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POSTGRADUATE INSTITUTE OF MEDICINE

UNIVERSITY OF COLOMBO

- 2009 -

BOARD OF STUDY IN  
ANAESTHESIOLOGY

REGULATIONS AND GUIDELINES

MD (ANAESTHESIOLOGY)

AND

BOARD CERTIFICATION IN ANAESTHESIOLOGY

Regulations for MD(Anaesthesiology)

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## REGULATIONS AND GUIDELINES FOR ANAESTHESIOLOGY TRAINING - 2009

The following are the regulations and guidelines relating to the training program in Anaesthesiology and Intensive Care, leading to the degree of MD (Anaesthesiology) of the Postgraduate Institute of Medicine of the University of Colombo and Board Certification as a specialist in Anaesthesiology. This is the improved version of the Prospectus embodying the curriculum.

The program is in six stages, inclusive of three examinations.

### 1.0. STAGE I

#### MD (ANAESTHESIOLOGY) PART I

Consists of two Examinations

- (a) Part I A (Anaesthesia)
- (b) Part I B (Basic Sciences)

The two examinations may be sat in any order but successful completion of both is necessary to commence the Clinical Training Program.

#### 1.1. PART I A Examination (Anaesthesia)

##### 1.1.1. Eligibility

Candidates should possess

- a) a Medical degree registered \* with the Sri Lanka Medical Council
- b) satisfactory completion of internship acceptable to the Sri Lanka Medical Council.
- c) satisfactory completion of one year of post internship in medical practice in a University/Public Sector/Private Sector Institution in Sri Lanka acceptable to the PGIM as at the date of closure of applications.
- d) should have six months experience (full time) in Anaesthesia prior to sitting the examination. The training should be certified by the supervising consultant. A four week deficit in the 6 months requirement may be accepted by the Board, if it is due to administrative reasons, provided that not more than 10 days' leave has been taken during the training period.

- (e) should have a certification in Cardio-Pulmonary Resuscitation.
- (f) should have fulfilled the requirements in appendix I  
(A quota for the Private Sector is presently available.)

##### 1.1.2. Format of the Examination

The examination will be held twice a year.

The examination is conducted in two parts:

- a) Essay Paper:  
There will be 8 questions of which 6 to be answered.  
The duration will be 3 hours.

- a) Viva:  
There will be one Viva Station.  
The duration will be 15 minutes with both examiners.

[See Appendix 8 Guide for Trainees and Trainers, Volume A]

##### 1.1.3 Marks required to pass the examination

To pass the examination a candidate will have to obtain:  
a minimum of 60% for the Essay Paper  
AND  
a minimum of 60% for the Viva.

#### 1.2. PART I B Examination (Basic Sciences)

##### 1.2.1. Eligibility

Candidates should possess:

- a) a Medical degree registered \* with the Sri Lanka Medical Council
- b) satisfactory completion of internship acceptable to the Sri Lanka Medical Council.
- c) satisfactory completion of one year of post internship in medical practice in a University/Public Sector/Private Sector Institution in Sri Lanka acceptable to the PGIM as at the date of closure of applications.

(A quota for the Private Sector is presently available.)

### 1.2.2. Format of the Examination

The examination will be held at least once a year. The Board of Examiners shall include at least one external examiner from a recognized overseas training body in Anaesthesiology. Number of attempts will be unlimited.

The subjects assessed are:

- (a) Physiology
- (b) Pharmacology
- (c) Physics, Clinical Measurements and Clinical Bio-chemistry with special emphasis on topics relevant to Anaesthesia Intensive Care, and pain management

[See Appendix 8 Guide for Trainees and Trainers, Volume B]

The examination is conducted in three parts:

- a) MCQ Paper with 90 question of 3 hours duration.  
(The number of questions from each subject will be 30).

Each question shall consist of a stem and five responses, each of which in conjunction with the stem is either a true or a false statement. Minus marks will be given for wrong answers, but will not be carried to the next question.

- b) Essay Type Question Paper of 3 hours duration with 6 questions. This will consist of 2 questions from each of the three subjects. (total components 3).
- c) Oral examination of 20 minutes duration in each of the three subject.(total components 3)

The MCQ paper will be held prior to the rest of the examination. In the MCQ paper a minimum of 50% should be obtained. This mark should be obtained in each subject to proceed to the rest of the examination.

### 1.2.3. Marks required to pass the examination:

In order to pass a candidate must obtain a minimum individual closed mark of (ICM) of 2, 2, 2, 2, 2, 1+ in each of the above six separate components in the Essay Type Question Paper and Oral Examination of the three subjects.

(The marks obtained for the MCQ Paper will not be considered to determine the final result)

### 1.2.4. Exemptions

Candidates holding foreign specialist qualifications which are recognized by the Board of Study in Anaesthesiology are exempted from the Part I A & I B examinations.

[See regulation 8]

## 2.0. STAGE II

### MD ANAESTHESIOLOGY CLINICAL TRAINING PROGRAM

#### 2.1. Eligibility

Successful completion of MD (Anaesthesiology) Part I A & I B Examinations.

#### 2.2. The Clinical Training Program (See also Appendix 2 and 3)

The program shall consist of 2 1/2 years of full time clinical experience gained under the supervision of consultants in posts approved by the Board of Study. The program should be completed to the satisfaction of the Board and duly certified by the respective consultants.

A maximum period of one year out of the 2 1/2 years of training can be completed in an approved training center abroad.

##### 2.2.1. The clinical program consists of the following:

- (a) 12 months of Anaesthetic training in General Surgery and in the following Surgical specialties:

ENT Surgery	Emergency & Trauma Surgery
Eye Surgery	Genito Urinary Surgery
Oral Surgery	Maxillo-Facial surgery
Orthopaedic Surgery	Vascular and transplant surgery
Burns and Plastic Surgery	

- (b) General ICU - 3 months
- (c) Cardiothoracic anaesthesia - 3 months
- (d) General medicine - 1 month
- (e) Obstetric anaesthesia - 2 months
- (f) Obstetric ICU - 1 month
- (g) Cardiothoracic ICU - 1 month
- (h) Accident service ICU - 1 month
- (i) Cardiology - 1 month
- (j) Paediatric anaesthesia at LRH - 3 months
- (k) NSU - 2 months

[See Appendix 8 Guide for Trainees and Trainers, Volume C]

### 2.2.2. The Academic Program

Trainees will follow the MD (Anaesthesiology) final study course which includes lectures, tutorials, journal clubs and mortality/morbidity conferences. Trainees are also expected to maintain a log book, a record book and a case book which should be certified as satisfactory.

#### (a) Record Book

The Record book consisting of student assessments and certificates of training should be maintained during the training program and duly certified by the consultants at the end of each rotation.

#### (b) Log Book

[See Appendix 4]

#### (c) Case Book

Case discussions of 10 patients managed by the trainee at each training appointment should be submitted to the Board of Study 6 months prior to the

MD (Anaesthesiology) final examination. Candidates will not be allowed to sit the examination unless this case book is approved by the Board.

[See Appendix ]

#### (d) A portfolio has to be maintained [See appendix 9]

### 2.3. Exemptions

Anaesthesiologists with recognised foreign specialist qualifications should submit the original diploma certificates when applying for exemptions.

[See Regulations 8.0]

## 3.0 STAGE III

### MD (ANAESTHESIOLOGY) FINAL EXAMINATION

#### 3.1. Eligibility

Satisfactory completion of the following:

- a) MD (Anaesthesiology) Part IA & I B examinations
- b) Clinical Training Program as laid out in 2.2&Appendix 2

#### 3.2. Format of the Examination

##### 3.2.1. The examination will be held at least once a year.

The Board of Examiners shall include at least one external examiner from a recognized overseas training body in Anaesthesiology.

##### 3.2.2. The subjects include:

- (i) Theory and practice of Anaesthesia, Pain management and Intensive Care
- (ii) Clinical medicine and Surgery relevant to Anaesthetic practice and Intensive Care and pain management
- (iii) Basic Sciences including anatomy applicable to Anaesthetic practice, Intensive Care and Pain management.

##### 3.2.3. The examination shall consist of FIVE components

###### a) Essay Paper:

The Essay paper has a choice of 4 questions out of which 3 to be answered.

The duration will be 3 hours.

###### b) SAQ Paper:

There shall be 12 questions.

The duration will be 3 hours

- c) Viva 1:  
The duration shall be 30 minutes (15 minutes with each examiner)
- d) Viva 2:  
The duration shall be 30 minutes (15 minutes each examiner).
- e) Clinical

Long case:

Each candidate will be given one patient.

The time allowed for history taking and examination shall be 30 minutes.

Short case:

Each candidate will be given two short cases.

The time allowed shall be 15 minutes for each case.

### 3.3. Marks required to pass the examination

In order to pass, a candidate must obtain a minimum Closed Mark of 2, 2, 2, 2, 1+ in each of the above five separate components (Essay, SAQ, Viva 1, Viva 2, Clinical) of the examination.

## 4.0. STAGE IV

### TRAINING IN RESEARCH METHODOLOGY

- 4.1. A scientific research project or an audit carried out by the trainee in the field of Anaesthesiology, Intensive Care or Pain management is a requirement before the board certification.  
Trainees should obtain prior Board approval by submitting the Project proposal of such a research project together with a letter of Ethical clearance, before proceeding with the project.
- 4.2. Details relating to the preparation of such a project are provided in Appendix 6
- 4.3. This part of the program may be completed at any time before the Board Certification and any delay in submitting the research paper will result in a delay of the board certification by the same period.

## 5.0. STAGE V

### POST MD TRAINING

#### 5.1. Eligibility

Successful completion of MD (Anaesthesiology) Final Examination

- 5.2. The date of commencement of Post MD training will be accepted as the date of successful completion of the MD (Anaesthesiology) final examination (Stage III).

- 5.3. The period of Post MD training will be for a period of two years

5.3.1. One year will be spent in Sri Lanka as a Senior Registrar out of which,

- i. Eight months of training should be in a Board approved Teaching hospital under the supervision of a Consultant Anaesthetist. At the end of such training a certified report of satisfactory training must be submitted to the Board, by the supervising consultant.

- ii. Three months of training as a Senior Registrar or Acting Consultant Anaesthetist in an outstation hospital, which is allocated by the Board. This period of training is supervised by the Board of Study.

A detailed report on the Clinical and Administrative conduct of the trainee should be submitted to the Board by him or her, at the end of this training.

- iii. One month of training in Cancer pain management at the Cancer Institute, Maharagama.

- a. A log book must be maintained and should be signed by the consultant Anaesthetist at the cancer hospital Maharagama.

- b. A report should be submitted to the Board.

The above one year period need not be continuous.

During the one year of Post MD training period spent in Sri Lanka, the trainees are also expected to gain experience in the following areas:

- i. Teaching and Organisation of educational activities for undergraduates, postgraduates and other health care personnel
- ii. Aspects of administration in providing Anaesthetic and Intensive Care facilities
- iii. Clinical Research
- iv. Upgrading the equipment of the Operation Theatre and ICU

5.3.2. A period of one year of training in a recognized overseas centre, approved by the Board.

#### 5.4. Assessments

Student performance both during the period of training in Sri Lanka and at the overseas centres should be assessed and certified as satisfactory by the supervising consultants on the relevant Assessment forms.

### 6.0. STAGE VI

#### BOARD CERTIFICATION

- 6.1. Trainees who satisfactorily complete stages I to V will be Board Certified in retrospect 2 years from the date of completion of the MD final examination. Any delay in the satisfactory completion of post MD training will delay the date of Board Certification by the same period.
- 6.2. Before Board Certification the trainee should make a presentation to the Board of Study and be present for a Portfolio Viva.
- 6.3. In deciding the effective date of Board Certification the other conditions stipulated in the PGIM General Guidelines and Regulations will apply and supercede 6.1.
- 6.4. Trainees could also be Board Certified with special training in a subspecialty such as Cardio-thoracic, Neuro, Paediatric, Obstetric, Intensive Care or Pain management, if such a trainee has obtained prior board approval for such training.

- (a) The special training should be obtained within the 3 year post MD training period where the trainee has spent 1 year in Sri Lanka, and 2 years abroad.
- (b) The option for special training would be offered on successful completion of the MD final examination, according to the order of merit and the exigencies of service.
- (c) The training period would be for a minimum period of 1 year in the sub specialty, of which a minimum period of 6 months should be hands on training in a recognized overseas center.
- (d) Overseas training in the subspecialty should be organized by the trainee and the Board approval should be sought before the commencement of such training.
- (e) Each of the 6 months' period of training should be supported by the duly completed relevant Log book for that subspecialty & should be certified by the local and overseas supervising consultants.

[See Appendix 7]

### 7.0 INTERPRETATION & AMENDMENTS

- 7.1. In any matter relating to the interpretation of the above regulations, the decision of the Board of Study, approved by the Board of Management of the PGIM shall be final.
- 7.2. With the approval of the Board of Management, the Board of Study will have the right to amend any of the provisions in the above regulations.
- 7.3. Stage II, IV and VI of the training program, will be accepted as having been satisfactorily completed, only if the training posts have had prior approval of the Board.
- 7.4. Leave  
Please refer PGIM General regulations and guidelines for information on leave
- 7.5. General Regulations of the PGIM  
General Regulations of the PGIM which are applicable to postgraduate trainees on all courses conducted by the PGIM are in a separate booklet. All trainees are expected to buy a copy and make themselves familiar with the General Regulations in this booklet.



## 8.0. REGULATIONS REGARDING FOREIGN QUALIFICATIONS

- 8.1. Qualifications recognized are:  
F.R.C.A. England  
F.F.A.R.C.S. Ireland  
F.F.A.R.C.S. Australia  
F.A.N.Z.C.A. New Zealand  
American Board examination
- 8.2. Candidates with any of the above qualifications are exempted from the MD (Anaesthesiology) Parts IA & IB Examinations
- 8.3. Such candidates must complete one year of compulsory service in the Department of Health or in the University before being released by the Ministry to the program.
- 8.4. Clinical Training Program
- 8.4.1. Candidates can either
- (a) Claim exemption from any period or periods of the clinical training programme by submitting documentation duly certified by the consultant and/or certifying authority as evidence that they have completed a period of full time in-service training comparable in nature and duration to that described in section 2.2.1. Such training should have been done after an examination comparable to the Part I A & 1B. For consideration and acceptance by the Board, such documentation should be submitted 6 months before the examination. Any deficiencies in the training program should be completed to the satisfaction of the Board before the MD (Anaesthesiology) final examination.
- OR
- (b) Claim exemption for one year of the training program and complete the balance period of 18 months in the various sub specialties as decided by the Board.
- 8.4.2. The program of training in Sri Lanka will be
- (a) On full time release to the PGIM  
(b) Supervised by the consultants appointed by the Board  
(c) Monitored as in the program for other trainees

- 8.4.3. The following must be submitted for approval, 6 months prior to the final examination as set out in the Appendix 8 The Guide for Trainees and Trainers
- (i) Log book  
(ii) Record book  
(iii) Case book  
(iv) Portfolio
- 8.4.4. The MD (Anaesthesiology) final examination must be successfully completed.
- 8.4.5. A Scientific paper should be submitted to and approved by the Board [See Appendix 6]
- 8.4.6. A period of two years as a Senior Registrar should be completed in one of two ways.
- (a) One year in a Provincial or Base hospital, and one year in a Teaching Hospital  
(b) Two years in a Provincial or Base Hospital

## THE INFORMATION OF ASSESSMENT TOOLS

### Multiple Choice Question Paper

The main aim of this component of the examination is to test the ability of factual recall over a wide range of topics.

The questions consist of a stem and five responses, each of which in conjunction with the stem is either a true or a false statement. Minus marks will be given for wrong answers, but will not be carried to the next question.

The Board of study may change the format of multiple choice questions having given due notice and providing examples.

### Essay Paper

This is designed not only to test factual recall, but the ability to select the most relevant information, to assign relative importance to each and assemble them logically. Therefore correct information randomly located within material of doubtful relevance may not achieve a pass standard.



## Oral Examination

The oral examination provides an in depth test of knowledge and the ability to lay emphasis on the most important aspects of any topic. It tests the ability to apply factual knowledge to clinical situations and solve problems posed by the examiners with justification of the answers.

## Clinical Examination

In the final examination one hour is allocated to the long case, which includes history taking, examination and discussion of a patient. Emphasis is placed on the ability to elicit key points in the history, conduct an appropriate clinical examination and discuss the problems posed. 30 minutes will be allocated to the short cases, which will be devoted to clinical diagnosis, discussion of problems and interpretation of investigations such as X'ray, ECG etc.

## CERTIFICATE OF COMPETENCE IN ANAESTHESIA (C.C.A.) [FOR PROMOTION TO GRADE I OF THE PUBLIC SERVICE]

The C.C.A. is not a degree or a diploma awarded by the Postgraduate Institute of Medicine, the University of Colombo. The C.C.A. will not entitle the holder to a consultant appointment in Anaesthesiology in Sri Lanka. Such a person will be expected to work under the supervision of the Consultant Anaesthetist of that or neighbouring hospitals and will be designated as Senior Medical Officer in Anaesthesiology, who will be eligible for promotion to Grade I of the public service. The C.C.A. will be awarded to medical officers who fulfill the following requirements satisfactorily.

## Eligibility

- (a) Successful completion of the MD Part I A (Anaesthesiology Examination)
- (b) 5 years experience in anaesthesia which should be certified as satisfactory by the Consultant Anaesthetist or the chief administrator of the hospital.

A minimum period of one year should be in Sri Lanka and at least 6 months of it should be under the supervision of a Consultant Anaesthetist. Any period of work abroad should be certified by a Consultant in that hospital and approved by the Board.

## The Format of the Examination

The examination will be held once a year, and will consist of

- (a) A 2 hour Essay
- (b) Oral examination of 40 minutes duration

## Marks required to pass the examination

To pass the examination a candidate will have to obtain:  
a minimum of 60% for the Essay Paper  
AND  
a minimum of 60% for the Viva.

## Training

This training period is optional and may also be completed after the examination. Any medical officer having completed five years of anaesthetic service in the Ministry of Health and wishing to avail themselves of one year of training may apply to the Secretary, Board of Study in Anaesthesiology with details of previous experience.

## Appendix 1

### MD (ANAESTHESIOLOGY) PART I A

#### TRAINING PROGRAM

The stipulated period in 1.1.1(c) should include the following compulsory minimum of supervised anaesthetic sessions including a minimum number of operations in the following subspecialties (a session is 4 hours).

	Sessions	Major
General surgery	20	20
Ophthalmic	10	10
ENT	10	10
Orthopaedics	10	10
Obstetric & Gynaecology	20	20
Others		30

The completion of compulsory minimum sessions including Training in CPR and satisfactory work done should be certified by the supervising consultant. Subspecialties should be certified by the Consultant Anaesthetist supervising the relevant subspecialty.

Note that a mandatory 80% attendance is compulsory during the six months.

The trainee should maintain a log book divided into the sections given below and recorded under the following headings (across 2 pages in a CR book).

Date	Surgery	Name	Age	Pre op	Anaesthesia
Complications	Routine/	Supervised	Problems	Emergency	
Time					
General Surgery	:	Head & neck		3	
		Thyroidectomy		3	
		Mastectomy		3	
		Cholecystectomy		3	
		Gastro-intestinal		3	
Orthopaedics	:	Lower limb		3	
		Upper limb		3	
		Spine		1	

Ophthalmic	:	10 (Intra-ocular, Extraocular, Retinal)
E.N.T.		10 (Majors, 'scopies)
Dental		10 (Majors, minors)
GU TURP		3
Cystoscopies		10

Obstetrics	:	10 General Anaesthesia
		10 Spinal Anaesthesia

Gynaecology	:	10 Majors
		10 Minors

Paediatrics	:	10
Trauma	:	10

## Appendix 2

### CLINICAL TRAINING PROGRAMME - GUIDELINES

These guidelines lay down the Knowledge, Skills and Attitudes to be acquired by the trainee during the Clinical Training Program.

