

**Board of Basic Surgical Training
Curriculum Objectives**

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Board of Basic Surgical Training - Curriculum Objectives

Overall Objectives

- The development of a sense of responsibility to patients, staff and community
- The understanding of basic sciences relevant to the practice of surgery as in the current syllabus or as redefined from time to time
- The application of these basic sciences to clinical surgery
- The acquisition of appropriate basic surgical skills
- The development of appropriate interpersonal and communication skills
- Competency in clinical assessment and the use of diagnostic modalities
- Sufficient maturity to enter Advanced Surgical Training

Anatomy General Objective

Assessment by BSE and Clinical Examination

Candidates will:

A1

appreciate the location and relations of the component structures of the human body of general significance to the practice of Surgery.

A2

be able to recognise the appearance under light microscopy of the tissues and organs of the human body, for the purpose of distinguishing normal from pathological structure.

A3

appreciate how at the cellular and tissue level individual tissues and organs are designed to subserve their physiological functions.

A4

appreciate how the structure of viscera is designed to subserve their physiological functions.

A5

appreciate the function of the bones, muscles, joints, nerves and vessels of the human body.

A6

appreciate how the anatomy of structures in the human body relates to the pathology of those structures and their relations with respect to the production of clinical signs and symptoms.

A7

understand the embryological basis of developmental abnormalities of surgical importance, namely:

- the abnormal shape and location of organs,
- the ectopic location of functioning tissues,
- the aberrant course of vessels or other structure that may give rise to clinical signs and symptoms or that may:
- constitute a hazard in the conduct of surgery,
- surgically reparable congenital abnormalities.

Anatomy Specific Objectives

In order to achieve the General Objectives, candidates will:

A8

State, identify (in patients and in dissected specimens and in photographs, radiographs and other facsimiles thereof), and distinguish correct from incorrect descriptions of the surface anatomy, morphology, relations, cellular and intra-cellular structure of the following structure or systems and their components:

- the eye
- the inner ear
- the middle ear
- the external auditory meatus
- the respiratory tract and lungs
- the gastrointestinal tract including the mouth, salivary glands, liver, biliary system and pancreas
- the reticulo-endothelial system
- the urinary tract
- the male and female reproductive tracts and their associated glands
- the heart and pericardium
- the pituitary, thyroid, parathyroid, and adrenal glands.
- Explicitly excluded from this objective are the cartilages of the nose and pinna, and the structure of teeth.

A9

For each of the structures and systems listed in Specific Objective A8, state, explain and recognise, and distinguish correct from incorrect descriptions of, how their morphological features are related to or subserve their functions, and how their morphological features are related to manifestations of disorders and diseases of those structures or systems.

A10

State, identify (in patients and in dissected specimens and in photographs, radiographs and other facsimiles thereof), and distinguish correct from incorrect descriptions of the course, surface anatomy, relations and distribution of:

- the primary, secondary, tertiary and quaternary branches of the aorta,
- the primary branches of the cervical, brachial, lumbar and lumbosacral plexuses,
- the intercostal nerves and vessels,
- the inferior and superior venae cavae and their primary, secondary, tertiary and quaternary tributaries,
- the thoracic duct
- the ophthalmic artery,
- the cranial nerves,
- the sympathetic trunk (including its segmental distribution).

A11

For each of the structures listed under Specific Objective A10, state and explain, recognise and distinguish correct from incorrect descriptions of, how their morphological features relate to the manifestations of diseases or disorders that may involve these structures, and how their features relate to the practice of surgery on and around these structures.

A12

State, recognise and distinguish correct from incorrect descriptions of what can be demonstrated by electron microscopy and light microscopy of tissues and cells of the human body.

A13

State, recognise in photomicrographs and facsimiles thereof, and distinguish correct from incorrect descriptions of, the electron microscopic appearance and morphology of the following components of an archetypical human cell:

the membrane,
the nucleus and nuclear envelope, and
cytoplasmic organelles.

A14

For each of the structures listed in Specific Objective A13, state and distinguish correct from incorrect descriptions of the functions of each of these structures.

A15

State, identify in patients and in dissected specimens and in photographs or other facsimiles thereof, and distinguish correct from incorrect descriptions of, plus state, recognise in photomicrographs and facsimiles thereof, and distinguish correct from incorrect descriptions of, the characteristic and distinguishing features, as seen by electron microscopy or light microscopy, of the following tissues:

- bone,
- fibrous connective tissue,
- fibrocartilage, elastic and hyaline cartilage,
- synovium, peritoneum, pleura and pericardium,
- blood cells and haemopoietic tissues,
- cardiac, smooth and skeletal muscle,
- peripheral nerves and their ganglia,
- adipose tissue,
- skin,
- blood vessels and lymphatics,

A16

For all cells and tissues listed under Specific Objective A15, state and distinguish correct from incorrect descriptions of how their microscopic structure relates to or subserves their function.

A17

State, identify in patients and in dissected specimens and in photographs and other facsimiles thereof, and distinguish correct from incorrect descriptions of the components, location and clinical significance of arterial anastomoses of the orbit,

shoulder, elbow, thigh, knee, hand, foot, chest wall and thoracic cavity, abdominal wall, thigh, pelvis, perineum and gastro-intestinal tract.

A18

State, identify in patients and in dissected specimens and in photographs and other facsimiles thereof, and distinguish correct from incorrect descriptions of the components, location and clinical significance of portal-systemic anastomoses and venous anastomoses that circumvent the internal jugular vein, the superior vena cava and the inferior vena cava.

A19

State, identify in specimens and in photographs, radiographs and other facsimiles thereof, and distinguish correct from incorrect descriptions of the bones of the skull, their named parts, their articulations, the foramina, canals and other spaces they contain, and the structures that pass through those foramina, canals and spaces.

A20

State, identify in patients and in dissected specimens and in photographs, radiographs and other facsimiles thereof, and distinguish correct from incorrect descriptions of the location, attachment, relations, actions and functions of the skeletal muscles of the human body.

