



# Anaesthesia Practitioner Curriculum Framework

*January 2008*

DH INFORMATION READER BOX	
Policy	Estates
<b>HR / Workforce</b>	Commissioning
Management	IM & T
Planning /	Finance
Clinical	Social Care / Partnership Working
<b>Document Purpose</b>	Policy
<b>Gateway Reference</b>	14997
<b>Title</b>	Annaesthesia Practitioner Curriculum Framework
<b>Author</b>	DH/WD/RCOA
<b>Publication Date</b>	20 Dec 2010
<b>Target Audience</b>	PCT CEs, NHS Trust CEs, SHA CEs, Care Trust CEs, Foundation Trust CEs , Medical Directors
<b>Circulation List</b>	Allied Health Professionals, HEI, Council of Deans, Anaesthesia Departments
<b>Description</b>	The document will support the comissioning process for the education delivery of Anaesthesia Practitioners. It will also be available for interested parties across the NHS and DH. Feedback will be on an ad hoc basis as this document has been agreed upon with all key stakeholders.
<b>Cross Ref</b>	N/A
<b>Superseded Docs</b>	Anaesthesia Practitioner Curriculum Framework
<b>Action Required</b>	N/A
<b>Timing</b>	<b>N/A</b>
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# Anaesthesia Practitioner Curriculum Framework

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First published 20 December 2010  
Published to DH website, in electronic PDF format only.  
<http://www.dh.gov.uk/publications>

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# Executive summary

This curriculum framework is a component part of the New Ways of Working in Anaesthesia (NWWA) programme to develop Physicians' Assistant (Anaesthesia) in the UK health system. In this context the Physicians' Assistant (Anaesthesia) is a non-medical practitioner working as part of the anaesthesia team. The parameters for the role are defined in the role description and in the Royal College of Anaesthetists' (RCoA) statements on supervision and working practices.

The education programme is open to registered health professionals and those wishing to train in healthcare work for the first time. The programme is normally 27 months long and, in common with all clinical trainings, the largest component is the clinical practice work, which is under the supervision of an anaesthetist. The clinical training is complemented by academic study of those disciplines relevant to the practice and understanding of the role.

The academic qualification offered at the end of the programme will be at postgraduate level. All practitioners wishing to be recognised as a Physicians' Assistant (Anaesthesia) will be required to pass the entire academic and practice components of the programme.

The implementation of this curriculum requires continuing partnership working between NHS Trusts, University education programme providers the RCoA and education programme commissioners.

It is acknowledged that all curricula are dynamic documents that require updating in relation to the experiences of implementation, new technologies, new areas of knowledge and new working practices. This curriculum will benefit greatly from the experiences of the first cohorts of Physicians' Assistant (Anaesthesia) trainees who entered the education and training programme in 2005 and 2006. There will be ongoing evaluation and updating as experience of training these practitioners' increases and future iterations of this document will reflect this.

Each of the sections builds on the first section, entitled Curriculum Framework, and holds supporting information to allow the education of Physicians' Assistants (Anaesthesia) to be commissioned.

The more detailed Core Syllabus, Module Learning Outcomes and Clinical Competences outline the role that the Physicians' Assistant (Anaesthesia) will be trained to undertake once qualified, and the teaching input that will need to be

# Introduction

This section describes the curriculum framework for the Physicians' Assistant (Anaesthesia) national learning programme. It is intended to guide the education and development of the practitioner through all of the teaching and learning activities in the work based and other learning environments. Assessment, which is integral to all teaching and learning activities, forms part of this framework.

Teachers in all settings should use this framework to plan the education of the practitioner and to maximize learning opportunities in all environments.

This curriculum was developed on behalf of the NHS Modernisation Agency, Changing Workforce Programme (CWP) in collaboration with the (RCoA), NHSU and University of Birmingham.

The (CWP) established a national programme of work in 2003 focusing on roles within anaesthesia, in the context of new ways of working. This programme builds on a joint evaluation of non-medical staff in the delivery of anaesthesia services in Sweden, Holland and the USA, undertaken by the CWP, Department of Health and RCoA. The Physicians' Assistant (Anaesthesia) will work as part of the anaesthetic team. This new role is seen to be important in supporting the gradual shift of work, traditionally done only by doctors, to a non-medically trained role through a controlled process underpinned by a robust competence based education programme.

## The aim of this curriculum is to:

- a) Develop a practitioner role that enables the anaesthesia team to have more staff working differently.
- b) Enable one medical anaesthetist to run two lists and release anaesthetists for other medical roles and teaching and training.
- c) Maintain patient safety and have transparency to the public.
- d) Maintain the quality of care and outcomes.
- e) Develop appropriate continuing education and training.
- f) Involve non-medical roles working as part of a team with medically qualified anaesthetic staff and in a supervised capacity i.e. by providing more widely technical skills currently unique to medically qualified anaesthetists.

## The audience for this section

- Those wishing to become Physicians' Assistant (Anaesthesia).
- Those wishing to offer an educational programme leading to qualification.
- Patients and the lay public, providing the standards required for the education and development of Physicians' Assistant (Anaesthesia).
- Regulatory bodies.

- Educators in other professions as an explicit statement of the framework for the education of Physicians' Assistant (Anaesthesia).
- Those wishing to employ Physicians' Assistant (Anaesthesia).

# Education Facilities

The education programme will usually be commissioned by the relevant Strategic Health Authority on behalf of its constituent organisations. The curriculum will be delivered by a range of service providers who meet the following criteria:

Each training organisation will need to provide the following facilities:

1. Registration as a postgraduate student with the higher education partner.
2. Access to personal study facilities.
3. Funding for the final OSCE Examination at the RCoA.
4. Access to appropriate library facilities.
5. One or more nominated consultant anaesthetist. The role of this/these individuals will be:
  - a) The organisation and delivery of the clinical teaching for the programme
  - b) Recruitment of tutors
  - c) The attendance at appropriate tutor training days
  - d) The organisation of student mentorship and the in course formative clinical assessments.
6. One or more anaesthetic tutors to deliver the weekly tutorials.
7. Access to operating rooms undertaking a wide spectrum of operations on adult patients under general anaesthesia. As a minimum, these should include:
  - a) General Surgery
  - b) Orthopaedic Surgery
  - c) Gynaecological Surgery
  - d) ENT Surgery
  - e) Urology.
8. Access to an adult Critical Care Unit to observe invasive monitoring techniques and the basics of critical care in practice.
9. Access to clinical skills training facilities. Ideally, these will be delivered by a dedicated clinical skills training facility but as a minimum, the equipment listed in the detailed clinical skills section of each module will be available.
10. The curriculum contains a substantial amount of material designed to be delivered by modern e-learning methods. In order to access this with maximum functionality, access to a personal computer with the following specifications will be required:
  - a) Internet access at ADSL broadband rate or higher
  - b) Internet Browser (e.g. Internet Explorer 5 and above, Netscape Navigator 4.7 and above, Mozilla or Firefox.

# Entry Requirements

Applicants should be able to show that they have carefully considered the commitment involved in a career as part of the anaesthesia team they must demonstrate to the selection panel that they have good communication skills and the ability to work well within a team.

Candidates will come from diverse backgrounds and this has been reflected in the entry requirements in order to enable equitable access. To facilitate equitable access it is anticipated that an admissions advisor will advise applicants appropriately.

Entry to the national learning programme will be open to applicants from one of two different routes:

## 1. Registered healthcare practitioners

For example nurses and operating department practitioners (ODPs); the following criteria must be met:

At least three years, full-time, post-qualification work experience in a relevant area and evidence of recent and successful academic activity.

## 2. New entrants to healthcare

- With a biomedical science, or biological science background
- Preferably with a second class Honours degree or better
- With a demonstrable commitment to a career in healthcare.

