



ZAMBIA COLLEGE OF MEDICINE & SURGERY

Advancing Specialist Care & Professional Growth

Specialty Training Programme
Curriculum & learning guide
for
ANAESTHESIA AND CRITICAL CARE

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GENERAL INTRODUCTION

This Curriculum and Learning Guide describes the work and competence-based professional training programme for the Specialty Training Programme (STP) in Anaesthesia and Critical Care (ACC) in Zambia. The intended readership for the curriculum and guideline includes the following:

- ✦ Trainees, host departments and managers of ACC healthcare services;
- ✦ STP ACC trainers, which includes all those involved in supervising, coordinating, assessing and delivering specialist education and training in Anaesthesia and Critical Care;
- ✦ Academic, administrative and professional staff within Higher Education Institutions (HEIs), the Higher Education Authority (HEA), and the Zambia Qualifications Authority (ZAQA);
- ✦ Strategic partners involved in supporting ACC and the training of healthcare practitioners in this and its related fields.

Zambia College of Medicine and Surgery (ZACOMS) advances professional training of medical specialists using the professional competence-based certification model beyond traditional university-based specialist training. It promotes specialist training as a vital pursuit for a successful professional medical career. The ZACOMS also promotes the increase in universal health coverage (UHC) by promoting equitable access to cost-effective quality specialist care as close to the family as possible for people in Zambia at all levels of socioeconomic status and geographical location. The ZACOMS certifies and admits members and/or fellows as specialists in a medical and/or surgical specialty in any of the various specializations of medicine and surgery.

The Zambia College of Medicine and Surgery (ZACOMS) oversees the training of Anaesthetists working through the Society of Anaesthetists of Zambia (SAZ).

Anaesthesia and Critical Care encompasses the provision and management of all types of anaesthesia and the diagnosis, assessment and management of critically ill patients because of various medical and/or surgical disorders of various human systems. The STP ACC training provides specialist training in Anaesthesia and Critical Care. This is a relevant programme because of the critical shortage of Anaesthetists. The STP ACC will equip trainees with core competencies reflecting the wide array of competencies required of an Anaesthetist and Critical Care Specialist. This will mean for every trainee who completes this programme, the population they serve will have gained access to a medical doctor competent to provide Anaesthesia and Critical Care at a Specialist Level. Furthermore, the graduate of this programme will offer support to the various surgical and medical specialties, improving outcomes in the management of a broad spectrum of pathology.

Vision

Our vision is to be innovative in providing a teaching and support structure that will empower every trainee to excel in Anaesthesia knowledge, skills and research through internal and external collaboration.

Mission Statement

The mission of the STP ACC training in Zambia is to train specialists who shall endeavour to improve the anaesthetic health care services to all by providing safe, evidence-based, humanistic specialist care in the field of anaesthesia in an efficient and proficient manner to meet the needs of the Zambian community, and contribute to the field of anaesthesia and critical care in the region and globally.

Values:

- Professional excellence
- Integrity
- Sensitivity to reproductive health needs
- Interdisciplinary, inter institutional collaboration
- Continuous professional development
- Innovation
- Academic Excellence
- Self and peer review

RATIONALE FOR THE SPECIALTY TRAINING PROGRAMME IN ANAESTHESIA AND CRITICAL CARE

The STP ACC aims to train specialists in Anaesthesia and Critical Care in order to prepare them for specialist service in the healthcare system. The STP ACC aims to bridge the critical shortage of Anaesthetists by advancing professional training of Anaesthetists using the competence-based certification model beyond traditional university-based specialist training. Simply put, this model works on the principle that every health facility equipped well enough to support an Anaesthesia practice has the basic requirements to train an Anaesthetist. The STP ACC curriculum is informed by the training requirements of the Health Professions Council of Zambia (HPCZ), the professional creed of the Society of Anaesthetists of Zambia (SAZ) and is alive to the unique opportunities obtaining across the various training sites. The training programme encourages self-directed learning, lifelong learning, and student-centred approaches while providing robust and structured guidance.

This curriculum provides a framework for the four year postgraduate specialty training and educational curriculum in Anaesthesia and Critical Care. Trainees who successfully complete the requirements and meet the minimum standards set out in this curriculum should be expected to demonstrate competence in Anaesthesia and Critical Care at specialist level.

The key outcomes are twofold as stipulated in Outcomes 1 and 2 below:

Outcome 1. Apply, at mastery level, Biomedical Sciences, Behavioural & Sociology, and Scientific Principles to the Practice of Anaesthesia

1. The graduate should be able to apply to Anaesthesia practice biomedical scientific principles, method and knowledge relating to anatomy, biochemistry, cell biology, genetics, immunology, microbiology, nutrition, pathology, pharmacology and physiology. The graduate should be able to:
 - a) Explain normal human structure and function relevant to Anaesthesia.
 - b) Explain the scientific bases for common diseases and conditions' signs, symptoms and treatment relevant to Anaesthesia.
 - c) Justify and explain the scientific bases of common investigations for diseases and conditions relevant to Anaesthesia.
 - d) Demonstrate knowledge of drugs, drug actions, side effects, and interactions relevant to Anaesthesia.
2. Apply Behavioural and Sociology Principles to the Practice of Anaesthesia
 - a) Explain normal human behavior relevant to Anaesthesia.
 - b) Discuss psychological and social concepts of health, illness and disease relevant to Anaesthesia.
 - c) Apply theoretical frameworks of psychology and sociology to explain the varied responses of individuals, groups and societies to Anaesthesia.
 - d) Explain psychological and social factors that contribute to illness, the course of the disease and the success of Anaesthesia interventions.
3. Apply Population Health to the Practice of Anaesthesia
 - a) Discuss population health principles related to determinants of health, health inequalities, health risks and surveillance relevant to Anaesthesia.
 - b) Discuss the principles underlying the development of health and health service policy, including issues related to health financing, and clinical guidelines relevant to Anaesthesia.
 - c) Evaluate and apply basic principles of communicable and non-communicable disease control at community and hospital level relevant to Anaesthesia.
 - d) Discuss and apply the principles of primary, secondary, and tertiary prevention of disease relevant to Anaesthesia.
4. Apply Scientific Method and Approaches to Anaesthesia Research.
 - a) Evaluate research outcomes of qualitative and quantitative studies in the medical and scientific literature relevant to Anaesthesia.
 - b) Formulate research questions, study designs or experiments to address the research questions relevant to Anaesthesia.
 - c) Discuss and apply appropriate research ethics to a research study relevant to Anaesthesia.

Outcome 2. Competence, at mastery level, in Anaesthesia Clinical Practice. On successful completion of the work-based STP training:

1. The trainees should have clinical and specialist expertise in Anaesthesia, underpinned by broader knowledge, skills, experience and professional attributes necessary for independent practice;
2. The trainees should be able to undertake complex clinical roles, defining and choosing investigative and clinical options, and making key judgements about complex facts and clinical situations.
3. The trainees should contribute to the improvement of anaesthetic services in the context of the national health priorities, by means of outstanding scientific research and application of safe, high quality, cost effective, evidence based practice within the Zambian health system.
4. The trainees should possess the essential knowledge, skills, experience and attributes required for their role and should demonstrate:
 - ✦ A systematic understanding of clinical and scientific knowledge, and a critical awareness of current problems, future developments, research and innovation in Anaesthesia practice, much of which is at, or informed by, the forefront of their professional practice in a healthcare environment;
 - ✦ Clinical and scientific practice that applies knowledge, skills and experience in a healthcare setting, places the patient and the public at the centre of care, prioritizing patient safety and dignity and reflecting outstanding professional values and standards;
 - ✦ Clinical, scientific and professional practice that meets the professional standards defined by the Health Professions Council of Zambia (HPCZ);
 - ✦ Personal qualities that encompass self-management, self-awareness, acting with integrity and the ability to take responsibility for self-directed learning, reflection and action planning;
 - ✦ The ability to analyse and solve problems, define and choose investigative and scientific and/or clinical options, and make key judgments about complex facts in a range of situations;
 - ✦ The ability to deal with complex issues both systematically and creatively, make sound judgements in the absence of complete data, and to communicate their conclusions clearly to specialist and non-specialist audiences including patients and the public;
 - ✦ The ability to be independent self-directed learners demonstrating originality in tackling and solving problems and acting autonomously in planning and implementing tasks at a professional level;
 - ✦ A comprehensive understanding of the strengths, weaknesses and opportunities for further development of anaesthesia as applicable to their own clinical practice, research, innovation and service development which either directly or indirectly leads to improvements in clinical outcomes and scientific practice;
 - ✦ Conceptual understanding and advanced scholarship in their specialism that enables the graduate to critically evaluate current research and

- innovation methodologies and develop critiques of them and, where appropriate, propose new research questions and hypotheses;
- ✦ Scientific and clinical leadership based on the continual advancement of their knowledge, skills and understanding through the independent learning required for continuing professional development.
5. Once registered as a specialist in Anaesthesia, a range of career development options will be available including sub-specialist training. Alternatively, others may opt to undertake further career development in post, as specialist, through structured Continuing Professional Development (CPD), provided by Accredited CPD providers. Specialist anaesthetists who have successfully completed the STP ACC will be eligible to compete for available Consultant positions in Anaesthesia.

The outcomes of the STP ACC training are affiliated to the following curriculum outcome categories:

Category I: Scientific foundations

- Goal 1:** Understand the normal structure and function of the human body, at levels from molecules to cells to organs, to the whole organism.
- Goal 2:** Understand the major pathological processes and their biological alterations.
- Goal 3:** Understand how the major pathologic processes affect the organ systems.
- Goal 4:** Integrate basic science and epidemiological knowledge with clinical reasoning.
- Goal 5:** Understand the principles of scientific method and evidence-based medicine including critical thinking.

Category II: Clinical Skills

- Goal 6:** Obtain a sensitive, thorough medical history.
- Goal 7:** Perform a sensitive and accurate physical exam including mental state examination.
- Goal 8:** Establish and maintain appropriate therapeutic relationships with patients.

Category III: Communication and Interpersonal Skills

- Goal 9:** Develop the knowledge, skills, and attitudes needed for culturally-competent care.
- Goal 10:** Participate in discussion and decision-making with patients and families.
- Goal 11:** Work effectively with other providers in the health system.
- Goal 12:** Clearly communicate medical information in spoken and written form.

Category IV: Prevention

- Goal 13:** Develop knowledge, skills, and attitudes to practice the basic principles of prevention.

Goal 14: Practice personalized health planning for long-range goals.

Goal 15: Understand the planning for communities and populations.

Category V: Diagnosis

Goal 16: Elicit and correctly interpret symptoms and signs of anaesthetic conditions.

Goal 17: Diagnose and demonstrate basic understanding of common disease and conditions.

Goal 18: Appropriately use testing to help guide diagnostic and therapeutic decisions.

Goal 19: Demonstrate sound clinical reasoning.

Category VI: Treatment, Acute and Chronic.

Goal 20: Understand therapeutic options and participate in the multidisciplinary care of patients with complex problems.

Goal 21: Recognize acute life-threatening medical problems and initiate appropriate care

Goal 22: Acquire the knowledge and skills necessary to assist in the management and rehabilitation of chronic diseases.

Goal 23: Participate in care in a variety of settings; including knowledge about palliative care.

Category VII: Patient Safety

Goal 24: Identify and remove common sources of medical errors.

Goal 25: Understand and apply models of Quality Improvement.

Goal 26: Appreciate the challenges associated with reporting and disclosure.

Category VIII: Information Management

Goal 27: Use information and educational technology to facilitate research, education, and patient care.

Category IX: Ethics, Humanities, and the Law

Goal 28: Develop a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to diversity.

Goal 29: Develop a critical understanding of the multiple factors that affect the practice of medicine, public health and research.

Goal 30: Incorporate ethical principles in clinical practice and research.

Category X: Professionalism

Goal 31: Develop healthy self-care behaviours and coping skills.

Goal 32: Model service to patients and community.

Category XI: Leadership & Management

Goal 33: Develop interpersonal and communication skills that result in leadership in patient health service delivery and health human resource management.

ADMISSION CRITERIA TO THE SPECIALTY TRAINING PROGRAMME IN ANAESTHESIA AND CRITICAL CARE

Applicants to the STP ACC must possess a primary qualification in medicine, that is, Bachelor of Medicine and Bachelor of Surgery (MB ChB) or equivalent, from a recognized university. Additionally, they must have completed internship and retain full registration and a practising licence issued by the Health Professions Council of Zambia. Other Ministry of Health policies and directives, for example, completion of rural posting, may apply.

CURRICULUM DESIGN/MODEL OF THE SPECIALTY TRAINING PROGRAMME IN ANAESTHESIA AND CRITICAL CARE

The STP ACC Curriculum is a work and competence-based professional training situated in an accredited training facility managed by specialists in Anaesthesiology and Critical Care with oversight by the Zambia College of Medicine and Surgery (ZACOMS) working through SAZ. This curriculum is based on a process model of curriculum and is designed to be flexible and open ended rather than predetermined; maximizing the potential for growth and development.

During the STP ACC programme the specialty registrar is an integral member of the clinical work of the department in which they are training to gain the required clinical experience and competence. The STP ACC programme is a work and competence-based professional training leading to the award of the Certificate of Completion of Specialty Training (CCST) by the Zambia College of Medicine and Surgery (ZACOMS). Graduates are then eligible to apply to the Health Professions Council of Zambia to enter the Specialist Register in Anaesthesia.

TEACHING METHODS IN THE SPECIALTY TRAINING PROGRAMME IN ANAESTHESIA AND CRITICAL CARE

The STP ACC training is a work and competence-based professional programme and should encompass diverse teaching and learning approaches that are appropriate for the target educational domain, i.e., cognitive (knowledge), psychomotor (practical), or affective (attitude) domain. The teaching methods may include, but not limited to, the following: expository lectures, tutorials, seminars, practical classes, skills laboratories, clinical demonstrations, clinical clerkships (bedside teaching, ward rounds, ambulatory

care teaching, operating theatre experience, post-mortem, and on-call duties), field and community based learning, and ICT supported learning experiences.

The Health Professions Specialty Training Guidelines for Zambia and Zambia College of Medicine and Surgery Society Objectives and By-Laws provide detailed guidance to the trainee about the STP and ZACOMS, respectively.

SPECIALTY TRAINING PROGRAMME IN ANAESTHESIA AND CRITICAL CARE - CURRICULUM STRUCTURE AND MAP

Curriculum Map for the STP ACC Programme

STP YEAR 1 ANA 1010	ZACOMS PT 1 ARCP	STP YEAR 2 ANA 2010	ARCP	STP YEAR 3 ANA 3010	ARCP	STP YEAR 4 ANA 4010	ZACOMS CCST Exams
Basic Sciences to Underpin Anaesthetic Practice (4 months)		General Anaesthesia (6 months)		Obstetric Anaesthesia (4 months)		Pain Management (4 months)	
The Foundations of Anaesthesia Practice (4 months)				Research methods (4 months)		Health systems management (4 months)	
Fundamental Anaesthesia (4 months)		Intensive Care Medicine (6 months)		Paediatric Anaesthesia (4 months)		Leadership & Management (4 months)	
Part 1: Generic Education & Training (1 year)	Part 2: Themed & Specialist Education & Training (3 years)						

N.B. The total number of years, in particular, the themed specialist education and training may vary between different specialties.

1. ARCP = Annual Review of Competence Progression
2. CCST = Certificate of Completion of Specialty Training Examination;
3. STP = Specialty Training Programme;

4. ZACOMS PT 1 = Zambia College of Medicine and Surgery Part 1 Examinations in Basic Sciences, Behavioural Sciences, Health Population Studies, and Professionalism & Ethics; ZACOMS CCST Examinations = Certificate of Completion of Specialist Training in Anaesthesia Examinations

ASSESSMENT IN THE SPECIALTY TRAINING PROGRAMME IN ANAESTHESIA

Progression to the next level of training is NOT automatic and is dependent on the trainee satisfying all the competency requirements of each defined level as per this curriculum and learning guide. The assessment framework is designed to provide a coherent system of assessing both formative and summative assessment which are workplace based and in examination settings.

Each training site must ensure that they use valid, reliable and appropriate methods for assessing the knowledge, clinical skills and attitude domains. The continuous assessments and final annual assessments are weighted at 40% and 60% of the final mark of Annual Review of Competence Progression, respectively. Assessment methods may include, but are not limited to, the following: Log of experiences and procedures completed, case reports, portfolios, project reports, multiple choice questions, essay questions, short answer questions, modified essay questions, short and long cases, objective structured clinical examinations (OSCE), practical examinations, objective structured practical examinations (OSPE), Mini-clinical Examination (MiniCEX), and Viva Voce, etc.

It is emphasized that marks from theory examinations **may not** compensate for poor scores in the clinical examinations; Students **MUST** pass the clinical examinations in order to progress to the next stage of training or completion.

Assessment	Knowledge, Skill and Attitude Domain	Examining Body
Formative Workplace Based Assessments	Outcome 1 & 2	Training Site
Annual Review of Competence Progression	Outcome 1 & 2	Training Site in conjunction with ZACOMS
ZACOMS Part 1 Examination	Outcome 1	ZACOMS
ZACOMS Certificate of Completion of Specialist Registration Examinations	Outcome 2	ZACOMS

A candidate shall be allowed a maximum of three attempts for ZACOMS Part 1 and/or Part 2 Examinations. Candidates must have submitted a completed log book to eligible to attempt the ZACOMS Part 2 Examination.

For ease of tracking progress and planning for Anaesthesia care, all STP ACC trainees will be registered with ZACOMS and SAZ for the duration of their training and will be allocated a ZACOMS Specialty Registrar Index Number.

Grading Scheme

The STP ACC Curriculum and Guide is the basis for all specialty training which contextualize the standards of proficiency set by the Zambia College of Medicine and Surgery (ZACOMS) in consultation with the Society of Anaesthetists of Zambia (SAZ) in a way that is accessible to the profession and the public. The Certificate of Completion of Specialist Training (CCST) is not graded. Separate assessments and examinations may be graded to show the level of achievement of the trainee in a particular course or assignment.

Assessment of Attainment of Competence in an Academic Subject

Status & Level	Description of Competence Features	% Range
Outright Fail [D]	<ul style="list-style-type: none"> • Has poor and inaccurate command of the subject vocabulary • Has poor and inaccurate command of the concepts (knowledge, skills and attitudes) of the subject across a broad range of topics. 	44.9% & Below
Bare Fail [D+]	<ul style="list-style-type: none"> • Has the basics of subject vocabulary • Has the basics of concepts (knowledge, skills and attitudes) of the subject across a broad range of topics • Unable to transfer and apply knowledge, skills and attitudes of the subject in a range of situations. Unable to exercise independent judgement in a range of situations 	45 – 49.9
Clear Pass [C]	<ul style="list-style-type: none"> • Has sound command of subject vocabulary • Has sound command of concepts (knowledge, skills and attitudes) of the subject across a broad range of topics • Able to formulate responses and demonstrate skill and exhibit appropriate attitude in well-defined and abstract problems/professional settings across a broad range of topics of the subject 	50 – 64.9

Meritorious Pass [B]	All of above in level 3 and: <ul style="list-style-type: none"> • Able to transfer and apply knowledge, skills and attitudes and exercise significant independent judgement in a broad range of topics of the subject 	65 – 74.9
Distinction Pass [A]	All of the above in level 4 and: <ul style="list-style-type: none"> • Displays masterly of complex and specialised areas of knowledge, skills and attitudes in a broad range of topics of the subject. 	75% & Above

ANAESTHESIA AND CRITICAL CARE HANDBOOK & CURRICULUM

The detailed STP Anaesthesia Handbook and Curriculum is presented in full in the next section.