A21

State, identify in patients and in dissected specimens and in photographs, radiographs and other facsimiles thereof, and distinguish correct from incorrect descriptions of

- the bones of the human body and their named features, including epiphyses,
- the ossification of the hip, femur and elbow,
- the shape and components of the joints of the human body,
- the primary attachments, disposition and relations of the named ligaments of the axial and appendicular skeletons and jaw, (as named in the latest edition of the *Nomina Anatomica*),
- the component parts of the ligaments of the knee, elbow and ankle,
- the disposition and attachments of the deep fasciae of the arm, forearm, hand, thigh, leg, back and neck,
- the location and attachments of the retinacula of the limbs,
- the location and extent of the most common patterns of the synovial sheaths of the wrist, hand ankle and foot.

Explicitly excluded from this objective are:

- the ossification of bones other than those specified,
- the component parts of the ligaments of the shoulder, wrist, hand and foot,
- the detailed structure of the intra-articular, capsular and related components of the interphalangeal, metacarpophalangeal, metatarsophalangeal, carpometacarpal, tarsometatarsal, intercarpal and intertarsal joints,
- the structure and disposition of the pulleys of the fibrous flexor sheaths,
- the fascial compartments of the foot.

A22

For each of the structures listed under Specific Objective A21, state and explain, recognise and distinguish correct from incorrect descriptions of, how their structure subserves their functions and how it relates to the manifestations of diseases and disorders involving these structures.

A23

State and distinguish correct from incorrect descriptions of the three primary germinal layers of the embryonic disc and their ultimate derivatives.

A24

State, explain, recognise in patients and in dissected specimens and in photographs, radiographs and in facsimiles thereof, and distinguish correct from incorrect descriptions of the following conditions and their embryological basis:

- the ectopic location of glandular organs and tissues,
- the malposition of viscera,
- the duplication of viscera,
- anomalies of the aorta and its primary branches,
- aberrant arteries of the kidney and liver,
- atresia of the gastrointestinal tract,
- imperforate anus,
- tracheo-oesophageal fistula,
- fistulae between the alimentary, urinary and genital tracts,
- Meckel's diverticulum,
- cysts of the mesonephric and paramesonephric ducts and their remnants,
- spina bifida and cystic defects of the spinal cord and dural sac,
- cleft lip and cleft palate,
- hypospadias,
- septal defects of the heart,
- transposition of the great vessels,
- exomphalos,
- normal and abnormal channels in the diaphragm,
- abnormal size or shape of the genitalia.

Explicitly excluded from these objectives are:

- the histogenesis of the central nervous system and special sense organs - the ear, eye and nose,
- the development of the limbs and their bones, joints, muscles nerves and vessels,
- intra-uterine growth of the embryo and foetus,
- the structure of the placenta,
- the formation of the blastocyst and implantation,
- the development of the neurocranium and viscerocranium,
- the embryonic and post-natal development of teeth.

A25

Describe, identify in dissected specimens and in photographs, radiographs and facsimiles thereof, and distinguish correct from incorrect descriptions of:

- the topographical features of the brainstem and spinal cord,
- the lobes of the cerebral hemispheres,
- the central sulcus, precentral and postcentral gyri, the parieto-occipital sulcus and calcarine sulcus,
- the cortical areas responsible for motor control, sensation, vision, hearing and eye movements,
- the light microscope appearance of typical neocortex,
- the macrostructure and relations of the basal ganglia,

- the topographical anatomy of the thalamus, metathalamus, hypothalamus and epithalamus,
- the topographical anatomy of the limbic system,
- the location and functions of the nuclei and central connections of the cranial nerves,
- the course and distribution of the anterior, middle and posterior cerebral, basilar and vertebral arteries and their primary branches,
- the structure, disposition and connections of the dural venous sinuses,
- Explicitly excluded from this objective is the internal venous drainage of the central nervous system.

A26

In terms of the nuclei, tracts and nerves involved, state and distinguish correct from incorrect descriptions of, and apply to the solution of clinical problems, the neural pathways and connections responsible for

- vision
- hearing
- balance
- taste
- salivation
- nociception
- touch
- vibration
- proprioception
- the blink reflex
- the gag reflex
- head-turning
- conjugate gaze
- optokinetic pursuit
- Explicitly excluded from this objective are the neural networks of the retina and of the inner ear and the central connections of the vestibular and cochlear nerves and of the olfactory tract.

A27

- State, distinguish correct from incorrect descriptions of, and apply to the solution of clinical problems, the origin, disposition and connections of
- the pyramidal tract
- the medial, lateral and dorsal reticulospinal tracts
- the lateral and medial vestibulospinal tracts
- the tectospinal tract

A28

- State, distinguish correct from incorrect descriptions of, and apply to the solution of clinical problems, the connections, pathways and functions of the cortical, spinal and vestibular loops of the cerebellum.

A29

- State, distinguish correct from incorrect descriptions of, and identify in dissected specimens and in photographs and facsimiles of specimens, the microscopic and macroscopic structure, attachments, relations, blood supply and nerve supply of the meninges of the skull and spinal cord.

Pathology General Objectives

Assessment by BSE and Clinical Examination

Candidates will:

PA1

extrapolate from normal structure and function, together with a knowledge of hereditary and environmental influences, how the body is affected by these with the production of any combination of consequences which are essentially:

- passive and degenerative and/or
- reactive and/or
- neoplastic;

PA2

understand the molecular biological bases and the structural/functional manifestations of these processes in general and in particular in common disease processes;

PA3

understand the principles of statistical analysis in biology;

PA4

understand the principles of pharmacology, pharmacokinetics, pharmacodynamics and the actions and interactions (both beneficial and harmful) of pharmacological agents which commonly and importantly impinge on surgical practice. Texts used are named in this document and in the Part 1 Examination Recommended Reading List. Robbins: Pathologic Basis of Disease 5th ed. (WB Saunders) is the pathology text. The majority of question material is sourced from the section on 'general pathological principles', comprising Chapters 1-10, pages 1-466 inclusive. Material sourced from the organ systems section is outlined in the Part 1 Examination Recommended Reading List. Roitt: Essential Immunology 8th ed. (Blackwell) is the source for immunology questions. Information in Roitt specifically excluded from use in question construction is also indicated in the Part 1 Examination Recommended Reading List. Immunopathology questions may be sourced from Robbins.