- Experience in this wide range of clinical practice via a rotation scheme consisting of two to three month periods in the specialized branches of anaesthesia.
- Academic knowledge and skills of judgement and evaluation through problem based learning via a program of tutorials, seminars, mortality / morbidity conferences, journal clubs, mock vivas etc. in addition to in-service teaching.
- Professional characteristics required of a consultant such as managerial and communication abilities, teaching and training, research, team work and attitudes.

The student is advised to utilize each rotation period to cover the practice, theory, and reading required in the field to be able to justify the choice of technique on the basis of physiological and pharmacological principles.

This Guide is not intended to be a complete syllabus.

Trainees will be expected to demonstrate the necessary Knowledge, Skills and attitudes towards patients / co-workers, in the assessment at the end of each clinical appointment.

### Appendix 3

#### MD ANAESTHESIOLOGY FINAL CLINICAL TRAINING PROGRAM - DURATION

##### A. General Anaesthetic Experience

Nominal period of one year with 450 sessions (a session is 4 hours.)

###### Minimum number of sessions

General Surgery	100
ENT	20
Eye	10
Dental	10
Orthopaedic	15
Emergency/Trauma	50
Genito-urinary, Vascular, Plastic	: 10 cases each

##### B. Anaesthetic experience in special fields :Nominal period of 1 year

###### 1. Obstetrics:

Nominal period of 8 weeks ( 70 sessions ) Minimum no. of cases

General anaesthesia	25
Subarachnoid block	25
Epidural	25
Epidural analgesia for labour	25

###### 2. Cardiology/Internal Medicine: Nominal period of 8 weeks

(70 sessions) Acceptable minimum 40 sessions

###### 3. Neuro-surgical anaesthesia: Nominal period of 8 weeks

(70 sessions) Acceptable minimum 50 sessions

###### 4. Cardiothoracic anaesthesia: Nominal period of 12 weeks

(100 sessions) Acceptable minimum 60 sessions

###### 5. Paediatric anaesthesia: Nominal period of 12 weeks

(100 sessions) Acceptable minimum 60 sessions

##### C. Intensive Care Medicine: Nominal period of 6 months

(26 weeks) Acceptable minimum 40 hrs. per week for 20 weeks

**The rotations should be recorded and certified by the supervising consultants in the Student Record Book, which should be submitted 3 months prior to the Part II examination.**

### Appendix 4

#### GUIDELINES FOR MAINTENANCE OF THE LOG BOOK

The log book should be divided into sections as follows

##### 1. ANAESTHETIC EXPERIENCE

- General surgical (Abdominal, Oesophageal, Head & neck)
- ENT (Laryngeal, Ear, Nasal, Miscellaneous)
- Ophthalmic (Intra ocular, Extra ocular, Retinal)
- Dental (Facial trauma, Condylectomy, Others)
- Vascular and Transplant Surgery
- Orthopaedic (Hip, Knee, Spine, Others)
- Plastic Surgery, burns
- Genito Urinary Surgery (Endoscopy, Open Surgery, Others)
- Neuro-surgery (Intracranial, Posterior fossa, Head trauma, Aneurysm, Spinal, Radio Imaging Techniques)
- Cardio thoracic (CP bypass, Valvotomy, Congenital heart disease, Lung)
- Paediatric (Children, Infants and Neonates)
- Obstetric (Subarachnoid, Epidural, GA, Analgesia, PIH)
- Haemorrhage, Heart disease)
- Trauma
- Intensive Care
- Cardiology and General Medicine
- Management of Pain

These sections could be subclassified as indicated or as appropriate.

The cases should be recorded under the following headings (across two pages)

\* Supervised refers to the conduct of a case in the presence of a Consultant Anaesthetist.

## 2. MANUAL SKILLS (one page for each skill)

Skill	Date	Name BHT	Surgery/ICU	Indication	Success	Complications

Cannulation -	CVP canulation (Internal jugular, Subclavian) Arterial cannulation
Regionals	Brachial plexus block (Axillary, Supraclavicular) Other upper limb blocks, Bier's block Lower limb blocks Epidural and Caudal block
Intubations	Fibre optic Bougie assisted, light wand Double lumen tubes Blind nasal Others

## 3. DISCUSSIONS & ESSAY QUESTIONS

A separate section of the log book should be similarly divided as follows to record the topics of discussions and essay questions answered during each appointment. Topics discussed and essay questions answered and corrected should be recorded with the date and signature of the consultant involved.

Date	Topic	Comment	Consultant
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## 4. COMPETENCE IN EMERGENCY PROTOCOLS

Knowledge of emergency protocols should be assessed and recorded by the supervising consultant eg. CPR, anaphylaxis, difficult intubation, haemorrhage, life threatening arrhythmias and other acute medical emergencies eg: acute severe asthma

Date	Protocol	Comment	Consultant
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The log book should be filled **daily**

The relevant sections of the log book must be signed by the consultant at the end of each appointment and submitted with the record book **three months** prior to the Part II examination.

The postgraduate may be asked to do more than the minimum number of sessions in the subspeciality if necessary. Consultants should use the "Guide to Study" prepared by the Board to decide whether the trainee has had sufficient experience in the particular field. Any remaining sessions can be done in other clinical work at the discretion of the consultant. It is not intended that only work in the subspeciality be done during any period. The Board will accept that the postgraduate has satisfactorily completed a training period only on the certificate given by the consultant.

The total number of sessions that the postgraduate must put in during the year must not be less than 450. Of this at least 300 must be clinical sessions. Postgraduates will work outside normal rosters, in a supernumerary capacity as anaesthetic registrars. They are on 'full release' to the PGIM and will be appointed to work in a particular hospital by the Director, PGIM. These appointments are made to satisfy the training needs of the postgraduate, not primarily service requirements. They can be moved from one post to another to satisfy training needs. Working on the service roster however forms part of the training of a postgraduate and they are reminded that they are expected to cover these service requirements with a sense of responsibility and reliability for these are the requisites of a consultant.

The main consideration in allocating training posts will be the choice of the postgraduate. It is important therefore that the hospitals provide sufficient facilities for training and study by providing libraries, training and teaching courses, etc. to attract postgraduates. The success of the scheme will therefore depend on the enthusiasm with which consultants and hospital administrators work to provide these facilities.

The Board may approve a period (not exceeding 12 months) of clinical training abroad if it conforms to the requirements of the 2 ½ year clinical training programme. The trainee should provide details of clinical sessions and satisfactory work done certified by the supervising consultant.

Date	Surgery	Name BHT	Age	Preoperative Complications	Intra/Postop Complications	Elective/ Emergency	*Supervised Unsupervised

## Appendix 5

### GUIDELINES FOR PREPARATION OF THE CASE BOOK

#### 1. Guidelines for the Preparation of casebook for MD Anaesthesiology Post Graduate Institute of Medicine, Colombo.

The casebook shall assess your involvement in anesthesiology and critical care management issues in the context of your ability to (a) present it in writing (b) recognize the importance of various techniques and maneuvers adopted (c) understand the weaknesses and the risks undertaken (d) critically analyze the management in relation to standard practice and (e) appropriately adduce evidence to justify or criticize methods adopted. The selected cases should highlight anesthetic difficulties, uncommon scenarios, risks, precautions, any complications etc and their management.

1. There should be 10 cases presented.
2. The candidate should have been personally involved in the management of the cases mentioned.
3. The cases discussed should represent the breadth of the candidate's experience in the specialty. Thus, it is prudent that the cases selected represent anesthetic subspecialties such as obstetric, pediatric, neuro-surgical, cardiothoracic, trauma, intensive care and medical disorders complicating anesthesia.
4. It is advisable that the candidate discusses his/her case with the supervisor and carry out corrections and obtains the supervisor signature on the final print out before incorporating it in the casebook.
5. The patient confidentiality should be maintained at all times. Therefore the case reports should not contain any information that will expose patient identity.
6. The format of presentation should be
  - (a) *Title*: This should be a concise description of the problem presented (maximum 75 characters)
  - (b) *Supervisor details*: Name, Designation, Place of work and Signature
  - (c) *Abstract*: A summary of the problem presented in the case report and its implications to the anesthetic management. (maximum 250 words)

- (d) *Case history*: The relevant aspects of the case-history should be presented in order to emphasize the envisaged management issues including pre-operative preparation, anesthetic technique and post operative care. Supplementary notes such as monitoring records, photographs, electronic material etc., may be submitted to illustrate the arguments and evidence.
- (e) *Discussion*: This should be a critical analysis of the management of the case with appropriate reference to evidence where necessary. Why? , Why I did not?, Why I couldn't?, Why I didn't? and Shouldn't I have done it better? are useful questions that could be raised in the mind when formulating this section. This section is not an essay or a chapter on the subject matter but a critical retrospective look on the management of the presented case in relation to standard practice, current evidence and reasoning for deviation from the norm.
- (f) *References* : These should be in Vancouver style, i.e. numbered consecutively, superscripted in the order in which they are cited in the text. Each reference must have an individual reference number. Figure legends should not exceed 50 words. Tables should be titled.

#### 7. Style

- (a) Nonstandard abbreviations should not be used. Spelling mistakes, grammatical errors should be eliminated.
- (b) All pharmaceutical names should be in generic form.
- (c) The case book should be type written with double spacing in A4 paper with a minimum of 2 cm margin all round. The body text of each case-report (excluding references) should not exceed 4000 words. A font size of 12 in Time New Roman would be preferred in body text.

#### 8. Submission

The book should be bound and forwarded to the Director, Post Graduate Institute of Medicine, Colombo, 6 months before the date of commencement of the final examination.

## Appendix 6

### GUIDELINES FOR THE SCIENTIFIC PAPER

The scientific paper is a requirement for Board Certification and needs to be accepted by the Board of Study prior to Board Certification. Presentation at a scientific meeting or publication in a journal will not necessarily imply acceptance by the Board.

Before commencing the study the protocol should be presented for approval to the consultant supervising the study. Ethical approval and the advice of a statistician should also be sought at this stage. The Board may appoint supervisors to monitor the progress of the study.

#### Guidelines for writing the study protocol

- (1) Aim  
State the aim of the study with an explanatory introduction and a brief review of the relevant literature.
- (2) Method  
Selection of cases with inclusion and exclusion criteria  
Method of randomisation  
Details of interventions, techniques, measurements, etc.
- (3) Sample of record / monitoring forms
- (4) Duration of study or number of subjects / observations
- (5) Names of Co-workers and Advisors (credit will be given to the chief author)
- (6) Method of statistical analysis
- (7) References (photocopies may need to be provided)

#### Guidelines for writing the scientific paper

- (1) Aim : State the aim or object of the study clearly and specifically
- (2) Introduction
  - (a) State the importance of the subject and why it was chosen
  - (b) Define the problem with a concise account of the background.
  - (c) Review briefly the relevant literature
  - (d) State the method of investigation
- (3) Patients and methods
  - (a) Selection of cases with inclusion and exclusion criteria
  - (b) Method of randomisation
  - (c) Duration of study and number of patients / observations
  - (d) Method of statistical analysis

- (4) Results
  - Summarise the results
  - Give an overall description of the major findings of the study.
  - Present the data
  - State briefly what you did not find if it is relevant.
  - Statistically analyse the data sensibly
  - Strive for clarity and avoid redundancy (repetition of data)
- (5) Discussion
  - Challenge the validity and interpretation of evidence
  - Summarise the major findings
  - Discuss uncertainties about methodology
  - Compare with previously published work
  - Discuss implications both theoretical and practical
- (6) Conclusion
  - State the principle conclusions and the significance of the work
  - Implications of study
  - What question have you tried to answer?
  - What message do you wish to convey?
  - Do the data and your interpretation of it justify the message?
- (7) References
  - Cite only the relevant references and present them as in the British Journal of Anaesthesia.
  - Photocopies of the relevant articles should be submitted.
  - Implications of study
  - What question have you tried to answer?
  - What message do you wish to convey?
  - Do the data and your interpretation of it justify the message?



## Appendix 7

### BOARD CERTIFICATION WITH SPECIAL TRAINING IN A SUBSPECIALTY

#### Eligibility

Applicants should possess the MD Anaesthesiology (Sri Lanka)

#### Selection

Selection will be at the Allocation Committee Meeting and will be in order of merit.

Applications will be entertained only from those within the first year of Post MD training.

#### Training Period

The duration of the training period will be for 2 years.

- a. (1) One year of training in Sri Lanka of which at least 6 months will be in the subspecialty in a Teaching Hospital
- (2) 3 months will be in an outstation hospital for development of managerial skills.
- b. Minimum period of one year abroad of which at least six months 'hands on' training in the specialty. This should be organized by the trainee, and Board approval obtained prior to commencement. The training should be certified with documentation of a log book, audit or study on the subspecialty and assessments from the supervising consultant/s.

#### Assessment

1. **Log Book** – A log book should be maintained by the trainee and checked and signed by the trainer to confirm that the minimum targets have been achieved. Interim checks should be done every 3 months during the appointment to identify problems or inadequacies which can be rectified.
2. **Record Book** - The record book should document the assessment of the trainee by the trainer throughout the clinical training appointment.

This should include:

Professional attributes such as attitudes, conduct, interest, motivation, knowledge, decision making and clinical skills in the chosen field.

Relevant documentation:

Teaching and training of juniors.

3. **Case Book** – Consisting of 3 cases in that selected specialty detailing management and discussion of each case.
4. **Audit or Study** – The trainee should conduct a study or audit relevant to the subspecialties. The protocol should be submitted to the Research Committee of the Board of Study before commencement. The audit or study should be submitted to the Board of Study and assessed by the Research Committee.

- (b) **Board Certification** – Board Certification with special training will be awarded 2 years after the MD examination after all requirements have been satisfied.

Candidates should apply for Board Certification with a portfolio containing

- a. log book
  - b. record book
  - c. case book including 3 case discussions in the speciality
  - d. one publication in a peer reviewed journal/College Journal
  - e. scientific research paper/audit
  - f. report on the 3 months outstation appointment
  - g. recommendation/s from supervising consultant/s.
5. Sub Specialities approved by the board
    - Cardiothoracic Anaesthesiology
    - Neuro Anaesthesiology
    - Paediatric Anaesthesiology
    - Intensive Care
    - Pain management
    - Obstetric Anaesthesia



## Appendix 8

### MD ANAESTHESIOLOGY GUIDE FOR TRAINEES AND TRAINERS

#### MD Anaesthesiology Guide for Trainees and Trainers

The Guide to Study for the MD Anaesthesiology elaborates on how certain regulations should be fulfilled and provides guidelines as to the scope and depth of knowledge that is required.

#### PART I EXAMINATIONS

1. Part I A (Anaesthesiology)
2. Part I B (Basic Sciences)

The Board of Study in Anaesthesiology does not have a training program for the Part I examinations. However, courses for the above examinations are conducted by the College of Anaesthesiologists of Sri Lanka.

After the satisfactory completion of the MD (Anaesthesiology) Part I A & 1B examinations, candidates will enter the Clinical Training Program. Medical officers working in the Ministry of Health will be released from the ministry to the PGIM to follow the training program.

#### 8.1 PART 1A (ANAESTHESIA)

The examination aims at an assessment of competence appropriate for a trainee at the end of six months of anaesthetic experience.

#### Syllabus for MD PART 1 A EXAMINATION (ANAESTHESIOLOGY) January 2008

#### ACKNOWLEDGEMENT

**We are very grateful to the Royal College of Anaesthetists for granting permission to adopt certain sections from the document “THE CCST IN ANAESTHESIA”- A Manual for Trainees and Trainers – 2003, in compiling this guide.**

## Board of Study in Anaesthesiology Sri Lanka

### INTRODUCTION

This volume of the Study Guide for trainees and trainers sets out the knowledge, skills and attitudes required of any Medical Officer ( MO) before he/she is eligible to take up the MD Part 1 A examination.

The material is arranged under the headings *Knowledge, Skills and Attitudes*, in individual clinical and basic science sections. This format inevitably results in the same topic appearing in more than one place (e.g. capnography can be found in sections on induction, physiology, and clinical measurement). Similarly there is inevitable cross-over between the knowledge and skills lists.

Sections on the attitudes to patient care (which include behaviour) are included. Each section relating to clinical practice also has a list of ‘Workplace Training Objectives’. These are intended to assist the trainees’ self-directed learning and to indicate the important aspects of clinical practice that they could be expected to demonstrate, and answer simple questions on, to satisfy their workplace assessments.

### ASSESSMENTS

Assessment of the M.O will be done in the workplace and by the performance at the Part 1A Examination

- (a) Workplace assessments will concentrate primarily on clinical skills, attitudes and behaviour together with a confirmation that the trainee has a practical understanding of the knowledge base, which include
  - i) preoperative assessment;
  - ii) general anaesthesia for ASA I or II patients (including equipment and anaesthetic machine check)
  - iii) general anaesthesia with spontaneous respiration;
  - iv) general anaesthesia with endotracheal intubation;/ LMA
  - v) rapid sequence induction and failed intubation routine;
  - vi) cardio pulmonary resuscitation (CPR) skills; and
  - vii) clinical judgement, attitudes and behaviour

\*\* a record of the relevant skills needs to be kept by the trainee

(b) Examination assessments will mainly test the knowledge base across basic science and clinical practice, together with the assessment of some skills and attitudes.

\*\* Assessors must be aware of their overall responsibilities for patient safety when assessing trainees at the M.O level because satisfactory assessments allow the M.O to undertake more anaesthetic activity away from direct supervision.

\*\* As the trainee progresses, he/she will gradually be judged to have achieved competence in more aspects of practice.

### Workplace assessment

To complete M.O training satisfactorily, the trainee must first pass the Initial Assessment of Competency and then demonstrate to the satisfaction of the trainers:

- (a) the ability to undertake pre-operative assessment, obtain consent for anaesthetic procedures and prescribe premedication
- (b) the routine induction, maintenance and recovery from general anaesthesia of ASA grade I or II patients and their safe discharge
- (c) an understanding of and the safe use of anaesthesia equipment and the use, interpretation and limitations of monitoring equipment
- (d) the ability to recognise ASA III, IV and V patients, the potential for difficult intubation and the timing and need to call for senior help
- (e) the ability to assess, resuscitate and manage a trauma patient, and when necessary to stabilise the patient and prepare for transfer
- (f) the ability to resuscitate a patient following a respiratory or cardiac arrest to the standards set by the European Resuscitation Council and to describe the management of critical incidents
- (g) the ability to establish and manage sub-arachnoid and epidural blockade, IVRA and some simple peripheral nerve blocks
- (h) an understanding of the implications of pregnancy, childhood (above age of 5), old age and infectious diseases in the pre, intra and post-operative periods
- (i) an understanding of the principles of intensive and high dependency care, and which groups of patients can benefit from them
- (j) attitudes, behaviour and judgement appropriate to the specialty

The patients seen by trainees will need to be selected so as to be appropriate to the trainees' limited exposure within the specialty and should always be of ASA I or II.

**\*\* These assessments will be formal. Both the assessment and its outcome must be recorded in departmental records and in the trainee's personal record. Should a trainee be assessed as unsatisfactory in any area, and thus be referred for further closely supervised training, the reasons for this referral must be recorded. The names of assessors must be legible, as must any additional comments.**

### Following the Initial Assessment of Competency

#### *Satisfactory assessment*

After a satisfactory assessment trainees may begin to undertake uncomplicated general anaesthesia cases and peripheral nerve blocks delegated to them, without direct supervision and may be given increased clinical responsibility (for example by working on the 'on-call' rota with indirect (local or distant) supervision)

#### *Unsatisfactory assessment*

After an unsatisfactory assessment trainees will need targeted instruction and a re-assessment. Whether the whole assessment is to be repeated or targeted at deficient areas is a decision to be taken locally, with regard to individual circumstances, and is left to the discretion of the assessors.