Zambia Anaesthesia
Specialty Training

Programme (STP)
Curriculum and Course
Handbook

2018

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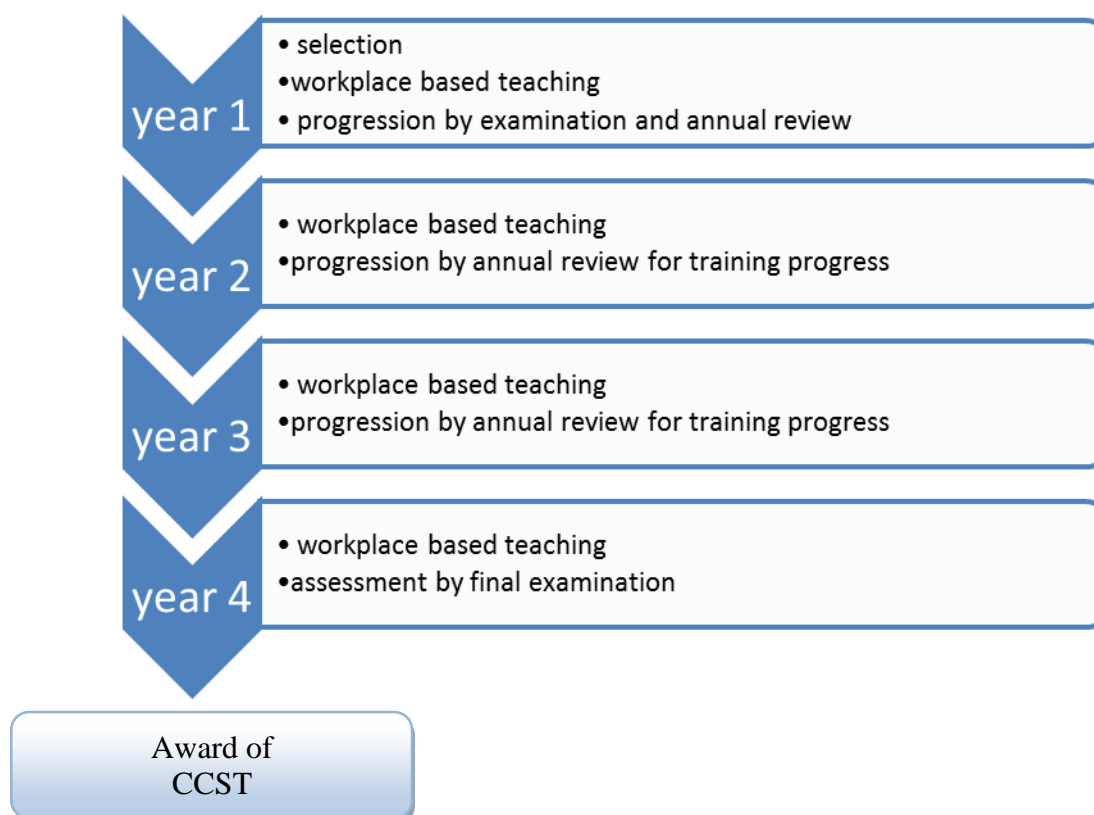
1. Introduction

1.1 Course aims and philosophy

Completion of the Anaesthesia and Critical Care Specialist Training Programme (STP) will lead to the award of a Certificate of Specialty Training (CCST) in Anaesthesia and Critical Care. The aim is to produce specialist practitioners who will have the knowledge, skills and attitudes to practice anaesthesia independently and to a high quality. It will also be important for the student to develop the skills of a lifelong learner and competent researcher so that he/she will continue to develop after completion of this programme. Since the learner will go on to become the teacher of future generations, the course also aims to instil the knowledge and skills required to become an effective educator in postgraduate medical education, as well as skills required for leadership and management.

1.2 Course delivery

The Anaesthesia STP will usually be completed after a minimum of 4 years and is governed by the rules and regulations as set by the Zambia College of Anaesthetists and the Zambia College of Medicine and Surgery (ZACOMS). An indicative pathway for progression is illustrated in figure 1.2.



1.3 Leave of Absence and Minimum time spent in training

Much of the learning in anaesthesia is experiential (service-based) and depends upon exposure to sufficient clinical practice. Performance improves with practice and research has shown that a procedure needs to be practised up to 200 times before the learner approaches the standard of an expert practitioner. Because of the shape of a standard learning curve, 70 to 80% of a 'proficient' standard is achieved after approximately 30 repetitions. It is therefore important to spend sufficient time in the clinical workplace to achieve adequate competence.

The Anaesthesia STP lasts for an indicative 48 months, and for proficiency to be achieved it is necessary to maximize clinical exposure during this time. Though the Anaesthesia STP is designed around a schedule of competencies, it is unlikely that a student will be able to complete the programme to a satisfactory standard in less than 48 months.

The following regulations will be applied to assessment for progression in the Anaesthesia and Critical Care STP:

1.3.1. Sick leave

A register will be kept in the Department of Anaesthesia of all days taken off on sick leave, which will be continuously monitored by the Head of Department (HoD). If the cumulative total reaches 30 working days within a year, there will be a delay of progression to that individual's training. The HoD will discuss the case with the Specialist Training Programme Co-ordinator and the student will be unable to sit exams, and will not be able to progress to the next training year until clinical time commensurate to time off on sick leave has been completed.

1.3.2. Maternity leave

The duration of maternity leave in the Department of Anaesthesia is 6 weeks, as stipulated by the HoD. If this time period is exceeded there will be a delay of progression to that individuals' training. The HoD will discuss the case with the Specialist Training Programme Coordinator and the student will be unable to sit exams, and will not be able to progress to the next training year until clinical time commensurate to time off on maternity leave has been completed.

1.3.3. Study leave

The study leave allowance in the Department of Anaesthesia is 10 working days per year. This time, however, is allowed at the discretion of the HoD. It is likely that on call duties will need to be continued during this time period. The HoD will divide the study leave period into appropriate blocks before the exams and within the year groups to enable the anaesthesia service to continue satisfactorily during the exam period.

1.3.4. Delay of progression

Delay to progression of training will be discussed by the HoD with both the Specialist Training Programme Coordinator and the student, and may take the form of one or both of the following actions:

- Delay of the date for completion of training by an amount equal to the time absent from the workplace
- Ineligibility to sit the end of year examinations for the relevant training year, which will necessarily prevent progression to the next year

1.3.5. Professionalism

Trainees are expected to maintain a high level of professionalism throughout their clinical practice and postgraduate studies. Respect and care should be demonstrated at all times to both senior and junior colleagues, the local faculty and consultant body, and the visiting faculty and lecturers. Respecting patients and their relatives is a fundamental professional duty, and should never be compromised. Relationships with other specialties should also be maintained and fostered.

Late arrival for theatre lists will not be accepted, and will be monitored by the HoD. It is a professional standard to uphold working hours; which at UTH are between 07.45 and 16.45 daily. Trainees are expected to assess patients on their lists pre-operatively, and inform the supervising consultant of any anticipated difficulty at the earliest opportunity. This should ideally be carried out on the ward once the patient is admitted. Trainees should be in theatre by 07.45 to prepare equipment and drugs before the patient arrives for their operation.

The teaching rota will try and take into account theatre list finish times, and a full timetable will be given out at the beginning of the academic year. All attempts will be made to enable trainees to attend teaching sessions but on occasion the clinical situation will dictate that this is not possible. An attendance register will be taken at every teaching session to determine adequate attendance, which will be closely monitored by the HoD throughout the year.

A trainee representative should be elected by each respective year group, rotating each year, and this trainee will be required to liaise with the HoD regarding rota issues and responsibilities. In the event of sick leave, the HoD must be informed and alternative on call and theatre cover provided by one of the other trainees.

2. Course structure

The specialty of anaesthesia incorporates knowledge, skills and attitudes that address the entire peri-operative patient pathway, to include emergency medicine, intensive care and pain medicine. As well as including specialty-specific expertise in the above domains, the generic attributes related to leadership, management, and scholarship should also be developed.

Professionalism is the overarching competence that dictates practice in all of these domains, and is the quality required of all doctors.

Figure 1 illustrates the domains that make up the training structure for the Anaesthesia and Critical Care STP.

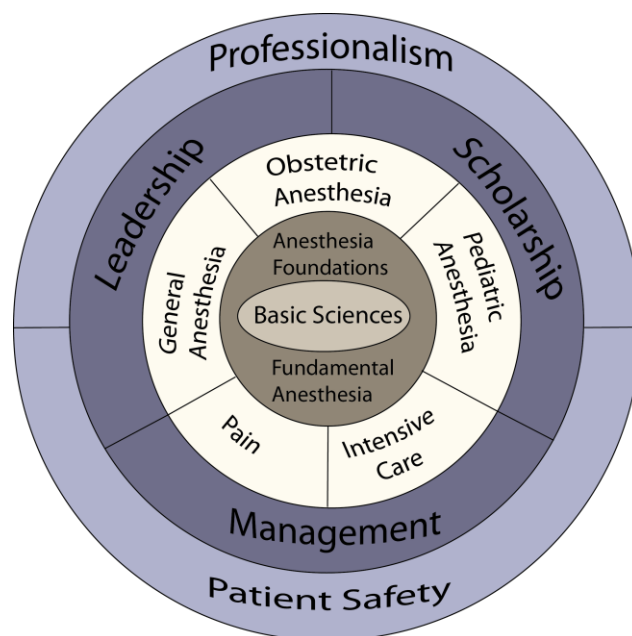


Figure 1. Structure of the Knowledge, Skills and Attitudes required for the STP Anaesthesia training programme

These represent the knowledge, skills and attitudes (KSAs) to be a good anaesthetist, and consist of:

➤ **Core Training**

- Basic sciences that underpin anaesthetic practice
- Foundations of anaesthetic practice
- Fundamental anaesthesia

○ **Clinical modules**

- General anaesthesia
- Paediatric anaesthesia
- Obstetric anaesthesia
- Intensive care medicine
- Pain management

○ **Knowledge and skills to be an effective anaesthetist**

- Leadership
- Management
- Scholarship

○ Attributes to be a good doctor

- Professionalism
- Patient Safety

Each of the clinical and non-clinical domains will be taught over every academic year, and repeated over the 4-year period of training at progressively deeper levels of complexity, the so-called 'spiral' curriculum approach. The level of achievement in each of the clinical modules will be assessed at the appropriate level of seniority of the STP trainees, as described by the following competence statements;

Level 1 (0-6 months): Has knowledge of, describes...competently.

Level 2 (6-12 months): Performs, manages, demonstrates under supervision

Level 3 (12-24 months): Performs, manages, demonstrates independently

Level 4 (24-48 months): Teaches or supervises others in performing, managing, demonstrating.

Even though clinical modules will be presented sequentially in the formal teaching programme it is recognised that in the workplace trainees will be exposed to elements of all modules simultaneously depending upon the nature of the clinical workload available.

It is essential to keep a logbook that describes this clinical exposure and the procedures performed, which will be part of the summative assessment for progression.

2.1. Additional subspecialty training

It is recognised that currently there is no country-based capability to deliver subspecialty training in several areas. Such training requires the allied surgical expertise (e.g. cardiac surgery), supportive equipment and infrastructure (e.g. regional anaesthesia and intensive care medicine), as well as clinical expertise within the anaesthetic faculty. To overcome this limitation in the short term, external and overseas faculty may provide focussed teaching in training hospitals that need extra support.

2.1.1. Electives

Where possible, electives will be arranged to offer short attachments to larger hospitals in order to observe areas of excellent practice. Selection to such elective placements will be by competition. Funding for electives are not guaranteed, and the Training Director for Fellowships will assist in identifying sponsoring organisations where possible.

3. Assessment Framework

- Trainees will undergo summative assessments throughout their training, which consist of a combination of in-course assessments and end-of-year

assessments (table 2). These elements will each contribute to 50% of the final mark, and the total pass mark will be deemed to be 50%. In addition, there are additional assessments for 1st year students: Initial assessment of competence after 3 months

Table 2. Assessment framework for Anaesthesia and Critical Care STP

Domain	Assessment	Format	Timing
Initial Assessment of competency - 1 st Year students only	Basic anaesthetic skills at 3 months - Workplace Based Assessment	Direct observation	After 1 st 3 months of practice
In-course assessments - All years	Workplace based assessment	Direct observation	Throughout academic year
	Annual Review of Competence Progression (ARCP)	Structured review by ARCP panel	
End of year assessment:			
Year	Assessment	Format	Additional ongoing assessment
1st Year:	Multiple Choice exam	Total of 60 questions: each question worth 5 marks, with no negative marking: Clinical - 30 questions Physiology (and anatomy) -10 questions Pharmacology -10 questions Physics, measurement & statistics -10 questions	End of each academic year: Satisfactory performance assessed by: - log books

of professional practice provides more robust evidence of a doctor's continuous performance over time. A portfolio is able to provide a comprehensive overview of the doctor's entire scope of work, and therefore is able to provide evidence in all the domains of knowledge, skills, and behaviour, as well as provide feedback in domains that include leadership, management, patient safety, quality improvement, team skills and professionalism.

The framework for the ARCP comprises several domains which have defined criteria that describe satisfactory performance in that domain. These domains include:

- Record of cumulative leave of absence (annual leave, maternity leave, etc)
The maximum absence of leave during any academic year is clearly defined in section 1.1 *Leave of Absence and Minimum time spent in training*
- Log Book of anaesthetic and ITU activity
A log book of clinical activities must be kept by all students, which describes their clinical practice undertaken throughout the training period. A summary should describe the total case load, the main types of anaesthesia delivered, the sub-specialties exposed to, and the interventions performed. This should include a record of procedures performed under supervision and independently.
- Critical Incidents
A record should be kept of all critical incidents that the student was involved in. The relevant nature and outcomes should be described, as well as the learning from the event.
- Complaints
All complaints that involve the student should be recorded, as well as whether these have been satisfactorily resolved.
- Initial Assessment of Competency (year 1)
This should be completed by all novice students after approximately 3 months of practice
- Attendance at work and teaching
Satisfactory attendance should be evidenced and signed off by the Head of Department for anaesthetics, and attendance for teaching evidenced by teaching registers, or sign-off by the Specialist Training Programme Co-ordinator.
- Audit and Quality Improvement projects undertaken
At least one audit or quality improvement project should be completed (or be in progress) at the time of the ARCP, per year.
- Teaching/presentations delivered
Trainees are expected to actively participate in the delivery of formal teaching sessions, but there is no minimum requirement in this domain. As with research, this may indicate excellence and contribute to the decision to recommend progression.
- Workplace based assessments

A minimum of four WBA from each of the 3 categories should be completed every academic year, and should be graded by the assessor as being of a satisfactory standard.

- CBD (case-based discussion)
- MiniCex (management of anaesthetic or ITU case)
- DOPS (direct observation of a procedural skill)
- Management activity undertaken
Participation in clinical management is an important aspect of professional development, but this should be evidenced relative to the seniority of the student. Evidence may include such activities as organisation of meetings, participation in administrative tasks, etc.
- Multisource feedback
This is provided by feedback from colleagues and clinical/educational supervisors.

Procedure: The ARCP requires adherence to a process that is clear, fair and evidence-based.

1. A panel of reviewers should be constituted and consist of:
 - a. A Chairperson who will be accountable to SAZ and ZACOMS.
 - b. At least one other panel member who is an accredited as a Specialty Training Programme Trainer.
 - c. An external moderator
2. The panel must be convened annually.
3. The summative ARCP process will apply to postgraduate students in the 2nd and 3rd years of study, who are being reviewed for progression to the next programme year.
4. The trainee must produce an adequate portfolio of evidence of their complete scope of practice, as indicated in the Framework for Assessment (Appendix B)
5. The panel will review the Portfolio for completeness, and for evidence of satisfactory progress in all the domains indicated in the Framework. The portfolio should be reviewed by the panel members prior to meeting with the student, and then discussed at the time of the meeting. In the case of students clearly meeting all requirements for the assessment, a face-to-face meeting may not be essential, but may contribute to the formative element of the assessment. Good practice should be recognised.
6. Having reviewed the Portfolio, and where necessary discussed the Portfolio with the student, a recommendation will be made by the panel to SAZ.
7. Possible outcomes of the review process will include:
 - **Outcome 1: Clear Pass** – Achieving progress and the development of competences at the expected rate. The trainee must have also satisfied examiners in the appropriate prescribed examinations for the level of competence, for example, Part 1: Foundation level; Part 2: Core Specialty Rotations; and Part III: Specialty Certification Level.

- **Outcome 2: Proceed & Remediate** - Development of specific competences required but additional training time not required.
- **Outcome 3: Inadequate Progress** – Additional training time required.
- **Outcome 4: Exclude from STP** - Released from training programme unsatisfactory progress rate in gaining competences.
- **Outcome 6: Graduate** - Certificate of Eligibility for Specialist Registration. Gained all required competences – Will be recommended as having completed the training programme and will be recommended for award of a CCST. The trainee must have also satisfied Examiners in the prescribed Exit examination of the specialty training.

The recommendation will be recorded on the ARCP Outcome form and returned to the student to retain in their portfolio

The appropriate recommendation will be made in writing to the Zambia College of Anaesthetists.

Teaching Syllabus

4.1. Syllabus outline

Core anaesthetic training

○ Basic sciences to underpin anaesthetic practice

- Anatomy
- Pharmacology
- Physiology and biochemistry
- Physics and clinical measurement
- Statistical methods

○ The foundations of anaesthetic practice

- Preoperative assessment by History taking, Clinical examination and Specific anaesthetic evaluation
- Premedication
- Induction of general anaesthesia
- Intra-operative care
- Postoperative and recovery room care
- Introduction to anaesthesia for emergency surgery
- Management of respiratory and cardiac arrest
- Control of infection

○ Fundamental anaesthesia

- Airway management
- Critical incidents

○ **General Anaesthesia**

- Airway management
- Critical incidents
- Day surgery
- General, urological and gynaecological surgery
- ENT, maxillo-facial and dental surgery
- Intensive care medicine
- Non-theatre
- Obstetrics
- Orthopaedic surgery
- Paediatrics
- Pain medicine
- Regional
- Sedation
- Transfer medicine
- Trauma and stabilisation

○ **Intensive care medicine**

- Domain 1: Resuscitation and initial management of the acutely ill patient
- Domain 2: Diagnosis, Assessment, Investigation, Monitoring and Data Interpretation
- Domain 3: Disease Management
- Domain 4: Therapeutic interventions / Organ system support in single or multiple organ failure
- Domain 5: Practical procedures
- Domain 6: Peri-operative care
- Domain 7: Comfort and recovery
- Domain 8: End of life care
- Domain 9: Paediatric care
- Domain 10: Transport
- Domain 11: Patient safety and health systems management
- Domain 12: Professionalism

○ **Obstetric Anaesthesia**

- Analgesia and anaesthesia for the pregnant patient
- Management of obstetric emergencies like major obstetric haemorrhage, pre-eclampsia and eclampsia, placenta praevia, amniotic fluid embolus and inverted uterus
 - resuscitation in acute collapse
- Neonatal life support

○ **Paediatric Anaesthesia**

- Anaesthesia for children of all ages

- Pain management in children
- Paediatric emergencies: acute airway obstruction
 - ✦ croup
 - ✦ epiglottitis
 - ✦ inhaled foreign body
- Fluid resuscitation for shock
- Management of acutely ill and injured children, Sepsis, Trauma, Convulsions, Diabetic emergencies
- Anaesthetic emergencies in children: loss of airway, laryngospasm, failed venous access, anaphylaxis including latex allergy
- Resuscitation of children [BLS and ALS]

○ Pain Medicine

- Assessment and management of acute pain: post-operative, non post-operative (e.g. trauma)
- Assessment and management of chronic pain
- Safe drug prescribing

○ Leadership & Management

- Effective and respectful communication with patients and their family/relatives
- Effective communication with colleagues to ensure optimal patient care
- Multidisciplinary and inter-professional team working
- Effective resolution of conflict situations
- Implementation and use of quality assurance programs according to recognized standards
- Implementation and use of local, national and international practice guidelines and standards while complying with national healthcare policies
- Promotion of and participation in better and safer patient care
- Knowledge of administrative and economical aspects of anaesthesia practice
- Effective knowledge of health economics

○ Scholarship

- Developing and maintaining a high degree of professional competence by becoming a lifelong learner
- Facilitating development of colleagues and other groups of professionals
- Promoting development of the specialty itself
- Becoming an effective teacher
- Contributing to research and development, and implementing/transmitting new medical knowledge
- Professionalism, as reflected by;

- Irreproachable behaviour and awareness of duties and responsibilities inherent to a professional
- Provision of high quality care with empathy, integrity, honesty and compassion
- Recognition of personal limits and abilities, and appropriate consultation with others when caring for the patient
- Medical decision-making based on thorough consideration of ethical aspects in patient care, management of ethical conflicts
- Knowledge of medico-legal aspects of anaesthesiology practice, with particular emphasis on the management and prevention of conflicts of interest
- Appropriate management of anaesthetic incidents and accidents, including near-misses.

○ Professionalism

All doctors should have a commitment to uphold the highest standards of ethical and professional behaviour consistent with the values of medical profession. Such commitment extends to their relations with patients, students, colleagues, staff, outside agencies, organizations and industry.