Genetics and Molecular Biology

General Objectives

PA5

understand the normal control of cell growth and division, the ways in which these mechanisms may malfunction and the principles of the methods by which genetic malfunctions may be detected.

Specific Objectives

Candidates will demonstrate an understanding of:

PA6

the structure of DNA and RNA, the cell cycle, the genesis of genetic abnormalities, including the principles of molecular biology techniques used in the detection of these abnormalities

PA7

Mendelian genetics including specific conditions which are either common or important, or which exemplify important principles

PA8

cytogenetics, including specific conditions which are either common and important disorders or which

PA9

exemplify important principles as well as the basics of laboratory techniques used for the detection of cytogenetic abnormalities

Statistics

General Objectives

PA10

understand the principles of statistical analysis which will permit the critical evaluation of published data in medical sciences, including the incidence of diseases and the effects of therapeutic intervention in the natural history of disease processes.

Specific Objectives

Candidates will demonstrate an understanding of:

PA11

the principles of statistical analysis, including commonly used parametric and non-parametric tests

PA12

clinical decision analysis

PA13

the principles of population statistics

PA14

the design and interpretation of clinical trials

Immunology

General Objectives

PA15

understand the function of the immune system in normal individuals and apply this to a range of stimuli including infective organisms and immunosuppressive drugs, including how the function of the immune system may be measured and how immunological mechanisms may be used in disease prevention.

PA16

understand ways in which the immune system itself may malfunction including hypersensitivity reactions, immunodeficiency disorders and autoimmunity. Specific Objectives

Candidates will demonstrate an understanding of:

PA17

non-specific defence mechanisms, the complement system, the major histocompatibility complex

PA18

the cells of the immune system, their functions, their interactions, cell subsets, cell surface markers and receptors

PA19

the structure, function and genetics of secretory products of cells involved in the immune response, including immunoglobulins, interleukins and various other factors

PA20

the control and activation of the normal immune response and how this is affected by various drugs or other therapeutic agents such as vaccines

PA21

immunity to infection by bacteria, viruses, fungi and protozoa

PA22

abnormal immunologic responses including hypersensitivity, autoimmunity and immunodeficiency disorders

PA23

the mechanisms of transplant rejection and how these may be avoided or modified by therapeutic intervention

PA24

the principles of diagnostic testing in immunology, without detailed knowledge of actual methodology, but with emphasis on application of such tests and their limitations.

General Pathological Phenomena and Tissue Response to Injury

General Objectives

PA25

understand the influences on cells and tissues, of injury and the degenerative (passive) changes that result from alterations in the internal and external environment of cells, including sublethal injury, necrosis and apoptosis.

PA26

understand the reactions of the body to the presence and damaging actions of noxious environmental agents (physical, chemical [including pharmacological and endogenous], biological) and how these are influenced by genetic factors; recognise and understand both the beneficial and harmful effects of body defence reactions (inflammation and healing, immunology, thrombocoagulation) to environmental damage and to the occurrence of localised tissue death within the individual.

Specific Objectives

Candidates will demonstrate an understanding of:

PA27

the environmental influences that can cause cell injury and death and how these act.

PA28

ways in which the metabolic and structural/functional integrity of cells is vulnerable to injury, from whatever cause.

PA29

the ways in which cells are structurally and functionally injured by damage to the integrity of structure and/or functions of aerobic respiration, membrane, proteins and the genetic apparatus of cells.

PA30

the mechanisms and consequences (passive, reactive and functional) of sublethal cell injury, necrosis and apoptosis, including basic knowledge of the pathological anatomy and types of tissue changes, including in particular ischaemia and infarction and its most common underlying cause, atheroma (and its pathogenesis).

PA31

the 'normal' reactive changes to injury (atrophy [eg. osteoporosis], hypoplasia, hypertrophy, and hyperplasia); their pathological counterparts, metaplasia, dysplasia and the common and important causes of these.

PA32

the molecular basis of diseases of metabolism and their clinical and morphological manifestations, including the basis and manifestations of pituitary, thyroid and adrenal diseases, diabetes mellitus, amyloidosis, fibrinoid necrosis; and the principles of the underlying (enzymic deficiency) basis of well-known metabolic (and

storage) diseases with significant surgical overtones; show an understanding of the pathogenesis and manifestations of pathological calcification and pigmentation.

PA33

the structural and functional changes involved in the reactions of the defence and healing processes of immune reactivity, acute and chronic (including granulomatous) inflammation, regeneration and fibrous repair. This should include an ability to demonstrate understanding of the molecular/pharmacological mechanisms which bring about these reactions, how they are endogenously modulated and how they interact and are modified by pharmacological manipulation. An appreciation of both the beneficial and harmful effects of these reactions should be able to be delineated, demonstrating an understanding of the pathogenesis and pathology of aberrant defence reactions of importance in surgical practice (such as inflammatory bowel disease, systemic vasculitis, rheumatoid disease).

PA34

interaction of the defence reactions with invading microbes, including the influence of variations in the effectiveness of the defence reactions in disease (eg. immune deficiency).

PA35

thrombocoagulation, both normal in trauma defence and pathological, causing local ischaemia and disseminated thrombocoagulation; the pharmacological mediation and pathological consequences of these processes, including arterial and venous thrombosis, embolism, ischaemia and thrombosis as well as the causes and effects of haemorrhage.

PA36

the pathophysiological basis of oedema due to pressure/volume overload and to increased vascular permeability, including the mechanistic and pharmacological bases (cardiac failure, hypoproteinaemia, anaphylaxis, progressive shock of various causes, lymphoedema).

PA37

the causes and pathophysiology of organ failure; in particular, this should include detailed knowledge of respiratory, renal and hepatic failure as well as a basic understanding of the pathophysiological principles of cardiac failure and of organ failure which impinges significantly on surgical practice (eg. adrenal cortical hypofunction).