**All applications will be individually assessed.**

# Course Structure

The course is at postgraduate diploma level and lasts for 27 months. Successful completion of the course will be followed by three months of pre-registration work experience and then statutory registration. The regulatory process for Physicians' Assistant (Anaesthesia) is being developed and these practitioners are encouraged to participate in the regulatory process as it develops.

## Course Learning Outcomes

The learning outcomes for this education programme are designed to encompass the knowledge, skills and attitude that practitioners must achieve to become Physicians' Assistant (Anaesthesia).

On completion of this programme the student/learner must:

- A. Be able to elicit the relevant history from the patient which identifies potential problems, before, during and after anaesthesia and to communicate this information to all members of the team.
- B. Demonstrate a thorough working knowledge of relevant anaesthetic pharmacology and be able to articulate in theory and practice, the physiological action of these drugs and their interactions with prescribed drugs that patients may be taking.
- C. Demonstrate a clear knowledge of the normal physiological changes which occur in the body before, during and after anaesthesia and be able to use the information to assess the wellbeing of patients before, during and post anaesthesia.
- D. Be able to use their knowledge of physiology and pathology to identify and report the needs of patients who may be an anaesthetic risk due to a pre-existing medical condition.
- E. Demonstrate a clear working knowledge of the applied anatomy and physiology of the respiratory, cardiovascular system and the spinal cord and brain in order to induce anaesthesia and undertake emergency resuscitative procedures.
- F. Demonstrate a clear working knowledge of the physics relevant to anaesthesia and to use that knowledge to monitor and measure patients' wellbeing during and after anaesthesia.
- G. Have the skills to reflect on their practice and to use the outcomes of that reflection for personal development and development, innovation and change in practice.
- H. Have developed the ability to support the learning of colleagues entering practice.

## Teaching and Learning Strategy

The course is made up of 12, two-month modules of teaching. Each module lasts for approximately 35 days.

Each module is broken down as follows:

- Directed self study 70 hours
- Small group teaching 14 hours
- Clinical skills teaching 21 hours
- Workplace experience 140 hours

These are times averaged across all 12 modules. Depending on prior knowledge and experience, some flexibility is allowed between time spent on theory and skills learning within a module.

### Reflective learning

The teaching and learning strategy is designed to enable students become reflective practitioners, capable of identifying problems, devising and reviewing potential solutions.

The clinical assessments and the student personal development plans should demonstrate the learning, which has taken place from and through reflection.

### Directed self study

This will comprise a combination of bespoke material delivered through e-lectures and interactive computer-aided tutorials with links to existing high quality online and written material where appropriate.

The trainee will need to have access to a computer with appropriate software and internet access.

This study will be supported by a module handbook, which will contain essential information points and suggestions.

### Small group teaching

There will be seven two-hour tutorials in each module delivered by consultant anaesthetists, senior anaesthetic trainees and other senior staff from related disciplines.

The module handbook contains learning objectives for each tutorial as well as additional information. Some tutorials will use problem-based learning methods for the illustration of case management.

### Clinical skills teaching

Clinical skills teaching is broken down into three components:

- communication skills;
- practical procedural skills;
- clinical examination skills.

A series of clinical skills workbooks will support the curriculum. Where possible this teaching will be delivered through existing clinical skills facilities or through simulator-based training.

The curriculum is, however, designed so that these skills can be taught and learnt using readily available low fidelity simulators.

### Workplace experience

The majority of the time in training will be spent in the operating room observing anaesthetic and surgical practice, undertaking clinical procedures under supervision, using anaesthetic and monitoring equipment and discussing case management with experienced senior staff.

It is anticipated that learning opportunities will be sought in other clinical learning environments, which will support the achievement of the learning outcomes of the programme.

A series of guided discussion notes are available in the module handbooks for trainees and tutors, to ensure that appropriate areas are covered during this time.

### Record of In-training Experience (RITE)

The trainee will keep a detailed diary of workplace experience as a record of in-training experience. This will take the form of a structured weekly diary recording the following for each case observed:

- Patient demographics and ASA grade (American Society of Anaesthesiologists scale of risk);
- Operation details including duration;
- Anaesthetic technique, drugs used;
- Airway used ;
- Ventilation (mode of);
- Monitoring used;
- Recovery;
- Untoward events. A series of workplace tasks mapped to learning outcomes will be included for each module, and successful completion of these will be recorded in the diary. In addition, the diary contains a record of topics covered in in-theatre teaching and a record of areas not fully understood so facilitating reflective practice. The diary can be held as a paper or electronic system but the paper version will be transcribed onto a computer database at regular intervals so allowing:
  - Secure backup of data collected
  - Analysis of procedures seen and practised
  - Record of successful task completion
  - Comparison with peers' data and identification of areas needing further attention
  - Analysis of experience for use by local tutor
  - Analysis of experience by local delivery group and curriculum design team.

### Assessments

The first four modules are designed to enable and support the students' development of theoretical and clinical knowledge, as they move from the foundation aspects of the programme, to the more complex knowledge and skills required for practice. The formative and summative assessments in the first eight months of the programme reflect the areas covered in the first four modules of the programme.

## Formative Assessments

Formative assessments will take the form of quizzes, student led discussions, written tests and clinical examinations.

## Summative Assessments

The main summative assessments occur at 8 and 24 months and are structured as follows: 1) 8 Month Assessment: MCQ (multiple-choice questions), RITE Diary and Tutor Assessment (Attitudes & Behaviour).

**MCQ:** Students will have to achieve the pass mark to continue the programme.

In addition, the student would need to show clear module progression.

**Clinical Skills:** Students will be assessed against a detailed set of criteria demonstrating an acceptable theoretical knowledge, as well as the ability to perform the procedure in an acceptable manner. **Pass/Fail**

**24 Month Assessment:** MCQ, PBL, Clinical Skills Workbook completion, RITE Diary, Tutor Assessment (Attitudes & Behaviour), OSCE (objective structured clinical examination) at Royal College of Anaesthetists The individual components will be assessed as follows:

**MCQ:** Students will have to achieve the pass mark to continue.

**Clinical Skills:** Students will be assessed against a detailed set of criteria demonstrating an acceptable theoretical knowledge, as well as the ability to perform the procedure in an acceptable manner. **Pass/Fail**

**RITE:** To pass the RITE component of the assessment students will have to achieve the following:

Exposure to an adequate number and variety of cases. **Pass/Fail**

## Tutor Assessment

In exceptional circumstances a tutor may consider it inappropriate for a student to continue because of unacceptable attitudes or behaviour. Tutor comments will be fed back to students from this component of the assessment. All components of the assessment have to be passed to progress; cross-competency compensation is not permitted.

# Module structure

Each of the 12 modules is constructed in the same way as illustrated below.

Formative Assessment Skills Theory, Basic Science Workplace Experience.

Entry Modules 4 x 2 month Exit Modules 2 x 2 month in parallel or series Middle Modules 6 x 2 months.

## Detailed module structure

### Module 1: Introduction to clinical practice (1)

#### Aim of the module

This module is designed to enable trainees to develop and build upon the skills and knowledge necessary for organising and managing the care of a patient in the operating theatre environment.

#### Learning outcomes

By the end of this module the trainees should develop the appropriate level of knowledge and professional behaviour to undertake the following:

#### 1. The layout and basic function of the typical anaesthetic room and operating theatre:

- a. Describe the basic function of the anaesthetic machine
- b. Describe the location and function of relevant equipment, particularly that required in an emergency
- c. Demonstrate how the operating table controls are manipulated, in order to make, break, lock and unlock it
- d. Describe, and explain the principles behind, the environmental controls within the operating room
- e. Describe the layout and function of the scrub area
- f. Describe drug checking procedures and measures for safe storage and use
- g. Define the roles of operating room staff and explain how they function as a team.