- General behaviour: exhibiting personal honesty, integrity, and trustworthiness, respecting others and refraining from harassment or discrimination based on race, religion, ethnicity, gender, sexual orientation, physical handicap, illness or age
 - abstaining from use of illicit drugs and avoiding inappropriate use of medication, mood altering drugs or alcohol
 - working in partnership with other colleagues and members of the health care team and assisting other colleagues in need of help in meeting their professional and ethical obligations
- Professional conduct
 - put the rights, needs and interests of the patient foremost, while respecting the professional obligations to society to participate in matters related to health care planning and resource allocation
 - respect the patient and observe the need for consent and confidentiality in all dealings with patient
 - uphold the principles of beneficence, non-maleficence, patient autonomy and honesty in one's dealings with patients
 - Recognize the limitation of one's own competence and continually strive to improve one's knowledge, skills, and competence as a physician
 - provide for continuity of care once professional responsibility has been accepted, until such care is no longer required or alternative arrangements have been made
 - avoid all forms of sexual exploitation of patients, including abuse, harassment or impropriety. Sexual conduct of any kind by a physician

with a patient is always unethical whenever a doctor–patient relationship exists

- avoid all forms of discrimination or harassment and seek help from others when needed
- avoid taking physical, emotional or financial advantage of patients
- behave in a way beyond reproach and respect the obligations to professional bodies to help ensure that one’s colleagues do not behave in a manner that might be generally considered as unbecoming to the profession
- Research
 - Ensure integrity and honesty in the collection, interpretation and reporting of data and ensure that any research carried out is scientifically and ethically valid and has received appropriate consent and approval
 - avoid taking advantage of real or perceived inequality in relationships in dealing with students, fellows or employees
 - uphold standards and rules of any sponsoring agencies and of the journals in which the results of research studies are published
 - avoid all forms of scientific misconduct, misrepresentation or falsification of data and refrain from assisting or colluding with any other colleagues in committing scientific misconduct either tacitly or overtly and report to the appropriate authorities any knowledge of such behaviour
 - adhere to the highest standards of integrity and avoid real or perceived conflicts of interest in the conduct of clinical trials, the evaluation of drugs, medical devices or other diagnostic and therapeutic modalities, and avoid taking undue financial or other advantage from information gained from, or by reporting on, such studies.
- Education
 - treat all students fairly and equitably
 - promote the student–teacher relationship and not abuse this trust for personal gain to promote and uphold high educational standards
 - observe the highest standards of honesty and integrity in one’s personal conduct during the course of examinations
 - avoid giving any assistance to other fellow students during the course of examinations unless specifically permitted or requested to do so by the examiner
 - support the highest standards of integrity and honesty among one’s colleagues by neither assisting, nor colluding with or tacitly permitting other colleagues to behave in a manner that is in violation to these standards or could be construed to be so.

○ Patient Safety

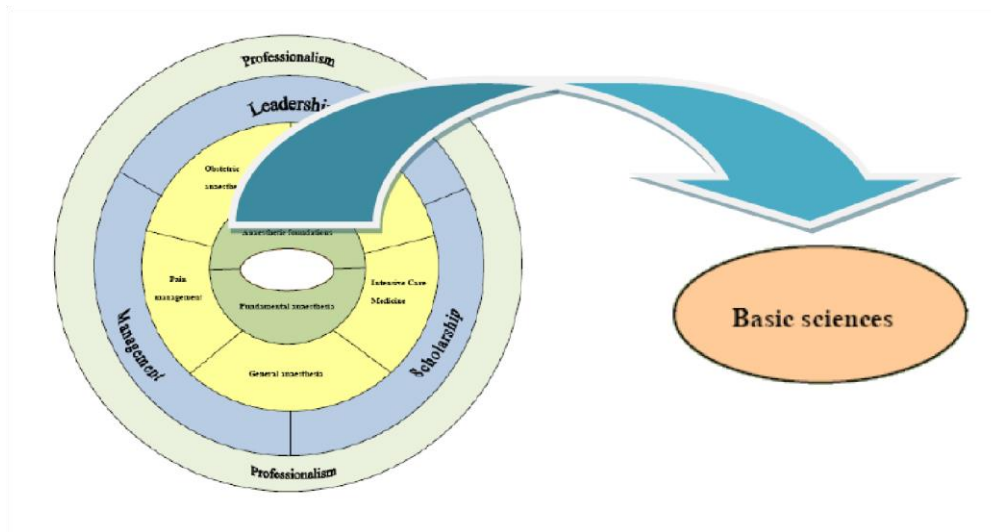
- Contribute to a Culture of Patient Safety
- Work in Teams for Patient Safety
- Communicate Effectively for Patient Safety
- Manage Safety Risks
- Optimize Human and Environmental Factors
- Recognize, respond to, and Disclose Adverse Events

4.2. Anaesthesia syllabus

There follows a detailed description of each of the elements of the clinical elements of the teaching syllabus, with each element defined in terms of;

- † *Learning outcomes*
- † *Core learning outcomes*
- † *Knowledge*
- † *Skills*

4.2.1. Basic sciences that underpin anaesthesia and critical care practice



Learning Outcomes:

- To gain a good understanding of human anatomy relevant to the safe practice of anaesthesia at basic level and to support progress to intermediate level training
- To acquire a sound understanding of human physiology, biochemistry and pharmacology, and to be able to apply this to clinical practice at a basic level and to support progress to intermediate training.
- To gain a good understanding of the basic principles of physics and clinical measurement; emphasis is on the function of monitoring equipment, equipment safety, and measurement techniques.

4.2.1.1. Anatomy

Demonstrates knowledge of:

Respiratory system:

- Mouth, nose, pharynx, larynx, trachea, main bronchi, segmental bronchi, structure of the bronchial tree; age-related changes from the neonate to the adult
- Airway / respiratory tract blood supply and innervations
- Pleura [including surface anatomy], mediastinum and its contents
- Lungs; lobes and microstructure of lungs
- Diaphragm, other muscles of respiration including innervation
- The thoracic inlet and 1st rib
- Interpretation of the normal adult chest x-ray

Cardiovascular system:

- Heart - chambers, valves, conducting system and pericardium; blood supply and innervations
- Great vessels, main peripheral arteries and veins

Nervous system

- Brain and its subdivisions; blood supply
- Spinal cord: structure of spinal cord, major ascending and descending pathways; blood supply
- Anatomical organisation of pain and sensory pathways from the periphery to the central nervous system

Pain pathways relevant to the stages of obstetric labour and delivery

- Spinal meninges, subarachnoid and extradural space; contents of extradural space - Anatomy of CSF system
- Spinal nerves; dermatomes; applied knowledge of dermatomes in regional anaesthesia
- Brachial plexus; nerves of the upper limb
- Intercostal nerves
- Nerves of the abdominal wall including innervation of the inguinal region
- Lumbar and sacral plexuses; nerves of the lower limb
- Anatomical organisation of the autonomic nervous system
- Sympathetic innervation, sympathetic chain, ganglia and plexuses
- Parasympathetic innervation; cranial and sacral outflow
- Stellate ganglion
- Cranial nerves
- Innervation of the pharynx and larynx
- Eye and orbit

Endocrine system

- Functional anatomy of the hypothalamic/pituitary system
- Functional anatomy of the adrenal gland
- Functional anatomy of the thyroid and parathyroid glands
- Anatomical organisation of the endocrine pancreas

Vertebral column

- Cervical, thoracic and lumbar vertebrae
- Sacrum, sacral hiatus
- Ligaments of vertebral column
- Surface anatomy of vertebral spaces; length of spinal cord and subarachnoid space; age-related differences from the neonate to the adult

Surface anatomy

- Structures in the antecubital fossa

- Structures in the axilla: landmarks for identifying the brachial plexus in the neck and axilla
- Large veins of the neck and the anterior triangle of the neck; surface anatomy and ultrasound demonstrated anatomy relevant to insertion of central venous cannulas
- Large veins of the leg and femoral triangle
- Arteries of the upper and lower limbs
- Landmarks for performance of cricoid pressure and surgical airway procedures
- Landmarks for insertion of intercostal drainage catheters

4.2.1.2. Pharmacology

Demonstrates knowledge of:

- Organic chemistry: drugs as organic molecules: interactions between molecules; organic compared with inorganic compounds; bond strength; important atomic constituents:
- Drug chemistry: solubility, partition coefficients and movement of drugs through membranes: Lipid solubility; influence of pKa and pH; partition coefficients. Passive and active transport mechanisms
- Isomers: structural and stereoisomers: classification systems; clinical relevance

Mechanisms of drug action: physicochemical; pharmacodynamic; pharmacokinetic: drug receptor interactions; dose-response and log[dose]-response curves; agonists, partial agonists, antagonists. Reversible and irreversible antagonism Potency and efficacy

- Non-specific drug actions: Physicochemical mechanisms: e.g. adsorption; chelation; neutralization
- Voltage-gated ion channels; membrane-bound transport pumps. Sodium, potassium and calcium channels as targets for drug action
- Receptors as proteins; ion channels; transmembrane transduction and intermediate messenger systems; intracellular/nuclear receptors. Receptor regulation and tachyphylaxis
- Transduction systems as receptors: G-protein coupled receptors [GPCRs] and non-GPCR systems.
- Nuclear receptors: Intracellular hormone receptors. e.g. cytoplasmic receptors for steroids; corticosteroids vs. mineralocorticoid receptors
- Enzymes as drug targets: Michaelis-Menten kinetics. Direct and allosteric mechanisms. e.g. acetylcholinesterase; cyclooxygenase; phosphodiesterase
- Anticholinesterases: Classification of drugs that inhibit acetylcholinesterase and plasma cholinesterase including organophosphates
- multiple anatomical locations; predictable enzyme induction-inhibition
- Idiosyncratic side effects of drugs: e.g. blood and bone-marrow dyscrasias; pulmonary fibrosis; anti-platelet effects.
- Anaphylactic and anaphylactoid reactions: comparison; treatment; identification of responsible drug; risks with polypharmacy

- Tachyphylaxis and tolerance: Examples of drugs demonstrating tachyphylaxis; proposed mechanisms. Opioid dependence and tolerance
- Drug interactions: Types of interaction: synergism, additivity, antagonism; isobolograms. Classification of mechanisms of drug
- Pharmacokinetics: general principles: absorption, distribution and redistribution; elimination, excretion. Chemical properties of drugs and their pharmacokinetics: blood-brain-barrier and placental barrier. Protein binding: plasma and tissue. Body compartments; adipose and vessel-poor tissue. Bioavailability; clearance
- Administration and absorption: routes of administration; first-pass metabolism and bioavailability. Selection of appropriate route. Drug delivery systems: e.g. sustained release, enteric coated, transdermal patch and ionophoretic systems
- Oral administration: Time-course for systemic appearance; factors e.g. pKa, lipid solubility, active transport. Bioavailability of drugs given orally and its measurement
- Drug elimination from plasma. Mechanisms: distribution; metabolism; excretion: exhalation; renal; biliary; sweat; breast milk.
- Factors affecting e.g.: pathological state: renal and hepatic failure; age, including extremes of age; gender; drug interactions
- Active and inactive metabolites; pro-drugs. Enzyme induction and inhibition
- Non-enzymatic drug elimination: Hofmann degradation
- Pharmacokinetic modelling: types of models available: one, two and three-compartment models; non-compartmental; physiological. Pharmacokinetic parameters: volume of distribution, half-life and time constant, clearance
- Context-sensitive half-time: comparison of drugs e.g. propofol, fentanyl and remifentanyl. Target-controlled infusions [TCI]
- TCI in practice: accuracy, applicability, cost. Variations due to patient differences:
predictable and unpredictable
Differences in patient response to therapy: age; gender; pathology; polypharmacy
Pharmacogenetics: pharmacokinetic variation e.g. pseudocholinesterase; acetylation; CYP450 variants. Poor and fast metabolizers; racial and geographic distribution of common abnormal genes
Volatile and gaseous anaesthetic agents: Structure of available agents. MAC. Clinical effects: CNS [including ICP], CVS, RS.
- Unwanted effects of individual agents. MH susceptibility; hepatitis risks. Factors affecting onset and offset time. Oil/gas partition coefficient
- Intravenous anaesthetic agents: Chemical classes. Properties of an ideal induction agent. Adverse effects on CNS [including effects on ICP], CVS, RS; pharmacokinetics including metabolism
- Mechanisms of general anaesthetic action
- Benzodiazepines: classification of action. Clinical actions. Synergism with anaesthetic agents. Antidote in overdose
- Local anaesthetic agents. Additional effects, including anti-arrhythmic effects. Mechanism of action. Clinical factors influencing choice: operative site, patient,

available agents. Toxicity syndrome; safe clinical and maximum clinical doses; treatment of overdose

- Analgesics. Simple analgesics, NSAIDs and opioids. Available routes of administration; perioperative prescribing; chronic compared with acute pain prescribing
- Aspirin and paracetamol. Comparison of structures; indications and contraindications; mechanisms of action. Bioavailability; metabolism; toxicity
- Non-steroidal anti-inflammatory analgesics: Classification. Mechanism of action. Clinical effects and uses; unwanted effects, contraindications
- Opioid analgesics: Receptor classification. Mechanism of action. Inhibitory effects, sites of action on pain pathways.
- Unwanted effects. Full and partial agonists and partial agonists. Routes of administration - Muscle relaxants. Classification. Sites of action. Properties of an ideal muscle relaxant. Dantrolene and management of MH
- Depolarizing muscle relaxants: Structure, mechanism of action. Organophosphate poisoning. Adverse effects and contraindications
- Non-depolarizing muscle relaxants: Structural classification; sub-classification according to onset-time and duration of action. General comparison of aminosteroids and bisbenzyisoquinoliniums. Comparison of individual agents; metabolism and active metabolites. Unwanted effects.
- Reversal of neuromuscular blockade: Indications for use; mechanisms of action; clinically unwanted effects of reversal of neuromuscular blockade
- Drugs and the autonomic nervous system: anatomy; myelinated and unmyelinated nerves; ganglia and rami communicantes. Neurotransmitters. Sites at which drugs can interfere with autonomic transmission
- Drugs and the sympathetic nervous system: adrenergic receptors and molecular mechanisms of action: Indications for pharmacological use of naturally occurring catecholamines and synthetic analogues.
- Drugs and the parasympathetic nervous system: nicotinic and muscarinic receptors with subgroups. Mechanism of action.
- Agonists, antagonists. Comparison of available drugs. Hyoscine and antiemesis
- Cardiovascular system: general: drug effects on the heart [inotropy and chronotropy] and on the circulation: arterial and venous effects; systemic and pulmonary effects
- Inotropes and pressors: Classification; site of action. Synthetic inotropes compared with adrenaline
- Drugs used in ischaemic heart disease: Classification of drugs used. Mechanisms of drug action. Unstable angina
Antiarrhythmics: Classification. Indications for use, including use in resuscitation
Hypotensive agents: Classes of drugs to produce acute hypotension in theatre. Therapeutic antihypertensive agents: classification according to mechanism of action. Adverse effects of drugs in each class
Anticoagulants: oral and parenteral. Sites of action; indications use; monitoring effect.

Comparison of heparins: unfractionated and fractionated. Newer anticoagulants

- Antiplatelet agents. Perioperative management of antiplatelet medication
- Pro-coagulants: Drugs. Individual factor concentrates; multi-factor preparations including FFP; vitamin K
- Colloids, including blood and blood products: Composition of preparations; safe use and avoidance of errors
- Crystalloid fluids: Composition; suitable fluids for maintenance and replacement of losses. Comparison with colloids; unwanted effects
- Respiratory system: general: Classes of drugs acting on the respiratory tract including bronchodilators; oxygen; surfactant; mucolytics; pulmonary vasodilators. Methods of administration; indications for use; mechanisms of action; adverse effects
- Respiratory system: drugs used in acute severe asthma and chronic asthma; volatile agents. Mechanisms of action
- Gastrointestinal system: general: antisialogogues; drugs reducing gastric acidity; drug effects on the GI tract including gastric and bowel motility
- Antiemetics: Anatomical sites for antiemetic action; central and peripheral inputs to vomiting centre; use of dexamethasone
- Renal system: diuretics: Classification of diuretics. Unwanted effects; indications for use
- CNS: antiepileptic agents: Mechanisms of action; unwanted side effects
- CNS: antidepressants: Classes of drug; anaesthetic relevance
- Therapy for diabetes mellitus: Drugs used in type 1 and type 2 diabetes: Insulins:
classification of types available; routes of administration; perioperative management. Unwanted effects and risks and therapy of hypo- or hyperglycaemia
- Hormones: corticosteroids: Indications for use; clinical effects; long-term complications of glucocorticoid use
- Hormones: treatment of thyroid disorders: Synthesis and release of thyroid hormones. Preparations used in hyper- and hypothyroidism
- CNS stimulants; classes, mechanisms of action, uses in anaesthesia
- stimulants including theophyllines, doxapram
- Antimicrobial agents: general classification: Types of antimicrobial agents: antiviral; antibacterial; antifungal; bacteriostatic and bacteriocidal. Mechanism of action. Indications for use of different classes of antibiotics. Bacterial resistance
- Effects of drugs on the eye and vision; includes intra-ocular pressure
- Social drugs including tobacco, alcohol and non-legal drugs: anaesthetic relevance

4.2.1.3. Physiology and Biochemistry

Demonstrates knowledge of:

GENERAL

- Organization of the human body and control of internal environment
- Changes at birth and variations with age
- Cells; components and organelles
- Function of cells; genes and their expression
- Cell membrane characteristics; cell junctions, receptors
- Protective mechanisms of the body

BIOCHEMISTRY

Definition of pH. Strong and weak acids.