Infection

General Objective

PA38

understand the pathogenesis and laboratory aspects of microbial infections, as related to the practice of surgery in general. Specific Objectives

Candidates will demonstrate an understanding of:

PA39

the body's normal microbial flora including situations which may influence its composition and number, and its potential role in disease.

PA40

the role and importance of the body's normal defence mechanisms (mucocutaneous surfaces, humoral and cellular) in the prevention, containment and resolution of microbial diseases.

PA41

microbe(s) commonly associated with infections of relevance to surgery.

PA42

microbial virulence as this relates to the pathogenesis of infections caused by bacteria, fungi, viruses and parasites important in the practice of surgery. The significant microbes are:

(a) BACTERIA -

Staphylococcus aureus, S. epidermidis;
Streptococcus pyogenes, St. pneumoniae, 'St. milleri' (St. anginosus);
Enterococcus faecalis, Ent. faecium;
Escherichia coli and related coliforms;
Pseudomonas aeruginosa;
Compylobacter jejuni;
Helicobacter pylori,
Mycobacterium tuberculosis, M. avium intracellulare;
Bacteroides fragilis and non-fragilis species of this group,
Clostridium perfringens, Cl. difficile, Cl. tetani.
Peptostreptococci

(b) FUNGI -

Candida albicans and related species;
Aspergillus fumigatus;
Pneumocystis carinii.

(c) VIRUSES -

human immunodeficiency virus (HIV);
hepatitis B and C viruses;
the herpes group;
papilloma viruses.

(d) PARASITES -

Echinococcus granulosus (hydatid).

PA43

the principles behind blood culture, direct microscopy and antibiotic sensitivity testing techniques.

PA44

the principles and methods of sterilisation, and the practical use of disinfectants.

Antibiotics

General Objective

PA45

understand the principles behind the scientific use of selected antimicrobial agents as relates to the prevention (prophylaxis) and treatment of surgically related microbial diseases.

Specific Objectives

Candidates will demonstrate an understanding of:

PA46

the mode of action and mechanisms (including genetic basis) of resistance to antibacterial agents

PA47

the properties and uses in surgery of the following antibiotics or groups of antibacterial agents - beta-lactams; aminoglycosides; quinolones; metronidazole, clindamycin and other anti-anaerobe agents; vancomycin; fusidic acid; and rifampicin

PA48

the rationale behind, and uses of antimicrobials in surgical prophylaxis

PA49

antifungal agents (amphotericin B and its various formulations, fluconazole, flucytosine) and their use in the treatment and prophylaxis of Candida infections

PA50

prophylactic regimens directed towards the prevention of viral diseases (eg. AIDS, hepatitis) following accidental exposure to blood and/or blood products Neoplasia

General Objective

PA51

demonstrate an understanding of the nature of neoplasia and the biology of neoplastic growth, the causes of neoplasms and the differences between benign and malignant neoplasms. Be able to apply these principles and demonstrate a knowledge of the anatomy, function and behaviour of common and important neoplasms, both benign and malignant.

Specific Objectives

Candidates will demonstrate an understanding of:

PA52

the characteristics of benign and malignant neoplasms including their general gross and microscopic appearances and their biological behaviour, growth and methods of spread including expansion, invasion and metastasis

PA53

the basis of classification of neoplasms according to their differentiation, the relationship of morphological characteristics to likely behaviour and the implications of these characteristics in regard to the likely biology and response to therapy

PA54

the molecular basis of neoplasia, the genetic and environmental causes of neoplasms and the basis of the progressive aggression of malignant neoplasms which reflects their acquired genetic instability

PA55

the progressive and multi-step nature of neoplastic induction and progression and how this is reflected in the nature of 'precancer' and precancerous conditions

PA56

the growth cycle, the molecular basis for this and the mediation and modulation of cell growth through ligand-receptor interactions. How these normal interactions are disorganised in neoplasia and how the factors coordinating normal cell growth (both DNA and protein/polypeptide 'growth factors') engage inappropriately in neoplastic growth mediation; this includes factors influencing the progressive and relentlessly increasing mass of neoplastic tissue and its invasive and destructive biology

PA57

the clinical effects of neoplasms including those which are predictable as well as those which are related to tumour secretions producing systemic effects such as cachexia, and paraneoplastic syndromes

PA58

the morphological and behavioural characteristics of common and clinically important neoplasms including prognosis, principles of treatment and the laboratory manifestations and investigations of neoplasms (particularly lung; breast; large bowel; prostate; solar skin cancers)

Pharmacological General Objectives

Assessment by BSE and Clinical Examination

General Objectives

PA59

understand the general principles of pharmacokinetics relating to therapeutic agents used in the treatment of common diseases.

PA60

understand the major principles of pharmacodynamics of therapeutic agents in frequent use in the treatment of common diseases.

PA61

extrapolate from a knowledge of anatomy, physiology and pathology the major changes to pharmacodynamic and pharmacokinetic processes which may occur and be significantly altered by and within surgical practice. Specific Objectives

Candidates will demonstrate a practical understanding of:

PA62

pharmacokinetic terms such as half-life, clearance and volume of distribution, using examples such as anticoagulants, anticonvulsants, antiarrhythmics etc.

PA63

the route of administration upon bioavailability of drugs such as opiates, antiarrhythmics etc.

PA64

the difference between drugs which undergo extensive metabolism within the body (such as phenytoin) and those that are excreted unchanged (such as gentamicin).

PA65

the changes in organ function which will be associated with significant changes in the pharmacokinetic parameters (eg. renal failure and digoxin, cardiac failure and lignocaine, liver failure and midazolam).

PA66

the pharmacodynamics of major drug groups, relating to the theories of receptor action, thus considering concepts of drugs with agonist, antagonist and partial agonist properties (eg. b-agonists such as salbutamol, b-blockers such as propranolol, partial agonists (predominantly blocking) such as tamoxifen).

PA67

the reflex responses (autonomic) which occur following the administration of many drugs (eg. decreased heart rate which accompanies therapeutic response to theophylline).