#### 2. Good practice that ensures personal safety at work

- a. Explain the importance of appropriate theatre clothing in ensuring personal and patient safety
- b. Demonstrate the appropriate method of putting on surgical clothing and gloves
- c. Describe and explain the basis of aseptic working practices
- d. Demonstrate the correct method for drawing up drugs, in liquid and powder form, safely and accurately
- e. Demonstrate the safe disposal of syringes and sharps
- f. Describe the factors to be considered, in terms of personal safety, when moving and positioning patients in the operating room
- g. Demonstrate appropriate manual handling skills in order to protect staff and patients
- h. Identify the common signs of stress in colleagues.

**3. The importance of clear and timely communication with patients and staff**

- a. Explain why communication between patients and staff and between different members of staff is crucial to safe practice
- b. Describe the factors to be considered when communicating with people with visual and hearing impairments, with non-English speakers and with people with disabilities
- c. Recognise when it is appropriate to communicate with other members of staff in the operating room and when it is not.

**4. The principles of checking patients in, caring for them safely whilst they are positioned, handing over in recovery, and keeping a record of their care**

- a. Explain the importance of checking patients' details
- b. Demonstrate how to check a fit adult on their arrival in the anaesthetic room or theatre
- c. Describe how a pre-operative history is taken from a patient
- d. Describe the positions patients are commonly put in for surgical procedures, to include: the supine position, the prone position, the lithotomy and Lloyd-Davis positions
- e. Describe the factors to be considered, in terms of patient safety, when moving and positioning patients in the operating room
- f. State where common pressure points are on the patient's body
- g. Demonstrate the safe positioning of a patient in the supine position
- h. State the purpose and content of the anaesthetic record
- i. Identify important times and events to be recorded
- j. Explain the principles of fluid balance charts
- k. Describe how patients are handed over in recovery and to ward staff
- l. Describe how analgesia and fluids are prescribed post-operatively
- m. Explain the role of post-operative pain teams in the management of pain.

**5. The basic equipment used in anaesthesia**

- a. Recognise and state the function of the following:
- b. Oral and nasal airways
- c. Bougies / introducers
- d. Intravenous giving sets
- e. Epidural needles
- f. Laryngeal masks
- g. Laryngoscopes
- h. Masks
- i. Needles for intravenous and intramuscular use
- j. Spinal needles
- k. Sterile packs
- l. Tracheal tubes.

**6. The importance of oxygenation and the basic management of the upper airway**

- a. Know the risks to the patient of hypoxia
- b. Explain the importance of oxygenation and airway management before, during and after surgery.

**7. The basic ethical and legal issues surrounding surgery and anaesthesia and the importance of anaesthetic records**

- a. Describe the responsibilities, limitations and legal boundaries relating to the role of the Physicians' Assistant (Anaesthesia)
- b. Describe the legal principles surrounding the use of controlled drugs
- c. Explain the fundamental ethical and legal issues surrounding patient consent
- d. Practice in a manner that demonstrates an awareness of a health professional's duty to the individual and to Society.

**8. The range of surgical procedures undertaken and their impact on the conduct of anaesthesia**

- a. Observe a variety of routine surgical procedures.

**Formative Assessment**

**Theory:** Basic Equipment & Safety.

**Skills:** Drawing up drugs Disposal of sharps Gloves, Manual Handling Meeting patients Hospital and Operating Theatre layout and functions The People in an Operating Theatre The Patient, The Law, Ethics Personal Safety, Manual Handling Communications 1.

**Workplace:** Introduction to Operating department Observation of Anaesthesia & Surgery (1) Introduction to Anaesthesia.

**Module 2: Introduction to clinical practice (2)**

**Aim of the module**

The design and content of this module builds on Introduction to Clinical Practice 1 and will enable trainees to develop the knowledge of anatomy, physiology and some of the likely pathologies of the human body. Trainees will be introduced to pharmacology with particular emphasis on the safe and effective use of drugs in anaesthesia.

**Learning outcomes**

By the end of this module the trainees should have developed the appropriate level of knowledge, skills and professional behaviour in relation to the following:

**1. The anatomy of the body, the positions and functions of the major organ systems and their core functions**

- a. Explain how the anatomy of the heart relates to its function as a pump
- b. Name the major arteries and veins
- c. Describe the position of the major arteries and veins within the body
- d. Describe the structure of the nervous system with reference to:
  - i. the brain and spinal cord
  - ii. the major divisions of the peripheral nervous system
- e. Explain how the anatomy of the lungs relates to their functions as gas exchangers
- f. Describe the range of normal movements of the wrist, elbow, shoulder, ankle, knee and hip
- g. Outline the major functions of the liver
- h. Outline the major functions of the kidney.

**2. Common pathological conditions that are treated surgically**

- a. Describe the aetiology and effects of:
  - i. Infections: abscesses, cholecystitis, peritonitis
  - ii. Vascular problems: arterial blockages, aneurysms, varicose veins and ulcers, DVTs
  - iii. Cancers: breast, bowel, lung and prostate
  - iv. Superficial swellings: hernias, lipomas, cysts, ganglions.

**3. Common medical conditions found in surgical patients and the implications of these for anaesthesia**

- a. Describe the aetiology and effects of:
  - i. Cardiovascular System: hypertension, angina, heart failure, valve problems
  - ii. Respiratory System: asthma, COAD, pneumonia
  - iii. Diabetes
  - iv. Renal failure
  - v. Liver: Jaundice, cirrhosis.

**4. The basic examination of patients, monitoring of their physiological status and interpretation of simple investigations**

- a. Demonstrate competence in the non-invasive measurement of systemic blood pressure
- b. Demonstrate competence in the measurement of pulse rate
- c. Demonstrate the location and palpation of major pulses
- d. Recognise the signs of poor peripheral perfusion and cyanosis
- e. Describe the central venous pressure and peripheral oedema
- f. Recognise normal breath sounds
- g. Demonstrate the basic principles of inserting an airway and holding a facemask on a patient with teeth and normal anatomy
- h. Demonstrate how to check the position of an ET tube or LMA
- i. Describe the measurement of urine flow
- j. Describe the measurement of blood glucose
- k. Interpret commonly performed blood tests.

**5. The major classes of drugs encountered in anaesthetic practice, the routes they are administered and the concept of balanced anaesthesia**

- a. Describe routes of administration of drugs:
  - i. Oral
  - ii. Subcutaneous
  - iii. IM
  - iv. Inhalational
- b. Be aware of induction agents, volatile agents, opioids and other analgesics, relaxants, anti-emetics
- c. Explain the basics of balanced general anaesthesia.

**6. The principles of preventing cross-infection**

- a. Describe the importance of universal precautions for the prevention of cross-infection including, hand washing, aprons and good housekeeping
- b. Explain the rationale behind decontamination, disinfection and sterilisation

- c. Describe the precautions taken with infectious patients (TB, MRSA, Hep-B, HIV, etc).

**7. Different types of surgery and the way in which they require anaesthesia to be conducted**

- a. Understand the need for muscle relaxants
- b. Describe and explain the necessary modifications to anaesthesia in the following scenarios:
  - i. The need for the head-down position
  - ii. Access to the perineum
  - iii. Operations on the back and sides.

**8. The principles, and importance, of good inter-professional working**

- a. Explain the roles played by different members of the anaesthetic and operating theatre team
- b. Describe the ways in which information can be communicated in the clinical environment
- c. Explain the need to communicate in an organised and timely fashion
- d. Understand the principles of when to ask for help.

**Formative Assessment**

**Module planning questionnaire**

**Theory :** Basic Physiology & Pathology Basic Anatomy & Pathology Common Medical Conditions.

**Skills:** Basic Clinical Examination Introduction to Surgery Introduction to Drugs Interpretation of simple investigations.

**Workplace:** Introduction to Surgery, Meeting other staff Inter-professional working Observation of Anaesthesia & Surgery (2).

