearance
Tubular function and urine formation
Endocrine functions of kidney
Assessment of renal function
Regulation of fluid and electrolyte balance
Regulation of acid-base balance
Micturition
Pathophysiology of acute renal failure

RESPIRATION:

Gaseous exchange: O₂ and CO₂ transport, hypoxia and hyper- and hypocapnia, hyper- and hypobaric pressures
Functions of haemoglobin in oxygen carriage and acid-base equilibrium
Pulmonary ventilation: volumes, flows, dead space.
Effect of IPPV and PEEP on lungs and circulation
Mechanics of ventilation: ventilation/perfusion abnormalities
Control of breathing, acute and chronic ventilatory failure, effect of oxygen therapy Non-respiratory functions of the lungs
Cardio-respiratory interactions in health & disease

NERVOUS SYSTEM:

Functions of nerve cells: action potentials, conduction, synaptic mechanisms and transmitters
The brain: functional divisions
Intracranial pressure: cerebrospinal fluid, blood flow
Maintenance of posture
Autonomic nervous system: functions
Neurological reflexes Motor function: spinal and peripheral
Senses: receptors, nociception, special senses
Pain: afferent nociceptive pathways, dorsal horn, peripheral and central mechanisms, neuromodulatory systems, supraspinal mechanisms, visceral pain, neuropathic pain, influence of therapy on nociceptive mechanisms
Spinal cord: anatomy and blood supply, effects of spinal cord section

LIVER:

Functional anatomy and blood supply
Metabolic functions
Tests of function

GASTROINTESTINAL:

Gastric function; secretions, nausea and vomiting
Gut motility, sphincters and reflex control
Digestive functions and enzymes
Nutrition: calories, nutritional fuels and sources, trace elements, growth factors

METABOLISM AND NUTRITION:

Nutrients: carbohydrates, fats, proteins, vitamins, minerals and trace elements Metabolic pathways, energy production and enzymes; metabolic rate
Hormonal control of metabolism: regulation of plasma glucose, response to trauma Physiological alterations in starvation, obesity, exercise and the stress response
Body temperature and its regulation

ENDOCRINOLOGY:

Mechanisms of hormonal control: feedback mechanisms, effect on membrane and intracellular receptors
Central neuro-endocrine interactions
Adrenocortical hormones
Adrenal medulla: adrenaline (epinephrine) and noradrenaline (norepinephrine) Pancreas: insulin, glucagon and exocrine function
Thyroid and parathyroid hormones and calcium homeostasis

PREGNANCY:

Physiological changes associated with a normal pregnancy and delivery
Materno-foetal, foetal and neonatal circulation
Functions of the placenta: placental transfer
Foetus: changes at birth

PHARMACOLOGY**PRINCIPLES OF PHARMACOLOGY:**

Dynamics of drug-receptor interaction
Agonists, antagonists, partial agonists, inverse agonists
Efficacy and potency
Tolerance
Receptor function and regulation
Metabolic pathways; enzymes; drug: enzyme interactions; Michaelis-Menten equation
Enzyme inducers and inhibitors.
Mechanisms of drug action Ion channels: types: relation to receptors.
Gating mechanisms.
Signal transduction: cell membrane/receptors/ion channels to intracellular molecular targets, second messengers
Action of gases and vapours
Osmotic effects
pH effects
Adsorption and chelation
Mechanisms of drug interactions:
 Inhibition and promotion of drug uptake.
 Competitive protein binding.
 Receptor inter-actions.
Effects of metabolites and other degradation products.

PHARMACOKINETICS & PHARMACODYNAMICS

Drug uptake from: gastrointestinal tract, lungs, nasal, transdermal, subcutaneous, IM, IV, epidural and intrathecal routes
Bioavailability
Factors determining the distribution of drugs: perfusion, molecular size, solubility, protein binding.
The influence of drug formulation on disposition
Distribution of drugs to organs and tissues:
 Body compartments Influence of specialised membranes: tissue binding and solubility
 Materno-foetal distribution
 Distribution in CSF and extradural space
Modes of drug elimination:
 Direct excretion
 Metabolism in organs of excretion: phase I & II mechanisms
 Renal excretion and urinary pH
 Non-organ breakdown of drugs
Pharmacokinetic analysis:
 Concept of a pharmacokinetic compartment
 Apparent volume of distribution
 Orders of kinetics
 Clearance concepts applied to whole body and individual organs
Simple 1 and 2 compartmental models:
 Concepts of wash-in and washout curves
 Physiological models based on perfusion and partition coefficients
 Effect of organ blood flow: Fick principle
Pharmacokinetic variation: influence of body size, sex, age, disease, pregnancy, anaesthesia, trauma, surgery, smoking, alcohol and other drugs
Effects of acute organ failure (liver, kidney) on drug elimination Influence of renal replacement therapies on clearance of commonly used drugs
Pharmacodynamics: concentration-effect relationships: hysteresis
Pharmacogenetics: familial variation in drug response
Adverse reactions to drugs: hypersensitivity, allergy, anaphylaxis, anaphylactoid reactions