PA68

the major types of side effects/toxicity which may occur secondary to drug use, including common ones such as extension of known action (eg. loss of consciousness with alcohol), itch with morphine (histamine release from mast cells), immune responses to sulphonamides/penicillins etc.

PA69

common drug interactions and the mechanisms by which they arise (eg. pharmacokinetic or pharmacodynamic).

Haematology and Transfusion

General Objectives

PA70

understand the normal development of cells of the bone marrow and lymphoid tissues, how they react normally to noxious stimuli, their abnormalities in terms of

reactive and neoplastic processes and the effects of these in the normal individual and in association with other diseases.

PA71

understand the causes and effects of defective haemostasis and abnormal thrombocoagulation.

PA72

have a basic understanding of blood groups and transfusion practice, particularly as it impacts on surgical practice; understand the hazards of transfusion and the use of blood products in medical practice.

Specific Objectives

Candidates will demonstrate an understanding of:

PA73

the causes and effects on the body of anaemia and the overproduction (reactive and neoplastic) of the erythroid cell series

PA74

the causes and effects on the body of underproduction and overproduction (reactive and neoplastic) of cells of the myeloid and monocytic series and interference with the normal functions of those cells. This includes an understanding of the morphological and functional effects of the leukaemias and other myeloproliferative disorders and their effects on an individual in health and in the face of surgical intervention.

PA75

the normal actions of the lymphoid system during defence reactions of the body; understand the malignant lymphomas including a functional classification system and the progression, effects and complications of Hodgkin's and non-Hodgkin's lymphomas.

PA76

the normal and impaired production of platelets, the role of platelets in normal haemostasis and pathological thrombosis, the effects of insufficiency of platelet numbers or action and the complications of thrombocytosis (reactive and neoplastic).

PA77

normal blood coagulation and the hereditary and acquired defects in (or overactivity of) blood coagulation, including the interaction of coagulation and platelet aggregation.

PA78

blood groups and transfusion principles, in particular as they apply to surgical practice, including the technical and biological hazards of transfusion and the use of blood products in surgical practice.

Visual Questions

General Objective

PA79

Candidates will demonstrate ability to recognise, both at the macroscopic and microscopic levels, the pathologic appearances of conditions which are common and important in surgical practice.

Board of Basic Surgical Training - Physiology General Objectives

Assessment by BSE and Clinical Examination

Candidates will:

PH1

demonstrate at oral and written assessments, that they have achieved Curriculum Objectives 2 and 3 as they relate to knowledge and understanding of mechanisms controlling normal and abnormal human function in the prevention and management of surgical conditions. They will also demonstrate application and synthesis of knowledge and understanding in the evaluation of preventative and management strategies of surgical conditions. In order to achieve the General Objective, the candidates will achieve the Specific Objectives of the following:

Physiological Controls

Specific Objectives

The candidates will demonstrate understanding of:

PH2

the philosophy of homeostasis by explaining the history and application of physiological control theory with particular reference to negative and positive feedback, and the laws of thermodynamics

PH3

cellular function by explaining the functional role of the structural components of the cell, with particular reference to the processes and regulation of gene expression

Alimentary

Candidates will demonstrate understanding of:

PH4

gastrointestinal motility by explaining its regulation

PH5

the different alimentary secretions by explaining their functions and regulation of production

PH6

carbohydrate, fat and protein digestion by explaining the processes by which digestive end products as well as water, electrolytes and other substances are absorbed

PH7

common and preventable surgical alimentary tract disorders by describing their special physiological bases and consequences

Blood

Specific Objectives

With respect to blood, the candidates will demonstrate understanding by:

PH8

describing the process and sites of erythropoiesis in the human, differentiating between different stages of development

PH9

listing the common human haemoglobin variants, indicating the developmental stage at which each appears

PH10

describing the structure of haemoglobin and the relationship between this structure and the oxygen carrying function

PH11

describing the mechanism by which senescent RBCs are removed from the blood and how the constituent components are "recycled"

PH12

outlining the mechanism by which iron is absorbed

PH13

differentiating forms of iron deficiency from investigational information (eg. blood film, iron studies)

PH14

describing the inheritance of ABO and Rh blood groups, and how a given pair of individuals could be related, given their blood groups

PH15

(with respect to blood clotting)

- explaining the mechanisms of clotting (intrinsic plus extrinsic pathways)
- describing the specific deficiency present in each of the major blood clotting disorders eg. haemophilia

- describing the mechanism(s) by which anticoagulation using warfarin/heparin plus antiplatelet agents (eg. aspirin) affect clotting
- interpreting a given "clotting profile" with respect to i) diagnosis, ii) the likely outcome of the defect, iii) in the case of anticoagulation whether therapy is appropriate or not, iv) the anticoagulation therapy appropriate
- Cardiovascular

The candidates will demonstrate an understanding of:

PH16

the origin and spread of cardiac excitation by explaining the mechanisms of the normal electrocardiogram, and the electrocardiographic findings in both cardiac and systemic disease, eg. cardiac arrhythmias, coronary disease, and hypertension.

PH17

the mechanical events in the cardiac cycle by explaining how changes are produced in both arterial and venous pulses, the heart sounds (murmurs and bruits commonly encountered) and in myocardial contraction.

PH18

the processes which control myocardial contractility and cardiac output by explaining how factors may modify these processes in health (eg. exercise) and disease (eg. heart failure)

PH19

control of blood flow by explaining the biophysical principles affecting flow in vessels and how blood flow is measured during physiological disturbances in man and experimental preparations

PH20

the capillary circulation by explaining how water, gases and larger molecules exchange across the capillary wall and equilibrate with the interstitial fluid

PH21

the content and volume of the interstitial fluid and the functional role of the lymphatic circulation, by explaining the role of the extracellular space in health and disease

PH22

rapidly acting regulation of the systemic circulation by outlining the functional role of substances secreted by the endothelium, of circulating hormones, and of neural mechanisms

PH23

factors which control systemic blood pressure, by explaining the role of 'baroreceptors', and 'volume receptors', and their efferent mechanisms

PH24

methods used for measuring blood pressure and their application (invasive and non-invasive)