**Module 3: Introduction to anaesthesia science and technology (1)**

**Aim of the module**

This module introduces the trainees to the history and development of anaesthesia. It also builds on their knowledge of pharmacology and the management of patient care during the induction and recovery from anaesthesia.

**Learning outcomes**

By the end of this module the student should be able to demonstrate the appropriate level of knowledge, skills and professional behaviour in relation to the following:

**1. The discovery and historical development of anaesthesia**

- a. Outline the early forms of anaesthesia
- b. Be aware of the important milestones that underpin current practice
- c. Use the search for the agent with ideal properties as an example to illustrate progress in anaesthetic pharmacology.

**2. The methods of establishing anaesthesia and recording its progress on an anaesthetic chart**

- a. Explain the rationale behind the classification of patients' fitness for anaesthesia (physical status)
- b. Outline the ASA grading system used to classify patients' fitness for anaesthesia (physical status)
- c. Describe, in principle, the various methods by which anaesthesia can be achieved
- d. Describe the composition of the anaesthetic record
- e. Explain the importance of keeping accurate records in anaesthesia.

**3. The theoretical and practical aspects of the administration of IV anaesthetics, inhalation anaesthetics, analgesics and relaxants**

- a. Outline the drugs available for intravenous anaesthesia
- b. Explain the principles of uptake and distribution of a single IV dose
- c. Summarise the dangers and treatment of intra-arterial injection
- d. Outline the drugs available for inhalational anaesthesia
- e. Explain the principles of uptake and distribution of a fixed inspired volatile concentration
- f. Outline the drugs available to produce analgesia and how they are administered (oral, S-C, IM, IV)
- g. Outline the drugs available to produce muscle relaxation
- h. Describe the special features of suxamethonium.

**4. Assessment of the airway**

- a. Explain the problems relating to the accurate prediction of difficult intubation
- b. Demonstrate competence in assessment of the airway, including:
  - i. Mouth opening
  - ii. Mallampatti scoring
  - iii. Thyromental distance
  - iv. Neck mobility
- c. Identify conditions associated with difficult intubation.

**5. Induction of anaesthesia, including rapid sequence induction**

- a. Demonstrate the checks necessary prior to inducing anaesthesia, including:
  - i. Oxygen supply
  - ii. Tipping trolley
  - iii. Suction
    - Intravenous access
    - Minimal monitoring conditions
- b. Demonstrate competence in the insertion of cannulae into a peripheral veins
- c. Demonstrate competence in setting up an intravenous infusion
- d. Describe the method of intravenous induction
- e. Demonstrate competence in the intravenous injection of drugs
- f. Describe the method of inhalational induction
- g. Explain the importance of drug solubility in inhalational induction
- h. Demonstrate the correct application of cricoid pressure
- i. Describe the technique of rapid sequence induction
- j. Explain the indications for rapid sequence induction in practice.

## 6. Maintenance and termination of anaesthesia

- a. Describe the Total Intravenous Anaesthesia (TIVA) technique
- b. State the drugs that are used for TIVA
- c. Define the time to waking when TIVA is employed
- d. Explain how anaesthesia is maintained with volatile agents
- e. Describe the relationship between the effect of solubility and the time to waking
- f. Describe how muscle relaxation is reversed
- g. Describe how to assess the adequacy of breathing.

## 7. Caring for a patient in the recovery room

- a. Explain the benefits of oxygen during the recovery period
- b. Identify commonly used oxygen masks and the indications for their usage
- c. Describe how nausea and vomiting is managed
- d. Identify the necessary physiological measurements to be made.

## 8. Caring for a post-operative patient on the ward

- a. Describe the basic needs of a patient, including:
  - i. Oxygen
  - ii. Analgesia
  - iii. Fluid
  - iv. Reassurance
- b. Outline the content of a post-operative ward recording chart.

## 9. Resuscitation to BLS standard

- a. Demonstrate resuscitation to the Resuscitation Council's Basic Life Support standard.

### Formative Assessment:

**Theory:** Brief History General Anaesthesia principles Local & Regional principles Introduction to Anaesthetic Drugs & Pharmacology Induction, maintenance & recovery Anaesthetic records, ASA grading.

**Skills:** IV cannulation & setting up a drip Airway basics, Airway assessment, Cricoid pressure External Cardiac Massage (To BLS standards) IV injection of drugs.

**Workplace:** Induction of Anaesthesia Holding an airway Guedel, LMA, ETT insertion RSI.

## Module 4: Anaesthesia science and technology (2)

### Aim of the module

This module is designed to develop the trainees advanced knowledge of the equipment used in anaesthesia for the measuring of physiological parameters. The trainees will be able to explore the equipment, their function and application within the conduct and maintenance of anaesthesia. The trainees will build upon their knowledge to drug administration and the physiological changes brought about by these drugs.

## Learning outcomes

By the end of this module trainees should develop the appropriate level of knowledge, skills and attitudes to be able to demonstrate a clear working knowledge of the following:

### **1. The properties of materials (solids, liquids and gases) with specific application to gases and vapours**

- a. Define an atom and a molecule
- b. Describe the basic physical properties of solids, liquids and gases
- c. State the gas laws
- d. Explain how the gas laws can be used to describe the behaviour of gases, and mixtures of gases, under a range of conditions
- e. Describe the nature of a vapour and its properties
- f. Describe the behaviour of nitrous oxide and volatile anaesthetic agents
- g. Describe how cylinders of oxygen, air and nitrous oxide behave when being emptied.

### **2. Units of measurement in common use and the preparation of diluted drugs**

- a. Be aware of the SI system and other commonly used units of measurement
- b. Define common prefixes used in units of measurement:
  - i. Nano
  - ii. Micro
  - iii. Milli
  - iv. Centi
  - v. Deci
  - vi. Kilo
- c. Demonstrate how to prepare a drug to a specified dilution.

### **3. The basic principles of electricity and its application to diathermy, defibrillation and electrical safety**

- a. Define the following electrical terms and state their units of measurement:
  - i. Current
  - ii. Voltage
  - iii. Resistance
  - Capacitance
  - Inductance
- b. Explain the hazards of electrocution and how they are avoided
- c. Describe the principles of diathermy and defibrillation
- d. Demonstrate how to correctly apply and remove a diathermy plate
- e. Demonstrate competence in defibrillating.

### **4. Flow and pressure transducers: waveforms, damping and resonance**

- a. Describe how commonly used flow transducers work
- b. Outline the factors that reduce the accuracy of flow transducers
- c. Explain how a blood pressure transducer works
- d. Demonstrate how to set up a blood pressure transducer
- e. Draw an average arterial waveform and label the main components
- f. Describe the appearance and effects of damping and resonance
- g. Draw a typical CO<sub>2</sub> waveform and label the main components.

**5. The measurement and analysis of certain physiological variables**

- a. Describe infra-red absorption and absorption spectra
- b. Describe the respiratory waveforms for CO<sub>2</sub> and vapours
- c. Explain the interference of CO<sub>2</sub> and N<sub>2</sub>O
- d. Describe what is measured by a blood-gas machine
- e. Define normal arterial O<sub>2</sub>, CO<sub>2</sub>, bicarbonate and base deficit values
- f. Describe the sites of measurement of body temperature
- g. Describe the types of thermometer used to measure body temperature.

**6. The principles underlying common measuring equipment commonly used in anaesthesia**

- a. Explain the principles of reference standards
- b. Explain the need for calibration
- c. Explain the following concepts:
  - i. Zero offset
  - ii. Linear proportionality
  - iii. Calibration limits
- d. Demonstrate how to zero a blood pressure transducer
- e. Describe how a blood pressure transducer could be calibrated.

**Formative Assessment:**

**Module planning questionnaire Theory:** Electricity and electrical safety Statistics.

**Skills:** Electrical Safety in practice 2, 4 Clinical Measurement Medical Devices Units of measurement Physics of Gases and Vapours, Pressure and Flow Peak Flow measurement Damped Waveforms Electrical Safety.