SYSTEMIC PHARMACOLOGY

Hypnotics, sedatives and intravenous anaesthetic agents
Simple analgesics
Opioids and other analgesics; Opioid antagonists
Non-steroidal anti-inflammatory drugs
Neuromuscular blocking agents (depolarising and non-depolarising) and anti-cholinesterases
Drugs acting on the autonomic nervous system (including inotropes, vasodilators, vasoconstrictors, antiarrhythmics, diuretics)
Drugs acting on the respiratory system (including respiratory stimulants and bronchodilators)
Antihypertensives
Anticonvulsants
Anti-diabetic agents
Diuretics
Antibiotics
Corticosteroids and other hormone preparations
Antacids. Drugs influencing gastric secretion and motility
Antiemetic agents
Local anaesthetic agents
Immunosuppressants
Principles of therapy based on modulation of inflammatory mediators indications, actions and limitations
Plasma volume expanders
Antihistamines
Antidepressants
Anticoagulants
Vitamins A-E, folate, B12

PHYSICS & CLINICAL MEASUREMENT

MATHEMATICAL CONCEPTS:

Relationships and graphs
Concepts of exponential functions and logarithms: wash-in and washout
Basic measurement concepts: linearity, drift, hysteresis, signal: noise ratio, static and dynamic response
SI units: fundamental and derived units
Other systems of units where relevant to ICM (e.g. mmHg, bar, atmospheres)
Simple mechanics: Mass, Force, Work and Power

GASES & VAPOURS:

Absolute and relative pressure.
The gas laws; triple point; critical temperature and pressure
Density and viscosity of gases.
Laminar and turbulent flow; Poiseuille's equation, the Bernoulli principle
Vapour pressure: saturated vapour pressure
Measurement of volume and flow in gases and liquids.
The pneumotachograph and other respirometers.
Principles of surface tension

ELECTRICITY & MAGNETISM:

Basic concepts of electricity and magnetism.
Capacitance, inductance and impedance
Amplifiers: bandwidth, filters
Amplification of biological potentials: ECG, EMG, EEG.
Sources of electrical interference
Processing, storage and display of physiological measurements
Bridge circuits

ELECTRICAL SAFETY:

Principles of cardiac pacemakers and defibrillators
Electrical hazards: causes and prevention.
Electrocution, fires and explosions.
Diathermy and its safe use
Basic principles and safety of lasers
Basic principles of ultrasound and the Doppler effect

PRESSURE & FLOW MONITORING:

Principles of pressure transducers
Resonance and damping, frequency response
Measurement and units of pressure.
Direct and indirect methods of blood pressure measurement; arterial curve analysis
Principles of pulmonary artery and wedge pressure measurement
Cardiac output: Fick principle, thermodilution

CLINICAL MEASUREMENT:

Measurement of gas and vapour concentrations, (oxygen, carbon dioxide, nitrous oxide, and volatile anaesthetic agents) using infrared, paramagnetic, fuel cell, oxygen electrode and mass spectrometry methods
Measurement of H^+ , pH, pCO_2 , pO_2
Measurement CO_2 production/ oxygen consumption/ respiratory quotient
Colligative properties: osmometry
Simple tests of pulmonary function e.g. peak flow measurement, spirometry.

Capnography
Pulse oximetry
Measurement of neuromuscular blockade
Measurement of pain

RESEARCH METHODS

DATA COLLECTION:

Simple aspects of study design (research question, selection of the method of investigation, population, intervention, outcome measures)

Power analysis

Defining the outcome measures and the uncertainty of measuring them

The basic concept of meta-analysis and evidence based medicine

DESCRIPTIVE STATISTICS:

Types of data and their representation

The normal distribution as an example of parametric distribution

Indices of central tendency and variability

DEDUCTIVE & INFERENCE STATISTICS:

Simple probability theory and the relation to confidence intervals

The null hypothesis.

Choice of simple statistical tests for different data types

Type I and type II errors

Inappropriate use of statistics