#### *Compulsory assessment after repeated failure*

- (a) Repeated failure by a novice M.O to achieve the prescribed standard after 6 months of full-time training will call into question the trainee's suitability for a career in anaesthesia.
- (b) Persistent poor performance after 6 months of full-time training should lead to an immediate, **compulsory assessment**. This may result in the SHO being advised to leave the specialty.

### Examination Assessment

The Part I examination assesses the knowledge and understanding (and some of the skills and attitudes) of the following topics and the knowledge and understanding of those aspects of basic science required to inform the clinical practice of an M.O and to undergo subsequent training.

The documentation of training by the trainee

It is the trainee's personal responsibility to maintain a log book.

#### **Confirmation of training: *HO /SHO Training Certificate***

The *HO /SHO Training Certificate* must be completed before a HO can take up a HO post.

## PREOPERATIVE ASSESSMENT

### Knowledge

Implications for anaesthesia of commoner elective conditions requiring gynaecological, abdominal, orthopaedic, ENT, dental, urological and body surface surgery. Knowledge of sub-specialty practice and specialised techniques is not required unless specified elsewhere.

- The relevance of trauma, intestinal obstruction and acute abdominal emergencies
- The ASA classification and other scoring systems such as Glasgow coma scale (GCS) The interpretation of relevant preoperative investigations
- Restriction of food and fluid by mouth, cessation of smoking, correction of dehydration
- Assessment of difficulties in airway management and the importance of the 'shared airway' Implications for anaesthesia of common medical conditions (ischaemic heart disease, hypertension, diabetes, asthma, rheumatoid arthritis etc).
- Anaesthetic implications of current drug therapy and whether it should be continued, modified stopped or changed peri-operatively
- Need for and methods of perioperative antithrombotic treatment
- The importance of an anaesthetic history and genetic diseases in anaesthesia with respect to suxamethonium apnoea, anaphylaxis and malignant hyperpyrexia
- Assessment of post-operative analgesic needs
- Assessment of whether ICU or HDU care will be required post-operatively
- The importance of consent and the issues surrounding it
- Dangers of repeat anaesthesia

### Skills

#### History taking

- Anaesthetic history: personal and familial
- Previous airway/ intubation difficulties
- Medication: current and past
- Allergies and previous drug reactions
- Previous anaesthetic exposure and surgery
- Respiratory status and symptoms (especially asthma and COPD)
- Cardiovascular status and symptoms (especially IHD and hypertension)
- Neurological status and symptoms (especially epilepsy, CVAs, conscious level including mental state)
- Gastro-intestinal problems (especially reflux, obstruction, potentially

delayed gastric emptying)

- Arthropathies and other musculo-skeletal problems (especially rheumatoid arthritis)
- Renal conditions
- Hepatic conditions (especially jaundice, cirrhosis)
- Endocrine conditions (especially diabetes, steroid therapy)
- Skin conditions
- Obstetric conditions
- Hereditary disorders affecting anaesthesia
- Haemoglobinopathies
- Coagulopathies
- Nutritional abnormalities (especially obesity)
- Social problems and identification of high risk groups for infection

#### Physical Examination

- Teeth/ airway/ cervical spine/ intubation assessment
- Cardiovascular system (IHD, Systemic hypertension, LVF, RVF, pulmonary hypertension)
- Respiratory system (asthma, COPD)
- Nutritional state (obesity)
- Neurological system (GCS: any acute or residual effects of CVA)
- Abdomen and GI tract
- Anaemia
- Jaundice
- Sequelae of diabetes and steroids
- Musculo-skeletal problems (including relevance to positioning, neck stability, regional blockade)

#### Data Interpretation

- Clinical
  - Respiratory function tests
  - Electrocardiographs
  - Central venous pressure measurement
  - Systolic, diastolic and mean arterial pressure
  - Exercise tests
  - Interpreting fluid balance and other charts
- Radiological (showing clear abnormalities):
  - Chest radiographs
  - Films showing long bone, skull, vertebral and rib fractures

- Simple CAT and MRI scans of head demonstrating fractures haemorrhage
- Neck and thoracic inlet films
- Films showing abdominal fluid levels/air
- Laboratory:
  - Haematology (including coagulation and sickle tests)
  - Urea and electrolytes
  - pH and blood gases
  - Liver function tests
  - Thyroid function

#### Factors in special groups

- Children (aged 5 years and over)
- The elderly
- Day case patients

#### Planning

- Deciding on an anaesthetic technique appropriate to the patient
- Ensuring the necessary resources are available for safe patient care

#### Attitudes and behaviour

##### Communication

- Consent for:
  - general anaesthesia (including a discussion of the risks)
  - epidural/caudal/spinal/regional/local blocks ((including a discussion of the risks)
- Explanation of need for preoperative routine and specialised tests (including hepatitis screening, HIV testing and sickle cell status)
- Explanation of pain management, side effects and complications of:
  - oral/sublingual/rectal/subcutaneous/IM/IV/nasal/transdermal drugs
  - epidural/regional techniques/local blocks
  - inhalational analgesia
  - patient controlled analgesia
- Discussion of preoperative medication choices
- Explanation of postoperative expectations and care
- Communication with other professionals

##### Other Attitudes

- Care and compassion for patients
- Ability to achieve appropriate information transfer
- Ethical behaviour

- Professional, unemotional approach
- Reassurance
- Attention to detail
- Punctuality
- Clean neat appearance and politeness
- Proper interaction with other professions and professionals
- Helpfulness

#### Workplace training objectives

Able to assess the airway for potential difficulties with airway management

Able to take a relevant history

Able to interpret pre-operative investigations and respond to them

Able to recognise when senior advice or assistance is required

Able to assess and plan the anaesthetic management of ASA I & II patients

Able to recognise ASA III, IV & V patients, and have a knowledge of the implications of this for anaesthesia

Able to assess the impact of the presenting surgical condition on the patient's physiological status

Able to assess suitability of patients for day case surgery

Able to identify patients at a high risk of nausea and vomiting

Able to explain risks and options of routine anaesthesia to patients and to obtain their consent

Have a knowledge of how to deal with emergencies arising before anaesthesia and how to stabilise a patient's condition until senior assistance can arrive

#### PREMEDICATION

##### Knowledge

Rationale for use of premedicant drugs

Choice of drugs, advantages and disadvantages

Rationale for antacid, and prokinetic premedication

Rationale for antithrombotic therapy

Understanding of causes of delayed gastric emptying

##### Skills

Assessment of level of anxiety and ability to address patient's concerns

Recognition of situations leading to delayed gastric emptying

Checking a patient prior to premedication and on arrival in the anaesthetic room/theatre.

## **Attitudes and behaviour**

Able to reassure patient and allay anxiety

Explain (as appropriate) problems/complications to patients and relatives concerning:

- Difficult intubation & dentition
- sore throat, nausea and vomiting
- thrombophlebitis
- post-spinal headache
- suxamethonium apnoea and pains
- anaphylaxis
- malignant hyperpyrexia

## **Workplace training objectives**

To become practised at answering patients questions in the most appropriate way

To always try to alleviate anxiety

To ensure thromboprophylaxis is considered

To gain a knowledge of the properties and effects of premedicant drugs

## **ANAESTHESIA, HDU AND ICU EQUIPMENT:**

### **MONITORING AND SAFETY\_**

#### **Knowledge**

Physical principles underlying the function of the anaesthetic machine, pressure regulators, flowmeters, vaporizers, breathing systems

Chemistry of absorption of carbon dioxide

Principles of lung ventilators, disconnection monitors

Manufacture and storage of oxygen, nitrous oxide, carbon dioxide, compressed air

Pipeline and suction systems, gas cylinders

Minimum monitoring requirements

Basis for pre-use checks of anaesthetic machine, breathing systems & monitoring apparatus

Airways, tracheal tubes, tracheostomy tubes, emergency airways, laryngeal masks, fixed and variable performance oxygen therapy equipment, self-inflating bags

The content of an anaesthetic record

Function and use of resuscitation equipment, transfusion devices

Humidification devices

Environmental control of the operating theatre including temperature, humidity, air

changes and scavenging systems for waste anaesthetic gases and vapours

Sterilisation and cleaning of equipment

Electrical safety

Characteristics of intravenous cannulae, spinal and epidural needles

#### **Skills**

Checking the anaesthetic machine

Checking pipelines

Changing and checking cylinders

Connecting up breathing systems

Checking breathing systems

Setting up/checking/monitoring lung ventilators

Setting up/checking alarm limits for monitoring equipment

Collecting data from monitors

Record keeping

Checking resuscitation equipment

Assembling resuscitation equipment

Selecting defibrillator settings

Recognising machine, breathing system and equipment errors: miss-assembly and disconnections

#### **Composing equipment checklists for:**

- resuscitation equipment
- difficult and failed intubation
- CVP monitoring
- arterial pressure monitoring
- epidural/spinal packs
- paediatric intubation set

#### **Attitudes and behaviour**

Recognition that anaesthetic equipment include an anaesthesia tool kit

Shared responsibility for equipment with theatre staff

Commitment to understand as fully as possible the working principles of all anaesthetic equipment

Determination to maximise safety, and not to compromise it by accepting substandard equipment both as to range and quality



## **Workplace training objectives**

- To check anaesthesia machine
- To assemble and check breathing systems
- To set up and check ventilator
- To describe the requirements for minimal monitoring
- To decide when additional monitoring (e.g. CVP, arterial line) is needed
- To set up and check monitoring equipment and alarm limits
- To check resuscitation equipment
- To keep a good anaesthetic record

## **INDUCTION OF GENERAL ANAESTHESIA**

### **Knowledge**

- Intravenous and inhalational induction of anaesthesia; advantages and disadvantages of each technique
- Indications for tracheal intubation
- Selection of tube type (oral, nasal, armoured etc), diameter and length
- Management of difficult intubation and failed intubation
- Methods of confirming placement of the endotracheal tube; oesophageal and endobronchial intubation, complications
- Insertion and use of oral airways, face masks and laryngeal mask airway
- Causes of regurgitation and vomiting during induction, prevention and management of pulmonary aspiration
- Cricoid pressure
  
- Induction of anaesthesia in special circumstances, (head injury, full stomach, upper airway obstruction, shock)
- Drugs: pharmacology and dosages of induction agents, relaxants, analgesics, and inhalational agents
- Side effects of drugs used and their interactions
- Monitoring during induction
- Recognition and management of anaphylactic and anaphylactoid reactions including follow up and patient information
- Management of intra-arterial injection of harmful substances (e.g. antibiotics, thiopentone)
- Management of asthma, COPD, hypertension, IHD, rheumatoid arthritis
- Problems of the obese patient

## **Skills**

- IV and inhalational Induction of anaesthesia in patients with elective and urgent conditions requiring gynaecological, abdominal, orthopaedic, ENT, dental, urological and body surface surgery (Knowledge of sub-specialty practice and specialised techniques is not required unless specified elsewhere)
- Checking patient in the anaesthetic room
- Safety checking of equipment
- Obtaining vascular access - suitability of sites and technique of intravenous injection
- Airway assessment and optimising the patient's position for airway management
- Airway management with mask and oral/nasal airways
- Introduction and checking correct placement of laryngeal mask airway
- Appropriate choice and passage of oral and nasal endotracheal tubes
- Intubation up to grade II Cormack-Lehane
- Use of gum elastic bougie and stilette
- Identifying correct/incorrect placement of tube (oesophagus/main bronchus)
- Interpretation of capnograph trace
- Failed intubation drill
- Rapid sequence induction/cricoid pressure
- Checking difficult intubation kit and paediatric intubation set
- Using of monitoring equipment, including application of ECG electrodes
- Managing of cardiovascular and respiratory changes during and after induction of general anaesthesia

### **Attitudes and behaviour**

- Safety first
- Always knowing the whereabouts of senior assistance
- Being clear in explanations to patient and staff
- Being reassuring to patients during induction of anaesthesia
- Being polite, calm and having a professional approach

### **Workplace training objectives**

- To perform routine intravenous induction of anaesthesia
- To perform routine gaseous induction of anaesthesia
- To identify the correct placement of the endotracheal tube after intubation
- To rehearse failed intubation drill
- To discuss induction of general anaesthesia in difficult airways, shocked patients and others of ASA>II**
- To manage the cardiovascular and respiratory complications of induction of general anaesthesia

## **To describe the management of aspiration, anaphylaxis, failed intubation and malignant hyperpyrexia**

### **INTRAOPERATIVE CARE (INCLUDING SEDATION)**

#### **Knowledge**

Techniques of maintenance of general anaesthesia involving both spontaneous and controlled ventilation (except sub-specialty and highly specialised practice)

Definition of and methods of sedation

Management of the shared airway

Effects and hazards of the pneumoperitoneum induced for laparoscopic surgery

Drugs: Pharmacology, uses and dosages of induction agents used for IV maintenance, relaxants, analgesics, inhalational agents

Methods of producing muscle relaxation

Choice of spontaneous and controlled ventilation and methods of monitoring them

Minimum monitoring standards

Additional monitoring for sick patients (e.g. CVP, urine flow)

Detection and prevention of awareness

Management of important critical incidents occurring during anaesthesia (see section 19)

Diagnosis and treatment of pneumothorax

Principles of fluid balance

Blood & blood products; synthetic colloids; crystalloids

Management of massive haemorrhage, volume expansion, blood transfusion (hazards including incompatibility reaction)

Correct intraoperative positioning on theatre table, care of pressure points, Avoidance of nerve injury: complications of supine and prone positions

Management of asthma, COPD, hypertension, IHD, rheumatoid arthritis, jaundice, steroid therapy, diabetes

Content of the anaesthetic record

Modification of technique in repeat anaesthesia

Understanding basic surgical operations

#### **Skills**

Maintenance of appropriate levels of anaesthesia with inhalational and intravenous agents in patients with elective and urgent conditions requiring gynaecological, abdominal, orthopaedic, ENT, dental, urological and body surface surgery (Knowledge of sub-specialty practice and specialised techniques is not required unless specified elsewhere.)

Transferring the patient from trolley to operating table

Positioning the patient

Airway control: recognition and correction of problems

Laryngoscopy and intubation and its problems

Detection and correction of airway obstruction

Use of oral airways, facemasks and laryngeal mask airway

Sharing the airway

Management of appropriate intermittent positive pressure ventilation

Methods of pain relief during maintenance

Management of effects of drugs used during anaesthesia

Management of hypo and hypertension

Provision of intra-operative fluids; transfusion of blood and blood products

Management of diabetes

Methods of detection of awareness

Management of appropriate muscle relaxation

Management of any critical incidents which occur during anaesthesia

Interpretation and limitations of monitoring equipment

#### **Attitudes and behaviour**

Vigilance

Attention to detail

Attention to multiple sources of data continuously

Recognition of need to communicate with colleagues

#### **Workplace training objectives**

To manage anaesthetised spontaneously breathing patients

To manage anaesthetised ventilated patients

To manage sedated patients

To manage diabetes perioperatively

To manage steroid cover

To checking blood and blood products

To apply and interpret appropriate monitoring

To know how to deal with emergencies as they occur in anaesthesia and how to stabilise a patient's condition until senior assistance arrives

To plan ahead with the surgeon any unusual requirements of anaesthesia

### **POSTOPERATIVE AND RECOVERY CARE**

#### **Knowledge**

Causes and treatment of failure to breathe at end of operation

Distinguishing between opiate excess, continued anaesthetic effect and/or residual paralysis

Care of the unconscious patient

Monitoring the patient in recovery



Interpretation of nerve stimulator patterns  
 Oxygen therapy, indications and techniques  
 Management of cyanosis, hypo- and hypertension, shivering and stridor  
 Postoperative fluid balance and prescribing  
 Assessment of pain and methods of pain management  
 Methods of treating of postoperative nausea and vomiting  
 Causes and management of post-operative confusion  
 Management of asthma, COPD, hypertension, IHD, rheumatoid arthritis, jaundice, steroid therapy, diabetes  
 Management of the obese patient  
 Recovery room equipment  
 Prevention, diagnosis and management of postoperative pulmonary atelectasis, Deep vein thrombosis and pulmonary embolus  
 Criteria for discharge of day-stay patients

### **Skills**

Recovery from anaesthesia in patients with elective and urgent conditions requiring gynaecological, abdominal, orthopaedic, ENT, dental, urological and body surface surgery (Knowledge of sub-specialty practice and specialised techniques is not required unless specified elsewhere.)  
 Clear instructions during handover of patient to recovery staff  
 Assessment of full return of protective reflexes  
 Assessment of adequacy of ventilation/reversal  
 Recognition of residual relaxant action  
 Use of nerve stimulator  
 Extubation and airway protection in the presence of potentially full stomach  
 Prescription of postoperative fluids  
 Assessment of fluid balance and need for urethral catheterisation  
 Evaluation and management of post-operative confusion  
 Assessment of postoperative pain  
 Prescription of postoperative pain regimen  
 Treatment of nausea and vomiting  
 Stabilisation before discharge from Recovery  
 Continuation of care until discharge from Recovery, and beyond as appropriate  
 Criteria for discharge of patients to ward  
 Criteria for discharge of day-stay patients

### **Attitudes and behaviour**

Clear communication  
 Responding rapidly to calls for help  
 Follow up of sick patients on the ward before going home

### **Workplace training objectives**

To achieve a smooth, controlled return of vital functions and reflexes  
 To practice giving clear instructions to recovery staff  
 To be able to discharge patients safely back to the ward  
 To know the criteria for discharge of day-stay patients  
 To recognise and treat of common recovery room complications  
 To recognise and treat conditions and circumstances requiring HDU or ICU care  
 To know the equipment requirements of a recovery room

### **Regional anaesthesia**

#### **Knowledge**

Pharmacology of local anaesthetics & spinal opioids  
 Anatomy of spine, nerve roots, cauda equina, intercostal nerves, brachial plexus, femoral nerve, inguinal canal, nerves at wrist and ankle, nerve supply of larynx  
 Dermatomes and levels for common operations (e.g. inguinal hernia, haemorrhoids)  
 Technique of spinal and epidural (including caudal) anaesthesia: single shot and catheter techniques  
 Management of the complications of spinal and epidural (including caudal) analgesia (associated hypotension, shivering, nausea & anxiety)  
 Management of accidental total spinal blockade  
 Management of dural tap  
 Techniques and complications of intravenous regional anaesthesia (IVRA),  
 Toxicity of local anaesthetic agents and its management  
 Management of failed/ deteriorating regional block  
 Methods of sedation  
 Absolute and relative contraindications to regional blockade

#### **Skills**

Technique of spinal and epidural (including caudal) analgesia in any suitable patients  
 Recognition of contraindicated or unsuitable patients or those in whom a block would be difficult to perform  
 Management of hypotension, nausea, anxiety and shivering induced by spinal or epidural blockade  
 Post-operative care following spinal or epidural block (including urinary retention)  
 Prescription of continuous epidural infusions  
 Use of epidural techniques for post-operative pain management  
 Checking epidural/spinal packs  
 Technique of intravenous regional anaesthesia (IVRA)

Performance of some simple peripheral nerve blocks  
Use of drugs to provide sedation  
Combined general and regional anaesthesia

### **Attitudes and behaviour**

Safety first  
Considering views of patient and surgeon  
Management of theatre environment with awake patient  
Planning list to allow block to take effect  
Communication and reassurance  
Consent for regional blockade  
Workplace training objectives

To obtain consent from patients

To create a safe and supportive environment in theatre

To position patients and to instruct and use assistants properly

To establish spinal and epidural blockade

To maintain epidural blockade using top up and continuous techniques with local anaesthetics and opioids