**Workplace:** Maintenance and reversal of Anaesthesia Oral suction.

**Module 5: Anaesthesia science and technology (3)**

**Aim of the module**

This module builds on the knowledge and skills developed in Modules 3 and 4 particularly in relation to the management of critical incidents. This module will seek to put a wider emphasis on the monitoring of patients; whilst ensuring the trainees comprehension of physics and the anaesthetic machine.

**Learning outcomes**

By the end of this module the trainees should have developed the appropriate level of knowledge, skills and attitudes which would demonstrate comprehension and a clear working knowledge of the following:

**1. Why the anaesthesia process necessitates clinical monitoring**

- a. Understand the scale and speed of physiological disturbances produced by anaesthesia
- b. Understand the life-threatening consequences of failing to adequately control these physiological disturbances
- c. Outline the common causes of awareness
- d. Describe the course of action to be taken if awareness is suspected.

## 2. The physiological and biochemical changes that require monitoring

- a. Explain the effect of anaesthesia on the cardiovascular system, in relation to:
  - i. Blood pressure
  - ii. Heart rate
  - iii. Heart rhythm
  - iv. Peripheral perfusion
- b. Explain the effect of anaesthesia on the respiratory system, in relation to:
  - i. Respiratory rate
  - ii. Tidal volume
  - iii. End-tidal CO<sub>2</sub>
  - iv. Effect of reduced Functional Residual Capacity in the lungs (FRC)
- c. Explain how the depth of anaesthesia can be assessed by measuring the functioning of the cardiovascular and respiratory systems
- d. Explain the principles of assessing circulating fluid volume
- e. Demonstrate the measurement of blood glucose
- f. Demonstrate the measurement of blood-gas status.

## 3. The purpose and function of the anaesthetic machine

- a. Explain the layout and components of a simple anaesthesia machine
- b. Demonstrate how to check a simple anaesthesia machine
- c. Demonstrate how to activate the oxygen bypass
- d. Explain the purpose of pressure reduction valves
- e. Explain how scavenging systems function and are attached to anaesthesia machines and breathing systems.

## 4. Gas pipelines, cylinders and suction

- a. Identify different gas cylinders based on their construction and colour coding
- b. Explain the principles of gas pipeline identification
- c. Describe how oxygen, air and nitrous oxide are stored and distributed in pipelines
- d. Explain the importance of the pin-index system and gas-specific pipeline collars
- e. Explain why powerful suction is important.

## 5. Vaporisers, capnographs and pulse oximeters

- a. Describe how a modern vaporiser works
- b. Describe how a capnograph works
- c. Draw a typical capnograph trace
- d. Describe how a pulse oximeter works
- e. Draw a typical pulse oximeter trace
- f. Demonstrate how to attach a pulse oximeter
- g. Outline the sources of error in capnography and pulse oximetry.

## 6. Minimal monitoring, stethoscope, oximetry, capnography, NIBP and the ECG

- a. Understand the concept and objectives of minimal monitoring
- b. Describe the uses and limitations of the following monitors:
  - i. Stethoscope
  - ii. Pulse oximeter
  - iii. Capnograph
  - iv. Non-invasive blood pressure (NIBP) cuff

v. ECG.

### **7. Breathing systems and ventilators**

- a. Explain the basic principles of breathing systems and ventilators
- b. Explain the function and fresh gas flow requirements of A, D and E breathing systems (Mapleson classification system)
- c. Explain the principles of the self-inflating resuscitation bag and the associated valves
- d. Demonstrate assembly of A, D and E breathing systems
- e. Demonstrate the use of a self-inflating resuscitation bag
- f. Describe volume and pressure controlled ventilation
- g. Demonstrate how to set up a ventilator for theatre use
- h. Demonstrate how to set up a ventilator for transport of an intubated patient.

### **8. Monitoring neuromuscular block**

- a. Understand the principles of a peripheral nerve stimulator
- b. Describe the characteristics of a depolarizing and non-depolarising block
- c. Understand how to apply single twitches, train of four and titanic stimulation
- d. Demonstrate the application of stimulating electrodes to the wrist.

### **9. Invasive versus non-invasive arterial and central venous monitoring**

- a. Identify situations when invasive monitoring is required.

### **10. Monitoring the depth of anaesthesia**

- a. Explain the concept of 'depth of anaesthesia'
- b. Describe how to monitor depth of anaesthesia using physiological surrogates, PRST scoring
- c. Be aware of the methods used to measure depth of anaesthesia using EEG.

### **Formative Assessment:**

### **Module planning questionnaire**

### **Theory:**

**Skills:** Checking anaesthetic machine Basic monitoring set up IPPV set up Suction Monitoring Brief History General principles Anaesthetic gases, Oxygen Vaporisers in practice Breathing systems & Mechanical ventilation ECG, NIBP, SPO2, Capnography, Ventilatory Volumes, NMB, Temp, Depth of Anaesthesia.

**Workplace:** Maintenance and reversal of Anaesthesia Oral suction.

## **Module 6: The heart and circulation**

### **Aim of the module**

The focus of this of this module is on the development of knowledge of the normal cardio vascular system and the normal and abnormal physiological changes which may influence practice.

## Learning outcomes

By the end of this module the, trainees should have developed the appropriate level of knowledge, skills and attitudes to care for patients in the operating theatre environment:

### 1. The anatomy of the heart and major blood vessels

- a. Label a diagram of the heart and associated blood vessels
- b. Describe the following structures:
  - i. Atria
  - ii. Ventricles
  - iii. Valves
    - Coronary arteries
    - Conduction system
- c. Explain the differences between the right and left sides of the heart
- d. Describe the path of blood as it circulates
- e. Describe the aorta and its major branches
- f. Describe the pulmonary artery
- g. Describe the superior and inferior vena cavae
- h. Demonstrate the location of the main arterial pulses
- i. Demonstrate how to check for raised central venous pressure.

### 2. The peripheral circulation and receptors

- a. Describe arterioles, capillaries and venules
- b. Explain the functions of the endothelium
- c. Explain the movement of fluid across the capillary wall and the importance of molecular weight in this process
- d. Demonstrate how to check for adequate peripheral perfusion and peripheral oedema.

### 3. The generation and control of the heartbeat

- a. Distinguish between myocardial cells and other cells
- b. Explain the factors that determine pre-potential drift and firing of the S-A node
- c. Describe how the action potential travels from the S-A node to the ventricular myocardium.

### 4. The ECG and the cardiac cycle

- a. Describe the principles underlying the standard 12 lead ECG
- b. Describe how the components of the normal ECG are generated
- c. Demonstrate how to recognize a normal cardiac axis
- d. Demonstrate the components of a normal ECG
- e. Demonstrate how to recognize the following
  - i. Abnormalities of axis, rate and rhythm
  - ii. Occurrence of ischaemia
- f. Describe the correlation of the ECG with mechanical aspects of the cardiac cycle
- g. Draw intra-ventricular pressures and link them with pressures in the aorta and pulmonary artery
- h. Note the action of stenotic and incompetent valves on the cardiac cycle
- i. Demonstrate how to apply the CM5 and other intra-operative ECG monitoring systems

**5. Heart failure, heart block, arrhythmias and pacemakers**

- a. Explain the concepts of right, left and congestive cardiac failure
- b. Describe 1st, 2nd and 3rd degree heart block
- c. Describe the following:
  - i. Sinus arrhythmia
  - ii. Atrial ectopics
  - iii. Atrial fibrillation
  - iv. Ventricular ectopics
- d. Explain the function of a pacemaker and its relevance to anaesthesia.