Acid base balance. Includes buffers, Henderson-Hasselbalch equation and anion gap

Ions e.g. Na⁺, K⁺, Ca⁺⁺, Mg⁺⁺, Cl⁻, HCO₃⁻ - Cellular metabolism; aerobic vs anaerobic

- Enzymes

BODY FLUIDS AND THE FUNCTIONS AND CONSTITUENTS

- Capillary dynamics and interstitial fluid; osmosis, filtration and convection
- Osmolarity: osmolality, partition of fluids across membranes, tonicity
- Lymphatic system
- Special fluids especially cerebrospinal fluid: also pleural, pericardial and peritoneal fluids - Active cellular transport mechanisms

HAEMATOLOGY AND IMMUNOLOGY

- Blood: physical properties, components, functions
- Red blood cells: production and turnover, haematinics, haemoglobin and its variants including abnormal haemoglobins eg thalassaemia, HbS
- Anaemia: acute and chronic adaptations . Iron absorption, transportation, metabolism
- Polycythaemia: causes and implications
- Blood groups: ABO, Rhesus, others
- Transfusion reactions; rhesus incompatibility
- Haemostasis and coagulation, fibrinolysis . including abnormalities, congenital and acquired - Alternative oxygen carrying solutions
- White blood cells: types, origins, characteristics, turnover, the inflammatory response, systemic inflammatory responses, hypersensitivity reactions
- Immunity and allergy; innate vs acquired, non-specific vs specific, humoral vs cellular - Immunodeficiency . congenital and acquired

MUSCLE

- Action potential generation and its transmission
- Physiology and Biochemistry
- Neuromuscular junction and transmission, motor end-plate
- Disturbances of neuromuscular transmission

- Myopathies, congenital and acquired
- Muscle contracture, malignant hyperthermia, myoclonus, burns
- Muscle types; skeletal, smooth, cardiac
- Skeletal muscle excitation-contraction coupling

HEART/CIRCULATION

- Cardiac muscle contraction
- The cardiac cycle: pressure volume relationships, work and power
- Rhythmicity of the heart; cardiac impulse generation
- Regulation of cardiac function; general and cellular
- Control of cardiac output [including Starling relationship]
- Fluid challenge and heart failure, types of shock
- Electrocardiogram and arrhythmias, origin of ECG, effects of temperature, ischaemia, infarction and electrolyte imbalance
- 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
- Functions of endothelium
- Characteristics of special circulations including: pulmonary, coronary, cerebral, renal, portal, transitional and foetal

RENAL TRACT

Structure and function, renal circulation

Blood flow and glomerular filtration, plasma clearance and tubulo-glomerular feedback

Tubular function and urine formation; transport processes

- Assessment of renal function
- Regulation of water and electrolyte [Na^+ , K^+ , Ca^{++} , Mg^{++} , PO_4^{--} ,] balance; response to fluid loss /hypovolaemia. Role of urea and creatinine measurement
- Regulation of acid-base balance
- Pathophysiology of acute renal failure

RESPIRATION

- Gaseous exchange: O_2 and CO_2 transport, hypoxia and hyper- and hypocapnia, hyper- and hypobaric pressures
- Function of haemoglobin in oxygen carriage and acid-base equilibrium
- Pulmonary ventilation: volumes, capacities, flows, dead space, compliance, work of breathing
- Effect of IPPV on lungs
- Mechanics of ventilation: ventilation/perfusion abnormalities, regional V/Q, surfactant - Control of breathing, acute and chronic ventilatory failure, effect of oxygen therapy

NERVOUS SYSTEM

- Neuronal structure and function
- Resting membrane potential, action potentials, conduction, synaptic mechanisms, actions of neurotransmitters

- Brain stem; organization, interconnections
- Intracranial pressure: cerebrospinal fluid, blood flow
- Autonomic nervous system; organization, ganglia, adrenergic vs cholinergic
- Neurological reflexes: monosynaptic, polysynaptic, stretch, inhibition
- Motor function: basal ganglia, spinal and peripheral
- Sense: receptors, nociception, proprioception, sight, taste, smell, hearing, balance, touch, temperature
- 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 - Nausea and vomiting

LIVER

- Functional anatomy and blood supply, immunological functions
- Metabolic and digestive functions ACE 1

GASTROINTESTINAL

- Gastric function; secretions, nausea and vomiting
- Gut motility, sphincters and reflex control. neurohumoral integration
- Digestive functions; composition of secretions; digestion of carbohydrates, lipids, proteins, vitamins, minerals
- Immune functions METABOLISM
- Energy homeostasis. Energy balance and nutritional status. Body mass/composition: body mass index, body fat estimation.
- Functional measurements: e.g. handgrip strength, work/exercise capacity. Biochemical measurements. Immune function
- Principles of nutrition: carbohydrates, fats, proteins, vitamins and minerals. Energy requirements/expenditure and measurement
- Metabolic pathways, energy production and enzymes; metabolic rate
- Hormonal control of metabolism: regulation of plasma glucose, response to trauma Physiological alterations in starvation, obesity [including normal and abnormal BMI ranges], exercise and the stress response

Body temperature and its regulation, [including differences at extremes of age]

ENDOCRINOLOGY

- Hormones; types, receptors, hierarchy, extracellular signalling
- Mechanisms of hormonal control; feedback mechanisms, effects on membrane and intracellular receptors
- Hypothalamic and pituitary function
- Adrenocortical hormones
- Adrenal medulla; adrenaline and noradrenaline
- Pancreas; insulin, glucagons and exocrine function
- Thyroid and parathyroid hormones and calcium homeostasis

PREGNANCY

- Physiological changes associated with pregnancy
- Materno-fetal, fetal and neonatal circulation
- Function of placenta; placental transfer
- Fetus; physiological changes at birth

4.2.1.4. Physics and Clinical Measurement

- Suction devices
- Scavenging devices
- Measurement of lung volumes and diffusion
- Density and viscosity of gases
- Laminar and turbulent flow: Hagen-Poiseuille equation, Reynold•fs number, examples including helium
- Measurement of volume and flow in gases and liquids, including pneumotachograph and other respirometers
- Bernoulli principle
- Venturi effect and entrainment devices
- Vapour pressure: saturated vapour pressure
- Vaporisation: process of vaporisation
- Vaporisers: principles, including plenum and draw-over, temperature compensation, concentration
- Principles of surface tension
- Basic concepts of electricity and magnetism
- Electrical voltage, AC and DC current, resistance, impedance
- Electrical circuits: series and parallel
- Symbols of basic components of electrical circuits
- Capacitance, inductance
- Wheatstone bridge: principles, uses
- Electrical hazards: causes and prevention
- Electrocutation: including microshock, earth faults, leakage
- Electrical equipment safety: domestic and medical, classification/types of equipment, symbols
- Circuit breakers, fuses

- Transformers, inductance
- Transistors, diodes
- Amplifiers: band width, low pass, high pass, band pass filters
- ECG: principles including electrodes and electrode placement
- Fourier analysis
- Amplification of biological signals: including ECG, EMG, EEG, BIS, CFM, CFAM
- Piezo-electric devices
- Electrical interference: sources, methods of reduction
- Processing, storage, display of physiological measurements
- Transducers and strain gauges
- Lasers: basic principles and safety
- Ultrasound: basic principles of ultrasound
- Demonstrates knowledge of the physics relevant to optical fibres
- Doppler effect, principle and clinical application
- Cardiac pacemakers: principles and classification
- Defibrillators and defibrillation: principles, including thoracic impedance, monophasic, multiphasic, implantable devices
- Diathermy: monopolar, bipolar; safety and uses
- Pressure transducers
- Resonance, damping, frequency response
- Plenum systems: warming blankets, theatre and anaesthetic room ventilation
- Breathing systems: Maplesons classification, coaxial systems, circle systems, T-piece; resuscitation breathing devices
- Ventilators: principles, including pressure and flow generators, cycling, minute volume dividers, jet and oscillator ventilators
- Disconnection: monitoring of patient ventilatory disconnection, CO₂ absorption: chemistry, complications
- Capnography
- Pulse oximetry
- Fires and explosions: risks and prevention
- Measurement of gas pressures
- Blood pressure: direct and indirect measurement
- Pulmonary artery pressure measurement
- Cardiac output: principles of measurement
- Measurement of gas and vapour concentrations: e.g. infra-red, paramagnetic, fuel cell, oxygen electrode, mass spectrometry
- Measurement of pH, PCO₂, PO₂, electrolytes
- Derived blood gas variables, e.g. HCO₃^a, HCO₃^s, BE. Siggaard-Andersen nomogram
- Measurement of CO₂ production, oxygen consumption, respiratory quotient
- Simple tests of pulmonary function: peak flow rate, spirometry
- Measurement of perfusion: coronary, cerebral, splanchnic, renal
- Assessment of neuromuscular blockade

- Infusion pumps and syringe drivers; including PCA drivers and epidural infusion devices:
principles, use, safety, and relevant drug infusion calculations
- Environmental monitoring: contamination by anaesthetic gases and vapours
- Minimum monitoring standards
- Understanding the limits of monitoring equipment
- Principles of calibration of monitoring equipment
- Principles of hygiene, including cleaning and sterilisation of equipment

Mathematical concepts: relationships and graphs

- Exponential functions including wash-in, wash-out, tear-away Logarithms
- Area under the curve [integration] and rate of change [differentiation]
- Basic measurement concepts relevant to understanding of monitoring in anaesthesia: Linearity, Drift, Hysteresis and signal to noise ratio of static and dynamic response
- Electrolyte solutions [also drug doses]: conversion between units e.g. molar, mg/ml, %
SI Units: fundamental units and derived units
- Other non SI units relevant to anaesthesia: including mmHg, bar, atmospheres, cm H₂O, psi
- Simple mechanics: mass, force, work, energy, power
- Heat: including temperature, absolute zero
- Heat transfer and loss: conduction, convection, radiation, evaporation
- Temperature measurement: including Hg, alcohol, infrared, thermistor, thermocouple, Bourdon gauge, liquid crystal. Anatomical sites used for measurement
- Latent heats, triple point of water
- Patient warming systems: principles
- Warming equipment for intravenous fluids: principles
- Laws of thermodynamics; mechanical equivalent of heat
- Humidity, absolute and relative; including measurement
- Colligative properties: osmolarity, osmolality, osmometry, diffusion
- Physics of gases. Gas Laws: kinetic theory of gases, Boyles, Henry, Dalton, Charles, GayLussac
- Critical temperature, critical pressure
- Physics of vapours
- Pressure: absolute and relative pressure; gauge pressure
- Manufacture and storage of gases and vapours, safety
- Cylinders and pipelines, Bourdon gauge

4.2.1.5. Statistical Methods

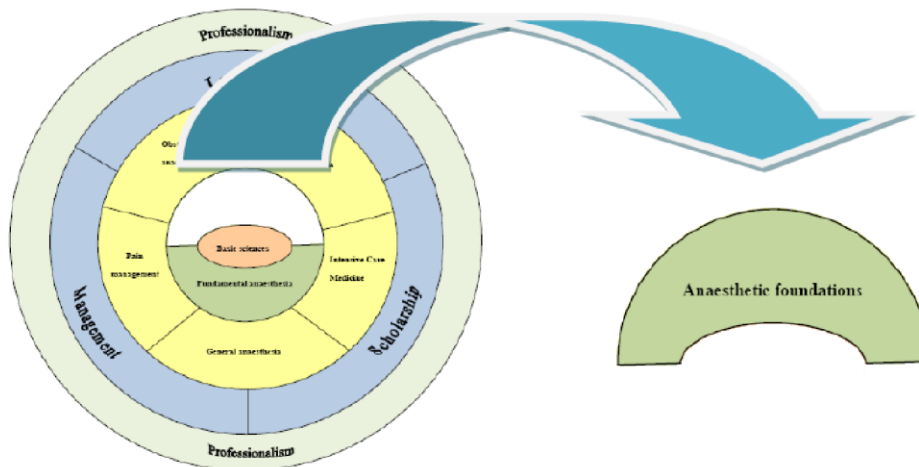
Learning Outcomes:

- To understand the basis of statistical concepts
- To understand the statistical background to measurement error and statistical uncertainty

Knowledge

- Data Collection, recalls the simple aspects of study design
 - o Explains the outcome, measures and the uncertainty in their definition
 - o Explains the basis of meta-analysis and evidence based medicine
- Descriptive statistics: Recalls the types of data and their representation
 - o Explains the normal distribution as an example of parametric distribution
 - o Explains indices of central tendency and variability A,C,E 1
- Deductive and inferential statistics: Recalls simple probability theory and the relationship to confidence values
- Explains the null hypothesis
 - o Explains the choices for simple statistical tests for different types of data. Recalls type I and type II errors

4.2.2. The foundations of anaesthesia and critical care practice



This provides a comprehensive introduction to the principles and practices of the delivery of safe and effective anaesthesia and critical care to patients for trainees new to the specialty. The following units of training must be completed satisfactorily:

- Preoperative assessment
- Premedication
- Induction of general anaesthesia
- Intra-operative care
- Postoperative and recovery room care
- Management of respiratory and cardiac arrest
- Control of infection
- Introduction to anaesthesia for emergency surgery

The fundamental importance of the need for students to develop [and demonstrate] safe clinical practice [including a basic understanding of basic sciences underpinning practice] means that students are expected to have achieved all the minimum clinical learning outcomes detailed in this section

4.2.2.1. Preoperative assessment

Core clinical learning outcomes:

- Is able to perform a structured preoperative anaesthetic assessment of a patient prior to surgery and recognise when further assessment/optimisation is required prior to commencing anaesthesia/surgery
- To be able to explain options and risks of routine anaesthesia to patients, in a way they understand, and obtain their consent for anaesthesia

A) History Taking

This training will:

- Develop the ability to elicit a relevant structured history from patients
- Ensure the history obtained is recorded accurately
- Ensure the history is synthesised with the relevant clinical examination

Knowledge

- Recognises the importance of different elements of history
- Knows the likely causes and risk factors for conditions relevant to mode of presentation
- Recognises that the patient's agenda and the history should inform examination, investigation and management

Skills

- Identifies and overcomes possible barriers to effective communication
- Supplements history with standardised instruments or questionnaires when relevant
- Manages alternative and conflicting views from family, carers, friends and members of the multi-professional team
- Assimilates history from the available information from the patient and other sources including members of the multi-professional team
- Recognises and interprets appropriately the use of nonverbal communication from patients and carers
- Focuses on relevant aspects of history and maintains focus despite multiple and often conflicting agendas

B) Clinical Examination

This training will enable the learner to:

- Develop the ability to perform focused, relevant and accurate clinical examination in patients with increasingly complex issues and in increasingly challenging circumstances
- Develop the ability to relate physical findings to history in order to establish diagnosis[es] and formulate management plan[s]

Knowledge

- Understands the need for a targeted and relevant clinical examination
- Understands the basis for clinical signs and the relevance of positive and negative physical signs
- Recognises constraints to performing physical examination and strategies that may be used to overcome them
- Recognises the limitations of physical examination and the need for adjunctive forms of assessment to confirm diagnosis

Skills

- Performs an examination relevant to the presentation and risk factors that is valid, targeted and time efficient
- Actively elicits important clinical findings
- Performs relevant adjunctive examinations

c) Specific Anaesthetic

Evaluation This training will:

- Develop the ability to establish a problem list
- Develop the ability to judge whether the patient is fit for and optimally prepared for the proposed intervention
- Develop the ability to plan anaesthesia and postoperative care for common surgical procedures
- Develop the ability to recognise the students' limitations and reliably determine the level of supervision they will need
- Ensure students can explain options and risks of routine anaesthesia to patients, in a way they understand, and obtain their consent for anaesthesia

Knowledge

- Knows the methods of anaesthesia that are suitable for common operations in the surgical specialties for which they have anaesthetised.
- Describes the ASA classifications and their implications in preparing for and planning anaesthesia
- Explains the indications for and interpretation of preoperative investigations
- Lists the indications for preoperative fasting and understand appropriate regimens
- Explains the methods commonly used for assessing the airway to predict difficulty with tracheal intubation
- Discusses the indications for RSI
- Gives examples of how common co-existing diseases affect anaesthesia and surgery including but not exclusively: obesity; diabetes; asthma; ischaemic heart disease; hypertension and rheumatoid disease; epilepsy
- Discusses how to manage drug therapy for co-existing disease in the perioperative period including, but not exclusively: obesity; diabetic treatment; steroids; anti-coagulants; cardiovascular medication; epilepsy
- Explains the available methods to minimise the risk of thrombo-embolic disease following surgery
- Knows about the complications of anaesthetic drugs [including anaphylaxis, suxamethonium apnoea and malignant hyperpyrexia] and how to predict patients who are at increased risk of these complications
- Identifies the principles of consent for surgery and anaesthesia, including the issue of competence
- Understands that consent is a process that may culminate in, but is not limited to, the completion of a consent form
- Understands the particular importance of considering the patient's level of understanding and mental state [and also that of the parents, relatives or carers when appropriate] and how this may impair their capacity for consent
- Recalls/lists the factors that affect the risk of a patient suffering PONV

Skills

- Demonstrates satisfactory proficiency in obtaining a history specifically relevant to the planned anaesthesia and surgery including:
 - o A history of the presenting complaint for surgery. A systematic comprehensive relevant medical history, Information about current and past medication, Drug allergy and intolerance
 - o Information about previous anaesthetics and relevant family history
- Demonstrates satisfactory proficiency in performing a relevant clinical examination including when appropriate: Cardiovascular system, Respiratory system, Central and peripheral nervous system: GCS, peripheral deficit
 - o Musculoskeletal system: patient positioning, neck stability/movement, anatomy for regional blockade
 - o Other: nutrition, anaemia, jaundice and Airway assessment/dentition
- Demonstrates understanding of clinical data including, but not exclusively:
 - o Patient clinical case notes and associated records and Clinical parameters such as:
 - ✦ BP, Pulse, CVP
 - ✦ BMI

 - ✦ Fluid balance

 - ✦ Physiological investigations such as:
 - ⑩ ECGs
 - ⑩ Echocardiography and stress testing
 - ⑩ Pulmonary function tests
- Demonstrates understanding of clinical laboratory data including:
 - Haematology such as
 - Routine report of Hb, WBC, haematocrit etc
 - Biochemistry such as
 - ✦ Arterial blood gases/acid-base balance
 - ✦ Urea and electrolytes
 - ✦ Liver function
 - ✦ Thyroid function
- Identifies normal appearances and significant abnormalities in radiographs including:
 - o Chest X-rays
 - Trauma films, cervical spine, chest, pelvis, long bones o Head CT and MRI showing clear abnormalities -
- Makes appropriate plans for surgery:
 - o Manages co-existing medicines in the perioperative period and Plans an appropriate anaesthetic technique[s]
 - o Secures consent for anaesthesia
 - o Recognises the need for additional work-ups and acts accordingly

- Discusses issues of concern with relevant members of the team
- Reliably predicts the level of supervision they will require
- Presents all information to patients [and carers] in a format they understand, checking understanding and allowing time for reflection on the decision to give consent - Provides a balanced view of all care options

4.2.2.2. Premedication

Note: This forms part of the comprehensive pre-assessment of patients.

Learning outcomes:

- Understands the issues of preoperative anxiety and the ways to alleviate it
- Understands that the majority of patients do not require pre-medication
- Understands the use of preoperative medications in connection with anaesthesia and surgery

Core clinical learning outcome:

- Is able to prescribe premedication as and when indicated, especially for the high risk population

Knowledge

- Summarises the value of appropriate explanations and reassurance in alleviating the patient's anxiety
- Lists basic indications for prescription of pre-medication drugs
- Explains how to select appropriate sedative or anxiolytic agents
- Discusses the applied pharmacology of these drugs
- Recalls/lists the factors that influence the risk of patients at increased risk of gastric reflux/aspiration and understands strategies to reduce it
- Recalls/describes the applied pharmacology of pro-kinetic and antacids including simple alkalis, H₂ and Proton Pump antagonists
- Identifies local/national guidelines on management of thrombo-embolic risk and how to apply them
- Explains the principles and practice of using prophylactic antibiotics

Skills

- Selects and prescribes appropriate agents to reduce the risk of regurgitation and aspiration, in timeframe available
- Explains, in a way the patient understands, the benefits and possible risks of sedative premedication
- Selects and prescribes appropriate anxiolytic/sedative premedication when indicated

4.2.2.3. Induction of general anaesthesia

Learning outcomes:

- The ability to conduct safe induction of anaesthesia
- The ability to recognise and treat immediate complications of induction, including tracheal tube misplacement and adverse drug reactions
- The ability to manage the effects of common co-morbidities on the induction process
- *Core clinical learning outcomes:*
 - Demonstrates correct pre-anaesthetic check of all equipment required ensuring its safe functioning [including the anaesthetic machine/ventilator in both the anaesthetic room and theatre if necessary]
 - Demonstrates safe induction of anaesthesia, using preoperative knowledge of individual patients' co-morbidity to influence appropriate induction technique; shows awareness of the potential complications of process and how to identify and manage them

Knowledge

- In respect of the drugs used for the induction of anaesthesia:
 - Recalls/summarises the pharmacology and pharmacokinetics, including doses, interactions and significant side effects of:
 - ✦ Induction agents
 - ✦ Muscle relaxants
 - ✦ Analgesics
 - ✦ Inhalational agents including side effects, interactions and doses
 - Identifies about the factors that contribute to drug errors in anaesthesia and the systems to reduce them
- In respect of the equipment in the operating environment:
 - Describes the basic function of monitors and knows what monitoring is appropriate for induction including consensus minimum monitoring standards and the indications for additional monitoring
 - Explains the function of the anaesthetic machine including
 - ✦ The basic functions of gas flow
 - ✦ Pre-use checking of the anaesthetic machine
 - ✦ The structural features of the anaesthetic machine that minimise errors
 - ✦ The operation of the anaesthetic ventilator
 - ✦ The function of the anaesthetic vaporisers
 - ✦ The operation of any monitoring equipment that is integral with the anaesthetic machine
 - ✦ Knows how to replenish anaesthetic vaporiser in respect of the induction of anaesthesia:
 - Describes the effect of pre-oxygenation and knows the correct technique for its use

- Explains the techniques of intravenous and inhalational induction and understands the advantages and disadvantages of both techniques
- Knows about the common intravenous induction agents and their pharmacology
- Knows the physiological effects of intravenous induction including the differences between agents
- Recalls/explains how to recognise the intra-arterial injection of a harmful substance and its appropriate management
- Describes the features of anaphylactic reactions and understands the appropriate management including follow up and patient information
- Knows the factors influencing the choice between agents for inhalational induction of anaesthesia
- Discusses the additional hazards associated with induction of anaesthesia in unusual places [e.g. Emergency Room] and in special circumstances including but not exclusively: brain injury; full stomach; sepsis; upper airway obstruction
- Identifies the special problems of induction associated with cardiac disease, respiratory disease, musculoskeletal disease, obesity and those at risk of regurgitation/pulmonary aspiration.
- Describes the principles of management of the airway including:
 - Techniques to keep the airway open and the use of facemasks, oral and nasopharyngeal airways and laryngeal mask airways - In respect of tracheal intubation:
 - Lists its indications
 - Lists the available types of tracheal tube and identifies their applications
 - Explains how to choose the correct size and length of tracheal tube
 - Explains the advantages/disadvantages of different types of laryngoscopes and blades
 - Outlines how to confirm correct placement of a tracheal tube and knows how to identify the complications of intubation including endobronchial and oesophageal intubation
 - Discusses the methods available to manage difficult intubation and failed intubation
 - Explains how to identify patients who are at increased risk of regurgitation and pulmonary aspiration and knows the measures that minimise the risk
 - Categorises the signs of pulmonary aspiration and the methods for its emergency management
- Explains the importance of maintaining the principles of aseptic practice and minimising the risks of hospital acquired infection