PH25

methods used for measuring cardiac output and relationship between cardiac output (cardiac index) and systemic vascular resistance. Explain how measurements are made in the clinical situation

PH26

methods used for the measurement of venous pressure and explain their application in the clinical situation

PH27

factors regulating venous return in the context of both health (eg. postural changes) and in surgical conditions (eg. congestive heart failure, acute blood loss, burns and dehydration)

PH28

cerebral circulation, explain the formation and function of cerebrospinal fluid, the structure and function of the blood brain barrier, and how to measure cerebral blood flow. Explain how the cerebral circulation and brain metabolism is regulated

PH29

coronary circulation, by explaining how coronary blood flow is regulated, and how this changes in coronary artery disease

PH30

cutaneous circulation, by explaining its control in temperature regulation, sweating and the local reaction to injury

PH31

splanchnic circulation, including the intestinal and hepatic circulations, by explaining how it is controlled, and its functional role in the splanchnic bed as a blood reservoir

PH32

placental and foetal circulations, by explaining their structure, function and control

PH33

skeletal muscle circulation, by explaining in particular the control of muscle blood flow in the context of exercise and sporting activities

PH34

compensatory adjustments of the cardiovascular systems, by explaining the effects and control during changes in gravity, particularly in the context of posture, altitude (including zero gravity), barometric pressure and rapid acceleration

PH35

cardiovascular response to exercise by describing the immediate haemodynamic effects and their mechanisms, and the longer-term adaptation that occurs with training

PH36

circulatory consequences of blood loss by outlining the reflex and local controls in hypovolaemia, and its management in clinical situations

PH37

various factors that produce and sustain shock, by explaining the cardiovascular compensatory reactions activated by shock, together with the treatment of shock

PH38

heart failure and explain its manifestations, pathogenesis and treatment

PH39

various types of hypertension by outlining the different causes, the long term effects on the cardiovascular system, and the management of hypertension

PH40

physiological effects of drugs used in cardiovascular medicine, by explaining the mechanism of action of inotropic agents, vasodilators, vasoconstrictors, anti-arrhythmics and beta-blockers

Endocrine

Candidates will demonstrate understanding of:

PH41

all endocrine systems by outlining the mechanisms regulating secretion of hormones and their actions on target cells and organs

PH42

control of anterior and posterior pituitary function, by explaining the influence of normal hypothalamic regulation

PH43

normal function of the anterior pituitary, by explaining the mechanisms of symptoms and signs of hyperpituitarism and hypopituitarism

PH44

normal function of the posterior pituitary, by explaining the mechanisms of symptoms and signs of hypofunction (diabetes insipidus) and hyperfunction (hypersecretion of vasopressin)

PH45

normal function of the thyroid, by explaining mechanisms of symptoms and signs of hyperthyroidism and hypothyroidism

PH46

normal function of parathyroid, by explaining mechanisms of symptoms and signs of hyperparathyroidism and hypoparathyroidism.

PH47

normal function of adrenal medulla and cortex, by explaining mechanisms of symptoms and signs of hypofunction (Addison's disease) and hyperfunction (Cushing's disease) of the adrenal cortex; and hyperfunction (phaeochromocytoma) of the adrenal medulla

PH48

normal endocrine function of the kidney, by explaining mechanisms of symptoms and signs of renal hypofunction (renal failure)

PH49

normal function of the endocrine pancreas, by explaining mechanisms of symptoms and signs of hypofunction (diabetes mellitus) and hyperfunction (insulinoma)

PH50

normal function of sex hormones in reproduction, by explaining the mechanisms of the symptoms and signs of reproductive dysfunction in the male and female

PH51

regulation of body function in response to trauma, starvation, sepsis, and the stress of surgery, by explaining the specific changes due to endocrine mechanisms

PH52

endocrine functions of other body organs eg. the heart, and lung, circumventricular organs in the brain and intermediate lobe of pituitary, by outlining their role in synthesising specific substances for controlling functions at both local, and remote sites (eg. in the case of the heart, atrial natriuretic peptides and angiotensin)

Muscle

Specific Objectives

Candidates will demonstrate understanding of:

PH53

muscle contraction, by explaining the common and different processes involved in excitation-contraction-coupling in skeletal, cardiac and vascular smooth muscle

PH54

the physiological role of nitric oxide, by explaining the sites and processes at and by which nitric oxide-like molecules are synthesised, and the role such molecules play in function of smooth, cardiac and skeletal muscle

Neurophysiology

Specific Objectives

Candidates will demonstrate an understanding of:

PH55

cell membrane excitability, by outlining the processes for which a membrane potential is created, an action potential is initiated and propagated, and of factors which may modify these processes in health, eg. local anaesthetics, and disease eg. electrolyte disturbances

PH56

intercellular signalling, by explaining the processes of synaptic transmission at neuroeffector junctions in the somatic and autonomic nervous systems; and the factors which can modify these processes

PH57

the autonomic nervous system, by explaining the function of the autonomic nervous system and the transmitter specificity of its component parts, including the role of peptide transmitters

PH58

reflex controls, including somatic and autonomic spinal reflexes, and axon reflexes, by explaining the role in symptoms and signs of eg. stroke, hypertension, hypoxia and inflammation

PH59

spinal neurophysiology, by outlining the functional role of the sensory, motor and autonomic spinal tracts, particularly within the context of the symptoms and signs demonstrating their derangement eg. referred pain, paraplegia

PH60

the functions of cranial nerves, by describing their role in "the special senses"

PH61

the functional roles of the basal ganglia, limbic system, hypothalamus and brainstem (including the reticular activating system) by explaining their role in memory, human behaviour, and in specific, relevant clinical derangements, eg. brain tumour, and stroke

PH62

the functional role of the cerebral cortex, by outlining its function in sensory perception, motor control, and speech

PH63

the functional role of the cerebellum, by explaining the mechanisms of fine motor coordination in health, and its destruction in disease

PH64

the role of the cerebrospinal fluid and blood-brain barrier, by explaining how these entities protect the brain

PH65

the EEG by explaining the patterns which demonstrate normal and deranged human behaviour (eg. sleep, epilepsy)