To perform IVRA

To perform some simple peripheral nerve blocks

To know the criteria for the safe discharge of patients from recovery

### **MANAGEMENT OF TRAUMA, STABILISATION AND TRANSFER OF PATIENTS**

#### **Knowledge**

Performance and interpretation of the primary and secondary survey  
Emergency airway management  
Anatomy and technique of cricothyrotomy/tracheostomy/mini-tracheotomy  
Establishing IV access: interosseous cannulation  
Immediate specific treatment of life-threatening illness or injury, with special reference to thoracic and abdominal trauma  
Recognition and management of hypovolaemic shock  
Effects of trauma on gastric emptying  
Central venous access: anatomy and techniques  
Central venous pressure monitoring

Arterial pressure monitoring  
Pleural drain insertion  
Peritoneal lavage  
Principles of the management of head injury  
Mechanisms and effects of raised intra-cranial pressure: coup and contra-coup injuries  
Methods of preventing the 'second insult' to the brain  
Principles of anaesthesia in the presence of a recent head injury  
Management of cervical spine injuries  
Principles of the safe transfer of patients  
Understanding portable monitoring systems  
Recognition and management of dilutional coagulopathy  
Factors affecting intraocular pressure

#### **Skills**

Assessment and immediate management of trauma patient: primary and secondary survey  
Glasgow coma scale  
Recognition of need for appropriate investigations (Hb, cross-match, chest X-ray etc)  
Assessment and management of circulatory shock  
Emergency airway management, oxygen therapy and ventilation  
Chest drain insertion and management: emergency relief of tension pneumothorax  
Cannulation of major vessels for resuscitation and monitoring  
Care and immobilisation of cervical spine  
Transfers within and between hospitals of adults who do not have life threatening conditions or a severe head injury  
Analgesia for trauma victim  
Urinary catheterisation in traumatised patient  
Establishing central venous pressure monitoring: interpretation of readings  
Establishing arterial pressure monitoring: interpretation of readings  
Anaesthesia in the presence of a recent head injury (which itself does not require surgery)  
Anaesthesia for a penetrating eye injury  
Ability to deal with emergencies before, during and after anaesthesia and the ability to stabilise a patient's condition until senior assistance arrives

### **Attitudes and behaviour**

Trauma matters: importance of speed of response and proper resuscitation  
Try to offer the best chance of survival  
Focus on the golden hour  
Communication with appropriate specialists  
Ability to take control when either appropriate or necessary  
Insist on stabilisation before transfer  
Pretransfer checking of kit and personnel  
Communication with relatives

### **Workplace training objectives**

To perform assessment, immediate care and management of the traumatised patient, (including the principles of managing a head injury)  
To stabilise a patient's condition until senior assistance arrives  
To know when to get senior or other specialist help  
To know of how to deal with emergencies related to trauma before, during and after anaesthesia  
To transfer a *stable* ventilated patient safely to another site, either in the same or in a different hospital

## **OBSTETRIC ANAESTHESIA AND ANALGESIA**

### **Knowledge**

Physiological changes associated with a normal pregnancy  
Functions of the placenta: placental transfer: feto-maternal circulation  
The fetus: fetal circulation: changes at birth  
Pain pathways relevant to labour  
Methods of analgesia during labour: indications and contraindications  
Effect of pregnancy on the technique of general and regional anaesthesia  
Principles of anaesthesia for incidental surgery during pregnancy

### **Skills (to observe or perform)**

Preoperative assessment of the pregnant patient  
Anaesthesia for retained products of conception  
Analgesia for labour  
Management of APH and PPH  
Management of dilutional coagulopathy  
Intubation problems in the full-term mother  
Anaesthesia/analgesia for instrumental delivery  
Anaesthesia for retained placenta  
Anaesthesia for caesarean section

### **Attitudes and behaviour**

Attempt by conscientious care to recognise problems early  
Seek senior help early  
Good communication with mother, partner and other family members  
Calmness under pressure  
Timely assistance and prompt response to requests for analgesia and help  
Reassurance to the mother  
Compassion and kindness when the outcome of labour has been poor

### **Workplace training objectives**

All MOs should have an attachment to an obstetric service to observe and preferably perform the listed skills. It is recognised that not all MOs will be able to become highly skilled in obstetric analgesia and it is accepted that in the time available some MOs will not be able to progress beyond direct supervision.

## **PAEDIATRIC ANAESTHESIA**

### **Knowledge (infants and children)**

Anatomical differences in the airway, head, and spinal cord from the adult  
Deciduous and permanent dentition  
Physiological differences from the adult  
Haematological and biochemical changes with age  
Estimation of blood volume, replacement of fluid loss  
Modification of drug dosages  
Analgesia for children  
Premedication, including local anaesthesia for venepuncture  
Calculation of tube sizes, selection of masks and airways  
Choice of breathing system  
Upper respiratory tract infections and when to cancel operations  
Psychological aspects of sick children

### **Skills (aged 5 and above, unless otherwise stated)**

Preoperative assessment of the previously fit child  
Anaesthesia in fit children for elective and urgent general, ENT, and ophthalmic surgery, minor trauma and other non-specialist procedures  
Venous access (including local anaesthesia premedication)  
Airway management, selection of correct sized tubes and masks etc  
IV and gaseous induction of general anaesthesia  
Spontaneous and ventilated maintenance of anaesthesia  
Caudal and other simple blocks  
Management and stabilisation of the injured child (excluding neonates and infants)

until senior help arrives

Paediatric resuscitation (practised in a resuscitation teaching session) as described by the Resuscitation Council (European)

### **Attitudes and behaviour**

Communication with the child and parents

Reassurance for the child and parents

Issues of consent

Management of the environment during induction of anaesthesia

### **Workplace training objectives**

The variation in paediatric exposure will vary greatly amongst MOs. Trainees should take whatever opportunities they can to obtain the skills in the list above. It is accepted that not all trainees will have sufficient clinical opportunity to progress beyond direct supervision.

## **ANAESTHESIA AND THE ELDERLY**

### **Knowledge**

Physiological changes with age

Altered pharmacological response

Erosion of physiological reserve

Frequent co-morbidities

Positioning difficulties

Communication difficulties (eyesight, hearing, CVAs)

Mental clarity, memory loss

Causes of post-operative confusion

Importance of social circumstances

### **Skills**

Modifications necessary when anaesthetizing the elderly

Management of post-operative confusion

### **Attitudes and behaviour**

Special efforts to communicate clearly (N.B. deafness and blindness)

Old people have feelings too

Respect for the social norms of older people

Problems of consent in mental infirmity

Recognising the limitations of therapy

Ethics of 'do not resuscitate' orders

## **Workplace training objectives**

When anaesthetising elderly patients to be aware of the special problems they pose.

## **PAIN MANAGEMENT**

### **Knowledge**

Afferent nociceptive pathways, dorsal horn, peripheral and central mechanisms, neuromodulatory systems, supraspinal mechanisms

Nociceptive pain, visceral pain, neuropathic pain

Influence of therapy on nociceptive mechanisms

The analgesic ladder

Simple analgesics: drugs and mechanisms

Opioids: drugs and mechanisms

Non-steroidal anti-inflammatory agents: drugs and mechanisms

Local anaesthetic agents: drugs and mechanisms

Measurement of pain

Organisation and objectives of an acute pain service

### **Skills**

Assessment and management of postoperative pain and nausea

Monitoring acute pain and pain relieving methods

Use of simple analgesics: paracetamol: NSAIDs

Opioids: intramuscular, intravenous infusion, intravenous PCA, subcutaneous PCA, epidural, intrathecal

Regional local anaesthetic techniques: lumbar epidural, caudal epidural, simple peripheral nerve blocks

Inhalational analgesia

Specific clinical groups: children, elderly, impaired consciousness, intensive care

Contributing to an acute pain service

### **Attitudes and behaviour**

Communication with patients, relatives, staff

Rapid response to unrelieved pain

Management tempered by awareness of potential complications and side effects

Awareness of limitations in pain management

Making efforts to follow patients up on the wards

Recognition of need for team approach and partnerships in a pain team

### **Workplace training objectives**

To prescribe appropriately for patients in pain awaiting surgery

To prescribe pain management for patients after common surgical procedures

To institute appropriate action to relieve pain quickly in recovery  
To become familiar and technically proficient with a variety of therapeutic methods listed above in the skills list

## **INFECTION CONTROL**

### **Knowledge**

Universal precautions and good working practices (hand washing, gloves etc)  
Cross infection: modes and common agents  
Emergence of resistant strains: antibiotic policies in a hospital  
Common surgical infections: antibiotic choice and prophylaxis  
Infections from contaminated blood  
Hepatitis and HIV infections: modes of infection: natural history: at risk groups  
Immunisation policy  
Sterilisation of equipment  
Strategy if contaminated

### **Skills**

Preoperative assessment: awareness of at risk groups  
Recognition of the immunocompromised patient  
Administration of IV antibiotics: risk of allergy and anaphylaxis  
Aseptic techniques  
Use of disposable filters and breathing systems  
Use of protective clothing/gloves/masks etc

### **Attitudes and behaviour**

Every patient entitled to the best care available  
Prevention of self-infection  
Prevention of cross infection

### **Workplace training objectives**

To think about and apply the skills and attitudes listed above to all patients  
To wash hands between patients

## **CRITICAL INCIDENTS**

### **Knowledge**

Common causes of critical incidents  
*Principles of the causes, detection and management of:*  
Cardiac and / or respiratory arrest  
    Unexpected Hypoxia with or without cyanosis  
    Unexpected increase in peak airway pressure

Progressive fall in minute volume during spontaneous respiration or IPPV  
Fall in end tidal CO<sub>2</sub>  
Rise in end tidal CO<sub>2</sub>  
Rise in inspired CO<sub>2</sub>  
Unexpected hypotension  
Unexpected hypertension  
Sinus Tachycardia  
Arrhythmias (ST segment changes; sudden tachydysrhythmia; sudden bradycardia; Ventricular Ectopics – Ventricular tachycardia – Ventricular Fibrillation)  
Convulsions

### **Management of the following specific conditions:**

Aspiration of vomit  
Laryngospasm  
Bronchospasm  
Tension Pneumothorax  
Gas / Fat / Pulmonary embolus  
Adverse drug reactions  
Anaphylaxis  
Transfusion of miss-matched blood or blood products  
Malignant hyperpyrexia  
Inadvertent intra-arterial injection of irritant fluids  
High spinal block  
Local Anaesthetic toxicity  
Failed intubation  
Difficulty with IPPV and sudden or progressive loss of minute volume

### **Skills**

Early recognition of deteriorating situation by careful monitoring  
Practice response protocols in resuscitation room or in simulation with other relevant health care professionals when appropriate

Respond appropriately if any of them happen  
Ability to obtain the attention of others when a crisis is occurring

### **Attitudes and behaviour**

Vigilance  
Awareness of the importance and process of critical incident reporting  
Acceptance that it can happen to you: the unexpected happens to everybody

Following through a critical incident with warning flags, presentation at morbidity meetings, proper reporting etc  
Information to patient and where necessary, counselling and advice

### **Workplace training objectives**

To have management plans for the listed critical incidents  
To practice whenever possible in mock-up situations or simulation with other relevant health care professionals when appropriate  
To respond appropriately if a critical incident occurs

## **MANAGEMENT OF RESPIRATORY AND CARDIAC ARREST**

### **Knowledge**

Patient assessment: diagnosis of causes of cardio-respiratory arrest  
Causes of cardio-respiratory arrest during induction, maintenance and recovery from anaesthesia  
Importance of considering non-cardiac causes of cardio-respiratory arrest  
Methods of airway management (mouth-mouth/nose, bag-mask, LMA, intubation)  
Recognition and management of life-threatening arrhythmias including defibrillation and drug therapy  
Recognition and management of non-cardiac causes of cardio-respiratory arrest  
Knowledge of specific problems of paediatric resuscitation  
Ethical aspects of resuscitation

### **Skills**

Recognition of cardiac and respiratory arrest  
Resuscitation equipment checklist  
ABC  
Practical life support – following current algorithm  
Managing the airway  
External chest compression  
Vascular access, suitability of sites  
Arrhythmia recognition and management (drugs/ defibrillators/ pacemakers)  
Defibrillation and defibrillator settings  
Deciding when further resuscitation is futile  
Diagnosis of brain death  
Fluid balance assessment/management

### **Attitudes and behaviour**

Always resuscitate unless certain it is inappropriate  
Not to resuscitate orders  
Recognise need for team leader

Desire to offer the best possible chance of survival  
Recognition of futility  
Dealing sensitively and honestly with relatives  
Medico-legal aspects of resuscitation (police reports etc)

### **Workplace training objectives**

**To resuscitate adults (and know the principles of resuscitating children) from cardio-respiratory arrest to the standards set by the Resuscitation Council [EUROPEAN] To discuss ethical aspects of resuscitation**

## **RECOMMENDED READING FOR PART 1A EXAM**

- (a) Textbook of Anaesthesia  
by A.R. Aitkenhead and G. Smith
- (b) A Handbook of Anaesthesia  
by D. Attygalle, N Rodrigo and A Abayadeera
- (c) Lee's Synopsis of Anaesthesia  
by Atkinson, Rushman, Davies
- (d) Clinical Anaesthesia  
by Carl L. Gwinnutt

## **8.2. MD PART I B (BASIC SCIENCES) (ANAESTHESIOLOGY)**

This guide is designed to indicate the general scope of preparation necessary for the examination. Reading of current literature is recommended.

### **Syllabus for MD PART 1 B Examination (Anaesthesiology)**

#### **PHYSIOLOGY**

##### **General**

Organisation of the human body and control of internal environment  
Variations with age  
Function of cells; genes and their expression  
Cell membrane characteristics; receptors  
Protective mechanisms of the body

##### *Biochemistry*

Acid base balance and buffers  
Ions e.g. Na<sup>+</sup>, K<sup>+</sup>, Ca<sup>++</sup>, Cl<sup>-</sup>, HCO<sub>3</sub><sup>-</sup>  
Cellular metabolism  
Enzymes



### *Body fluids and their functions and constituents*

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

### *Haematology and Immunology*

- Red blood cells: haemoglobin and its variants
- Blood groups
- Haemostasis and coagulation
- White blood cells
- The inflammatory response
- Immunity and allergy

### *Muscle*

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

### *Heart/Circulation*

- Cardiac muscle contraction
- The cardiac cycle: pressure and volume relationships
- Rhythmicity of the heart
- Regulation of cardiac function; general and cellular
- Control of cardiac output (including the Starling relationship)
- Fluid challenge and heart failure
- Electrocardiogram and arrhythmias

Neurological and humoral control of systemic blood pressures, blood volume and blood flow (at rest and during physiological disturbances e.g. exercise, haemorrhage and Valsalva manoeuvre)

Peripheral circulation: capillaries, vascular endothelium and arteriolar smooth muscle

Characteristics of special circulations including: pulmonary, coronary, cerebral, renal, portal and foetal

### *Renal tract*

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

### *Respiration*

- Gaseous exchange: O<sub>2</sub> and CO<sub>2</sub> transport, hypoxia and hyper- and hypocapnia, hyper- and hypobaric pressures
- Functions of haemoglobin in oxygen carriage and acid-base equilibrium
- Pulmonary ventilation: volumes, flows, dead space
- Effect of IPPV on lungs
- Mechanics of ventilation: ventilation/perfusion abnormalities
- Control of breathing, acute and chronic ventilatory failure, effect of oxygen therapy
- Non-respiratory functions of the lungs

### *Nervous System*

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

### *Liver*

- Functional anatomy and blood supply
- Metabolic functions

### *Gastrointestinal*

- Gastric function; secretions, nausea and vomiting



Gut motility, sphincters and reflex control  
Digestive functions

### *Metabolism*

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

### *Endocrinology*

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

### *Pregnancy*

Physiological changes associated with normal pregnancy  
Materno-fetal, fetal and neonatal circulation  
Functions of the placenta: placental transfer  
Fetus: changes at birth

## **PHARMACOLOGY**

### **Knowledge**

#### *Applied chemistry*

Types of intermolecular bonds  
Laws of diffusion. Diffusion of molecules through membranes  
Solubility and partition coefficients  
Ionization of drugs  
Drug isomerism  
Protein binding  
Oxidation and reduction

#### *Mode of action of drugs*

Dynamics of drug-receptor interaction  
Agonists, antagonists, partial agonists, inverse agonists  
Efficacy and potency. Tolerance

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

### ***Pharmacokinetics and pharmacodynamics***

Drug uptake from: gastrointestinal tract, lungs, transdermal, subcutaneous, IM, IV, epidural, intrathecal routes  
Bioavailability  
Factors determining the distribution of drugs: perfusion, molecular size, solubility, protein binding  
The influence of drug formulation on disposition  
Distribution of drugs to organs and tissues: Body compartments  
Influence of specialised membranes: tissue binding and solubility  
Materno-fetal distribution  
Distribution in CSF and extradural space  
Modes of drug elimination:  
Direct excretion  
Metabolism in organs of excretion: phase I & II mechanisms  
Renal excretion and urinary pH  
Non-organ breakdown of drugs  
Pharmacokinetic analysis:  
Concept of a pharmacokinetic compartment  
Apparent volume of distribution  
Clearance  
Clearance concepts applied to whole body and individual organs  
Simple 1 and 2 compartmental models: concepts of wash-in and wash-out curves  
Physiological models based on perfusion and partition coefficients  
Effect of organ blood flow: Fick principle

Pharmacokinetic variation: influence of body size, sex, age, disease, pregnancy, anaesthesia, trauma, surgery, smoking, alcohol and other drugs  
Effects of acute organ failure (liver, kidney) on drug elimination  
Pharmacodynamics: concentration-effect relationships: hysteresis  
Pharmacogenetics: familial variation in drug response  
Adverse reactions to drugs: hypersensitivity, allergy, anaphylaxis, anaphylactoid reactions

### *Systematic Pharmacology*

Anaesthetic gases and vapours  
Hypnotics, sedatives and intravenous anaesthetic agents  
Simple analgesics  
Opioids and other analgesics; and opioid antagonists  
Non-steroidal anti-inflammatory drugs  
Neuromuscular blocking agents (depolarising & non-depolarising), and anticholinesterases  
Drugs acting on the autonomic nervous system: cholinergic and adrenergic agonists and antagonists  
Drugs acting on the heart & cardiovascular system (including inotropes, vasodilators, vasoconstrictors, antiarrhythmics, diuretics)  
Drugs acting on the respiratory system (including respiratory stimulants & bronchodilators)  
Antihypertensives  
Anticonvulsants  
Anti-diabetic agents  
Diuretics  
Antibiotics  
Corticosteroids and other hormone preparations  
Antacids. Drugs influencing gastric secretion and motility  
Antiemetic agents  
Local anaesthetic agents  
Plasma volume expanders  
Antihistamines  
Antidepressants  
Anticoagulants  
Vitamin K, B12 and thiamine

## **PHYSICS AND CLINICAL MEASUREMENT**

### **Knowledge**

Mathematical concepts: relationships and graphs  
Concepts only of exponential functions and logarithms: wash-in, wash-out and tear away  
Basic measurement concepts: linearity, drift, hysteresis, signal: noise ratio, static and dynamic response  
SI units: fundamental and derived units  
Other systems of units where relevant to anaesthesia (e.g. mmHg, bar, atmospheres)  
Simple mechanics: mass, force, work and power  
Heat: freezing point, melting point, latent heat  
Conduction, convection, radiation  
Mechanical equivalent of heat: laws of thermodynamics  
Measurement of temperature and humidity  
Colligative properties: osmometry  
Physics of gases and vapours  
Absolute and relative pressure  
The gas laws; triple point; critical temperature and pressure  
Density and viscosity of gases  
Laminar and turbulent flow; Poiseuille's equation, the Bernoulli principle  
Vapour pressure: saturated vapour pressure  
Measurement of volume and flow in gases and liquids  
The pneumotachograph and other respirometers  
Principles of surface tension  
Basic concepts of electricity and magnetism  
Capacitance, inductance and impedance  
Amplifiers: band width, filters  
Amplification of biological potentials: ECG, EMG, EEG  
Sources of electrical interference  
Processing, storage and display of physiological measurements  
Bridge circuits  
Basic principles and safety of lasers  
Basic principles of ultrasound and the Doppler effect  
Principles of cardiac pacemakers and defibrillators  
Electrical hazards: causes and prevention  
Electrocution, fires and explosions  
Diathermy and its safe use  
Principles of pressure transducers

Resonance and damping, frequency response  
 Measurement and units of pressure  
 Direct and indirect methods of blood pressure measurement  
 Principles of pulmonary artery and wedge pressure measurement  
 Cardiac output: Fick principle, thermodilution  
 Measurement of gas and vapour concentrations, (oxygen, carbon dioxide, nitrous oxide, and volatile anaesthetic agents) using infra-red, paramagnetic, fuel cell, oxygen electrode and mass spectrometry methods  
 Measurement of pH, pCO<sub>2</sub>, pO<sub>2</sub>  
 Measurement of CO<sub>2</sub> production/ oxygen consumption/ respiratory quotient  
 Simple tests of pulmonary function e.g. peak flow measurement, spirometry  
 Capnography  
 Pulse oximetry  
 Measurement of neuromuscular blockade  
 Measurement of pain

## STATISTICAL METHODS

Trainees will be required to demonstrate understanding of basic statistical concepts, but will not be expected to have practical experience of statistical methods. Emphasis will be placed on methods by which data may be summarised and presented, and on the selection of statistical measures for different data types. Candidates will be expected to understand the statistical background to measurement error and statistical uncertainty.