Skills

- Demonstrates safe practice in checking the patient in
- Demonstrates appropriate checking of equipment prior to induction, including equipment for emergency use
- In respect of the equipment in the operating environment:

- Demonstrates understanding of the function of the anaesthetic machine including
 - ✦ Performing proper pre-use checks
 - ✦ Changing/checking the breathing system
 - ✦ Replenishing the vaporiser
 - ✦ Changing the vaporiser
- Demonstrates safe practice in selecting, checking, drawing up, diluting, labelling and administering of drugs
- In respect of intravenous cannulation:
 - Obtains intravascular access using appropriate size cannulas in appropriate anatomical location
 - Demonstrates rigorous aseptic technique when inserting a cannula
- In respect of monitoring:
 - Demonstrates appropriate placement of monitoring, including ECG electrodes and NIBP cuff
 - Manages monitors appropriately e.g. set alarms; start automatic blood pressure
 - Demonstrates proficiency in the Interpretation of monitors
- Demonstrates effective pre-oxygenation, including correct use of the mask, head position and clear explanation to the patient
- In respect of intravenous induction:
 - Makes necessary explanations to the patient
 - Demonstrates satisfactory practice in preparing drugs for the induction of anaesthesia
 - Demonstrates proper technique in injecting drugs at induction of anaesthesia
 - Manages the cardiovascular and respiratory changes associated with induction of general anaesthesia
- In respect of inhalational induction of anaesthesia:
 - Satisfactorily communicates with the patient during induction
 - Satisfactorily conducts induction
- In respect of airway management:
 - Demonstrates optimal patient position for airway management
 - Manages airway with mask and oral/nasopharyngeal airways
 - Demonstrates hand ventilation with bag and mask
 - Able to insert and confirm placement of a Laryngeal Mask Airway
 - Demonstrates correct head positioning, direct laryngoscopy and successful nasal/oral intubation techniques and confirms correct tracheal tube placement
 - Demonstrates proper use of bougies
 - Demonstrates correct securing and protection of LMAs/tracheal tubes during movement, positioning and transfer
 - Correctly conducts RSI sequence
 - Correctly demonstrates the technique of cricoid pressure
- Demonstrates correct use of oropharyngeal, laryngeal and tracheal suctioning

- Demonstrates failed intubation drill

4.2.2.4. Intra-operative care

Learning outcomes:

- The ability to maintain anaesthesia for surgery
- The ability to use the anaesthesia monitoring systems to guide the progress of the patient and ensure safety
- Understanding the importance of taking account of the effects that co-existing diseases and planned surgery may have on the progress of anaesthesia
- Recognise the importance of working as a member of the theatre team *Core clinical learning outcome:*
- Demonstrates safe maintenance of anaesthesia and shows awareness of the potential complications and how to identify and manage them

Skills

- Demonstrates how to direct the team to safely transfer the patient and position of patient on the operating table and is aware of the potential hazards including, but not exclusively, nerve injury, pressure points, ophthalmic injuries
- Manages the intra-operative progress of spontaneously breathing and ventilated patients
- Demonstrates the ability to maintain anaesthesia with a face mask in the spontaneously breathing patient
- Demonstrates the use of a nerve stimulator to assess the level of neuromuscular blockade
- Manages the sedated patient for surgery
- Maintains accurate, detailed, legible anaesthetic records and relevant documentation
- Demonstrates role as team player and when appropriate leader in the intra-operative environment
- Communicates with the theatre team in a clear unambiguous style
- Able to respond in a timely and appropriate manner to events that may affect the safety of patients [e.g. hypotension, massive haemorrhage]
- Manages common co-existing medical problems [with appropriate supervision] including but not exclusively: Diabetes, Hypertension, Ischaemic Heart Disease, Asthma and COPD, Patients on steroids

4.2.2.5. Postoperative and recovery room care

Learning outcomes:

- The ability to manage the recovery of patients from general anaesthesia
- Understanding the organisation and requirements of a safe recovery room
- The ability to identify and manage common postoperative complications in patients with a variety of co-morbidities
- The ability to manage postoperative pain and nausea
- The ability to manage postoperative fluid therapy *Core clinical learning outcomes:*

- Safely manage emergence from anaesthesia and extubation
- Shows awareness of common immediate postoperative complications and how to manage them
- Prescribes appropriate postoperative fluid and analgesic regimes and assessment and treatment of PONV

Knowledge

- Lists the equipment required in the recovery unit
- Lists the types of monitoring and the appropriate frequency of observations required for patients having undergone different types of surgery
- Describes the care of an unconscious patient in the recovery room, including safe positioning
- In respect of restoring spontaneous respiration and maintaining the airway at the end of surgery:
 - Explains how to remove the tracheal tube and describes the associated problems and complications
 - Recalls/describes how to manage laryngospasm at extubation
 - Recalls/lists the reasons why the patient may not breathe adequately at the end of surgery
 - Recalls/identifies how to distinguish between the possible causes of apnoea
 - Lists the possible causes of postoperative cyanosis
 - Understands how to evaluate neuro-muscular block with the nerve stimulator
- With respect to oxygen therapy:
 - Lists its indications
 - Knows the techniques for oxygen therapy and the performance characteristics of available devices
 - Recalls/explains the causes and management of stridor
- Outlines/recalls the principles of appropriate post-operative fluid regimes including volumes, types of fluids and monitoring of fluid balance including indications for urethral catheterisation
- In respect of postoperative pain:
 - Describes how to assess the severity of acute pain
 - Knows the analgesic ladder
 - Discusses how emotions contribute to pain
 - Identifies appropriate post-operative analgesic regimes including types of drugs and doses
 - Explains how to manage rescue analgesia for the patient with severe pain
 - Lists the complications of analgesic drugs
- In respect of PONV:
 - Accepts fully how distressing this symptom is
 - Recalls/lists the factors that predispose to PONV

- Recalls/describes the basic pharmacology of anti-emetic drugs
- Describes appropriate regimes for PONV
- Recalls/lists the possible causes and management of post-operative confusion
- Knows the causes and describes the management of post-operative hypotension and hypertension
- Identifies the special precautions necessary for the postoperative management of patients with co-existing diseases including cardiac disease, respiratory disease, metabolic disease, musculoskeletal disease, obesity and those at risk of regurgitation/pulmonary aspiration
- Explains the prevention, diagnosis and management of postoperative pulmonary atelectasis
- Lists the appropriate discharge criteria for day stay patients to go home and for patients leaving the recovery room to go to the ward
- Explains the importance of following up patients in the ward after surgery

Skills

- Demonstrates appropriate management of tracheal extubation, including;
 - Assessment of return of protective reflexes
 - Assessment of adequacy of ventilation
 - Safe practice in the presence of a potentially full stomach
- Evaluates partial reversal of neuromuscular blockade, including the use of a nerve stimulator
- Demonstrates the safe transfer of the unconscious patient from the operating theatre to the recovery room
- Demonstrates how to turn a patient into the recovery position
- Makes a clear handover to recovery staff of perioperative management and the postoperative plan
- Prescribes appropriate postoperative fluid regimes
- Demonstrates the assessment of postoperative pain and prescribes appropriate postoperative analgesia regimes
- Demonstrates the assessment and management of postoperative nausea and vomiting
- Demonstrates the assessment and management of postoperative confusion
- Recognises when discharge criteria have been met for patients going home or to the ward
- Undertakes follow-up visits to patients after surgery on the ward

4.2.2.6. Introduction to anaesthesia for emergency surgery

Learning outcomes:

- Undertake anaesthesia for patients requiring emergency surgery for common conditions
- Undertake anaesthesia for sick patients and patients with major co-existing diseases

Core clinical learning outcome:

- Delivers safe perioperative anaesthetic care to adult patients requiring emergency surgery

Knowledge

- Discusses the special problems encountered in patients requiring emergency surgery and how these may be managed including:
 - Knowing that patients may be very frightened and how this should be managed
 - Recognising that the patient may have severe pain which needs immediate treatment
 - Understanding that patients presenting for emergency surgery are more likely to have inadequately treated coexisting disease
 - Understanding how to decide on the severity of illness in the frightened apprehensive emergency patient
 - Understanding the pathophysiological changes and organ dysfunction associated with acute illness
 - How to recognise that the patient may be dehydrated or hypovolaemic and understanding the importance of preoperative resuscitation
- In respect of the preparation of acutely ill patients for emergency surgery discusses:
 - How to resuscitate the patient with respect to hypovolaemia and electrolyte abnormalities
 - The fact that patients may be inadequately fasted and how this problem is managed
 - The importance of dealing with acute preoperative pain and how this should be managed
- Describes how to recognise the sick patient [including sepsis], their appropriate management and the increased risks associated with surgery
- Understands the airway management in a patient with acute illness who is at risk of gastric reflux

Skills

- Manages preoperative assessment and resuscitation/optimisation of acutely ill patients correctly
- Demonstrates safe perioperative management of patients requiring emergency surgery
- Manages rapid sequence induction in the high risk situation of emergency surgery for the acutely ill patient

4.2.2.7. Management of respiratory and cardiac arrest in adults and children

Learning outcomes:

- To have gained a thorough understanding of the pathophysiology of respiratory and cardiac arrest and the skills required to resuscitate patients
- Understand the ethics associated with resuscitation *Core clinical learning outcome:*

- Be able to resuscitate a patient in accordance with the latest Resuscitation guidelines.

Knowledge

- Recalls/lists the causes of a respiratory arrest, including but not limited to: Drugs, toxins; Trauma; Pulmonary infection; Neurological disorders; Muscular disorders
- Identifies the causes of a cardiac arrest, including but not limited to: Ischaemic heart disease; Valvular heart disease; Drugs; Hereditary cardiac disease; Cardiac conduction abnormalities; Electrolyte abnormalities; Electrocutation; Trauma; Thromboembolism
- Demonstrates an understanding of the basic principles of the ECG, and the ability to recognise arrhythmias including but not exclusively: Ventricular fibrillation; Ventricular tachycardia; Asystole; Rhythms associated with pulseless electrical activity [PEA]
- Discusses the mode of action of drugs used in the management of respiratory and cardiac arrest in adults and children, including but not limited to: Adrenaline; Atropine; Amiodarone; Lidocaine; Magnesium sulphate; Naloxone
- Identifies the doses of drugs, routes given [including potential difficulty with gaining intravenous access and how this is managed] and frequency, during resuscitation from a respiratory or cardiac arrest
- Explains the physiology underpinning expired air ventilation and external chest compressions
- Explains the need for supplementary oxygen during resuscitation from a respiratory or cardiac arrest in adults and children
- Lists advantages and disadvantages of different techniques for airway management during the resuscitation of adults and children, including but not limited to:
 - Oro and nasopharyngeal airways
 - Laryngeal Mask type supraglottic airways including but not limited to: LMA, Proseal, LMA supreme, iGel
 - Tracheal intubation
- Explains the reasons for avoiding hyperventilation during resuscitation
- Compares the methods by which ventilation can be maintained in a patient suffering a respiratory or cardiac arrest, using:
 - Mouth to mask
 - Self-inflating bag
 - Anaesthetic circuit
 - Mechanical ventilator
- Recalls/explains the mechanism of defibrillation and the factors influencing the success of defibrillation
- Identifies the energies used to defibrillate a patient
- Recalls/discusses the principles of safely and effectively delivering a shock using both manual and automated defibrillator

- Explains the need for continuous chest compressions during resuscitation from cardiac arrest once the trachea is intubated
- Explains the need for minimising interruptions to chest compressions
- Recalls/discusses the reversible causes of cardiac arrest and their treatment, including but not limited to: Hypoxia, Hypotension, Electrolyte and metabolic disorders, Hypothermia, Tension pneumothorax, Cardiac tamponade, Drugs and toxins, Coronary or pulmonary thrombosis
- Recalls/describes the Adult and Paediatric Advanced Life Support algorithms
- Discusses the specific actions required when managing a cardiac arrest due to:
 - o Poisoning
 - o Electrolyte disorders
 - o Hypo/hyperthermia
 - o Drowning
 - o Anaphylaxis
 - o Asthma
 - o Trauma
 - o Pregnancy [including peri-mortem Caesarean Section]
 - o Electrocution
- Identifies the signs indicating return of a spontaneous circulation
- Recalls/lists the investigations needed after recovery from a respiratory or cardiac arrest and describes the potential difficulties with obtaining arterial blood samples and how this may be overcome in these patients
- Discusses the principles of care required immediately after successful resuscitation from a respiratory or cardiac arrest
- Discusses the importance of respecting the wishes of patients regarding end of life decisions
- Outlines who might benefit from resuscitation attempts and the importance of knowing/accepting when to stop

Skills

- Uses an ABCDE approach to diagnose and commence the management of respiratory and cardiac arrest in adults and children
- Demonstrates correct interpretation of the signs of respiratory and cardiac arrest
- Maintains a clear airway using basic techniques with or without simple adjuncts: Head tilt, Chin lift, Jaw thrust, Oro- and nasopharyngeal airways
- Demonstrates correct use of advanced airway techniques including:
 - o Supraglottic devices, including but not limited to LMA, Proseal, LMA supreme, iGel
 - o Tracheal intubation - Maintain ventilation using:
 - o Expired air via a pocket mask
 - o Self-inflating bag via facemask, or advanced airway
 - o Mechanical ventilator

- Performs external cardiac compression
- Monitor cardiac rhythm using defibrillator pads, paddles or ECG lead
- Uses a manual or automated defibrillator to safely defibrillate a patient
- Turn a patient into the recovery position
- Prepare a patient for transfer to a higher level of care
- Maintains accurate records of all resuscitation events

4.2.2.8. Control of infection

Learning Outcomes:

- To understand the need for infection control processes
- To understand types of possible infections contractible by patients in the clinical setting
- To understand and apply most appropriate treatment for contracted infection
- To understand the risks of infection and be able to apply mitigation policies and strategies *Core clinical learning outcome:*
- The acquisition of good working practices in the use of aseptic techniques

Knowledge

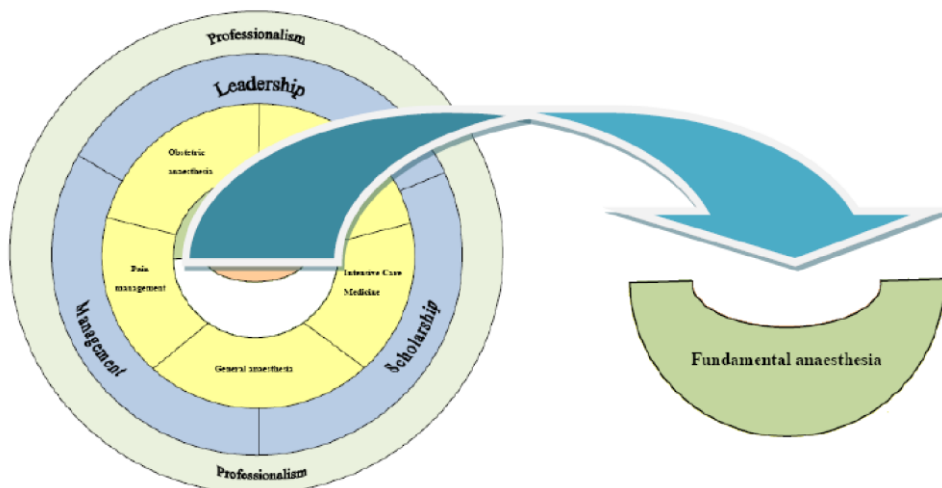
- Identifies the universal precautions and good working practices for the control of infection including but not limited to:
 - Decontaminate hands before treating patients; when soap and water hand wash is appropriate; when alcohol gel decontamination is appropriate
 - The use of gloves
 - The use of sterilised equipment
 - The disposal of used clinical consumables [single use and reusable]
- Lists the types and treatment of infections contracted by patients usually in the ward and ITU, including but not limited to: MRSA, C Diff
- Recalls/discusses the concept of cross infection including:
 - Modes of cross infection
 - Common cross infection agents
- Recalls/explains the dynamics of bacterial and viral strain mutation and the resulting resistance to antibiotic treatment
- Explains the need for antibiotic policies in hospitals
- Recalls/discusses the cause and treatment of common surgical infections including the use of but not limited to: Antibiotics; Prophylaxis
- Recalls/lists the types of infection transmitted through contaminated blood including but not limited to: HIV, Hepatitis B and C
- Discusses the need for, and application of, hospital immunisation policies
- Recalls/explains the need for, and methods of, sterilisation
- Explains the Trust's decontamination policy and their application

Skills

- Identifies patients at risk of infection and applies an infection mitigation strategy
 - Identifies and appropriately treats the immunocompromised patient
- Be able to administer IV antibiotics taking into account and not limited to:
 - o Risk of allergy o Anaphylaxis
- Demonstrates good working practices, following local infection control protocols and the use of aseptic techniques
- Demonstrates the correct use of
 - disposable filters and breathing systems
- Demonstrates the correct use and disposal of protective clothing items including but not limited to: Surgical scrubs, Masks, Gloves,
- Demonstrates the correct disposal of clinical consumable items [single use and reusable]

4.2.3. Fundamental anaesthesia and critical care

This represents the essential knowledge and skills related to the safe administration of anaesthesia and the provision of critical care that must be achieved within the first 3 months of practice.