**6. The generation and maintenance of blood pressure**

- a. Explain the concept of baroreceptors and the reflexes that control the systemic blood pressure
- b. Describe the factors that control the cardiac output
- c. Describe the distribution of the cardiac output
- d. Explain the role of systemic vascular resistance in the determination of the blood pressure
- e. Explain the concept of contractility and the relevance of filling pressures.

**7. The pulmonary circulation and central venous pressure**

- a. Describe the major differences between the systemic and pulmonary circulations
- b. Explain how pulmonary oedema forms and its effect on oxygenation
- c. Describe the normal central venous pressure
- d. Explain the causes of abnormally high and low central venous pressures.

**8. Drugs that work on the cardiovascular system**

- a. Explain the function and basic mode of action of commonly used anti-hypertensive and anti-arrhythmic drugs
- b. Explain the function, basic mode of action and method of administration of:
  - i. Inotropes
  - ii. Vasodilators
  - iii. Vasoconstrictors.

**9. The cardiovascular system during pregnancy – maternal and foetal**

- a. Describe the main changes in the maternal cardiovascular system that occur during normal pregnancy
- b. Describe the normal foetal circulation
- c. Describe the major changes in moving from the foetal to normal adult circulation
- d. Describe the common congenital cardiac abnormalities, ASD, VSD, PDA.

**10. Common heart sounds and advanced cardiovascular monitoring**

- a. Describe the generation of normal heart sounds
- b. Recognise normal heart sounds
- c. Recognise a loud systolic ejection murmur
- d. Describe the common murmurs and abnormal heart sounds.

## Formative Assessment

### Module planning questionnaire

#### Theory:

**Skills:** 12 lead ECG Management of Hypotension & Hypertension  
Management of common arrhythmias Anatomy of Heart & Circulation (+ pregnancy)  
Cardiovascular Physiology The ECG, CVP, PCWP, CO Cardiovascular Pharmacology  
Arrhythmias, low cardiac output, heart failure Common Heart Sounds Advanced cardiovascular monitoring.

**Workplace:** Invasive Monitoring.

## Module 7: The airways and lungs

### Aim of the module

This module will focus on the normal physiology of respiratory system and the effects on anaesthetic practice if there are abnormalities to this system.

### Learning outcomes

By the end of this module the trainees should have developed the appropriate level of knowledge, skills and attitudes to begin to practice proactively:

#### 1. The anatomy, functions and examination of the upper airway

- a. Describe the anatomy of the mouth, nose, pharynx, larynx and trachea, including the blood and nerve supply.
- b. Demonstrate how to assess the airway for prediction of difficult intubation
- c. Demonstrate how to insert an oral airway and hold a facemask so as to optimise the passage of inhaled and exhaled gases
- d. Demonstrate how to apply cricoid pressure
- e. Demonstrate how to orally intubate a person with normal anatomy
- f. Demonstrate how to insert an LMA in a person with normal anatomy.

#### 2. The anatomy, functions and examination of the major bronchi and lungs

- a. Describe the anatomy of the right and left major bronchi
- b. Describe the major lobar divisions of the lungs and the location of the pleura
- c. Describe and explain how the lungs expand and contract
- d. Demonstrate how to examine the chest.

#### 3. The physiological control of breathing

- a. Describe the action of chemoreceptors and the CSF in the control of breathing
- b. Describe the control of breathing in a healthy person
- c. Describe the control of breathing in the chronically hypoxic patient.

#### 4. Gas exchange, emboli, shunts, hypoxia and the normal capnograph

- a. Describe the composition of the alveolar gas and be aware of the alveolar gas equation
- b. Explain the process of gas exchange across the alveolar wall
- c. Draw the normal capnograph and describe how it is generated

- d. Describe the information that can be obtained from a capnogram
- e. Understand the effects of pulmonary emboli and shunts on the capnogram
- f. Explain each of the causes of hypoxia (failure of oxygen supply, failure of bellows function, failure at alveolar level)
- g. Describe the methods of detecting hypoxia
- h. Understand the process and objectives of pre-oxygenation.

**5. Interpretation of investigations relevant to the respiratory system (reading a chest x-ray, pulmonary function tests and interpreting blood gas results)**

- a. Demonstrate how to read a chest x-ray
- b. Describe the use of the Vitalograph and peak flow meter
- c. Demonstrate the interpretation of blood-gas results.

**6. Problems with pulmonary function: disconnections and displaced tubes, pneumothorax, COPD and pneumonia, asthma and bronchospasm, laryngospasm**

- a. Describe how a disconnection might be detected
- b. Demonstrate how to confirm the correct placement of an endotracheal tube and an LMA
- c. Describe the signs and symptoms of a pneumothorax
- d. Demonstrate the treatment of a pneumothorax
- e. Describe the clinical and investigational findings in COPD and pneumonia
- f. Understand the causes of bronchospasm and describe its management
- g. Understand the causes of laryngospasm and describe its management
- h. Describe surgical emphysema and its management.

**7. Pulmonary pharmacology and the administration of drugs via the airways**

- a. Describe the nerve endings and basic receptor types found in the lungs
- b. Understand the actions of bronchodilators
- c. Demonstrate how to give bronchodilators via a nebulisers
- d. Discuss the choice of antibiotics for a chest infection.

**Formative Assessment:**

**Module planning questionnaire**

**Theory:** Anatomy of Airway & Lungs Asthma, COPD, Pneumonia.

**Skills:** Nebulisers Disconnection, The displaced tube Blood gas monitoring Respiratory Physiology Spirometry, Blood gases Respiratory Pharmacology Chest examination Common Breath Sounds Management of the difficult airway.

**Workplace:** Management of bronchospasm Visit CCU: Advanced IPPV, CPAP etc.

**Module 8: The kidneys, liver, endocrine system and blood**

**Aim of the module**

The focus of this module is on the development and broadening of the trainees' knowledge of the normal anatomy and physiology of the kidneys, liver and endocrine system.

## Learning outcomes

By the end of this module the trainees should have developed the appropriate level of knowledge, skills and attitudes to be able to care for patients in the theatre environment who may normal or complex needs:

### **1. The anatomy and functions of the kidneys, including the consequences of renal failure**

- a. Describe the gross anatomy of the kidneys, ureters and bladder
- b. Describe the action of the glomerulus and the tubules
- c. Describe the major functions of the normal kidney
- d. Analyse and explain the changes in blood biochemistry during renal failure.

### **2. Oliguria and the action of diuretics**

- a. Define oliguria
- b. Describe the causes of oliguria
- c. Demonstrate how to catheterise male and female patients
- d. Describe the action of osmotic and loop diuretics.

### **3. The anatomy and functions of the liver, including the consequences of liver failure**

- a. Describe the gross anatomy of the liver and biliary tree
- b. Describe the major biochemical functions of the liver and the role of bile
- c. Understand the causes of jaundice, the effects of cirrhosis and the consequences of liver failure.

### **4. The uptake, management and excretion of drugs**

- a. Understand the differences in drug availability and time of action of oral, SC, IM, and IV administration
- b. Describe the principle stages in drug metabolism
- c. Be aware of enzyme systems
- d. Describe the action of plasma cholinesterase
- e. Describe the excretion of drugs by the liver and kidneys.

### **5. The anatomy and functions of the thyroid and parathyroid glands**

- a. Describe the anatomy of the thyroid and parathyroid glands
- b. Understand the consequences of hyper and hypothyroidism.

### **6. The anatomy and functions of the adrenal and pituitary glands: the stress response**

- a. Describe the gross anatomy of the adrenal glands
- b. Describe the gross anatomy of the pituitary gland
- c. Explain how the pituitary-adrenal axis works
- d. Understand the secretion and actions of catecholamines, gluco and mineralocorticoids
- e. Describe the rennin-angiotensin system.