### Knowledge

#### *Data Collection.*

Simple aspects of study design  
 Defining the outcome measures and the uncertainty of measuring them  
 The basic concept of meta-analysis and evidence based medicine

#### *Descriptive statistics*

Types of data and their representation  
 The normal distribution as an example of parametric distribution  
 Indices of central tendency and variability

#### *Deductive and inferential statistics*

Simple probability theory and the relation to confidence intervals  
 The null hypothesis  
 Choice of simple statistical tests for different data types  
 Type I and type II errors

## Objectives for trainees

This knowledge base will be tested in the Primary Examination. Some clinical aspects may be asked in the workplace assessments.

## RECOMMENDED READING ON PHYSIOLOGY

1. Text book of Medical Physiology  
by Arthur Guyton
2. A Review of Medical Physiology  
by William F. Ganong
3. Respiratory Physiology  
by John B. West

### Reference books

1. Applied Respiratory Physiology  
by J.F. Nunn
2. Anaesthetic Equipment  
by Wards

## ON PHARMACOLOGY

1. Drugs in Anaesthetic Practice  
by M.D. Vickers, M. Morgan, Spencer
2. Pharmacology & Physiology in Anaesthetic practice  
by Robert K. Stoelting

### Reference books

1. Drugs and Anaesthesia. Pharmacology for Anaesthetists  
by Margaret Wood & Alastair Wood
2. Pharmacology  
by H.P. Rang and Dale
3. Principles and practice of Pharmacology for Anaesthetists  
by T.V. Calvey and N.E. Williams

## PHYSICS, CLINICAL MEASUREMENTS AND CLINICAL CHEMISTRY

1. Basic Physics Measurements in Anaesthesia  
by G.D. Parbrook, P.D. Davis, E.O. Parbrook
2. Principles of measurement and monitoring in Anaesthesia and Intensive Care  
by M.K. Sykes & M.D. Vickers

## Reference books

1. Scientific Foundations of Anaesthesia  
by Cyril Scuur , Stanley Feldman, & Neil Soni
2. Ward's Anaesthetic equipment  
by John T B Moyle, Andrew Davey
3. Statistics at Square one

## 8.3 The Clinical Training Program For MD Final Examination (Anaesthesiology)

### ACKNOWLEDGEMENT

We are very grateful to the Royal College of Anaesthetists for granting permission to adopt certain sections from the document “THE CCST IN ANAESTHESIA”- A Manual for Trainees and Trainers – 2003, in compiling this guide Board of Study in Anaesthesiology Sri Lanka.

### CONTENTS

### TOPIC

#### Clinical Training Program (CTP)

- a) Training program
- b) Assessment

#### Key Units of Training

Cardiac / Thoracic anaesthesia  
Intensive Care Medicine  
Neuroanaesthesia  
Obstetric anaesthesia  
Paediatric anaesthesia  
Pain management, acute & chronic  
Vascular anaesthesia

#### General Units of Training

Day surgery  
Ear, Nose and Throat (Otorhinolaryngology)  
General surgery / Gynaecology / Urology (+/- Transplantation)  
Orthopaedic anaesthesia  
Regional anaesthesia  
Trauma and accidents

## Additional Units of Training

Diagnostic imaging, anaesthesia & sedation  
Maxillo-facial / Dental anaesthesia  
Ophthalmic anaesthesia  
Plastics / Burns  
Applied physiology  
Applied clinical pharmacology  
Statistical basis of clinical trial management  
Clinical measurement

### (a) Clinical Training Program (CTP)

This guide lays down the knowledge skills and attitudes (including behavioural patterns) which are required to complete 2 1/2 years of CTP leading up to the MD Part 11 final examination.

It incorporates the MD Part 11 syllabus and the material has been arranged to bring it under the headings *Knowledge*, *Skills* and *Attitudes*, in clinical and the basic science sections. This format inevitably results in the same topic appearing in more than one place. Similarly there is some inevitable crossover between the knowledge and skills lists. Each section relating to clinical practice also has a list of ‘Workplace training objectives’. These are intended to assist the trainees’ self-directed learning and to indicate the important aspects of clinical practice on which they could be expected to demonstrate and answer simple questions, to satisfy their ‘Workplace Assessments’.

The Board of Study / Anaesthesiology (BSA) relies on the good sense of its assessors in ‘signing trainees off’. It is recognized that, as with consultant practice, there are individual variations in ability, aptitude and application. What is required of the assessor is a confirmation that the trainee has been trained in the relevant aspect of practice and has attained a minimum standard that would be acceptable to other trainers.

### (b) Assessment

- Workplace Assessments will concentrate primarily on clinical skills, attitudes and behaviour together with a confirmation that the trainee has a practical understanding of the knowledge base across anaesthesia, critical care and pain management.
- Examination assessments will mainly test the knowledge base across anaesthesia, critical care and pain management with the associated applied basic science.

- The documentation of training by the trainee
- To enable external evaluation to take place and to ensure that individual trainees are receiving an appropriately balanced training, it is essential that trainees maintain proper records (log book / appendix 3)
- Record book

**(c) Units of Training**

**i. Key units**

Although it is competence that will be judged, nevertheless in these key sub-specialties, it is necessary that trainees have the equivalent of at least one month (but not normally more than 3 months) of training in each during CTP whether these are continuous blocks or a series of shorter attachments will depend on local arrangements). The seven 'Key Units of Training' are as follows:

- Cardiac / Thoracic anaesthesia
- Intensive Care Medicine
- Neuroanaesthesia
- Obstetric anaesthesia
- Paediatric anaesthesia
- Pain management
- Vascular anaesthesia

**ii. General units**

There are also six 'General Units of Training' which are widely available, in which it would be expected that all trainees will receive appropriate training and in which 'Workplace Assessments' will take place.

- Day surgery
- ENT General surgery / Gynaecology / Urology (+ Transplantation)
- Orthopaedic anaesthesia
- Regional anaesthesia
- Trauma and accidents

**iii. Additional units**

Finally there are five 'Additional Units of Training'

Diagnostic imaging, anaesthesia & sedation

- Maxillo-facial / Dental
- Ophthalmic surgery
- Plastics / Burns
- Miscellaneous

**(d) Trainees will be expected to demonstrate knowledge at an appropriate level under the following headings:**

- Anaesthetic equipment.
- Preoperative assessment
- Pre-medication
- Pre-, per- and postoperative management of anaesthesia
- The medical management of the surgical patient
- Anaesthesia for patients with co-existing disease
- Audit and quality control
- Ethics, relevant legislation and the duty of care, consent, and information given to patients before anaesthesia
- Trainees should be able to demonstrate a good understanding of human anatomy, physiology and pharmacology relevant to the practice of anaesthesia, critical care and pain management. The syllabus for the MD Part 1A & 1B examinations is considered core knowledge. For the MD Part 11 examination, application of this knowledge to clinical practice will be explored. For instance, this will include the knowledge of anatomy as demonstrated by endoscopic and imaging techniques.

**1. GENERAL KNOWLEDGE AND SKILLS**

*Listed here are general aspects of knowledge and skills that should be acquired in the first 6 months of the clinical training programme. Knowledge and skills relating to the airway are particularly emphasised. These will generally represent a further development of the basic competencies obtained as a MO / HO in Anaesthesia.*

**a) Knowledge**

Anaesthetic and monitoring equipment:

- standards
- care, cleaning, disinfecting and sterilisation (particularly airway equipment)
- potential defects and problems
- safety precautions and checking

Anaesthesia in abnormal environments:

- altitude
- in pressure chambers / at depth
- low temperature

Problems for patients and staff of:

- age (anaesthesia and the elderly)
- obesity
- smoking
- alcoholism
- drug dependency and addiction
- hepatitis B & C carriers
- HIV and AIDS
- variant CJD
- pacemakers

Hazards for patients and staff of:

- anaesthetic drugs and pregnancy
- electricity and electrocution
- diathermy
- sharps injury
- pollution by anaesthetic gases
- fires and explosions
- Intravenous fluid replacement
- blood transfusion
- Jehovah's Witnesses
- blood substitutes
- disseminated intravascular coagulation
- colloid / crystalloid

Posture and positioning

- lateral position
- prone position
- Trendelenberg position
- lithotomy
- peripheral nerve damage
- prevention of deep vein thrombosis

## **b) Airway Management**

Anatomy of the airway

Physiology of airway and airway reflexes

Pharmacology relevant to the airway:

- control of secretions
- control of airway reflexes in conscious sedation
- effect of anaesthetic drugs on airway reflexes
- reducing the prevalence and sequelae of gastro-oesophageal reflux

Evaluation of the airway:

- history
- general examination
- specific predictive tests
- special investigations

Airway strategy:

- aspiration risk
- predicted difficult direct laryngoscopy
- predicted difficult mask inflation
- known abnormal / narrowed tracheo-bronchial tree
- unexpected difficult ventilation
- unexpected difficult intubation
- can't intubate / can't oxygenate

Preoxygenation – techniques / purpose

Confirmation of position of tracheal tube within trachea

Monitoring of ventilation by pressure changes, gas flows and capnography

Application of cricoid force in a rapid sequence induction

Cricoid force induced difficulties with airway management

Airway equipment – difficult airway trolley

Tracheostomy tubes, types, fixation and care

Conscious sedated (awake) intubation

- Preparation of patient
- Topical anaesthesia
- nerve blocks
- laryngoscopy, bronchoscopy
- specialized tubes

The obstructed airway:

- recognition
- immediate treatment of acute obstruction
- anaesthetic management of acute and chronic obstruction
- flexible nasoendoscopy and imaging

Emergency cricothyrotomy

- needle
- purpose built cannula > 4 mm ID
- surgical

Extubation strategies – routine, predicted and unexpected difficulty

Complications of difficult airway management

Follow – up care of patient, documentation and patient information

Surgical approach to the airway – indications, techniques, conduct

Percutaneous cricothyrotomy and tracheostomy



### c) Skills

Recognition of the difficult airway

- when to ask for help

Failed rapid sequence intubation

- performance of recognised 'drills' for failed intubation / ventilation

Alternative methods of intubation

- other laryngoscopy blades and bougies
- low skill fiberoptic intubation e.g. via laryngeal mask or specialised airway

Placement and checking of double lumen tubes

Anaesthetic techniques for laryngoscopy, bronchoscopy and tracheostomy

Extubation in abnormal airway

Clinical review of patient to detect and treat airway instrumentation damage

Interpretation of CT, MRI imaging and flow-volume loops

*Additional desirable clinical skills to be learnt primarily in the non - clinical environment (manikin) but supplemented by some clinical experience. The availability of equipment to display the fiberoptic image on a screen will also extend the opportunities for clinical teaching.*

Awake intubation:

- indications
- use with the compromised airway

Fiberoptic intubation through the nose and mouth with and without concurrent ventilation

Fibre - endoscopy skills to:

- visualise tracheo-bronchial tree
- confirm placement of single and double lumen tubes
- intubate through the laryngeal mask
- Blind and fiberoptic assisted intubation via the intubating laryngeal mask

Elective trans-tracheal ventilation to aid difficult intubation

Retrograde intubation - blind and fiberoptic assisted

Placement of bronchial blockers

Specialised bougies and airway exchange catheters

Use of the combitube or other supraglottic balloon device

Emergency cricothyrotomy:

- landmarks
- insertion of needle / cannula
- confirmation of position within trachea
- fixation
- pressures required for adequate gas flows
- ventilation through cannula / catheter
- complications

Application of 30 N cricoid force

2. **ACADEMIC / RESEARCH** *An understanding of the scientific basis of anaesthetic practice is essential. This unit of training effectively underwrites the understanding and education of trainees in all the other aspects of the training that they will receive. Even if separate time is not allocated, the concepts identified here should be fundamental to the education of trainees.*

### a) Knowledge

The scientific basis of clinical practice

The methodology and processes of clinical and laboratory research including the ethical considerations raised by research, the importance of study design in clinical research and the importance of statistical analyses

The audit cycle

The major national audit processes, including National Confidential Enquiry into Perioperative Deaths (NCEPOD)

Critical Incident Reporting:

purpose and value

methods – local / national anonymity – pros and cons



## b) Skills

Able to locate published research in a systematic manner

Critically interpret and evaluate the value of published clinical research

Plan and prepare a presentation and present to a live audience.

## c) Attitudes and behaviour

Maintain an inquisitive, questioning approach to clinical practice

Cultivate an evidence-based practice

Awareness of and detachment from vested interests or entrenched views

Develop a readiness to both listen and explain

Demonstrate a willingness to teach and learn

Develop an informed critical approach to the scientific literature

## d) Workplace training objectives

Trainees should gain competency in the critical interpretation and evaluation of published clinical research and be able to assess the benefit of applying the results of research to clinical practice.

### Recommended local requirements to support training

- A suitably experienced consultant or clinical academic
- Library and computing facilities
- Regular academic meetings

## 3. CARDIAC / THORACIC ANAESTHESIA

*This is a 'Key Unit of Training' over 3 months*

### (a) Knowledge

#### *Cardiac Anaesthesia*

Preoperative assessment and perioperative care of patients with cardiac disease

Induction and maintenance of anaesthesia for high risk cardiac procedures, including valve replacement

Antibiotic prophylaxis against bacterial endocarditis

Problems of cardiopulmonary bypass

Postoperative cardiac critical care, including analgesia, sedation and ventilatory management

Significance of cardiac tamponade

Interpretation of ECG and CXR

Interpretation of invasive and non-invasive cardiovascular monitoring

Temperature control and patient rewarming methods

Coagulopathy

Cardiac pacing modes

Intra-aortic balloon counter pulsation

Understanding of the patient with congenital heart disease

A working knowledge of the following investigations:

- stress testing
- cardiac catheterisation
- echocardiography – transthoracic / transoesophageal
- radionuclide scan

#### *Thoracic Anaesthesia*

- Preoperative pulmonary function tests
- Local and general anaesthesia for bronchoscopy including techniques of ventilation
- Understanding of fiberoptic bronchoscopic techniques for airway management
- Principles of one-lung anaesthesia
- Management of a pneumothorax
- Principles of underwater seals on chest drains
- Postoperative care and analgesia after thoracic surgery

## **(b) Skills**

### ***Generic***

- Internal jugular and subclavian venous cannulation
- Arterial cannulation
- Invasive pressure monitoring, including pulmonary artery catheters and interpretation of derived indices
- Postoperative analgesia by appropriate methods including local techniques
- Cardiopulmonary resuscitation and appropriate use of defibrillators

### ***Cardiac Anaesthesia***

- Preoperative assessment of patients with valvular and with ischaemic heart disease
- Induction and maintenance of anaesthesia for elective coronary bypass
- Management of the patient during cardiopulmonary bypass
- Use of inotropes and vasodilators
- Use of Intra aortic balloon pump
- Anaesthesia for procedures in intensive care including emergency re-sternotomy, re-intubation, tracheostomy or cardioversion

### ***Thoracic Anaesthesia***

- Preoperative assessment, preparation of patients with pulmonary disease
- Preoperative assessment, preparation of patients for thoracic surgery
- Induction and maintenance of anaesthesia for minor thoracic procedures, in particular, bronchoscopy and the use of the Sanders injector
- Use of single and double lumen endobronchial intubation
- Fiberoptic endoscopic confirmation of tube placement
- Induction and maintenance of anaesthesia for major thoracic procedures
- One lung ventilation

## **(c) Attitudes and behaviour**

- To communicate effectively with surgical colleagues / other members of the theatre team
- To be able to summarise a case to critical care staff
- Understand how to communicate with the intubated patient in intensive care
- To be able to recognise the need for senior help when appropriate
- Maintain accurate clinical records
- Presentation of material to departmental meetings and participation in clinical audit

## **(d) Workplace training objectives**

By gaining experience in cardiothoracic anaesthesia, the trainee should also develop competency in the management of cardiovascular and pulmonary problems arising in non-cardiac surgical patients.

### ***Cardiac Surgery***

The trainee should develop the ability to assess the circulation and have experience in the use of inotropes and vasoactive agents to support the circulation in patients with cardiac disease. They should also develop an understanding of the problems of extracorporeal circulation.

### ***Thoracic Surgery***

The trainee should understand the problems of one lung anaesthesia and develop experience in the placement of double-lumen tubes

## **(e) Recommended local requirements to support training**

### ***Cardiac Surgery***

- Cardiac surgery must take place in theatres equipped to a high standard for anaesthesia and monitoring with facilities for cardiopulmonary bypass and mechanical support of the circulation.
- Rapid access to biochemistry and haematology services.
- Each cardiac unit must have a consultant anaesthetist with dedicated responsibility for cardiac anaesthetic services.
- There must be appropriate support facilities provided.
- Extensive patient monitoring is required.
- Adequate critical care facilities must be provided.
- There must be resident medical staff cover of the intensive care unit
- There must be an ongoing, adequately resourced, audit programme

### ***Thoracic Surgery***

- On-site pulmonary function laboratory facilities must be available.
- Patients must be managed in an area, equipped and staffed to a high standard.
- Patients may routinely return to a high dependency care facility, however supporting intensive care facilities should also be easily accessible.
- Pain relief and other clinical protocols must be clearly defined.