4.2.3.1. Airway management

Core clinical learning outcomes:

- o Able to maintain an airway and provide definitive airway management as part of emergency resuscitation
- o Maintains anaesthesia in a spontaneously breathing patient via a facemask for a short surgical procedure

Knowledge

- Describes the effect of pre-oxygenation and knows the correct technique for its use
- Describes the principles of management of the airway including techniques to keep the airway open and the use of facemasks, oral and nasopharyngeal airways and laryngeal mask airways
- In respect of tracheal intubation:
 - o Explains how to choose the correct size and length of tracheal tube o Outlines how to confirm correct placement of a tracheal tube and knows how to identify the complications of intubation including endobronchial and oesophageal intubation
 - o Explains how to identify patients who are at increased risk of regurgitation and pulmonary aspiration and knows the measures that minimise the risk
 - o Understands the airway management in a patient with acute illness who is at risk of gastric reflux
- In respect of restoring spontaneous respiration and maintaining the airway at the end of surgery:
 - o Explains how to remove the tracheal tube and describes the associated problems and complications
 - o Recalls/describes how to manage laryngospasm at extubation
 - o Lists the possible causes of postoperative cyanosis
- With respect to oxygen therapy: Recalls/explains the causes and management of stridor
- Discusses the indications for RSI
- Describes the care of the airway in an unconscious patient in the recovery room, including safe positioning
- Lists advantages and disadvantages of different techniques for airway management during resuscitation, including but not limited to:
 - o Oro and nasopharyngeal airways
 - o Laryngeal Mask type supraglottic
 - o Tracheal intubation
- Compares the methods by which ventilation can be maintained in a patient suffering a respiratory or cardiac arrest, using:
 - o Mouth to mask
 - o Self-inflating bag

Skills

- Reliably predicts the level of supervision they will require
- Demonstrates effective pre-oxygenation, including correct use of the mask, head position and clear explanation to the patient - In respect of airway management:
 - o Demonstrates optimal patient position for airway management, including head tilt, chin lift, jaw thrust
 - o Manages airway with mask and oral/nasopharyngeal airways
 - o Demonstrates hand ventilation with bag and mask [including self-inflating bag]
 - o Able to insert and confirm placement of a Laryngeal Mask Airway
 - o Demonstrates correct head positioning, direct laryngoscopy and successful nasal/oral intubation techniques and confirms correct tracheal tube placement
 - o Correctly conducts RSI sequence
 - o Correctly demonstrates the technique of cricoid pressure
- In respect of inhalational induction of anaesthesia:
 - o Satisfactorily communicates with the patient during induction
 - o Satisfactorily conducts induction
- Demonstrates the ability to maintain anaesthesia with a face mask in the spontaneously breathing patient

4.2.3.2. Critical incidents

Core clinical Learning Outcomes:

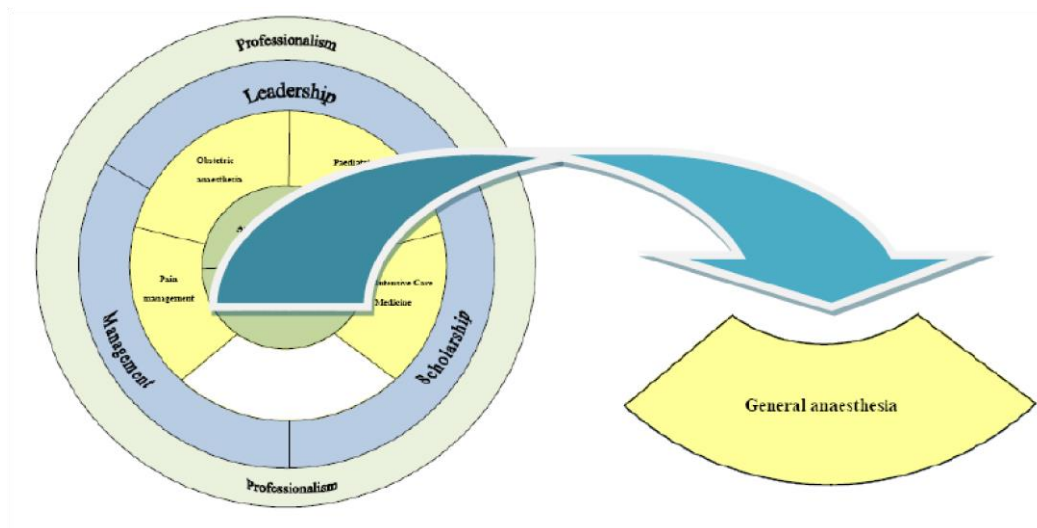
- To be able to recognise critical incidents early and manage them with appropriate supervision

Knowledge

- Recall/describes the causes, detection and management of the following:
 - o Cardiac and/or respiratory arrest
 - o Unexpected fall in SpO₂ with or without cyanosis
 - o Unexpected increase in peak airway pressure
 - o Progressive fall in minute volume during spontaneous respiration or IPPV
 - o Unexpected hypotension
 - o Unexpected hypertension

- Sinus tachycardia
- Recalls/describes the causes, detection and management of the following specific conditions:
 - Difficult/failed mask ventilation
 - Failed intubation
 - Regurgitation/Aspiration of stomach contents
 - Laryngospasm
 - Bronchospasm
 - Anaphylaxis

4.3. GENERAL ANAESTHESIA



4.3.1. Airway management

Core clinical learning outcomes:

- Able to predict difficulty with an airway at preoperative assessment and obtain appropriate help
- Able to maintain an airway and provide definitive airway management as part of emergency resuscitation
- Demonstrates the safe management of the can't-intubate can't- ventilate scenario
- Maintains anaesthesia in a spontaneously breathing or ventilated patient for any surgical procedure

Knowledge

- Explains the methods commonly used for assessing the airway to predict difficulty with tracheal intubation
- Describes the effect of pre-oxygenation and knows the correct technique for its use
- Describes the principles of management of the airway including techniques to keep the airway open and the use of facemasks, oral and nasopharyngeal airways and laryngeal mask airways
- Explains the technique of inhalational induction and describes the advantages and disadvantages of the technique.
- Knows the factors influencing the choice between agents for inhalational induction of anaesthesia
- In respect of tracheal intubation:
 - o Lists its indications
 - o Lists the available types of tracheal tube and identifies their applications
 - o Explains how to choose the correct size and length of tracheal tube
 - o Explains the advantages/disadvantages of different types the laryngoscopes and blades including, but not exclusively, the Macintosh and McCoy
 - o Outlines how to confirm correct placement of a tracheal tube and knows how to identify the complications of intubation including endobronchial and oesophageal intubation
 - o Discusses the methods available to manage difficult intubation and failed intubation
 - Explains how to identify patients who are at increased risk of regurgitation and pulmonary aspiration and knows the measures that minimise the risk
 - o Understands the airway management in a patient with acute illness who is at risk of gastric reflux
 - o Categorises the signs of pulmonary aspiration and the methods for its emergency management
- In respect of restoring spontaneous respiration and maintaining the airway at the end of surgery:
 - o Explains how to remove the tracheal tube and describes the associated problems and complications
 - o Recalls/describes how to manage laryngospasm at extubation
 - o Recalls/lists the reasons why the patient may not breathe adequately at the end of surgery
 - o Recalls/identifies how to distinguish between the possible causes of apnoea
 - o Lists the possible causes of postoperative cyanosis
 - o Understands how to evaluate neuro-muscular block with the nerve stimulator - With respect to oxygen therapy:
 - o Lists its indications
 - o Knows the techniques for oxygen therapy and the performance characteristics of available devices
 - o Describes the correct prescribing of oxygen

- Recalls/explains the causes and management of stridor
- Discusses the indications for RSI
- Describes the care of the airway in an unconscious patient in the recovery room, including safe positioning
- Lists advantages and disadvantages of different techniques for airway management during resuscitation, including but not limited to:
 - Oro and nasopharyngeal airways
 - Laryngeal Mask type supraglottic airways including but not limited to: LMA, Proseal, LMA supreme, iGel
 - Tracheal intubation
- Compares the methods by which ventilation can be maintained in a patient suffering a respiratory or cardiac arrest, using:
 - Mouth to mask
 - Self-inflating bag
 - Anaesthetic breathing system
 - Mechanical ventilator
- Discusses the different types of laryngoscope blades available in routine practice and the indications for their use
- Outlines the advantages/disadvantages and reasons for development of new laryngoscopes
- Outlines the indications for fibre-optic intubation and how awake intubation may be achieved
- Describes the management of the can't intubate, can't ventilate scenario
- Describes the principles of, and indications for, the use of needle cricothyrotomy and manual jet ventilation

Skills

- Demonstrates satisfactory proficiency in performing a relevant clinical examination and assessment of the airway and dentition
- Identifies normal appearances and significant abnormalities in radiographs including:
 - Cervical spine, chest

Head CT and MRI showing clear abnormalities relevant to the airway

- Reliably predicts the level of supervision they will require
- Demonstrates effective pre-oxygenation, including correct use of the mask, head position and clear explanation to the patient
- In respect of airway management:
 - Demonstrates optimal patient position for airway management, including head tilt, chin lift, jaw thrust
 - Manages airway with mask and oral/nasopharyngeal airways
 - Demonstrates hand ventilation with bag and mask [including self-inflating bag]
 - Able to insert and confirm placement of a Laryngeal Mask Airway

- Demonstrates correct head positioning, direct laryngoscopy and successful nasal/oral intubation techniques and confirms correct tracheal tube placement
- Demonstrates proper use of bougies
- Demonstrates correct securing and protection of LMAs/tracheal tubes during movement, positioning and transfer
- Correctly conducts RSI sequence
- Correctly demonstrates the technique of cricoid pressure
- Demonstrates correct use of advanced airway techniques including but not limited to Proseal, LMA supreme, iGel
- In respect of inhalational induction of anaesthesia:
 - Satisfactorily communicates with the patient during induction
 - Satisfactorily conducts induction
- Demonstrates the ability to maintain anaesthesia with a face mask in the spontaneously breathing patient
- Demonstrates failed intubation drill
- Demonstrates management of can't intubate, can't ventilate scenario
- Demonstrates correct use of oropharyngeal, laryngeal and tracheal suctioning
- Demonstrate appropriate management of tracheal extubation, including;
 - Assessment of return of protective reflexes
 - Assessment of adequacy of ventilation
 - Safe practice in the presence of a potentially full stomach
 - Demonstrates how to turn a patient into the recovery position
- Demonstrates small and large bore needle cricothyrotomy and manual jet ventilation
- Demonstrates surgical cricothyrotomy

4.3.2. Critical incidents

Core clinical Learning Outcomes:

- To gain knowledge of the principle causes, detection and management of critical incidents that can occur in theatre
- To be able to recognise critical incidents early and manage them with appropriate supervision
- To learn how to follow through a critical incident with reporting, presentation at audit meetings, and discussions with patients
- To recognise the importance of personal non-technical skills and the use of simulation in reducing the potential harm caused by critical incidents

Knowledge

- Recall/describes the causes, detection and management of the following:
 - Cardiac and/or respiratory arrest
 - Unexpected fall in SpO₂ with or without cyanosis
 - Unexpected increase in peak airway pressure

- Progressive fall in minute volume during spontaneous respiration or IPPV
- Fall in end tidal CO₂
- Rise in end tidal CO₂
- Rise in inspired CO₂
- Unexpected hypotension
- Unexpected hypertension
- Sinus tachycardia
- Arrhythmias:
 - ✦ ST segment changes
 - ✦ Sudden tachyarrhythmias
 - ✦ Sudden bradycardia ▪ Ventricular ectopics
 - ✦ Broad complex tachycardia
 - ✦ Ventricular Fibrillation
 - ✦ Atrial fibrillation
 - ✦ Pulseless electrical activity [PEA]
 - ✦ Convulsions
- Recalls/describes the causes, detection and management of the following specific conditions:
 - Difficult/failed mask ventilation
 - Failed intubation
 - Can't intubate, can't ventilate
 - Regurgitation/Aspiration of stomach contents
 - Laryngospasm
 - Difficulty with IPPV, sudden or progressive loss of minute volume
 - Bronchospasm
 - Pneumothorax and tension pneumothorax
 - Gas / Fat/ Pulmonary embolus
 - Adverse drug reactions
 - Anaphylaxis
 - Transfusion reactions, transfusion of mis-matched blood or blood products
 - Inadvertent intra-arterial injection of irritant fluids
 - High spinal block
 - Local anaesthetic toxicity
 - Accidental decannulation of tracheostomy or tracheal tube
 - Coning due to increases intracranial pressure
 - Malignant hyperpyrexia
- Discusses the importance of understanding the need for the following attitudes and behaviours:
 - Awareness of human factors concepts and terminology and the importance of nontechnical skills in achieving consistently high performance such as: effective communication, team-working,

leadership, decision-making and maintenance of high situation awareness

- Awareness of the importance and the process of critical incident reporting
 - Acceptance that it can happen to you; the unexpected can happen to anyone
 - To practice response protocols in resuscitation room or in simulation with other healthcare professionals as appropriate
 - The need to follow through a critical incident with proper reporting, presentation at morbidity meetings and warning flags as necessary, with appropriate supervision
 - The provision of information to the patient and where necessary ensuring they get the appropriate counselling and advice, with appropriate supervision
- Demonstrates good non-technical skills such as: [effective communication, team-working, leadership, decision-making and maintenance of high situation awareness]
 - Demonstrates the ability to recognise early a deteriorating situation by careful monitoring
 - Demonstrates the ability to respond appropriately to each incident listed above
 - Shows how to initiate management of each incident listed above
 - Demonstrates ability to recognise when a crisis is occurring
 - Demonstrates how to obtain the attention of others and obtain appropriate help when a crisis is occurring

4.3.3. ENT, maxillo-facial and dental surgery

Learning outcomes:

- Gain knowledge and skills of the perioperative anaesthetic care of patients undergoing minor to intermediate ear, nose and throat [ENT], maxilla-facial and dental surgery
- To be able to recognise the specific problems encountered with a shared airway and know the principles of how to manage these correctly *Core clinical learning outcome:*
- Deliver perioperative anaesthetic care to adults and children, for ear, adenotonsillar and nasal surgery

Knowledge

- Lists specific conditions that may complicate airway management [e.g. anatomical variation; tumour; bleeding]
- Describes how the surgeon operating in the airway, or requiring access via the airway, complicates anaesthesia for this type of surgery
- Recalls/describes the pathophysiology of obstructive sleep apnoea and its relevance to anaesthesia

- Recalls/describes the specialised devices used to maintain the airway during head and neck surgery
- Identifies the indications for the special surgical devices used during surgery including gags, micro-laryngoscopes, oesophagoscopes and laser surgery equipment
- Describes appropriate anaesthetic techniques for common ENT and dental procedures and lists the particular difficulties that face the anaesthetist including but not exclusively: tonsillectomy, septoplasty, myringotomy, middle ear surgery, dental extractions and apicectomies
- Recalls/explains the principles of correct and timely recognition/management of bleeding tonsils
- Explains the principles of the emergency management of the obstructed airway including tracheostomy
- Describes the special risk of transmitting prion diseases by contamination with tonsillar tissue and explains how this risk is minimised in practice

Skills

- Demonstrates development of preoperative assessment and preparation/optimisation knowledge and skills [as identified in the basis of anaesthetic practice], focused on the specific difficulties presented by these surgical sub-specialties
- The provision of safe perioperative anaesthetic care for a wide range of commonly performed procedures, with good operating conditions and an appropriate level of analgesia, including: procedures such as tonsillectomy, septoplasty and myringotomy, Common dental procedures such as extractions and apicectomies
- Demonstrates the correct use of a variety of specialised airway devices, including RAE tubes, LMAs, throat packs and intubating forceps
- Manages anaesthesia so as to achieve smooth emergence, with minimal airway disturbance, laryngospasm and bronchospasm
- Demonstrates awareness of the increased risk of airway complications postoperatively and takes precautions to assist in their early recognition and prompt management

4.3.4. Orthopaedic surgery

Learning outcomes:

- To gain knowledge, skills and experience of the perioperative anaesthetic care of patients requiring orthopaedic surgery including patients with long-bone fractures
- To understand the relevance of diseases of bones and joints to anaesthesia
- To be able to recognise and manage the perioperative complications of orthopaedic surgery relevant to anaesthesia

Core clinical learning outcome:

- Deliver perioperative anaesthetic care to adult patients for elective and emergency orthopaedic/trauma surgery to both upper and lower limbs,

including Open Reduction Internal Fixation [ORIF] surgery [which includes fractured neck of femur]

Knowledge

- Recalls/describes the perioperative implications of rheumatological disease, including but not limited to rheumatoid arthritis, osteoarthritis, osteoporosis and ankylosing spondylitis
- Recalls the complications of prolonged immobility, including those due to traction
- Recalls the problems associated with limb tourniquets
- Recalls/explains the potential hazards associated with positioning [supine, lateral, prone, sitting]
- Recalls/explains the problems associated with anaesthesia for surgery in the prone and lateral positions
- Recalls/describes the pathophysiology, diagnosis and management of specific orthopaedic surgical complications that are relevant to anaesthesia including but not exclusively:
 - o Bone cement Implantation Syndrome
 - o Diagnosis and management of fat embolism
 - o Upper and lower limb compartment syndromes
- Discusses strategies for blood conservation in major orthopaedic surgery
- Describes the principles of perioperative anaesthetic care for elective and emergency upper and lower limb orthopaedic surgery, including primary arthroplasty
- Discusses the current guidance on early surgical management of hip fractures and the necessary assessment for anaesthesia
- Discusses the timing of surgery, and the need for investigations in urgent [surgical] cases with cardiovascular signs
- Describes the different surgical procedures for managing hip fractures, the anaesthetic requirements for each and the current evidence for the choice of anaesthetic technique
- Discusses the importance of consistent decision making on fitness for surgery in elderly patients

Skills

- Demonstrates the provision of perioperative anaesthetic care for patients requiring orthopaedic surgery to the upper and lower limbs including but not exclusively:
 - o ORIF surgery including internal fixation of fractured neck of femur
 - o Lower limb primary arthroplasty including patients in the lateral position
- Demonstrates sensitive handling of the patient with cognitive disturbance or communication problems
- Demonstrates correct assessment and perioperative management of the elderly patient with a hip fracture
- Shows sensitive handling of patient with cognitive impairment in anaesthetic room

4.3.5. Regional anaesthesia

Learning outcomes:

- To become competent in all generic aspects of block performance
- Able to obtain consent for regional anaesthesia from patients
- Create a safe and supportive environment in theatre for awake and sedated patients
- Demonstrate knowledge of the principles of how to perform a number of regional and local anaesthetic procedures
- Be able specifically to perform spinal and lumbar epidural blockade
- Be able to perform some simple upper and lower limb peripheral nerve blocks under direct supervision
- Be able to use a peripheral nerve stimulator or ultrasound to identify peripheral nerves
- Demonstrate clear understanding of the criteria for safe discharge of patients from recovery following surgery under regional blockade
- Recognise that they should not attempt blocks until they have received supervised training, and passed the relevant assessments
- Accepts the right of patients to decline regional anaesthesia even when there are clinical advantages

Core clinical learning outcome:

- Demonstrates safely at all times during performance of blocks including:
 - marking side of surgery and site of regional technique; meticulous attention to sterility; selecting, checking, drawing up, diluting, and the adding of adjuvants, labelling and administration of local anaesthetic agents
- Establish safe and effective spinal and lumbar epidural blockade and manage immediate complications
- Ability to establish a simple nerve block safely and effectively

Knowledge

- Recalls/describes the anatomy relevant to regional and peripheral blocks identified [Cross ref basic sciences]
- Recalls the relevant physiology and pharmacology [including toxicity of local anaesthetic agents, its symptoms, signs and management, including the use of lipid rescue]
- Recalls the relevant physics and clinical measurement related to the use of nerve stimulators in regional anaesthesia
- Recalls the relevant basic physics and clinical application of ultrasound to regional anaesthesia
- Discusses the advantages/disadvantages, risks/benefits and indications/contra-indications of regional blockade
- Describes how to obtain consent from patients undergoing regional blockade

- Describes the principles of performing the following regional and local anaesthetic procedures:
 - o Subarachnoid and Lumbar/caudal epidural blockade
 - o Brachial plexus blocks: axillary, interscalene and supraclavicular
 - o Other more distal upper limb blocks [elbow and wrist]
 - o Lower limb blocks [femoral, sciatic and ankle]
 - o Ilio-inguinal nerve blocks/penile blocks
 - o Ophthalmic blocks
 - o Intravenous Regional Anaesthesia [IVRA]
- Demonstrates understanding of the use of continuous epidural infusions and the need to prescribe correctly
- Recalls/discusses the complications of spinal and epidural analgesia and their management including, but not exclusively, accidental total spinal blockade and accidental dural tap and post-dural puncture headache
- Describes techniques and complications of other blocks listed
- Shows understanding of the principles of identification of correct anatomy including the use of nerve stimulators and ultrasound
- Outlines the dangers of accidental intravenous administration of local anaesthetic drugs, signs, symptoms and management, including the role of intra-lipid
- Outlines the management of incomplete or failed regional blockade including, where appropriate, the use of rescue blocks
- Demonstrates understanding of the methods of sedation used in conjunction with regional anaesthesia
- Recalls/describes absolute and relative contraindications to regional blockade
- Outlines the possible effects regional blockade will have on the patient, list and the theatre staff and how these may be managed
- Lists the advantages and disadvantages of regional anaesthetic techniques for postoperative analgesia
- Describes the problems and solutions to obtaining adequate post-operative analgesia in the ward or home [if discharged] setting when the regional anaesthetic wears off
- Understands the need to review patients or contact patient following regional anaesthetic techniques to ensure block has worn off and there are no residual complications
- Understand the necessity to document the procedure and any complications e.g. paraesthesia, vascular puncture, pneumothorax and record images / video clip if using ultrasound where appropriate or indicated
- Be aware of the use of information leaflets in the decision making process and in the reporting of problems or complications following discharge
- Recalls the relevant basic physics and clinical application of ultrasound to regional anaesthesia

Skills

- Obtains valid consent for regional blockade, including confirmation and marking of side of operation and site or regional technique where indicated
- Demonstrates safe and correct checking of the contents of epidural / spinal packs
- Practices safely including: meticulous attention to sterility during performance of blockade; selecting, checking, drawing up, diluting, adding adjuvants, labelling and administration of local anaesthetic agents
- Demonstrates how to undertake a comprehensive and structured pre-operative assessment of patients requiring a subarachnoid blockade, perform the block and manage side effects/complications correctly
- Demonstrates how to undertake a comprehensive and structured pre-operative assessment of patients requiring a lumbar epidural blockade, perform the block and manage side effects/complications correctly
- Recognises which patients are unsuitable for regional blockade
- Recognises patients in whom a block would be difficult to perform
- Demonstrates the management of hypotension, nausea, anxiety and shivering induced by spinal or epidural blockade
- Demonstrates correct post-operative care following spinal or epidural block
- Demonstrates how to use epidural techniques for post-operative pain management
- Demonstrates how to perform some simple nerve blocks from amongst the following:
 - o Femoral
 - o Ankle
 - o Elbow, wrist and or digital
 - o Rectus sheath
 - o Inguinal
 - o Intercostal
 - o Infiltration techniques
- Shows how to use sedation correctly during surgery under regional blockade
- Manages patients with combined general and regional anaesthesia
- Shows consideration for the views of patients, surgeons and theatre team with regard to surgery under regional blockade
- Shows the ability to correctly manage the theatre environment with an awake or sedated patient
- Demonstrates list planning to allow time for the conduct of a block and for it to take effect
- Shows good communication skills towards the patients and staff during the use of regional blockade
- Shows due care and sensitivity to the patients' needs during performance of regional block
- Demonstrates how to identify peripheral nerves using basic ultrasound technology [e.g. the median, radial and ulna in the arm]

4.3.6. Transfer Medicine

Learning outcomes:

- Correctly assesses the clinical status of patients and decides whether they are in a suitably stable condition to allow intra-hospital transfer
- Gains understanding of the associated risks and ensures they can put all possible measures in place to minimise these risks

Core clinical learning outcome:

- Safely manages the intra-hospital transfer of the critically ill but stable adult patient for the purposes of investigations or further treatment [breathing spontaneously or with artificial ventilation] with distant supervision

Knowledge

- Explains the importance of ensuring the patient's clinical condition is optimised and stable prior to transfer
- Explains the risks/benefits of intra-hospital transfer
- Recalls/describes the minimal monitoring requirements for transfer
- Lists the equipment [and back up equipment] that is required for intra-hospital transfer
- Outlines the physical hazards associated with intra-hospital
- Explains the problems caused by complications arising during transfer and the measures necessary to minimise and pre-empt difficulties
- Outlines the basic principles of how the ventilators used for transfer function
- Indicates the lines of responsibility that should be followed during transfer
- Outlines the consent requirements and the need to brief patients in transfer situations
- Outline the issues surrounding the carrying/recording of controlled drugs during transfer
- Describes the importance of keeping records during transfer
- Outlines the problem of infection and contamination risks when moving an infected patient
- Explains how to assess and manage an uncooperative and aggressive patient during transfer Understands hospital protocols governing transfer of patients between departments Outlines the importance of maintaining communication, when appropriate with the patient and members of the transfer team.