Nutrition and Metabolism

Candidates will demonstrate an understanding of:

PH66

basic nutritional requirements for normal daily life

PH67

the inter-relationships of carbohydrate, protein and fat metabolism in the production of energy, and how these factors are changed with undernutrition and overnutrition

PH68

the nutritional impact of surgery, by outlining the metabolic complications and their mechanisms that may arise from surgery on patients with normal and abnormal nutrition

Urinary Tract

Specific Objectives

Candidates will demonstrate an understanding of:

PH69

the renal circulation by explaining its control systems, particularly with respect to the afferent and efferent arterioles, and the vasa recta

PH70

glomerular filtration by explaining the factors which mediate control

PH71

renal tubular function by explaining its control from the proximal to distal segments

PH72

renal function tests by explaining how they apply to diagnosis particularly in renal failure

PH73

the functional changes in the nephron in renal failure, explaining how these changes affect homeostasis, particularly in surgical conditions such as burns and crush injuries, and during the different forms of shock

PH74

how diuretics affect nephron function by explaining the nature of diuresis

PH75

the control of bladder function by outlining the role of mechanisms used normally, and how these change in paraplegia, stroke, and destructive processes locally

PH76

the effects of obstruction of the nephron, ureters, bladder and prostate, by describing the mechanisms of the relevant symptoms and signs

Respiratory

Candidates will demonstrate an understanding of:

PH77

the respiratory system by outlining its structure in terms of function

PH78

the medullary and pontine respiratory control centres by explaining the influence of changes in oxygen and carbon dioxide tensions, and in H⁺ concentration in blood and CSF, on the control of breathing

PH79

the control of breathing by explaining the influence of pulmonary and somatic reflexes on ventilation

PH80
the ventilatory response to exercise in terms of central and peripheral mechanisms involved

PH81
pulmonary ventilation by describing the concepts of

alveolar ventilation
dead space ventilation including anatomical and alveolar components

PH82
hypoventilation by describing its effects on blood chemistry and cardiovascular changes

PH83
Fick's law of diffusion by outlining its significance for oxygen and carbon dioxide exchange in pulmonary and systemic tissues

PH84
the differences between pulmonary and systemic circulations by comparing vascular haemodynamics and capillary exchange factors

PH85
the pressures within and around the pulmonary vessels

PH86
hypoxic pulmonary vasoconstriction

PH87
pulmonary blood flow by explaining how it can be measured and its quantitative value

PH88
the regional distribution of pulmonary blood flow by outlining the control factors responsible for it

PH89
water balance within the lung by describing how the responsible factors determine water distribution

PH90
the metabolic functions of the lung by defining its catabolic and anabolic actions

PH91
regional ventilation-perfusion ratio by explaining how differences occur in regional:

- ventilation
- perfusion
- V/Q ratio
- and the effects on overall gas exchange
- PH92
- how the effects of increasing and decreasing the V/Q ratio alter alveolar and end-capillary gas tensions

PH93

how high V/Q ratio regions generate alveolar dead space, and of the factors contributing to alveolar dead space ventilation

PH94

mechanisms by which veno-arterial shunting results from low V/Q ratio regions and from absolute shunting

PH95

how measurements of venous admixture using the shunt equation can be made and how the A-a PO₂ difference can be used as an index of shunting

PH96

how oxygen is carried in blood, by explaining the significance of oxygen dissolved and bound to haemoglobin

PH97

the properties and significance of the Hb-oxygen dissociation curve in explaining how oxygen is taken up in the lungs, and delivered to tissues

PH98

mechanism of cyanosis, in terms of haemoglobin desaturation

PH99

how carbon dioxide is carried in blood, by explaining the role of plasma and red cells

PH100

properties and significance of the carbon dioxide dissociation curve with respect to:

carbon dioxide elimination by the lungs

Haldane effect

PH101

how the muscles of respiration overcome the elastic and flow-resistive impedance to breathing

PH102

how regional differences in ventilation occur due to changes in elastic properties of the lung (pressure-volume relationships, compliance and surfactant)

PH103

elastic properties of the chest wall

PH104

total compliance of the respiratory system by outlining its controlling factors

PH105

pressure/volume/flow relationships for spontaneous ventilation

PH106

airway resistance by defining the physical determinants including the role of lung volume and dynamic airway compression

PH107
effects of increased airway resistance.

PH108
effects of regional differences in airway resistance on the distribution of ventilation and gas exchange.

PH109
how the upper airway humidifies, filters and warms inspired gas.

PH110 subdivision of lung volume into primary lung volumes and capacities,
especially vital capacity
functional residual capacity
closing volume.

PH111
how common tests of lung function are carried out and how abnormal results may be interpreted

PH112
the mechanisms of arterial hypoxaemia, by explaining the effects of

- hypoventilation
- shunt
- low V/Q ratios
- diffusion impairment
- and of the role of increasing the inspired oxygen concentration in each type

PH113
the basic mechanisms of hypoxic and ventilatory acute respiratory failure

PH114
IPPV and PEEP, by explaining the physiological effects of these applications

PH115
the effects of age and surgery on respiratory function, by explaining how this differs from normal

Temperature Regulation

Specific Objectives

Candidates will demonstrate an understanding of:

PH116
the normal regulation of body temperature, by explaining how metabolism interacts with autonomic controls

PH117

the regulation of body temperature during fever, by explaining the mechanism of central thermostat resetting

PH118

how variations in body temperature relate to homeostasis in normal, and in the post-operative state and in surgical conditions eg. sepsis

Fluid and Electrolyte Balance

Specific Objectives

Candidates will demonstrate an understanding of:

PH119

normal distribution of body fluids and their composition, explaining how the component-compartment volumes may be measured

PH120

factors responsible for the maintenance of fluid balance and electrolyte concentrations in the different body fluids eg. in the extracellular compartments, and intracellular departments, by explaining the role of ion pumps, buffer systems, hormones

PH121

effects of changes in body fluid composition on membrane excitability in the different cells of the body by describing the effects on neurones, cardiac myocytes

PH122

control of acid-base balance, particularly as it applies to surgical conditions of fluid and electrolyte retention, and loss, by explaining the mechanisms and resultant state, in renal failure, gastrointestinal fistulae and obstruction, diarrhoea and dehydration

Surgical Skills General Objectives

Assessment by application of basic science knowledge and understanding and clinical practice, by objective structured clinical examination covering attitudes, interpersonal communication, ethical, surgical and technical skills.