## **4. INTENSIVE CARE MEDICINE**

*This is a 'Key Unit of Training' requiring 6 months of training within the specialty*

## (a) Knowledge

### *General*

- Trainees should have a good understanding of the diagnosis and management of the critically ill patient. All trainees should be familiar with the monitoring and life support equipment used in the treatment of critically ill patients. Trainees must be able to demonstrate their knowledge of practical invasive procedures, with an understanding of the principles and hazards involved and the interpretation of data from such procedures.
- Transport of the critically ill:
  - assessment and organisation of transfer
  - physiological consequences of acceleration
  - problems of working in isolated environments
- Outreach care:
  - early warning signs and symptoms
  - infection and Multiple Organ Failure
- Sepsis and endotoxaemia:
  - nosocomial infections
  - assessment and management of oxygen delivery
  - antibiotics and immunotherapy
  - reperfusion injury and antioxidants
- Cardiovascular system to include
  - pathophysiology and management of cardiogenic and hypovolaemic shock
  - pulmonary embolism
  - investigation and management of cardiac failure
  - investigation and management of arrhythmias
- Respiratory system to include:
  - airway care, including tracheal intubation and clearance of secretions
  - humidification
  - management of tracheostomy and decannulation
  - ventilators and modes of pulmonary ventilation (including non-invasive ventilation)
  - management of acute and chronic respiratory failure
  - management of severe asthma

- Nervous system to include:
  - central nervous system infection
  - acute polyneuropathy
  - traumatic and non-traumatic coma
  - encephalopathies
  - cerebral ischaemia
  - status epilepticus
  - brain stem death
- Renal, Electrolyte and Metabolic Disorders to include:
  - diagnosis, prevention and management of acute renal failure
  - fluid, electrolyte and acid-base disorders
  - body temperature
  - adrenal and thyroid dysfunction
- Haematological Disorders to include:
  - coagulopathies
  - immunocompromised patients
- Gastrointestinal Disorders:
  - acute liver failure - diagnosis and management
  - acute pancreatitis
  - gut ischaemia
  - gastrointestinal ulceration and bleeding
  - translocation and absorption disorders
- Nutrition:
  - enteral and parenteral nutrition: methods, nutrients, and complications
  - Analgesia, Anxiolysis and Sedation
- Trauma:
  - management of multiple injuries
  - near-drowning
  - burns and smoke inhalation
- Cardiopulmonary Resuscitation
- Management of Acute Poisoning:
  - paracetamol
  - aminophylline
  - digoxin

- ecstasy
  - tricyclics
  - organophosphate
  - diagnoses of brain death
- Diagnosis of brain death
    - Organ Donation
    - Scoring Systems and Audit
    - Ethics

## (b) Skills

### *General*

- Arterial and central venous access
- Insertion of thoracic drain
- Insertion of oro- or naso- gastric tube

### *Specific*

- Recognition of the critically ill patient
- Insertion of flow directed pulmonary artery catheter principles
- Insertion of transvenous pacemaker
- Insertion of oesophageal Doppler probe
- Ultrasound visualisation of main veins
- Percutaneous tracheostomy
- Fiberoptic bronchoscopic clearance of sputum
- Peritoneal lavage
- Set up ventilator for adult suffering from severe ARDS
- Assist in prone positioning of patient
- Assist in weaning patient from IPPV via assist/CPAP

## (c) Attitudes and behaviour

- An awareness of the importance of communication skills and interpersonal relationships will be expected
- Obtaining consent / assent for procedures in the critical care unit
- Breaking bad news
- Requesting post mortem investigation
- Explaining need for unexpected / early discharge
- Introducing the concept of organ donation

## (d) Workplace training objectives

There will be variation in the experience and degree of competence that individual trainees will achieve in this initial period of ICM training. However,

for example, they should be able to admit and manage a patient who has undergone major emergency for instance in vascular surgery or to admit and organise the early management of a patient suffering from severe respiratory failure complicated by acute renal failure.

### **Recommended local requirements to support training**

- There should be a separate designated facility (the Intensive Care Unit) for the care of the critically ill patient.
- There must be a sufficient number of intensive care and high dependency beds available to serve the designated population.
- The Critical Care Unit must be properly staffed and equipped for the care of such patients.
- All staff providing Critical Care, medical, nursing and paramedical must be appropriately trained.
- Critical Care services should be subject to clinical audit using the Intensive Care Unit

## 5. NEUROANAESTHESIA

*This is a 'Key Unit of Training' requiring*

*Two months of Anaesthetic training for Neurosurgery and Neuroradiology will take place within designated specialist centres with the appropriate critical care facilities.*

### (a) Knowledge

Preoperative assessment and management of patients with neurological disease

Anaesthesia for imaging relevant to the CNS

Anaesthesia for MRI including problems of magnetic fields

Anatomy of the skull and skull base Anatomy, physiological control and effect of drugs on cerebral blood volume and flow, ICP, CMRO<sub>2</sub>

Principles of anaesthesia for craniotomy, to include vascular disease, cerebral tumours and posterior fossa lesions

Anaesthetic implications of pituitary disease including endocrine effects (acromegaly) and trans-sphenoidal surgery

Perioperative management of interventional neuroradiological procedures

Anaesthesia for spinal column surgery and anaesthetic implications of spinal cord trauma

Principles of immediate postoperative management including pain relief and special considerations with narcotics

Principles of neurological monitoring

Implications of prion diseases for the anaesthetist and other staff

Anaesthetic and critical care implications of neuromedical diseases:

- Guillain-Barré syndrome
- myasthenia gravis - pharmacological management / thymectomy
- myasthenic syndrome
- dystrophia myotonica
- muscular dystrophy
- paraplegia and long-term spinal cord damage
- control of convulsions including status epilepticus
- tetanus
- trigeminal neuralgia including thermocoagulation

## **(b) Skills**

The trainee will be supervised during the provision of anaesthesia for:

Planned

- intracranial surgery
- spinal surgery

Emergency neurosurgery for

- head trauma

Safe patient positioning – prone, park-bench (lateral)

The trainee will be instructed in the non-surgical management of the head injured patient

Resuscitation and patient transfer

Monitoring:

- insertion of arterial lines
- insertion of CVP lines
- techniques for detection and management of air embolism
- EEG and evoked potentials
- intracranial pressure measurement
- spinal drainage

Critical Care:

- indications for ventilation
- the role of drugs
- management of raised intracranial pressure and manipulation of cerebral perfusion pressure
- fluid and electrolyte balance in neurocritical care
- complications
- treatment of raised intracranial pressure
- cerebral protection and prevention of cerebral ischaemia
- management of patients for organ donation

Neuroradiology

- practical aspects of patient management for CT and MRI
- anaesthetic considerations in interventional radiology

## **(c) Attitudes and behaviour**

- To understand the problems of obtaining consent in patients with impaired consciousness.
- To appreciate the limits of medical intervention
- To gain the ability to establish a rapport with the operating neurosurgeon and exchange information during surgery on aspects of changes in the patient's vital signs which are relevant to the operative procedure
- To communicate well with the nursing staff in the ICU, patients, relatives and other hospital staff
- To offer comfort to the patient and relatives when there is no prospect of survival?
- To understand the requirements for organ donation

## **(d) Workplace training objectives**

Trainees should gain an understanding of the principles of neuroanaesthesia and the associated neuro-critical care in order to manage, with safety, patients for routine operations on the brain and spinal cord. For patients with head injury, trainees should be able to manage their resuscitation, stabilisation and transfer.

## **(e) Recommended local requirements to support training**

- Neuroanaesthesia should only take place in Neuroscience Centres.
- Staffing levels in the operating theatre should be sufficient to allow anaesthetists to work in teams during long operations.

- Interventional neuroradiology requires full neuroanaesthesia cover by consultants
- Neuro-critical care is a joint responsibility between neuroanaesthesia and neurosurgery; there should be specific sessions for neuroanaesthetists in Critical care.
- The provision of beds for neuro-critical care must be adequate, the ventilation of patients in other areas should only occur in exceptional circumstances.
- Operating theatres, Intensive Care Units (ICU) and neuroradiology facilities including scanners should all be in close proximity.

### ***For patients with Head Injuries***

- The care of head injured patients is an integral part of neuroanaesthesia. Specialist units accepting these patients need to make specific arrangements including protocols, staff training and rapid availability of facilities. Optimal management will improve outcome and save resources in the long term.
- Local guidelines on the transfer of patients with head injuries should be drawn up between the referring hospital trusts and the neurosurgical unit which should be consistent with established national guidelines. Details of the transfer, of the responsibility for patient care should also be agreed.
- Only in exceptional circumstances, should a patient with a significantly altered conscious level requiring transfer for neurosurgical care not be intubated.

## **6. OBSTETRIC ANAESTHESIA / ANALGESIA**

*This is a 'Key Unit of Training' requiring two months of training.*

Obstetric anaesthesia and analgesia is the only area of anaesthetic practice where two patients are cared for simultaneously. Pregnancy is a physiological rather than a pathological state. Patient expectations are high and the mother expects full involvement in her choices of care. The majority of the workload is the provision of analgesia in labour and anaesthesia for delivery. Multidisciplinary care for the sick mother is increasingly important and highlighted.

### **(a) Knowledge**

Anatomy and physiology of pregnancy

Physiology of labour

Placental structure and mechanisms affecting drug transfer across the placenta

Basic knowledge of obstetrics

Gastrointestinal physiology and acid aspiration prophylaxis

Pharmacology of drugs relevant to obstetric anaesthesia

Pain and pain relief in labour

Emergencies in obstetric anaesthesia:

- pre-eclampsia, eclampsia, failed intubation, major haemorrhage,
- maternal resuscitation, amniotic fluid embolus, total spinal

Use of magnesium sulphate

Incidental surgery during pregnancy

Assessment of fetal well being in utero

Thromboprophylaxis

Feeding / starvation policies

Influence of common concurrent medical diseases

Management of twin pregnancy

Management of premature delivery

Maternal morbidity and mortality

Management of difficult or failed intubation

Maternal and neonatal resuscitation

Legal aspects related to fetus

### **(b) Skills**

Assessment of pregnant woman presenting for anaesthesia / analgesia

Epidural / subarachnoid analgesia for labour

Management of complications of regional block and of failure to achieve adequate block

Epidural and subarachnoid anaesthesia for Caesarean Section, and other operative deliveries



Conversion of analgesia for labour to that for operative delivery  
 General anaesthesia for Caesarean Section  
 Airway management  
 Management of the awake patient during surgery  
 Ability to ventilate the newborn with bag and mask  
 Anaesthesia for interventions other than delivery  
 Post-delivery pain relief  
 Management of accidental dural puncture and post-dural puncture headache  
 Recognition of sick mother  
 High dependency care of obstetric patients  
 Optimisation for the 'at risk' baby

**(c) Attitudes and behaviour**

To be aware of local guidelines in the obstetric unit  
 To communicate a balanced view of the advantages, disadvantages, risks and benefits of various forms of analgesia and anaesthesia appropriate to individual patients  
 To communicate effectively with partner and relatives  
 To help deal with disappointment  
 To be involved in the initial management of complaints  
 To communicate effectively with midwives  
 To obtain consent appropriately  
 To keep good records  
 To identify priorities  
 To attempt by conscientious care to recognise problems early  
 To allocate resources and call for assistance appropriately  
 To be aware of local audits and self audit

**(d) Workplace training objectives**

Within the obstetric team, the trainee should play a full part; communicating effectively about anaesthetic and analgesic techniques used in obstetrics and developing organisational skills. They should consolidate clinical management

of common obstetric practice but recognise and treat common complications exercising proper judgement in calling for help.

**(e) Recommended local requirements to support training**

- Training should normally be provided in units carrying out at least 2,000 deliveries annually.
- There should be at least 1 consultant anaesthetic session allocated for every 500 deliveries. (In units with a frequent turnover of inexperienced trainees, with a higher than average epidural or Caesarean Section rate and/or a substantial number of high risk cases, sessions above this minimum will be required).
- Local protocols should be available to guide trainees in the management of common obstetric emergencies based on the individual units staffing and local support.
- Appropriately trained assistance for the anaesthetist should ideally be available whenever a trainee anaesthetist is required to manage a patient during an operative delivery. The person providing this assistance to the anaesthetist should have no other duties at that time.
- Access for patients to critical care facilities must be immediately available at all times.
- Appropriate anaesthetic 'bench books' should be available within the delivery suite.

**7. PAEDIATRIC ANAESTHESIA**

*This is a 'Key Unit of Training' requiring three months of training.*

Paediatric anaesthesia and pain management includes everything from healthy children to the sickest premature babies in tertiary referral centres and in paediatric intensive care units (PICU).

However, those who intend to progress to a post with an interest in paediatric anaesthesia may be able to gain access to more paediatric training in the post MD period when their *Skills* should begin to include those areas listed under *Knowledge: Neonates*.

**(a) Knowledge**

*General*

- Anatomical and physiological characteristics which affect anaesthesia and the changes which take place during growth from neonate to a young child
- Paediatric medical and surgical problems including major congenital abnormalities, congenital heart disease and syndromes e.g. Down's and their implications for anaesthesia

- Starvation and hypoglycaemia
- Preoperative assessment and psychological preparation for surgery
- Anaesthetic equipment and the differences from adult practice
- Anaesthetic management of children for minor operations and major elective and emergency surgery

### ***Children and Infants***

- Management of recovery
  - Management of postoperative pain, and nausea and vomiting in children
  - Management of acute airway obstruction including croup and epiglottitis
  - Anatomical, physiological and pharmacological differences to the older child / adult Neonates
  - Preoperative assessment
  - Anaesthetic techniques and thermoregulation
  - Analgesia
  - Neonatal equipment and monitoring
  - Anaesthetic problems and management of important congenital anomalies including those requiring surgical correction in the neonatal period (tracheo-oesophageal fistula, diaphragmatic hernia, exomphalos, gastroschisis, intestinal obstruction, pyloric stenosis)
  - Special problems of the premature and ex-premature neonate
- Resuscitation of the newborn
  - Principles of paediatric intensive care: management of the commoner problems, ventilatory and circulatory support, multi-organ failure PICU
  - Principles of safe transport of critically ill children and babies

### **(b) Skills**

#### Children and Infants

- Resuscitation – Basic life support (PBLIS) and advanced life support (PALS) at all ages
- Preoperative assessment and preparation
- Techniques of induction, maintenance and monitoring for elective and emergency anaesthesia
- Selection, management and monitoring of children for diagnostic and therapeutic procedures carried out under sedation
- Maintenance of physiology: glucose, fluids, temperature
- Strategies and practice for the management of anaesthetic emergencies in children: loss of airway, laryngospasm, failed venous access, suxamethonium apnoea and anaphylaxis including latex allergy.

- Postoperative pain management including the use of local and regional anaesthetic techniques, simple analgesics, NSAIDs and use of opioids (including infusions and PCA)
- Communication with paediatric patients and their family

- c) **Attitudes and behaviour** To understand consent in children: the law, research, restraint

To communicate with parents (carers) and children throughout the surgical episode

### **d) Workplace training objectives**

The trainee should develop a wide knowledge of the anaesthetic needs of children and neonates. They should, at the end of their training, be able to organise and manage safely a list of paediatric cases including neonates. They should understand the potential hazards of paediatric anaesthesia and have had as much practical training as is possible in planning for the management of such events.

### **e) Recommended local requirements to support training**

- Trainers for the initial period of training should be spending not less than the equivalent of one full operating session a week in paediatric anaesthesia
- Anaesthesia for children requires specially trained staff and special facilities
- Provision should be made for parents to be involved in the care of their children
- Adequate assistance for the anaesthetist by staff with paediatric training and skill should be available
- Paediatric anaesthetic equipment must be available where children are treated

## **8. PAIN MANAGEMENT, ACUTE & CHRONIC**

*This is a 'Key Unit of Training' in which the trainees should spend the equivalent of at least 1 month of training and, normally, not more than 3 months.*

The recommendations for basic training are in addition to the knowledge, skills, attitudes and workplace training objectives described for SHO training. Topics that are already included in the lists for training are treated in greater depth during the SR period. This aspect of training could be covered during Pre or Post MD training period.

**a) Knowledge**

Anatomy, physiology, pharmacology and basic psychology relevant to pain management

Mechanisms of pain: somatic, visceral and neuropathic pain

Consequences of peripheral nerve injury, spinal cord injury and differentiation

Assessment and measurement of acute pain:

Techniques for control of acute pain: postoperative and post-traumatic - including children and neonates, the elderly, and patients who are handicapped, unconscious or receiving critical care

Application of pharmacological principles to the pain control: conventional analgesics and adjuvant analgesics; side effects; problems of drug dependency and addiction

Opioid and non-opioid medication, opioid infusions, patient controlled analgesia

Other medication used to manage chronic pain: antidepressants, anticonvulsants, antiarrhythmics and other adjuvant medication

Pharmacology of local anaesthetics

Principles of neural blockade for pain management: peripheral nerve, plexus, epidural and subarachnoid blocks; sympathetic blocks including stellate, coeliac plexus and lumbar sympathetic blocks; neurolytic agents and procedures; implanted catheters and pumps for drug delivery

Non-pharmacological methods of pain control. The principles of stimulation induced analgesia: transcutaneous electrical nerve stimulation and acupuncture

The role of other treatment modalities; physical therapy, surgery, psychological approaches, rehabilitation approaches, pain management programmes

Assessment of patients with chronic pain and of pain in patients with cancer

Understanding of the principles of chronic pain management in the pain clinic setting

Understanding of the importance of psychology and pain

Management of severe pain and associated symptoms in palliative care

Principles and ethics of pain research

**b) Skills**

Assessment and management of acute pain: postoperative, post-traumatic and non-surgical acute pain

Management of acute pain including special clinical groups: infants, patients with opioid dependence or tolerance, non-surgical acute pain (e.g. sickle cell disease crisis), patients who are handicapped or with impaired consciousness

Explanation of analgesic methods: oral; sublingual; subcutaneous, IM; IV; inhalational analgesia, patient controlled analgesia, epidural; regional techniques and local blocks; possible side effects and complications

Neural blockade: brachial plexus blocks, paravertebral nerve block, intrathecal and epidural drug administration for acute and cancer pain

Management of side effects of pain relieving medication and procedures

Basic assessment of patients with chronic pain

Recognition of neuropathic pain

Prescription of medication for chronic pain including antidepressants and anticonvulsants

Use of stimulation induced analgesia: transcutaneous electrical nerve stimulation

Basic assessment and management of pain in patients with cancer

**c) Attitudes and behaviour**

Listens to patients and their relatives

Provides explanations in a way that patients and relatives can understand

Appropriate communication with staff

Enlists help / advice from other professionals when appropriate

Awareness of role in a multi-professional team

Awareness of ethnic, cultural and spiritual issues in pain

Keeps adequate records

**d) Workplace training objectives**

Able to assess and manage acute pain for patients after most types of surgery including cardiothoracic, neurosurgery and paediatric surgery

Able to provide explanation of analgesic methods: oral, sublingual, subcutaneous, IM, IV drugs, inhalational analgesia, patient controlled analgesia, epidural and regional techniques; possible side effects and complications

Able to institute appropriate action for patients with unrelieved pain in the immediate postoperative period and unrelieved non-surgical acute pain on the wards

Able to establish priorities and formulate a treatment plan

Able to diagnose and institute initial management for neuropathic pain

Able to demonstrate technical proficiency with procedures from the skills list

Able to work as a part of a multi-professional team

**Recommended local requirements to support training**

- Pain Management Services should be planned as an integrated programme although staffing and equipment resources for acute and non acute pain may differ
- Acute and non-acute pain management in all hospitals requires:
- Appropriate facilities, consultant sessional allocation and equipment
- Responsibility for the management of pain to be undertaken by appropriately trained consultants
- Liaison between pain management, palliative care services and other specialties to provide an inter-disciplinary approach in all areas
- Ongoing education in the understanding of pain, its presentation and management, for all grades and disciplines caring for patients

- The provision of inter-disciplinary programmes which will improve patient rehabilitation whilst reducing pain and use of other health care resources
- Specific arrangements must be made for the treatment of children
- The services of investigation departments must be readily available and information concerning their services easily available to both staff and patients.

**9. VASCULAR ANAESTHESIA**

*This is a 'Key Unit of Training' in which the trainees should spend at least 1 month of training.*

Developments in interventional radiology are changing the range of elective vascular procedures taking place in the operating theatre. However, the demands for the anaesthesia and critical care of patients undergoing emergency vascular procedures, make it essential that all trainees receive appropriate training in this sub-specialty.