Skills

- Demonstrates the necessary organisational and communication skills to plan, manage and lead the intra- hospital transfer of a stable patient
- Demonstrates how to set up the ventilator and confirm correct functioning prior to commencing transfer
- Demonstrates safety in securing the tracheal tube securely prior to commencing the movement/transfer
- Demonstrates the ability to calculate oxygen and power requirements for the journey

- Demonstrates safety in securing patient, monitoring and therapeutics before transfer
- Demonstrates how to check the functioning of drug delivery systems
- Demonstrates appropriate choices of sedation, muscle relaxation and analgesia to maintain the patient's clinical status during transfer
- Demonstrates the ability to maintain monitoring of vital signs throughout transfer
- Demonstrates the ability to maintain clinical case recording during

4.3.7. Trauma and stabilisation

Learning outcomes:

- To understand the basic principles of how to manage patients presenting with trauma
- To recognise immediate life threatening conditions and prioritise their management

Core clinical learning outcome:

- Understands the principles of prioritizing the care of patients with multi-trauma including airway management

Knowledge

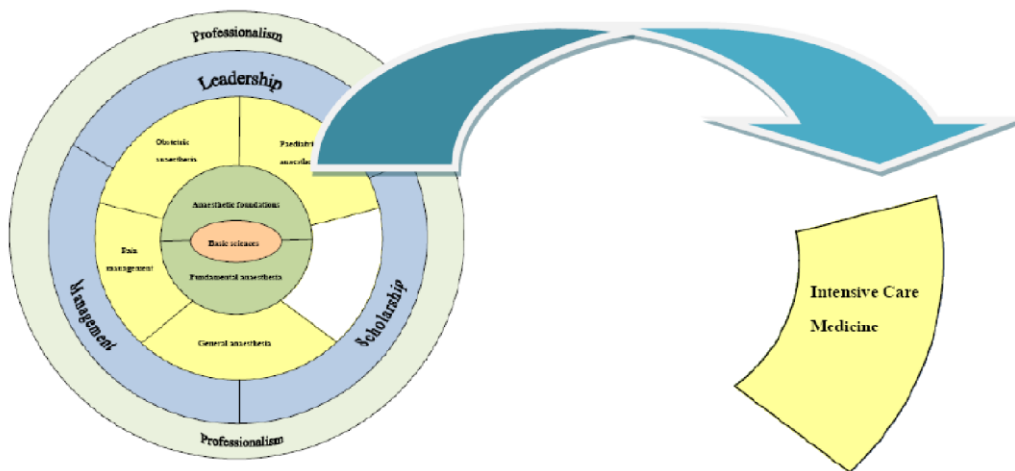
- Explains the principles of the primary and secondary survey in trauma patient
- Recalls/describes the related anatomy, physiology and pharmacology
- Recalls/describes the pathophysiological changes occurring in the trauma patient
- Explains the importance of early recognition of and the potential for airway compromise
- Explains the importance of correct airway management in the trauma patient
- Describes how to recognise and correctly manage hypovolaemia and other causes of shock
- Recalls/describes the indications for invasive cardiovascular monitoring, the relevant anatomy, principles of placement, associated complications and principles of their management
- Recalls/discusses the effects of hypothermia, the reasons for its prevention and methods available in trauma patients
- Explains the importance of correct pain relief in the trauma patient and methods used
- Discusses the options available for intravenous access in trauma patients including the intraosseous route
- Understands the importance of preventing hypothermia and acidosis in the trauma patient
- Describes the correct initial investigations required in the trauma patient
- Describes the imaging requirements in the emergency room
- Recalls/explains the principles of assessment and management of patients with brain injury [including the use of the Glasgow Coma Scale [GCS]]

- Describes the causes and mechanisms for the prevention of secondary brain injury
- Outlines the particular problems associated with patients presenting with actual or potential cervical spine injuries particularly airway management
- Describes the principles of the perioperative management of the trauma patient
- Describes how to manage intra-hospital transfer of trauma patients

Skills

- Demonstrates how to perform the Primary survey in a trauma patient
- Demonstrates correct emergency airway management in the trauma patient including those with actual or potential cervical spine damage
- Demonstrates how to manage a tension pneumothorax
- Demonstrates how to insert a chest drain
- Demonstrates assessment of patients with brain injury including the use of the GCS
- Demonstrates the initial resuscitation of patients with trauma and preparation for further interventions including, emergency surgery
- Demonstrates provision of safe perioperative anaesthetic management of patients with multiple trauma
- Demonstrates how to perform a secondary survey in a trauma patient
- Demonstrates the ability to undertake intra-hospital transfer of patients from the Emergency Department for further management [e.g. to imaging suite, theatre and/or intensive care]

4.4. INTENSIVE CARE MEDICINE



Learning outcomes:

- Appreciate the factors involved in the decision to admit to the ICU
- Identify a sick patient at an early stage
- Be able to undertake immediate resuscitation of patients with cardiac arrest and sepsis
- Have an outline understanding of the pathology, clinical features and the management of common problems which present to ICU
- Understand the principles and place of the common monitoring and interventions in ICU
- Be able to follow a management plan for common ICU problems and recognise developing abnormalities, but appreciate that they will need assistance in deciding on an appropriate action.
- Be able to continue the management, with distant supervision, of:
 - a resuscitated patient
 - a stable post-operative patient
 - a patient established on non-invasive ventilation

Knowledge

Domain 1: Resuscitation and 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

Domain 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 Performs electrocardiography [ECG / EKG] and interprets the results
- 2.4 Obtains appropriate microbiological samples and interprets results
- 2.5 Obtains and interprets the results from blood gas samples
- 2.6 Interprets imaging studies
- 2.7 Monitors and responds to trends in physiological variables
- 2.8 Integrates clinical findings with laboratory investigations to form a differential diagnosis

Domain 3: Disease Management

- 3.1 Manages the care of the critically ill patient with specific acute medical conditions
- 3.2 Identifies the implications of chronic and co-morbid disease in the acutely ill patient
- 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

Domain 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
- 4.6 Initiates, manages, and weans patients from invasive and non-invasive ventilatory support
- 4.8 Recognises and manages electrolyte, glucose and acid-base disturbances
- 4.9 Co-ordinates and provides nutritional assessment and support

Domain 5: Practical procedures

- 5.1 Administers oxygen using a variety of administration devices
- 5.2 Performs emergency airway management
- 5.4 Performs endotracheal suction
- 5.7 Performs chest drain insertion
- 5.8 Performs arterial catheterisation
- 5.9 Performs ultrasound techniques for vascular localisation
- 5.10 Performs central venous catheterisation
- 5.11 Performs defibrillation and cardioversion

- 5.14 Demonstrates a method for measuring cardiac output and derived haemodynamic variable
- 5.15 Performs lumbar puncture [intradural / 'spinal'] under supervision

Domain 6: Peri-operative care

- 6.1 Manages the pre- and post-operative care of the high risk surgical patient

Domain 7: Comfort and 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

Domain 8: End of life care

- 8.2 Discusses end of life care with patients and their families / surrogates

Domain 9: Paediatric care

- 9.1 Applies the special considerations that are required for children to the critical care environment

Domain 10: Transport

See Transfer Medicine under General Anaesthesia

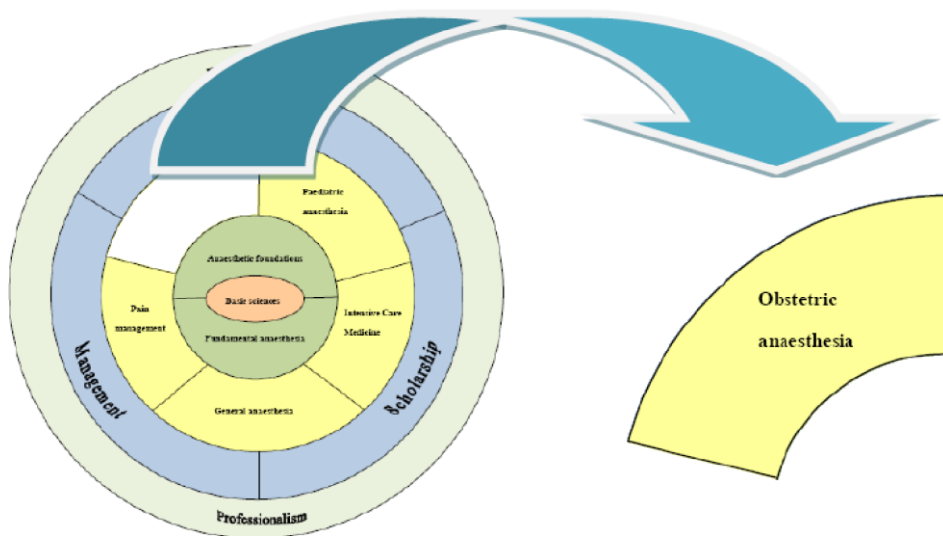
Domain 11: Patient safety and health systems management

- 11.2 Complies with local infection control measures
- 11.3 Identifies environmental hazards and promotes safety for patients and staff
- 11.4 Identifies and minimises risk of critical incidents and adverse events, including complications of critical illness
- 11.6 Critically appraises and applies guidelines, protocols and care bundles
- 11.7 Describes commonly used scoring systems for assessment of severity of illness, case mix and workload

Domain 12: Professionalism

- 12.1 Communicates effectively with patients and relatives
- 12.2 Communicates effectively with members of the health care team
- 12.3 Maintains accurate and legible records / documentation
- 12.6 Respects privacy, dignity, confidentiality and legal constraints on the use of patient data
- 12.7 Collaborates and consults; promotes team-working
- 12.8 Ensures continuity of care through effective hand-over of clinical information
- 12.11 Takes responsibility for safe patient care
- 12.13 Seeks learning opportunities and integrates new knowledge into clinical practice
- 12.14 Participates in multidisciplinary teaching
- 12.15 Participates in research or audit under supervision

4.5. OBSTETRIC ANAESTHESIA



Learning outcome:

- To gain knowledge, skills and experience of the treatment of the pregnant woman *Core clinical learning outcomes:*
- To be able to provide analgesia and anaesthesia as required for the majority of the women in the delivery suite
- To understand the management of common obstetric emergencies and be capable of performing immediate resuscitation and care of acute obstetric emergencies [e.g. eclampsia; pre-eclampsia; haemorrhage], and recognising when additional help is required

Knowledge

- Recalls/describes the anatomy, physiology and pharmacology related to pregnancy and labour [cross ref basic sciences]
- Lists common obstetric indications for anaesthetic intervention on the delivery suite
- Describes the effects of aortocaval compression and how to avoid it
- Recalls/describes how to assess fetal wellbeing in utero
- Discusses the management of pre-eclampsia and eclampsia
- Lists risk factors and describes the management of major obstetric haemorrhage
- Explains local feeding / starvation policies and the reasons behind them
- Explains the thromboprophylaxis requirements in pregnancy
- Describes the grading of urgency of Caesarean section
- Explains why anaesthetic techniques must be modified in the pregnant patient
- Lists methods of analgesia during labour and discusses their indications and contraindications
- Describes epidural or CSE analgesia in labour and recalls/discusses the indications, contraindications and complications

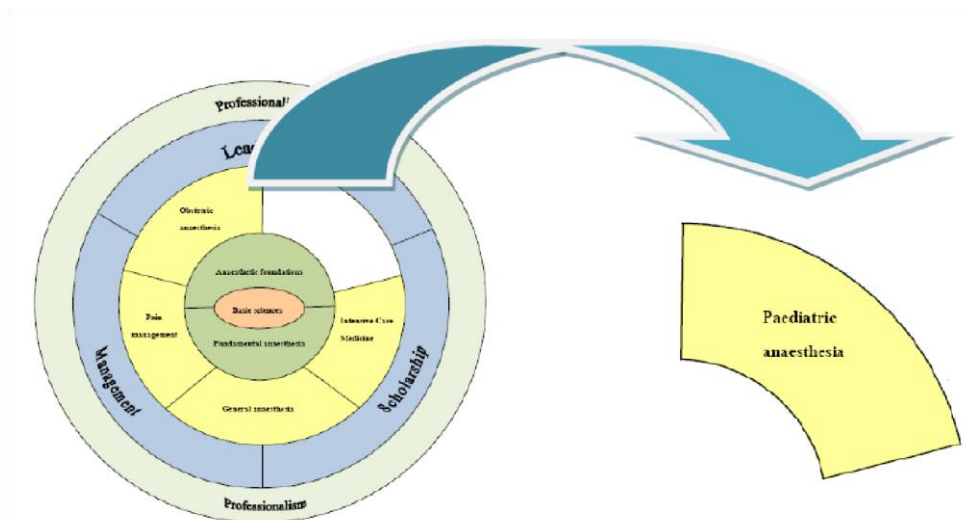
- Explains how to provide regional anaesthesia for operative delivery
- Understands the need to call for assistance after several attempts at placement of regional blocks proves unsuccessful
- Describes the immediate management of accidental dural puncture
- Recalls/describes maternal and basic neonatal resuscitation
- Describes how to access local maternity guidelines and the value of having these guidelines
- Recalls/describes the influence of common concurrent medical diseases on
- Discusses the obstetric and anaesthetic management of a premature delivery
- Discusses the obstetric and anaesthetic management of multiple pregnancy
- Explains the classification of placenta praevia and the associated risk to the patient
- Recalls/describes the recognition and management of amniotic fluid embolus
- Describes the recognition and management of inverted uterus
- Demonstrates understanding of the methods of treating post dural puncture headache
- Discusses common causes of maternal morbidity and mortality, including national reports
- Discusses the particular sensitivity of patient choices in obstetric practice – even when this is not in line with accepted evidence based best practice e.g. choice of birth plan, and refusal of blood products

Skills

- Undertakes satisfactory preoperative assessment of the pregnant patient
- Demonstrates the ability to clearly explain and prepare an obstetric patient for surgery
- Demonstrates the use of techniques to avoid aorto-caval compression
- Demonstrates the ability to provide epidural analgesia in labour
- Demonstrates the ability to provide spinal anaesthesia for caesarean section
- Demonstrates the ability to convert epidural analgesia to epidural anaesthesia for surgical intervention
- Demonstrates the ability to provide general anaesthesia for caesarean section
- Demonstrates an appropriate choice of anaesthesia/analgesia for instrumental delivery
- Demonstrates an appropriate choice of anaesthesia for retained placenta
- Demonstrates safe and effective management of post-delivery pain relief
- Demonstrates ability to recognise when an obstetric patient is sick and the need for urgent assistance
- Demonstrates the ability to provide advanced life support for a pregnant patient
- Demonstrates the ability to provide basic neonatal life support
- Demonstrates satisfactory assessment of pregnant woman presenting for anaesthesia / analgesia including those with concurrent disease
- Demonstrates ability to communicate a balanced view of the advantages, disadvantages, risks and benefits of various forms of analgesia and anaesthesia appropriate to individual patients
- Demonstrates the ability to provide intravenous opiate analgesia including PCA for labour

- Demonstrates the ability to manage complications of regional block including failure to achieve an adequate block
- Demonstrates the ability to choose the most appropriate regional technique for an operative delivery and justify the decision
- Demonstrates the appropriate management of accidental dural puncture and post-dural puncture headache
- Demonstrates the ability to provide intra uterine resuscitation for the “at risk” baby
- Demonstrates the ability to provide appropriate anaesthesia for a caesarean section for placenta praevia
- Demonstrates the ability to manage a high dependency obstetric patient with distant supervision

4.6. PAEDIATRIC ANAESTHESIA



Learning outcomes:

- Develop in-depth knowledge and understanding of the anaesthetic needs of children and neonates
- Understand the potential hazards associated with paediatric anaesthesia and have obtained practical skills in the management of such events

Core clinical learning outcomes:

- Demonstrates correct management of the paediatric airway in the following ways
 - Is able to size airway devices correctly [i.e. oral airways and tracheal tubes]
 - Is able to insert airway devices correctly
 - Is able to ventilate an apnoeic child using a bag and mask +/- an oral airway
 - Is able to intubate a child correctly, using the most appropriate size tracheal tube, placed at the correct length

Knowledge

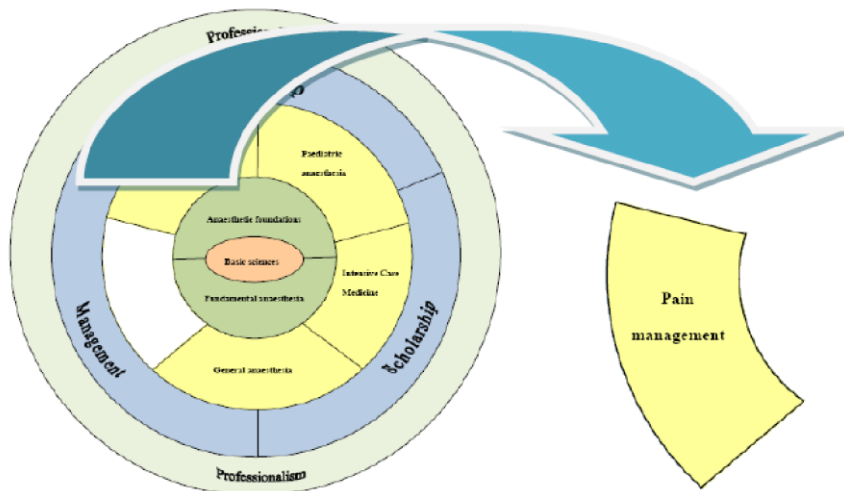
- Recalls/explains the relevance of the basic sciences specific to children
- Describes the preoperative assessment and psychological preparation of children [and their parents] for surgery
- Explains the importance of avoiding excessive starvation times
- Describes how anaesthesia can be induced for children
- Describes maintenance of anaesthesia for children
- Describes how recovery from anaesthesia is managed in children
- Explains the management of postoperative pain, nausea and vomiting in children
- Describes the management of acute airway obstruction including croup, epiglottitis and inhaled foreign body
- Recalls/explains how blood volume is estimated and how correct solutions and volumes are used for replacement of fluid loss. Particular attention must be given to the risks of hyponatraemia if hypotonic solutions are used for fluid resuscitation
- Explains the importance of modification of drug dosages
- Describes how pain-relief is provided for children undergoing surgery including the use of common regional techniques [e.g. Caudal epidural, ilioinguinal block]
- Explains the place of premedication, including topical anaesthesia for venepuncture
- Describes paediatric anaesthetic equipment and the differences from adult practice
- Recalls/explains how to calculate tracheal tube sizes and the reasons for its importance; sizing of face masks and airways [oro- and naso-pharyngeal and LMAs]
- Explains the choice of breathing systems and the appropriate fresh gas flow rates
- Explains the importance of identifying when upper respiratory tract infections are/are not significant and, as a result, when to cancel operations
- Explains how to obtain consent for anaesthesia in children
- Recalls/explains the implications of paediatric medical and surgical problems including major congenital abnormalities (e.g. tracheoesophageal fistula, diaphragmatic hernia,) congenital heart disease and syndromes e.g. Down's for anaesthesia
- Recalls/explains the adverse effects of starvation and hypoglycaemia in neonates and children
- Recalls the specific factors in preoperative assessment and preparation of neonates for surgery
- Describes special anaesthetic techniques for
- Explains the difficulty of thermoregulation in the new born and the measure required to prevent hypothermia
- Describes the anaesthetic management of neonates and infants for minor operations, major elective and emergency surgery
- Calculates the analgesic requirements of neonates and infants
- Describes the specific anaesthetic and monitoring equipment required for neonates