### **7. The anatomy and functions of the pancreas and the management of diabetes**

- a. Explain the pancreas' exocrine function
- b. Explain the pancreas' endocrine function
- c. Understand how blood glucose levels are maintained
- d. Describe the presentation of hyper and hypoglycaemia
- e. Explain the principles of diet, tablet and insulin control of diabetes

- f. Demonstrate the peri and intraoperative management of glucose levels
- g. Demonstrate how to set up an insulin infusion and use a sliding scale.

#### **8. The control of temperature and the effects of anaesthesia and surgery**

- a. Explain how body temperature is controlled
- b. Describe the effects of anaesthesia on body temperature
- c. Demonstrate methods of conserving body heat during anaesthesia.

#### **9. Blood clotting, anticoagulants and DVT prophylaxis**

- a. Describe the clotting cascade
- b. Demonstrate the correct usage of warfarin, heparin and antiplatelet drugs in the management of blood loss and coagulopathies
- c. Outline the occurrence of DVT and pulmonary embolus during surgery
- d. Describe mechanical and drug methods of DVT prophylaxis.

#### **Formative Assessment**

**Theory:** Anatomy of the Kidneys, Liver and Endocrine organs Physiology of Kidneys, Liver and Endocrine organs Physiology of Blood and Clotting, DVT prophylaxis Renal Failure, Liver Failure Pregnancy, Diabetes and management Diuretics, anticoagulants

**Skills:** Interpretation of common Blood Tests Management of diabetes Checking blood Management of blood loss and coagulopathies

**Workplace:** Routine fluid management Use of Blood & Blood Products (FFP, platelets etc.) Finding results Management of Oliguria

#### **Module planning questionnaire**

### **Module 9: The brain and the nervous system**

#### **Aim of the module**

This module addresses the knowledge of the nervous system and the neuromuscular junction. The effects of anaesthesia on both will be considered with particular attention to pain pathways and analgesics. The provision of an acute pain service will be addressed in this module.

#### **Learning outcomes**

By the end of this module the trainees should have developed the appropriate level of knowledge, skills and attitudes to be able to meet the outcomes outlined below and to use the knowledge and skills acquired to actively participate in all aspects of the patient care as it relates to anaesthesia and pain relief.

#### **1. Anatomy of the central nervous system: major ascending and descending pathways**

- a. Describe the major morphological divisions of the central nervous system
- b. Describe important areas of specific function (motor, sensory and visual cortex, internal capsule, thalamus, reticular formation, pyramidal and extra-pyramidal pathways, anatomically functional areas of the spinal cord).

#### **2. Blood flow to the brain and spinal cord: formation and circulation of CSF**

- a. Describe the arterial supply to the brain and spinal cord

- b. Describe the main venous pathways from the brain
- c. Describe the formation, circulation and absorption of CSF
- d. Explain autoregulation and the effects of CO<sub>2</sub>, hypoxia and anaesthesia.

### **3. Anatomy and function of the peripheral nervous system**

- a. Describe the major divisions of the peripheral nervous system
- b. Understand the main functions of the somatic, sympathetic and para-sympathetic nervous systems
- c. Describe the basic anatomy of the motor and sensory roots and the sympathetic and parasympathetic outflows
- d. Be aware of dermatomes and their segmental nature
- e. Be aware of the distribution of nerves through the brachial and sacral plexuses
- f. Demonstrate the surface markings of the major peripheral nerves
- g. Demonstrate how to prevent injuries to the brachial plexus when positioning a patient
- h. Understand the actions of the sympathetic and para-sympathetic nervous systems on the cardiovascular system and the eye.

### **4. Pain pathways and reflexes**

- a. State the different types of peripheral nerve fibre and their basic properties
- b. Describe the main pathways for nociception and proprioception from the skin to the cerebral cortex
- c. Describe the mechanism of the basic spinal reflex arc.

### **5. Synapses and the neuromuscular junction**

- a. Explain the concept of synaptic transmission and structure of the neuromuscular junction
- b. Describe the main transmitters at somatic and visceral nerve endings
- c. Describe the contractile process in striated muscle
- d. Explain the importance of alpha and beta receptors and their relevance to cardiovascular and respiratory pharmacology.

### **7. Pharmacology and mechanisms of neuromuscular blockade**

- a. Describe the mode of action of depolarizing and non-depolarising neuromuscular blockers
- b. Understand the properties of some commonly used short and long acting relaxant drugs
- c. Describe the function of anti-cholinesterases in reversing non-depolarising block
- d. Understand the variability in plasma cholinesterase activity in patients and its relevance to anaesthesia
- e. Demonstrate the monitoring of neuromuscular block and tests of adequate reversal.

### **8. Uptake and distribution of general anaesthetics: depth of anaesthesia and sedation**

- a. Review the uptake and distribution of volatile and IV anaesthetic agents
- b. State the possible mechanisms of general anaesthesia
- c. Describe the concept of depth of anaesthesia and how it might be measured directly from the nervous system.

## 9. The acute pain service

- a. Justify the need for an acute pain service
- b. Explain how postoperative pain can be monitored and recorded
- c. Understand the use of PCA and epidural analgesia in the postoperative period.

## 10. Classes of analgesic, their pharmacology and uses

- a. Describe the properties of oral, SC, IM, and IV administration of analgesics
- b. Explain the mode of action and uses of:
  - i. nitrous oxide
  - ii. simple analgesics
  - iii. NSAIDs
  - iv. opioids
- c. Understand the unwanted side effects of commonly prescribed analgesics
- d. Describe the use of naloxone to reverse the effects of opioids.

## 11. The principles of local anaesthetic action and managing patients with regional and axial blocks

- a. Describe the principles of action of local anaesthetics
- b. Describe the toxic effects of local anaesthetics
- c. Demonstrate how to position a patient for a spinal or epidural injection
- d. Demonstrate the management of patients with a brachial block, a spinal block or an epidural block.

## Formative Assessment

### Module planning questionnaire

**Theory:** Anatomy of the Brain, CNS, PNS, SNS etc. Pharmacology of General Anaesthesia Pain management and Pharmacology Skills: Depth of Anaesthesia Monitoring (PRST etc.) PCA Management of Regional/Local blocks Regional Anaesthesia & Local blocks Combined GA & Regional Sedation Physiology of Brain, CNS, CSF, NMJ, Pain Pharmacology of local and regional anaesthesia Pharmacology of Neuromuscular Blockade NMB monitoring

### Workplace:

## Module 10: Clinical history and examination

### Aim of the module

This module formally brings together the knowledge and experience that has been acquired from the theory and practice of previous modules. This knowledge and experience will be used to aid in eliciting a full clinical history from a patient and undertaking a full clinical examination.

### Learning outcomes

By the end of this module the trainees should have developed the appropriate level of knowledge, skills and attitudes to be able to meet the outcomes outlined below and to demonstrate an advanced working knowledge of all aspects of communication.

**1. Good communication with patients and staff**

- a. Demonstrate sympathetic but effective communication with patients
- b. Demonstrate the use of different communication styles with staff depending upon the circumstances
- c. Answer the questions of staff and patients in a way in which they understand
- d. Be aware of one's own weaknesses in communication.

**2. Consent for adult patients**

- a. Explain the concepts of implied and informed consent
- b. Understand the principles of taking consent for surgical procedures
- c. State who is able to give consent
- d. Understand what complications should be mentioned.

**3. Pre-operative assessment and taking a history**

- a. Demonstrate how to take a clinical history
- b. Describe the use of pre-operative check lists and questionnaires.

**4. The impact of common co-existing and familial diseases and the ASA grading system**

- a. Explain the implications of common co-existing conditions on the delivery of anaesthesia and peri-operative management (myocardial ischaemia, hypertension, peripheral vascular disease, asthma, COPD, diabetes, strokes and neurological conditions)
- b. Identify those familial conditions that have an impact on the delivery of anaesthesia
- c. Demonstrate how to classify patients on the ASA system.