**a) Knowledge**

Resuscitation and management of major vascular accidents

Management of the patient with atherosclerotic disease

Management of the patient for major vascular surgery

Management of patients for endovascular radiological procedures (stenting etc)

Management of carotid artery surgery

Management of pheochromocytoma

Sympathectomy

Postoperative management and critical care

Postoperative analgesia

Anaesthesia for non-cardiac surgery in patients with cardiac disease

Effects of smoking on health

Morbidity and mortality of vascular surgery

Massive blood transfusion, strategies for blood conservation, red cell salvage

Consequences of aortic cross-clamping and renal protection

**b) Skills**

- Preoperative assessment
- Insertion of invasive monitoring
- Interpretation of information from monitoring
- Management of massive blood loss
- Maintenance of normothermia
- Recognition and management of complications
- Postoperative care

**c) Attitudes and behaviour**

- Sympathetic explanation of risks and benefits of surgery and anaesthesia
- Preoperative optimisation
- Teamwork with surgeons throughout perioperative period
- Anticipation of problems
- Recognition of need for help
- Clarity of instructions for postoperative care

**d) Workplace training objectives**

Trainees should demonstrate competency in assessing cardiac and pulmonary function in patients with limited exercise tolerance, in the management of significant blood loss and in the use of drugs to support the heart and circulation.

**Recommended local requirements to support training**

- Investigative facilities for cardiac and pulmonary function must be available
- Surgeons must be available with vascular expertise
- Anaesthetist with regular vascular list
- Vascular emergencies dealt with routinely
- Intensive Care / HDU facilities must be available

**10. DAY SURGERY**

*This is a 'General Unit of Training' in which it is expected that all trainees will gain appropriate training.*

Training should take place ideally within a dedicated Day Surgery Unit where the management of cases as an outpatient is not compromised by elective or other operations taking place for in-patients. However knowledge on Day Surgery is essential for the MD examination.

**a) Knowledge**

- Anaesthetic pre-assessment clinics
- Instructions to patients, anaesthetic and social
- Regional analgesia appropriate to day cases
- General anaesthesia appropriate to day cases
- Appropriate drugs for day cases
- Recovery assessment
- Postoperative analgesia

**b) Skills**

Instructions to patient:

- transport
- accompanying person who can drive if in own car
- home not more than 1 hour away from day stay unit
- level of care overnight
- telephone availability

Anaesthesia:

- regional or local anaesthesia
- local topical anaesthesia or sedation
- general anaesthesia
- recognise those unsuitable for day case management

General Anaesthesia:

- to limit the loss of physiological stability and to achieve rapid recovery
- to select where appropriate analgesics and muscle relaxants used during outpatient GA to recognise when a patient is sufficiently recovered to return home supervised

Use of protocols or guidelines

**c) Attitudes and behaviour**

Good communication with nursing staff, patients, relatives and other hospital staff

The development of a professional and reassuring manner in order to allay patient anxieties

**d) Workplace training objectives**

The trainee must understand and apply agreed protocols with regard to patient selection and other aspects of care, and also appreciate the importance of minimising postoperative complications such as nausea and pain, in patients who are returning home the same day.

**The following will be the recommended local requirements to support training in the future**

- Clear guidelines must exist for appropriate patient selection for day case surgery, these will include consideration of social factors
- Day surgery units will have a consultant in charge who chairs a multi-disciplinary management team
- Specific arrangements must be made for the treatment of children
- All patients must be assessed during the recovery phase for the adequacy of analgesia and fitness for discharge
- Clear written discharge criteria must be established
- Full written records must be maintained
- Specific instructions and information must be available for patients, their relatives and community services

**11. EAR, NOSE AND THROAT (OTORHINOLARYNGOLOGY)**

*This is a 'General Unit of Training' in which it is expected that all trainees will gain appropriate training.*

**a) Knowledge**

Preoperative assessment, particularly prediction of a difficult intubation

Management of patients of all ages to include patients with: stridor; intubation difficulties; sleep apnoea; concomitant diseases

Local techniques and surface analgesia

Acute ENT emergencies (e.g. bleeding tonsils, croup, epiglottitis, foreign bodies) Laryngoscopy and bronchoscopy

Knowledge of special tubes, gags and equipment for microlaryngoscopy, bronchoscopy, laser surgery (e.g. Venturi devices, ventilating bronchoscope and fiberoptic bronchoscopy)

Middle ear surgery including hypotensive techniques

Major head and neck surgery (including laryngectomy)

Emergency airway management including tracheostomy

Use of helium

Postoperative management

**b) Skills**

***Preoperative***

- Recognise the importance of preoperative assessment with particular attention to:
- age (paediatric / adult / elderly)
- concomitant disease GI tract
- patients with sleep apnoea, stridor and intubation difficulties
- Discuss the anaesthetic procedures with the patient and/or relatives (if a child is involved)
- Discuss special requirements with the surgical team
- Acute ENT emergencies such as bleeding tonsil, croup / epiglottitis
- Prepare all appropriate drugs, appropriate masks, airways, tracheal tubes, bougies, laryngoscopes, throat packs
- Use of appropriate disposable equipment to prevent transmission of nvCJD

***Peroperative***

- Provide smooth anaesthesia / analgesic / surgical operating conditions
- Cope with parental presence in the anaesthetic room
- Use the appropriate tracheal tube or laryngeal mask
- Use of special tubes, gags and goggles (laser surgery)
- Techniques available for microlaryngoscopy and bronchoscopy (Venturi devices and ventilating bronchoscope)
- Hypotensive anaesthetic techniques, when appropriate
- To use invasive monitoring (arterial, CVP, urinary) for major surgical procedures on the head and neck
- Extubation procedures to avoid laryngospasm



### ***Postoperative***

- Oxygen therapy
- Appropriate postoperative analgesia
- Postoperative fluid balance
- Maintain venous access after operation, if required ? Postoperative anti-emetics

### **c) Attitudes and behaviour**

Develop an understanding of the needs of the surgeon when operating on a shared airway but the absolute importance of not compromising patient safety.

To support and guide recovery and other staff taking responsibility for the unconscious patient who has undergone surgery to the airway.

### **d) Workplace training objectives**

To develop confidence in the anaesthetic management of adults and children undergoing surgery to the airway.

### **e) Recommended local requirements to support training**

- Surgery is undertaken on patients of all ages from neonates to the elderly. Ear Nose and Throat units must have a paediatric facility with trained paediatric nurses
- Upper airway problems are commonplace, equipment and expertise for fiberoptic intubation must be available
- Rapid access to an experienced and efficient emergency service is required.
- Access to beds for intensive or high dependency care must be available when required

## **12. GENERAL SURGERY / GYNAECOLOGY / UROLOGY ( + TRANSPLANTATION)**

*This is a 'General Unit of Training' in which it is expected that all trainees will gain appropriate training.*

Anaesthesia for general surgical procedures forms the backbone of specialist anaesthesia. Knowledge skills and attitudes learned as an SHO should be enhanced and refined as increased responsibility is taken by the trainee.

### **a) Knowledge**

#### ***General surgery***

- Relevant anatomy and physiology for common surgical procedures
- Anaesthesia for complex GI surgery including intrathoracic procedures
- Emergency anaesthesia for general surgery
- Carcinoid syndrome / tumours
- Endocrinology; diseases relevant to hepatobiliary, pancreatic, splenic surgery
- Management of thyroid (and parathyroid) surgery
- Starvation / obesity
- Metabolism; nutrients, carbohydrates, fats, proteins, vitamins, minerals

#### ***Gynaecology***

- Relevant anatomy and physiology
- Endocrinology relating to gynaecology
- Preoperative assessment
- Laparoscopic surgery
- Gynaecological procedures during pregnancy

#### ***Urology***

- Anatomy of the renal tract
- Blood flow, GFR, plasma clearance
- Tubular function, urine formation and micturition
- Assessment of renal function
- Disturbances of fluid balance, oedema and dehydration
- Management of acid-base abnormalities
- Renal failure and its management
- Plasma electrolyte disturbances
- Anaesthesia on spinal injuries patients for urological procedures
- TURP syndrome

#### ***Transplantation***

- Principles and complications of Immunosuppression
- Specific anaesthetic problems associated with renal transplantation
- Anaesthetic management of patients with transplanted organs

### **b) Skills**

#### ***General surgery***

- Preoperative assessment and resuscitation of emergency surgical patient eg. trauma, obstruction and perforation
- Postoperative analgesia eg. regional and field blocks

- Assessment of need for ICU and HDU admission
- Assessment of the elderly and children
- Laparoscopic surgery
- TIVA

#### Gynaecology

- Regional techniques
- Laparoscopic surgery

#### Urology

- Regional techniques
- Major procedures – eg. Nephrectomy, cystectomy

### c) Attitudes and behaviour

#### General surgery

- Can assess preoperative patients effectively and resuscitate appropriately
- Links with other staff showing ability to co-ordinate team

#### Gynaecology

- Shows appropriate attitude and behaviour to the female patient

#### Transplantation

- Understands the ethical implications of transplantation

### d) Workplace training objectives

The trainee should demonstrate the required professional judgement in assessing and managing the risk of aspiration, in deciding the urgency of a case against any delay necessary for resuscitation and in assessing the requirement for postoperative critical care.

## 13. ORTHOPAEDIC ANAESTHESIA

*This is a 'General Unit of Training' in which it is expected that all trainees will gain appropriate training.*

### a) Knowledge

Preoperative assessment with particular reference to the problems of children, the elderly and patients with co-existing disease or injury such as congenital syndromes, rheumatoid arthritis or vertebral fractures  
Special airway problems especially in the rheumatoid patient and those with cervical spine injury or pathology

Emergency anaesthesia for fractures

Resuscitation and management of patients with multiple injuries

Routine anaesthesia for joint replacement surgery, arthroscopy, fractured bones, dislocations and tendon repair

The problems that may result from the use of tourniquets and of cement

Problems of operations in the prone position

Anaesthesia for spinal surgery (including scoliosis)

Perioperative analgesia, including use of regional analgesia

Prevention, recognition and management of potential postoperative complications, including prophylaxis, recognition and management of deep venous thrombosis & pulmonary embolus, and fat embolus

Other specific complications of orthopaedic surgery including continuing blood loss, compartment syndromes, neurovascular deficit, complications due to difficulty of access to patients who may be on traction, in hip spicas, plaster jackets, and the problems of pressure areas

### b) Skills

Airway assessment and management in the patient with rheumatoid arthritis

Safe positioning of patient, particularly in lateral and prone positions

Assessment and management of major blood loss

Correct application and use of tourniquets

### c) Attitudes and behaviour

Provides explanations of anaesthesia for orthopaedic surgery in a way that patients can understand

Gentle handling of patient during positioning and performance of general or regional anaesthesia

Enlists help / advice from other professionals when appropriate

### d) Workplace training objectives

Anaesthesia for orthopaedic lists enables trainees to attain competency in ensuring the smooth and efficient running of an operating list; liaising with other staff, avoiding delays and reassuring patients. They should demonstrate their ability to employ safe but effective methods for postoperative pain relief. In addition they should develop awareness of the potential hazards and complications of orthopaedic surgery.

### e) Recommended local requirements to support training

As well as the requirements for adequately staffed and equipped operating theatres, there must be provision of adequate recovery facilities, and access to an HDU if there is massive blood loss, severe hypothermia, or postoperative compromised lung function. An ICU will be needed if ventilation is required.

## 14. REGIONAL ANAESTHESIA

*This is a 'General Unit of Training' in which it is expected that all trainees will gain appropriate training.*

### a) Knowledge

Basic sciences applied to regional anaesthesia: anatomy, physiology and pharmacology

Advantages / disadvantages, risks / benefits and indications / contra-indications

Assessment, preparation and management of the patient for regional anaesthesia

The principles of minor and major peripheral nerve blocks (including cranial nerve blocks) and central neural blocks

Desirable effects, possible side effects and complications of regional anaesthesia

Management of effects and complications

### b) Skills

Assessment and preparation of the patient for regional anaesthesia, to include discussion of anaesthetic options (i.e. regional versus general)

Management of the patient receiving a regional block during surgery (whether awake or as part of a 'balanced' anaesthetic technique) and during labour

Management of the patient receiving regional techniques in the postoperative period, including liaison with surgeons, acute pain teams, and ward staff

#### Central nerve blocks:

- Spinal anaesthesia
- Epidural block (lumbar & sacral)
- Combined spinal /epidural
- Major nerve block – able to perform at least one method for upper and lower limb surgery respectively:
- Brachial plexus
- Cervical plexus
- Sciatic
- Femoral

#### Minor nerve block:

- Trunk (penile, intercostal & inguinal blocks)
- Upper limb (elbow and distal)
- Lower limb (ankle & distal)

Miscellaneous: Ophthalmic blocks, topical, IVRA, infiltration & intra-articular  
Recognition and management of the adverse effects of regional anaesthesia

*[Note: Competency in Thoracic epidural and deep cervical plexus blocks can be acquired during the Post MD training period. A fuller range of 'major' nerve block techniques would be appropriate at Post MD level also. Cranial nerve, cervical epidural, paravertebral, lumbo-sacral and autonomic block competencies are appropriate only to senior trainees working towards competency in pain and other relevant sub-specialties].*

### c) Attitudes and behaviour

Provides explanations of regional techniques in a way that patients can understand

Understands patients' anxieties about regional techniques, especially the stress of undergoing surgery while conscious

Recognises need for communication with staff about use of regional block

Handles patients gently during performance of regional block

Meticulous attention to safety and sterility during performance of regional blocks

Enlists help / advice from other professionals when appropriate

### d) Workplace training objectives

Trainees should take appropriate opportunities to use regional anaesthesia in patients undergoing a range of operations in specialties such as orthopaedics, gynaecology, urology and plastic surgery in order to demonstrate their attainment of the listed requirements. All such cases should be fully detailed in the logbook.

## 15. TRAUMA AND ACCIDENTS

*This is a 'General Unit of Training' in which it is expected that all trainees will gain appropriate training.*

Many aspects of this unit of training will be closely linked with knowledge and skills covered in other units of training. The recommendations made here are therefore broadly stated. Increasingly anaesthetic trainees completing training will have taken part in a course in Advanced Trauma Life Support (ATLS or equivalent) which will have fulfilled the requirements of this unit of training. For those trainees that have not had this opportunity, it is suggested that this unit of training be modelled along similar lines.

**a) Knowledge**

Management of head injury, spinal injury and multiple trauma with major blood loss  
Major incident management, triage and anaesthesia in situations outside the hospital  
Transfer of the traumatised patient including emergency airway and pain management  
Management of the burned patient  
Immersion / drowning and near-drowning  
Hypothermia  
Trauma scoring systems

**b) Skills**

Many of the skills required are those also associated with other specialties, but there is the additional requirement to be able to perform rapid assessments and to prioritise patients' needs  
Experience in transfers should be gained  
Management of allergy

**c) Attitudes and behaviour**

Linking with other specialists to work in a team (this includes paramedic and ambulance personnel)  
Understanding and adherence to, agreed protocols  
Recognising the essential requirement for stabilisation prior to transfer  
To be able to organise and manage the safe transfer of the intubated / ventilated patient

**d) Workplace training objectives**

The trainee should attain the ability to be an effective member of the trauma team and take an appropriate role in managing transfers

**e) Recommended local requirements to support training**

- Every hospital should have a designated consultant anaesthetist to co-ordinate anaesthetic services for trauma
- In hospitals designated to receive major trauma patients there should be a defined trauma team to respond immediately whenever a patient with major injuries is admitted
- Hospitals designated to receive major trauma patients should have:
  - Access to core specialities at all times
  - An intensive care unit

- Facilities for high dependency care
- Any hospital designated to manage major trauma in children should have staff with paediatric training and experience. There should be an agreed set of guidelines for the treatment of children
- There should be agreed guidelines for the referral and transfer of trauma patients

**16. DIAGNOSTIC IMAGING, ANAESTHESIA & SEDATION**

The role of the anaesthetist in providing general anaesthesia and sedation together with physiological and pharmacological support for patients in the X-ray department is evolving rapidly. Trainees need to understand the benefits and risks particularly with regard to interventional procedures.

**a) Knowledge**

Preanaesthetic preparation  
Techniques appropriate for adults and children for CT scanning, MR imaging and angiography  
Post-investigation care

**b) Skills**

Pre-anaesthetic preparation  
Sedation and general anaesthetic techniques for:

- angiography and interventional procedures
- CT scanning, adults and children
- Magnetic resonance imaging with respect to:
  - the isolated patient
  - the problems due to magnetic field
  - Post-investigation care

**c) Attitudes and behaviour**

Establishing good communication and an understanding of their working needs with nursing staff, radiographers and radiologists

**d) Workplace training objectives**

Trainees should understand the implications of different interventional radiological procedures in their anaesthetic care of the patient and be able to establish safe anaesthesia or sedation within the confines and limitations of the X-ray department.

**e) Recommended local requirements to support training**

The provision of anaesthetic and monitoring equipment together with assistance for the anaesthetist should be to a similar standard as is provided in the operating theatres for an equivalent case.

## 17. MAXILLO-FACIAL / DENTAL ANAESTHESIA

Maxillo-facial surgery covers a range of procedures from simple dental extractions to complex resections and reconstructive procedures. The age range of patients is similarly wide, from childhood to the elderly.

### a) Knowledge

Preoperative assessment

Day case / inpatient requirements

Resuscitation facilities

Anaesthesia for dental extractions (to include sedation and analgesic techniques)

Paediatric anaesthesia

Assessment and management of the difficult airway including fiberoptic intubation Anaesthesia for maxillo-facial surgery including the perioperative management of the fractured jaw and other major facial injuries.

Postoperative management for all patients undergoing dental or maxillo-facial procedures

### b) Skills

*Many of the skills required for this unit of training are shared with ENT surgery*

Patient assessment for day-stay surgery, including children and the mentally and physically handicapped

Pre and postoperative instructions for patients

Talking to patients and explaining the anaesthesia proposed

Choice of anaesthetic technique

Potential problems and hazards of the shared airway

Airway management including nasal masks, naso-pharyngeal airways, laryngeal mask airways, oral and nasal endotracheal intubation

Working with dental and oral surgeons and their use of mouth props and packs

Appropriate monitoring techniques and record keeping

Recovery and patient assessment for discharge including regular audit of outcomes

Management of emergencies

Conscious sedation:

- Patient selection, assessment and suitability for treatment under sedation
- The techniques and drugs available including non-pharmacological methods

- Administration methods - oral, inhalational, intravenous, transmucosal, patient-controlled
- Monitoring and management of the sedated patient

### c) Attitudes and behaviour

Develop an understanding of the needs of the surgeon when operating on a shared airway but the absolute importance of not compromising patient safety

To support and guide recovery and other staff taking responsibility for the unconscious patient who has undergone surgery to the airway

### d) Workplace training objectives

Trainees should develop confidence in the anaesthetic management of adults and children undergoing surgery to the airway.

### e) Recommended local requirements to support training

- Surgery is undertaken on patients of all ages from neonates to the elderly. There must be a paediatric facility with trained paediatric nurses
- Upper airway problems are commonplace, equipment and expertise for fiberoptic intubation must be available
- Rapid access to an experienced and efficient emergency service is required.
- Access to beds for intensive or high dependency care must be available when required

## 18. OPHTHALMIC ANAESTHESIA

This specialty affords potentially very valuable training. The age range of the patients and the wide adoption of local anaesthetic techniques are particular aspects that can be beneficial to the development of the trainee.