- Lists common anaesthetic problems in the neonatal period and explains their perioperative anaesthetic management [e.g. inguinal hernia, intestinal obstruction, pyloric stenosis]
- Describes the special problems of the premature and ex-premature neonate
- Recalls/explains how to recognise the critically ill child with e.g. sepsis, trauma, convulsions, diabetic emergencies and describes their timely management
- Explains the principles of stabilisation and safe transport of critically ill children and babies

Skills

- Undertakes satisfactory preoperative assessment of children
- Demonstrates the ability to use the correct technique for induction, maintenance and monitoring for elective and emergency anaesthesia
- Shows how to manage the environment during the induction of anaesthesia in children
- Demonstrates ability to secure peripheral venous access in children
- Demonstrates ability to perform intraosseous cannulation
- Demonstrates ability to manage the airway correctly including selection of the correct masks, airways, laryngeal mask airways and tracheal tubes
- Demonstrates ability to perform both intravenous and gaseous induction of general anaesthesia in children
- Demonstrates ability to stabilise and manage the sick or injured child
- Shows sensitivity when communicating with children and their parents/carers
- Shows how to recognise signs leading to suspicion of non-accidental injury or abuse and the correct action
- Demonstrates the ability to resuscitate all ages, both basic and advanced [BLS and ALS]
- Demonstrates correct selection, management and monitoring of children requiring diagnostic and therapeutic procedures carried out under sedation
- Demonstrates ability to maintain perioperative physiology [e.g. glucose, fluids and temperature] in children
- Demonstrates strategies for, and the practical management of, anaesthetic emergencies in children [e.g. loss of airway, laryngospasm, failed venous access, anaphylaxis including latex allergy]
- Demonstrates correct postoperative pain management, including the use of regional and local anaesthetic techniques, simple analgesics, NSAIDs and opioids
- Demonstrates the ability to communicate clearly with children & young people, parents and carers. including those with cognitive, communication or behavioural problems

4.7. PAIN MEDICINE



Learning outcomes:

- To be competent in the assessment and effective management of acute post-operative and acute non post-operative pain
- To acquire knowledge necessary to provide a basic understanding of the management of chronic pain in adults

Core clinical learning outcomes:

- Competence in the assessment of acute surgical and non-surgical pain and demonstrate the ability to treat effectively
- To have an understanding of chronic pain in adults

Knowledge

- Recalls the anatomy and physiology of pain medicine to include nociceptive, visceral and neuropathic pain
- Describes drugs used to manage pain and their pharmacology [including but not limited to opioids, NSAIDs, Coxibs, local anaesthetics and drugs used to manage neuropathic pain]
- Explains the principles of neural blockade for acute pain management
- Describes the methods of assessment of pain
- Explains the relationship between acute and chronic pain
- Describes a basic understanding of chronic pain in adults
- Explains the importance of the biopsychosocial aspects of pain
- Describes the organisation and objectives of an acute pain service
- Explains the limitations of pain medicine

Skills

- Demonstrates the ability to assess manage and monitor acute surgical and non-surgical pain and side effects of medication
- Demonstrates appropriate and safe drug prescribing

- Demonstrates the safe use of equipment used to manage pain including equipment used for PCA, epidurals and inhalational techniques
- Demonstrates the safe and effective use of local anaesthetic peripheral and regional neural blockade techniques
- Demonstrates the ability to manage severe unrelieved acute pain and distress in a timely, safe and effective manner
- Demonstrates the importance of regular on-going monitoring of pain management/follow up
- Demonstrates recognition of acute neuropathic pain
- Demonstrates the ability to communicate effectively with patients, relatives and carers including advantages, disadvantages and side effects of pain management

4.8. LEADERSHIP AND MANAGEMENT



Medical Leadership Framework

Learning outcomes:

1. Introduction to Health Leadership

- Understand the programme – context, structure and approach
- Gain an understand the different definitions/theories of leadership and management
- Appreciate different leadership styles and attributes
- Improve understanding of local health structure and environment

2. Personal Impact and Influence

- Develop communication skills
- Understand how yourself and others like to be communicated with
- Understand what good presentation skills look like
- Improve knowledge and skills on how to resolve conflict

3. Project Management

- Understand the planning cycle and how it can improve healthcare
- Understand the change process
- Appreciate the importance in stakeholder engagement in change
- Become familiar with a range of change management techniques
- Learn how to develop a project plan and implement

4. Team Building

- Understand the importance of awareness of self and others through models such as Belbin and Myers Briggs.
- To recognise and value "normal" personality differences, including diversity and equality
- Understand the importance of and the benefits of good team work
- Recognise the value and importance of multi-professional roles

5. People and Performance Management

- Understand how to motivate others
- Understand the local HR policies within which you are working
- Understand the need for workforce redesign
- Recognise and practice how to tackle challenging behaviour

6. Data, data, data!

- Understand the importance of monitoring and evaluating services and improvements
- Understand the audit cycle
- Understand the importance of evidence based decision making

7. Finance/procurement

- Understand how healthcare money flows nationally and locally
- Understand and practice budget setting and management
- Understand the importance of cost effectiveness in healthcare
- Learn how to write a business case
- Gain knowledge in local and national procurement processes

8. Mentoring/coaching

- Explore the definitions and values of mentoring and coaching
- Understand you own motivations and career drivers
- Understand the importance of feedback skills for team and personal development

- Practice giving and receiving feedback with peers

9. Setting direction

- Understand the importance of strategy
- Identify and develop department objectives
- Appreciate the importance of working across organisational boundaries

10. Patient Experience

- Understand the concept of customer service in the context of healthcare
- Understand the value of patient, relative and staff feedback in improving services
- Understand the importance of patient confidentiality
- Appreciate how to reduce errors and complaints through clear giving, receiving and recording of information and the importance of being open and honest

4.9. SCHOLARSHIP

Scholarship will be considered in four categories according to Boyer's model of the scholarship of discovery (original research), teaching, integration (review and synthesis of the literature) and application (knowledge translation) (1,2).

Scholarship of discovery

STP trainees will be expected to complete one audit and one Quality Improvement project every year, as described below. STP trainees will be encouraged to collaborate on or undertake research projects relating to anaesthesia and critical care – and supported to develop skills in research methodology and statistics.

Scholarship of teaching

Opportunities for teaching include peer teaching of trainees from their own and other post-graduate years and teaching of anaesthesia clinical officers.

- Small group teaching including tutorials, simulation and case-based teaching. It is anticipated that this will be observed and assessed in the 3rd and 4th years of training by visiting or local faculty.
- Large group teaching (lectures)-It is anticipated that this will be observed and assessed in the 3rd and 4th years of training by visiting or local faculty.

Scholarship of integration

This involves stepping back from a narrow area of research to search for connections between discoveries obtained by different approaches or even from varied disciplines. It includes critical appraisal of the literature and literature reviews.

Trainees will be expected to:

- Present the critical appraisal of original research at a departmental journal club. This will be observed and assessed by visiting or local faculty.

Scholarship of application

This can also be described as knowledge translation, or building bridges between theory and practice. This aspect of scholarship basically asks how knowledge can be used in a practical situation.

Trainees will be expected to:

- Audit (or re-audit) current clinical anaesthesia practice in their training centre to established standards from the published literature. It is expected that trainees will complete an audit (or re-audit) in the first two years of their training. This will be assessed with the STP Anaesthesia Program Audit Marking Criteria form (see appendix).
- Draft or revise departmental protocols for the clinical management of different situations in anaesthesia practice in the department, applying conclusions from the peer-reviewed literature and other published protocols to the local context. These protocols will be developed in collaboration with consultants in all relevant specialties, will need to be approved by all relevant heads-of-department and will be revised every three years (minimum).

4.10. PATIENT SAFETY

This curriculum element is based on the 6 Canadian Patient Safety Institute (CPSI) Patient Safety Competencies.

Contribute to a Culture of Patient Safety

A commitment to applying core patient safety knowledge, skills, and attitudes to everyday work.

Postgraduate students must demonstrate the following competencies:

1. Commit to patient and provider safety through safe, competent, high-quality daily practice
2. Describe the fundamental elements of patient safety
3. Maintain and enhance patient safety practices through ongoing learning
4. Demonstrate a questioning attitude as a fundamental aspect of professional practice and patient care

This will be assessed using end of module evaluation forms by visiting faculty members and with multi-source feedback (MSF) assessments.

Work in Teams for Patient Safety

Working within inter-professional teams to optimize patient safety and quality of care.

Trainees must demonstrate the following competencies:

1. Participate effectively and appropriately in an inter-professional health care team to optimize patient safety
2. Meaningfully engage patients as the central participants in their health care teams
3. Appropriately share authority, leadership, and decision-making
4. Work effectively with other health care professionals to manage inter-professional conflict

This will be assessed using end of module evaluation forms by visiting faculty members and with multi-source feedback (MSF) assessments.

Communicate Effectively for Patient Safety

Promoting patient safety through effective healthcare communication.

Trainees must demonstrate the following competencies:

1. Demonstrate effective verbal and non-verbal communication abilities to prevent adverse events
2. Communicate effectively in special high-risk situations to ensure the safety of patients
3. Use effective written communications for patient safety
4. Apply communication technologies appropriately and effectively to provide safe patient care

A focus on these non-technical skills is an important part of simulation training. This will be assessed using end of module evaluation forms by visiting faculty members and with multi-source feedback (MSF) assessments.

Manage Safety Risks

Anticipating, recognizing, and managing situations that place patients at risk.

Trainees must demonstrate the following competencies:

1. Recognize routine situations and settings in which safety problems may arise
2. Systematically identify, implement, and evaluate context-specific safety solutions

3. Anticipate, identify and manage high-risk situations

This will be assessed using end of module evaluation forms by visiting faculty members and with multi-source feedback (MSF) assessments. This will include audit and quality improvement projects.

Optimize Human and Environmental Factors

Managing the relationship between individual and environmental characteristics in order to optimize patient safety.

Trainees must demonstrate the following competencies:

1. Describe the individual and environmental factors that can affect human performance
2. Apply techniques in critical thinking to make decisions safely
3. Appreciate the impact of the human/technology interface on safe care

This will be assessed using end of module evaluation forms by visiting faculty members and with multi-source feedback (MSF) assessments.

Recognize, Respond to, and Disclose Adverse Events

Recognizing the occurrence of an adverse event or close call and responding effectively to mitigate harm to the patient, ensure disclosure, and prevent recurrence.

Trainees must demonstrate the following competencies:

1. Recognize the occurrence of an adverse event or close call
2. Mitigate harm and address immediate risks for patients and others affected by adverse events and close calls
3. Disclose the occurrence of an adverse event to the patient and/or their families as appropriate and in keeping with relevant legislation
4. Report the occurrence of an adverse event or close call
5. Participate in timely event analysis, reflective practice and planning for the prevention of recurrence

This will be assessed using end of module evaluation forms by visiting faculty members with specific attention to involvement and participation in mortality and morbidity rounds.

Appendix A - ARCP Assessment

Candidate Name:	
Examiner panel:	

DOMAIN	1-2	3-4	5-6	7-8	9-10
Time spent in Training (amount of absence from work)	Prolonged absence from work with significant impact on training	Absence from work exceeds the guidelines, with some impact on training	Acceptable absences from work within the departmental guidance	Minimal absence from work apart from recognized annual and study leave	No absence from work apart from recognized annual and study leave
Workplace-Based Assessments	None undertaken in the last academic year	Insufficient number or inadequate in quality	Satisfactory in number and quality	Exceeds basic requirement and/or of good quality	Excellent in number and quality
Logbook of clinical activity	No logbook kept	Inadequate completion of logbook	Satisfactory number and variety of procedures undertaken	Exceeds expected number and/or variety for grade	Excellent in number and variety
Audits Completed	No audit project undertaken	Incomplete audit project	Satisfactory participation in audit project	Completed audit with presentation to the department	Completed audit with national/international presentation; or re-audit
Quality Improvement Activity	No participation or observation of quality improvement activity	Has observed quality improvement activity, but not participated	Participation in a quality improvement activity	Completed a quality improvement project/activity	Measurable outcome from a quality improvement project/activity
Leadership & Management	No awareness or participation in leadership or management activities	No participation in any activity that may develop leadership or management competencies	Participates in leadership or management activities appropriate to stage of training	Has a significant role in leadership and/or management within the department	Has a leadership and/or management role in the hospital, regionally or nationally
Teaching	Does not deliver any teaching	Minimal teaching activity	Has delivered teaching to peer group within anaesthetics	Has delivered teaching at a hospital or regional level	Has delivered teaching at national or international level
Supervisor/360° Feedback (if available)	Significant concerns in one or several areas	Some concerns in one or several areas	Satisfactory feedback with no concerns	Excellent performance in one or more domains	Exceptional performance in all domains
Global rating of Overall Presentation	Below standard in all respects, with significant concerns about progress	Borderline overall performance, with some concerns about ability to progress	Typical performance for grade. Areas of underperformance can be easily addressed	Performance above standard in most respects with few concerns	Performance above standard in every respect. Exceptional.

Final mark	Outcome decision	Examiner's comments
	<p>Outcome 1: Clear Pass Achieving progress and the development of competences at the expected rate. The trainee must have also satisfied examiners in the appropriate prescribed examinations for the level of competence, for example, Part 1: Foundation level; Part 2: Core Specialty Rotations; and Part III: Specialty Certification Level.</p> <p>Outcome 2: Proceed & Remediate Development of specific competences required but additional training time not required.</p> <p>Outcome 3: Inadequate Progress</p>	

Additional training time required.

Outcome 4: Exclude from STP

Released from training programme
unsatisfactory progress rate in gaining
competences.

Outcome 6: Graduate

Certificate of Eligibility for Specialist

Registration. Gained all required
competences – Will be recommended as
having completed the training
programme and will be recommended

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APPENDIX B – STANDARDS FOR TRAINING

Anaesthesia Training Programme Standards for Training

This document refers to the nine standards for training as described in *Specialty Training Guidelines for Zambia 2017*.

Domain 1: Patient Safety

Please refer to section 4.10 of the STP Handbook

Domain 2: Quality Management, Review and Evaluation

Quality will be ensured in the following ways:

- HPCZ Approval against standards of STP, curricula and training centres.
- Evidence-based policies and guidelines regarding areas of greatest regulatory risk.
- HPCZ Inspection and monitoring visits and checks.
- Peer review mechanisms, including the presence of an external examiner at the part one and part two examinations.
- Linkages with the HPCZ and MoH Quality Improvement Framework

Domain 3: Equality, Diversity and Opportunity

Equality of opportunity is fundamental to the selection, training and assessment of anaesthetists. Trainees will not be discriminated against on the basis of ability, age, bodily appearance and decoration, class, creed, caste, culture, gender, health status, relationship status, mental health, offending background, place of origin, political beliefs, race, and responsibility for dependants or religion. All trainees will receive equality and diversity training.

Domain 4: Recruitment, Selection and Appointment

The process of recruitment is an annual event for the programme and runs immediately after the training posts are advertised by the Ministry of Health, enabling successful applicants to formally join the programme at the start of the training year, in January.

We aim to recruit to 100% of our training quota, as agreed by the Ministry of Health of Zambia, which is traditionally ten places per year.

4.1 How this programme recruits

All applicants must:

Complete an application form

Collect three references

Attend an interview

The application form is set by the Zambian College of Anaesthetists and is released at the time the training positions are advertised by the Ministry of Health. In this application, applicants are asked to provide evidence that they meet the longlisting criteria including having completed school education to stage 12, have completed a medicine undergraduate degree and are registered with the Health Professions Council of Zambia. They are also asked to gain three references, two academic and one professional, from Consultants or Senior Registrars who have supervised them in this capacity.

All applicants that meet the long-listing criteria will be interviewed. This is done face-to-face unless there are exceptional circumstances meaning the applicant is unable to travel. Interviews aim to determine the qualifications of the doctor, their commitment to anaesthesia, and should answer any questions that they might have about the training programme. We request that applicants all attend a careers talk about Anaesthesia Specialty Training at their local central or tertiary hospital, and an anaesthesia taster day enabling them to meet other Anaesthesia trainees and see the day-to-day role of the anaesthetist. Although these appear to be useful for the applicant and the department, they are desirable and not essential to undertake prior to joining the programme.

4.2 Completion of the recruitment process

After all applicants are interviewed, each applicant is presented to the Zambian College of Anaesthetists with a recommendation to either be admitted or not admitted to the programme. The Zambian College of Anaesthetists then presents these applicants to the Ministry of Health who provide formal acceptance letters.

4.3 Policy Maintenance

The Specialty Training Programme Director is responsible for the maintenance of this guidance.

Domain 5: Delivery of Approved Curriculum including Assessment

Please refer to the content of the handbook.

Domain 6: Support and Development of Directors, Coordinators, Trainers, Assessors, and Trainees

The ZACOMS Training and Examinations committee is responsible for registering specialty registrars; arranging specialty Index registrar numbers from the HPCZ; accrediting trainers; accrediting examiners; organizing faculty development for trainers and examiners; all aspects of Annual Scientific Meeting; continuous professional development programmes. The anaesthesia faculty will work closely with ZACOMS to ensure the support and development of all stakeholders.

Domain 7: Management of Education and Training

The Specialty Training Programme Directory will be responsible for ensuring that quality systems are in place, that all trainers are suitably qualified and that all procedures are

being correctly followed. They will work closely with the HPCZ and ZACOMS as the programme is being developed.

Domain 8: Educational Resources and Capacity

The minimum standards for the resources available to and characteristics of each specialty training centre are set out in the document “Quality Standard for Anaesthesia Training Institutions².”

Domain 9: Outcomes of STP

The outcomes from the Specialty Training Programme are described elsewhere in the curriculum document – please refer above.

INDICATIVE RESOURCES

1. **Anaesthesia and Intensive Care A-Z - Print & E-Book: An Encyclopedia of Principles and Practice, 5e** Yentis SM, Hirsch NP, Ip JK
2. **Fundamentals of Anaesthesia** Edited by Tim Smith , Colin Pinnock , Ted Lin , Robert Jones
3. **Pharmacology for Anaesthesia and Intensive Care** Tom Peck, Sue Hill
4. **Drugs in Anaesthesia and Intensive Care** Smith S, Scarth E and Sasada M
5. **Physics in Anaesthesia** Ben Middleton; Justin Phillips; Rik Thomas; Simon Stacey
6. **Basic Physics and Measurement in Anaesthesia** Kenny, Gavin, BSc (Hons) MD FRCA; Davis, Paul D., BSc CPhys MInstP MIPSM
7. **Essentials of Anaesthetic Equipment, 4e** Al-Shaikh B and Stacey S
8. **Respiratory Physiology: The Essentials, 8e (Paperback)** West JB
9. **Q Base series 1, 4 and 7**
10. **Guide to the FRCA Examination - The Primary**
11. **The Anaesthesia OSCE (Second Edition)** Arthurs, Elfuturi
12. **The Anaesthesia Viva 2** Blunt, Mark; Urquhart, John; Pinnock, Colin
13. **Anatomy for Anaesthetists** Harold Ellis and Andrew D Lawson
14. Website www.frca.co.uk including anaesthesia tutorial of the week.