**5. Clinical examination**

- a. Demonstrate examination of the airway
- b. Demonstrate examination of the cardiovascular system
- c. Demonstrate examination of the respiratory system
- d. Understand the consequences of dehydration and loss of circulating fluid volume
- e. Demonstrate the use of the Glasgow Coma Scale.

**6. The interpretation of abnormal findings in the history, examination and investigations**

- a. Plan the management of patients with abnormal pre-operative findings
- b. Identify patients needing referral for further assessment.

**7. The pre-operative optimisation of patients**

- a. Describe the dangers of anaesthetising patients with unstable physiology
- b. Explain the management of a patient with a significant injury or an acute abdomen
- c. Outline the possibilities for pain management
- d. Describe the objectives of fluid management and how the effectiveness of therapy is assessed
- e. Define emergency, urgent and elective in relation to surgery
- f. Explain the differences in the management of emergency, urgent and elective surgery
- g. Outline the indications for direct arterial and central venous monitoring.

## 8. Post-operative fluid management and blood transfusion

- a. Demonstrate the planning of a routine post-operative fluid regimen
- b. Describe how to assess its effectiveness
- c. Understand when to transfuse blood and blood products
- d. Demonstrate how to check red cells and other blood products.

## 9. Post-operative pain relief, nausea and vomiting

- a. Explain the causes and timescale of post-operative pain
- b. Describe methods of relieving post-operative pain with their advantages and disadvantages
- c. Understand the importance of the patient's perspective and perception of post-operative pain and other side effects
- d. Describe the factors predisposing to PONV
- e. Describe the methods of minimizing and treating PONV.

## Formative Assessment

### Module planning questionnaire Theory: The Law on Consent

**Skills:** Assessing the airway Post-op pain & fluid management A, D Coexisting diseases Familial diseases Communications 2 Taking a history Clinical Examination Finding and interpreting results Explaining procedures.

**Workplace:** Pre-op Visits and ASA classification Post-op Visits Pre-op optimisation.

## Module 11: Management of life-threatening emergencies

### Aim of the module

The purpose of this module is to consolidate the experience and knowledge acquired from previous theory and practice modules in order to enhance the trainees' knowledge of the management of emergencies.

### Learning outcomes

By the end of this module the trainees should have developed the appropriate level of knowledge, skills and attitudes to be able to manage emergencies competently and confidently.

### 1. The practice of resuscitation to Immediate Life Support (ILS) standard (as a minimum)

- a. Demonstrate the ability to resuscitate to ILS standard as defined by the Resuscitation Council.

### 2. Intra-arterial injection

- a. Explain the dangers of intra-arterial injection
- b. Describe the management of an inadvertent intra-arterial injection.

### 3. Can't intubate, can't ventilate: emergency airways

- a. Describe the incidence of the problem
- b. Outline approaches to the problem (LMA, obturator airway etc)
- c. Demonstrate how to assist with a cricothyrotomy

- d. Demonstrate how to assist with the placement of an emergency needle airway into the trachea and the breathing system attachments to ensure safe operation
- e. Demonstrate how to assist with the insertion of a “Mini-Trac” form of airway.

#### **4. Bronchospasm, laryngospasm**

- a. Describe factors that can precipitate bronchospasm
- b. Demonstrate the management of bronchospasm
- c. Describe the factors that can precipitate laryngospasm
- d. Demonstrate the management of laryngospasm.

#### **5. Prevention of aspiration, management of regurgitation**

- a. Describe the conditions that predispose to aspiration
- b. Demonstrate approaches to the prevention of aspiration (cricoid pressure, sitting position)
- c. Demonstrate approaches to limiting the damage from aspiration (anti-acids, histamine blockers, proton pump inhibitors)
- d. Describe the diagnosis and management of aspiration.

#### **6. Anaphylaxis and adverse drug reactions**

- a. Understand the process that causes anaphylactic reactions
- b. Demonstrate the management of an acute event
- c. Outline the long term management of a patient who has had an anaphylactic reaction.

#### **7. Major blood loss and shock**

- a. Understand the physiological processes that follow blood loss
- b. Describe a protocol for managing acute blood loss (including non-fluid management such as oxygen)
- c. Demonstrate the management of a patient with acute blood loss
- d. Describe the assessment of the response to treatment
- e. Describe practical problems that might occur (difficult vascular access, urgent need for cross matching, coagulopathies)
- f. Outline the order in which the patients problems are tackled (major source of blood loss first)
- g. Identify medico-legal issues (e.g. problems with consent, unknown identity).

#### **8. Malignant hyperpyrexia**

- a. Describe the incidence and genetic nature of the condition
- b. Identify the signs suggesting the onset of the condition
- c. Explain the physiological consequences of the condition
- d. Describe the management of the condition.

#### **9. Management of intra-operative death**

- a. Identify the issues in deciding when further attempts at resuscitation are futile
- b. Anticipate responses from the wider theatre team and how best to manage them
- c. Recognise the need to confirm death has occurred and to record the time accurately
- d. Demonstrate the ability to manage the relatives in such a situation

- e. Explain when and how to refer a death to the coroner.

## **Formative Assessment**

### **Module planning questionnaire**

#### **Theory:**

**Skills:** Anaphylaxis Admission to HDU/CCU Basics of emergency management Resuscitation to ILS standard as a minimum Unable to Ventilate, Unable to Intubate Regurgitation Laryngospasm, Bronchospasm Blood Loss Trauma.

**Workplace:** Increased responsibility cases.

## **Module 12: Advanced practice**

### **Aim of the module**

The purpose of this module is to bring together all aspects of the clinical and theoretical parts of the programme so as to ensure that the trainees are prepared for the challenges of practice within a complex environment.

### **Learning outcomes**

By the end of this module the trainees should have developed the appropriate level of knowledge, skills and attitudes to be able to fulfil all aspects of advanced practice:

#### **1. Communication problems**

- a. Outline the considerations when communicating with the blind, deaf and disabled
- b. Demonstrate effective communication with patients with physical and mental impairments
- c. Describe how to establish the capacity to give consent
- d. Demonstrate effective communication with non-English speakers
- e. Demonstrate appropriate and effective communication with relatives.

#### **2. Managing difficult situations involving patients**

- a. Demonstrate successful management of and communication with patients who may:
  - i. Be unreliable
  - ii. Be aggressive
  - iii. Be reluctant to give information
  - iv. Wish to specify aspects of their treatment.

#### **3. Managing difficult situations involving colleagues**

- a. Demonstrate the ability to build successful working relationships with colleagues
- b. Demonstrate strategies for dealing with colleagues who are
  - i. Unhappy
  - ii. Unreliable
  - iii. Dishonest
  - iv. Sick.

**4. Handling and investigating a complaint**

- a. Understand the emotional reaction to a complaint
- b. Be aware of the methods of dealing with a complaint.

**5. Audit, critical incident reporting**

- a. Understand the value of personal and institutional audit
- b. Understand the principles behind critical incident reporting
- c. Define a critical incident
- d. List the common causes of critical incidents
- e. Describe how to report a critical incident.

**6. Managing controlled drugs**

- a. Be aware of the law on the storage and dispensing of controlled drugs.

**7. The presentation and simple analysis of data**

- a. Understand the purpose and interpretation of graphs, bar charts, pie charts, and trend analysis
- b. Understand the presentation of grouped data: mean, range and median
- c. Define standard deviation
- d. Explain the concept of error and the principle of confidence limits.

**8. Integrated case management**

- a. Discuss the management options for interesting cases occurring in practice.

**Formative Assessment**

**Module planning questionnaire**

**Theory:** Summative MCQ, OSCE and RITE.

**Skills:** G, H Audit, EBM, Professional Bodies, The NHS, Complaints Communications 3 Total case management Coping with difficult patients Coping with difficult colleagues Teaching others Personal reflection.

**Workplace:** Increased responsibility cases.