### a) Knowledge

Preoperative assessment with particular reference to patients with co-morbidities. Choice of local or general anaesthetic techniques in relation to the patient and surgery with particular reference to:

- strabismus surgery
- cataract surgery
- surgery for the detached retina



Penetrating eye injury

Control of intraocular pressure

Action of anaesthetic drugs on the eye

Anatomy relevant to local anaesthetic blocks

Local analgesia

- topical anaesthesia
- risks of sharp needles in peribulbar and retrobulbar techniques
- sub-Tenon's block

Problems of glaucoma surgery

Postoperative care

**b) Skills**

Assessment and preparation, including the use of day care facilities

Anaesthetic management of patients for lachrymal surgery including syringing and probing and dacryocystorhinostomy

Requirements for strabismus surgery, including knowledge of the oculocardiac reflex

Control of intraocular pressure

The use of topical preparations, possible effects and interactions

Appropriate local anaesthetic methods

Techniques of general anaesthesia for ophthalmic surgery

Choice and use of appropriate method for airway maintenance under general anaesthesia

Postoperative care

**c) Attitudes and behaviour**

Understanding of the importance of the patient's general health and wishes to decisions relating to the choice of anaesthetic techniques

Being an effective communicator with elderly patients in explaining the risks and benefits of general and local anaesthesia for eye surgery

**d) Work place training objectives**

Trainees should develop expertise in the administration of local anaesthesia for eye surgery trying to obtain competency in at least one block. They should also show the necessary medical knowledge and skill in the preoperative assessment of elderly patients.

**e) Recommended local requirements to support training**

Availability of facilities, support staff including assistance for the anaesthetist and the anaesthetic and monitoring equipment must be available.

**19. PLASTICS / BURNS**

Whilst much plastic surgery takes place in specialist centres, there are often routine lists in other hospitals, this should enable most anaesthetic trainees to gain some experience in this specialty. However severe burns, although initially admitted to many Trauma Units will, following resuscitation, be transferred to a specialist unit. Training opportunities will therefore be limited, although the expectation is that many anaesthetists will be involved in the initial resuscitation of burns at a receiving hospital.

**a) Knowledge**

Preoperative assessment

Assessment and management of the difficult airway including fiberoptic intubation

Day case / inpatient requirements

Paediatric anaesthesia

Postoperative management for patients who have undergone plastic surgical procedures with particular reference to free flaps

Physiology of tissue blood flow

Benefits and risks of hypotensive anaesthesia

Pathophysiology of the patient with burns

Resuscitation of the patient with burns with particular reference to fluid management

Pathophysiology, assessment, diagnosis and management of injury due to heat and smoke inhalation

**b) Skills**

**Plastic surgery**

- General and regional anaesthesia for plastic surgery including:
- anaesthesia for head and neck surgery
- anaesthesia for free flaps and reimplantation
- anaesthesia for cleft palate repair
- Specific problems of prolonged anaesthesia
- Manipulation and control of blood pressure to assist surgery
- Managing the acutely compromised airway including experience with trans-tracheal ventilation
- Prediction and management of the difficult intubation
- Selection of the appropriate method of airway maintenance, use of the LMA
- Techniques for continuous local anaesthesia



## **Burns**

- Resuscitation in the management of the patient with burns
- Recognition and treatment of airway problems
- Institution of intravenous fluid therapy and fluid replacement
- Analgesia
- Transportation requirements
- Temperature maintenance
- Monitoring
- insertion of lines
- problems with access
- Responses to drugs in burned patients
- Recognition and management of the airway burn and initiating appropriate treatment

### **c) Attitudes and behaviour**

To be able to foresee potential problems and plan appropriately.

When using elective hypotensive techniques to maintain professional independence, recognising the absolute need to protect the patient's safety at all times and not to succumb to unreasonable pressure from the surgeon

### **d) Workplace training objectives:**

**Trainees should develop skills in the management of the difficult airway, learn the value and limitations of hypotensive techniques and obtain a clear understanding of the priorities in the resuscitation of the patient with burns.**

### **e) Recommended local requirements to support training**

#### **Plastics**

- The care of head & neck patients is an integral part of plastic anaesthesia. Specialist units accepting these patients need to make specific arrangements including protocols, staff training and rapid availability of facilities, especially access to HDU or ICU beds. Optimal management will improve outcome and save resources in the long term.

#### **Burns**

- Emergency anaesthetic assessment and treatment of burned patients may be required in any hospital with an A & E department. Guidelines should be available concerning immediate care and transfer to an appropriate Burn Care service.
- The critical care of burned patients is an integral part of burns anaesthesia services. Specialist departments accepting these patients need to make specific arrangements including protocols, staff training and rapid

availability of facilities. Optimal management will improve outcome and save resources in the long term.

- Major burn anaesthesia should take place only in a Burns Centre or Burns Unit. Full consultant cover should be available.
- Paediatric burn cases, which constitute a major proportion of burn victims, require special facilities & staffing.
- Pain relief throughout the care process and especially for interventions is an integral part of burn anaesthesia provision.

## **20. MISCELLANEOUS**

There are a number of other aspects of the practice of anaesthesia, critical care and pain management which will, to a greater or lesser extent, be available to trainees within a specific training programme. Some are itemised here, others may be added.

### **a) Knowledge**

Electro-convulsive therapy (ECT)

Radiotherapy

Minimal access surgery

Perioperative management of a patient with sleep apnoea

### **b) Skills**

The ways in which anaesthetic techniques need to be modified to suit the requirements of particular environments, surgical techniques and patients with uncommon but potentially dangerous problems.

### **c) Attitudes and behaviour**

Co-operation with other medical professionals in using anaesthetic skills to assist their work but only within the anaesthetist's responsibility to safeguard the patient.

Recognising the ethical duty that the anaesthetist has to their patient.

### **d) Workplace training objectives**

Trainees should demonstrate adaptability in their approach to anaesthetic practice but recognise the essential importance of not compromising the safety of the anaesthetised patient whatever the external demands that are being made.

## **21. APPLIED PHYSIOLOGY**

### **a) Knowledge**

*Candidates are expected to be able to apply the basic knowledge of human physiology necessary to pass the MD Part 1B examination to the clinical*

*practice of anaesthesia and Intensive care medicine. While all branches of physiology are of importance, it is recognised that clinical relevance dictates the topics selected for the examination*

#### Haematological

- Anaemia
- Polycythaemia
- Immunity and allergy
- Inflammation
- Blood groups
- Alternative oxygen carrying solutions
- Abnormalities of coagulation and haemostasis
- Abnormal haemoglobins: sickle cell disease; thalassaemia

#### Muscle Function

- Muscle contracture and malignant hyperthermia
- Disturbances in neuromuscular transmission
- Myopathies

#### Cardiovascular

- Abnormal electrocardiogram and arrhythmias
- Cardiomyopathy and abnormal ventricular function
- Heart failure
- Hypovolaemia and shock
- Ischaemic heart disease
- Valvular defects
- Hypertension
- Common congenital heart defects

#### Kidney and Body Fluids

- Disturbances of fluid balance, oedema and dehydration  
?Management of acid-base abnormalities
- Assessment of renal function
- Renal failure and its management
- Diuresis
- Plasma electrolyte disturbances

#### Liver

- Hepatic failure
- Jaundice
- Porphyria

#### Respiration

Disorders of respiratory mechanics, gas exchange and gas transport

- Disorders of the pulmonary circulation
- Respiratory failure and ventilatory support
- Effects of changes in ambient pressure

#### Nervous System

- Consciousness and sleep
- Depth of anaesthesia
- Consequences of spinal cord injury and deafferentation
- Monitoring of spinal cord function under general anaesthesia
- Mechanisms of pain; somatic, visceral, neuropathic
- Control of cerebral circulation, intracranial and intraocular pressures
- Disorders of the autonomic nervous system

#### Gastrointestinal Tract

- Nausea and vomiting
- Oesophageal reflux
- Obstruction
- Swallowing disorders
- The mucosal barrier

#### Metabolism and Body Temperature

- Hormonal and metabolic response to trauma
- Hyperthermia and hypothermia
- Starvation / obesity
- Endocrinology
- Endocrine diseases of significance in anaesthesia

#### Obstetrics and Paediatrics

- Principles of neonatal physiology
- Effects of prematurity
- Development in infancy and childhood
- Physiology of normal and abnormal pregnancy

## 22. APPLIED CLINICAL PHARMACOLOGY

### a) Knowledge

*This section requires a wider knowledge of drugs than in the MD Part 1B examination. For drugs used in anaesthesia and Intensive care medicine candidates will also be expected to be aware of new drugs which are undergoing evaluation and whose human application has been reported in the mainstream anaesthetic journals. There will be emphasis on the practical application of pharmacological and pharmacokinetic knowledge, and upon an appreciation of the hazards and limitation of individual techniques.*

General therapeutics. Pharmacological management of:

- Heart failure, coronary insufficiency and arrhythmias
- Hypertension, including hypertension in pregnancy
- Acute and chronic respiratory diseases
- Hepatic and renal failure
- Gastrointestinal disorders including modification of gastric contents
- Musculo-skeletal problems such as rheumatoid and osteoarthritis
- Myasthenia and muscle diseases
- Pituitary, adrenal and thyroid dysfunction
- Depression, anxiety states and schizophrenia
- Epilepsy
- Bacterial, fungal and viral infections
- Malignant disease
- Adverse reactions: Types of reactions: The yellow card system;  
Regulation of drug licensing

Application of pharmacological principles to the practical management of anaesthesia:

- Premedication:
- The use of anxiolytics, sedatives and antisialogogues.
- Pro-kinetic and anti-emetic drugs.
- H<sub>2</sub> and proton pump antagonists
  
- Inhalational anaesthesia:
  - Control of alveolar tension during induction and recovery
  - Control of anaesthetic depth and prevention of awareness
  - Management of sedation techniques (including entonox)
  - Environmental effects
  
- Intravenous anaesthesia:
  - Methods for achieving specified plasma concentrations
  - Bolus, infusion, and profiled administration
  - Management of neuromuscular blockade:
    - Techniques for the use and reversal of muscle relaxants
    - Management of abnormal responses
  
- Regional anaesthesia:
  - Choice of agent and technique
  - Additives
  - Systemic effects
  - Avoidance of toxicity

- Prevention of postoperative nausea and vomiting  
Application of pharmacological principles to the control of acute pain (including intraoperative analgesia and postoperative pain management) and chronic pain.  
Pharmacological control of myocardial function, vascular resistance, heart rate and blood pressure  
Anticoagulant and thrombolytic therapies. Management of coagulopathies  
Pharmacological control of blood sugar  
Pharmacological problems in cardiopulmonary bypass. Cardioplegia  
Therapeutic problems associated with organ transplantation: heart, lung, liver kidney  
Management of malignant hyperthermia  
Pharmacological considerations in cardiopulmonary resuscitation, major trauma and exsanguination  
Pharmacological control of severe infections  
Pharmacological treatment of severe asthma  
Effect of renal or hepatic impairment on drug disposition

## 23. PHYSICS AND CLINICAL MEASUREMENTS

### a) Knowledge

*The Final examination assumes knowledge of the MD Part 1B examination syllabus, with the addition of more sophisticated measurements. There is an emphasis on clinical applications of clinical measurement, such as indications, practical techniques and interpretation of acquired data. Candidates will be expected to understand the sources of error and the limitations of individual measurements.*

Assessment of respiratory function

Assessment of cardiac function

The electroencephalograph (EEG) and evoked potentials

The electromyograph (EMG) and measurement of nerve conduction

Assessment of neuromuscular function, peripheral nerve stimulators

Principles and practice of in vitro blood-gas measurements. Interpretation of data

Interpretation of biochemical data

Interpretation and errors of dynamic pressure measurements including

systemic, pulmonary arterial and venous pressures, intracranial,

intrathoracic and intra-abdominal pressures

Methods of measurement of cardiac output and derived indices; limitations and interpretation

Principles of imaging techniques including CT, MRI and ultrasound.  
Doppler effect  
Interpretation and errors of capnography, oximetry and ventilatory gas analysis

## 24. APPLIED ANATOMY

Trainees should be able to demonstrate a good understanding of human anatomy relevant to the practice of anaesthesia and analgesia

### a) Knowledge

#### *Respiratory System*

- Mouth, nose, pharynx, larynx, trachea, main bronchi, segmental bronchi, structure of bronchial tree: differences in the child
- Airway and respiratory tract, blood supply, innervation and lymphatic drainage
- Pleura, mediastinum and its contents
- Lungs, lobes, microstructure of lungs
- Diaphragm, other muscles of respiration, innervation
- The thoracic inlet and 1st rib
- Interpretation of a normal chest x-ray

#### *Cardiovascular system*

- Heart, chambers, conducting system, blood and nerve supply.
- Pericardium
- Great vessels, main peripheral arteries and veins
- Fetal and maternal - fetal circulation

#### *Nervous System*

- Brain and its subdivisions
- Spinal cord, structure of spinal cord, major ascending and descending pathways
- Spinal meninges, subarachnoid and extradural space, contents of extradural space
- CSF and its circulation
- Spinal nerves, dermatomes
- Brachial plexus, nerves of arm ? Intercostal nerves
- Nerves of abdominal wall
- Nerves of leg and foot
- Autonomic nervous system
- Sympathetic innervation, sympathetic chain, ganglia and plexuses
- Parasympathetic innervation

- Stellate ganglion
- Cranial nerves: base of skull: trigeminal ganglion
- Innervation of the larynx
- Eye and orbit

#### *Vertebral column*

- Cervical, thoracic, and lumbar vertebrae
- Sacrum, sacral hiatus
- Ligaments of vertebral column
- Surface anatomy of vertebral spaces, length of cord in child and adult

#### *Surface anatomy*

- Structures in antecubital fossa
- Structures in axilla: identifying the brachial plexus
- Large veins and anterior triangle of neck
- Large veins of leg and femoral triangle
- Arteries of arm and leg
- Landmarks for tracheostomy, cricothyrotomy
- Abdominal wall (including the inguinal region): landmarks for suprapubic urinary and peritoneal lavage catheters

### Objectives for trainees

This knowledge base will be tested in the MD Part 11 Examination. Some clinical aspects may be asked in the workplace assessments.

## 25. THE STATISTICAL BASIS OF CLINICAL TRIAL MANAGEMENT

### a) Knowledge

Candidates will be expected to understand the statistical fundamentals upon which most clinical research is based. They may be asked to suggest suitable approaches to test problems, or to comment on experimental results. They will not be asked to perform detailed calculations or individual statistical tests.

### b) Data Collection and analysis

Simple aspects of study design defining the outcome measures and the uncertainty of measuring them.

### c) Application to clinical practice

Distinguishing statistical from clinical significance  
Understanding the limits of clinical trials  
The basics of systematic review and its pitfalls

#### **d) Study design**

Defining a clinical research question  
Understanding bias  
Controls, placebos, randomisation, blinding exclusion criteria  
Statistical issues, especially sample size ethical issues

### **8.4 CERTIFICATE OF COMPETENCE IN ANAESTHESIA STUDY GUIDE FOR TRAINEES AND TRAINERS**

The syllabus will include the syllabus of the MD Part I A examination as well as the basic aspects of Intensive Care, High Dependency Care, Neonatal anaesthesia and Emergency Thoracic/ Neurosurgical anaesthesia.

[Please see the relevant sections in CTP on Volume C]

#### **INTENSIVE AND HIGH DEPENDENCY CARE**

##### **(a) Knowledge**

An understanding of the potential benefits of high dependency and intensive care  
Common causes of admission to high dependency and intensive care  
Method of examination of the unconscious patient  
The principles of brain stem death diagnosis  
An understanding of sepsis and the basic patterns of failure of the major organs  
The common causes of cardiac and respiratory arrest  
The anatomy of the oropharynx, larynx, trachea & bronchial tree  
Basic anatomy of neck, upper thorax, arms, wrists, inguinal region and foot relevant to insertion of venous and arterial access  
Method of inserting a chest drain and relief of tension pneumothorax  
Understanding of the choice of intravenous fluids appropriate for use in major fluid loss, and their pharmacology  
The recognition of basic cardiac dysrhythmias and the current therapies (physical (carotid sinus massage), electrical (defibrillation & countershock), electrolytic (Mg<sup>++</sup>, Ca<sup>++</sup>), and pharmacological (adrenaline (epinephrine), atropine, lignocaine and 2nd line drugs)  
Pharmacology of the common inotropic agents used in the critically ill (adrenaline (epinephrine), nor-adrenaline (nor-epinephrine))  
Pharmacology of major analgesics used as respiratory depressants (morphine, fentanyl series), and common side effects and contra-indications  
Pharmacology of common muscle relaxants (depolarising and non-depolarising) and common side effects and contra-indications

Pharmacology of intravenous sedative and anaesthetic induction agents used in the critical care unit  
Thromboprophylaxis in intensive and high dependency patients  
Choice of antibiotics  
Use of diuretics for cardiac and respiratory failure and to maintain urine output  
The basic cardiac and respiratory physiology  
The basic physiology of respiration and the consequences of positive pressure ventilation  
An understanding of common blood gas abnormalities  
An understanding of the use of ventilation in use on critically ill patients, with a knowledge of the vocabulary  
An understanding of the uses and limitations of monitoring equipment  
The content of an ICU record  
An insight into likely outcome based upon severity scoring  
The grief response

##### **Skills**

Cardiopulmonary resuscitation  
Maintenance of a clear airway using bag and mask  
Insertion of an endotracheal tube, via the oral route  
Change of tracheostomy tube  
Examination and care of the unconscious patient  
Insertion of adequate peripheral venous access sufficient to manage major haemorrhage  
Insertion of central venous and arterial cannulae  
Institution and maintenance of controlled mechanical ventilation in a critically ill patient  
Ability to summarise and provide a concise analysis of the patient's medical history, ongoing therapies and expected problems to medical and nursing colleagues  
Good communication with patients, relatives and staff  
Ability to explain and discuss the nature of the patient's illness with relatives

##### **(a) Attitudes and behaviour**

Understanding of the needs and behaviour of worried and grieving relatives  
Commitment to good communication  
Willingness to accept failures of therapy  
Involving others with specialist skills  
Recognition of team approach



d) Workplace training objectives

To gaining the skills and confidence to resuscitate adult patients following cardio-pulmonary arrest

To caring for the unconscious patient

To recognition of an adult critically ill patient and begin resuscitation with appropriate urgency

To communicate well with the nursing staff in the ICU, patients, relatives and other hospital staff

To recognise one's own limitations and the nature and importance of team working

To make clear presentations of patients to other medical and nursing staff

To offer comfort to patient and relatives when there is no prospect of survival

## Appendix 9

### Portfolio

The following information and documentation should be included in the portfolio.

#### Section 1

- Personal information
- Hospital placements
- Details of leave – sick, casual, vacation, study
- Audit/Research/Publications
- Teaching sessions
- Membership of societies
- Record of appraisals
- PGIM registration document
- SLMC registration document

#### Section 2

##### Registrar Training

- MD (Anaesthesiology) 1A & 1B certificates
- Personal Development plan
- End of appointment assessments

*It is recommended that each session is recorded: operating list, ward round in ITU, clinic attendance, pain rounds and indicate level of supervision and obtain a confirmatory signature from trainer/supervising consultant.*

- Record of relevant skills developed
- Assessment of communication skills, attitudes and behaviour
- Log book summaries
- Reports on reflective practice of interesting cases and the report of case book of 10 cases
- Evidence of conferences, workshops, seminars attended
- Evidence of teaching sessions, lectures, journal clubs, skills workshops attended/conducted.
- Final assessment information.

#### Section 3

##### Senior Registrar Training

- Final MD examination
- Work place assessments – special training, advanced training
- Log book records
- Assessment of communication skills, attitudes and behaviour
- Outstation appointment  
Training approval documents  
Place & period  
Assessment reports from supervisor's /trainers  
Report from trainee
- Chronic pain appointment  
Assessment report from trainers.  
Trainee report
- Reports on reflective practice of interesting cases
- Evidence of conferences, workshops, seminars attended
- Evidence of teaching sessions, lectures, journal clubs, skills workshops attended/conducted.
- Final assessment information.
- Confirmation of completion of Senior registrar appointment
- Date of overseas training
- Overseas training assessments
- Documents for assuming duties after return from training
- Study/audit protocol
- Study/audit
- Board certification

#### Section 4

- Any other relevant documentation/correspondence from the PGIM