Clinical skills, surgical procedures, attitudinal, interpersonal communication and ethics General Objective

Candidates will:

C1

Demonstrate during in-house training and under the supervision of mentors that they have acquired the appropriate attitudes, and interpersonal plus communication and ethical skills of the practising surgeon. They will also demonstrate that they have the

required applied knowledge and understanding to implement basic surgical procedures.

Specific Objectives

C2

demonstrate appropriate attitudes, eg. rapport with patients, peers, supervisors. They will demonstrate diligence in attendance, responsibility, and compassion toward those around them.

C3

demonstrate that they can document clinical information in a clear, accurate, concise and relevant manner.

C4

demonstrate that they can document an appropriate management plan.

C5

demonstrate that they can document instructions in a clear and concise manner.

C6

demonstrate that their documented medical records are a clear form of written communication.

C7

demonstrate that they can make effective clinical judgements in reaching a differential diagnosis based on the satisfactory history, complete physical examination, and correct interpretation of appropriate investigations.

C8

demonstrate that once a diagnosis is made, that they can carry out appropriate investigations and/or treatment.

C9

demonstrate that they attend and perform satisfactorily at clinical rounds, journal club, audits and hospital-based education meetings.

C10

demonstrate that they carry out and are successful at self-directed learning.

C11

demonstrate that they actively take opportunities to teach in appropriate settings, other medical professionals and students.

C12

demonstrate that as a part of self-directed learning, they participate in successful research activities. In this sense they should be proactive in seeking opportunities to carry out original research in both literature surveys and in the laboratory (inductive and hypothetic-deductive activities).

Clinical Competence

C13

demonstrate the skills of history taking and physical examination, expected of Basic Trainees who are completing their third year of postgraduate ward work. Examples would include

- acute abdominal pain
- assessment of fitness for surgery
- head and neck disorders
- interview a parent of a child with a surgical problem
- postoperative disorders
- the breast and endocrine system
- the cardiovascular system
- the digestive tract
- the groin and external genitalia
- the musculoskeletal system
- the nervous system including:
 - central nervous system disorders
 - peripheral neurological disorders
 - the peripheral vascular system
- the respiratory system
- trauma

C14

demonstrate competency in procedural skills which Basic Trainees may be expected to carry out in the Emergency Department or the wards. Examples would include

- application of a plaster cast
- arterial puncture for blood gas analysis
- cricothyroidotomy
- diagnostic peritoneal lavage
- endotracheal intubation
- establishment of venous access
- gowning and gloving
- insertion of: central venous line
- chest drain
- knot tying and knowledge of suture material characteristics
- lumbar puncture
- resuscitation of adult, child or infant
- skin suturing and associated regional anaesthesia
- urethral catheterisation and passage of urethral sounds
- fine needle aspiration - for cytology

C15

demonstrate competency in counselling patients and/or relatives on topics which include breaking bad news, dealing with families and relatives. Examples may include

- breaking news of malignancy
- HIV and hepatitis

- post operative complications
- post operative pain relief

C16

demonstrate the skill of obtaining informed consent for surgical procedures Some examples of procedures include the following:

- amputation
- appendicectomy
- craniotomy
- insertion of foreign materials eg. hip prostheses
- laminectomy
- laparoscopy
- paediatric operations requiring parental consent
- parotidectomy
- prostatectomy
- splenectomy
- vasectomy
- intussusception
- lymph node biopsy
- pyloric stenosis
- surgery for abdominal aortic aneurysm
- swelling in the neck

C17

demonstrate skill in solving clinical problems in the field of surgery related to:

- brain death
- burns
- delayed primary closure of wounds
- depressed or altered conscious state
- drug abuse
- infection and related topics:
 - antibiotic prophylaxis
 - brain abscess
 - clostridial infection
 - instrument sterilisation
 - osteomyelitis
 - septic shock
 - synergistic gangrene
 - tendon sheath infection
 - wound sepsis
- interpretation of:
 - arterial blood gas data
 - biochemical data
 - electrocardiograms
 - fluid balance
 - haematological data
 - isotope scans
 - pathological specimens
 - radiographs (including CT, ultrasound, and MRI) of common conditions
 - needle stick injury

- pre-operative assessment
- post-operative problems:
- atelectasis
- confusion
- deep vein thrombosis
- haemorrhage
- pulmonary embolus
- urinary retention
- wound dehiscence
- theory and practice of diathermy
- trauma and related topics:
- compound fracture
- gun shot injury
- digital laceration
- multiple trauma
- spinal shock
- stab wound
- statistical analysis
- surgical aspects of diabetes
- syncope
- the ischaemic limb
- tracheostomy
- transfusion
- comorbid conditions - effect on surgery
- renal and heart failure
- anaemia

Technical Skills General Objective

The following Curriculum Objectives deal specifically with the acquisition of technical skills. Within the general objective of acquiring basic skills of this kind, the candidates will

Specific Objectives

C18

understand and apply aseptic techniques.

C19

protect patients for surgical procedures.

C20

select and use appropriate suture material and needle type for different tissues.

C21

satisfactorily tie the surgical knots specified in the Basic Surgical Skills Course.

C22

satisfactorily manage and close traumatic and surgical wounds (skin, subcutaneous tissue, fascia, wound irrigation and debridement, simple wound drainage).

C23

select and use surgical instruments appropriately.

C24

perform competently those surgical procedures encountered in the ward or emergency department.

C25

demonstrate a satisfactory anastomosis technique (intestinal, vascular).

C26

demonstrate appropriate selection and use of local anaesthesia.

C27

understand and set-up equipment stack for minimally invasive surgery.

C28

use simple laparoscopic instruments appropriately.