Theory and Science of Practice Examination

Quick Look-up Syllabus
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To achieve the required standard of knowledge of the scientific basis of paediatric practice, the candidate must be competent in the following areas:

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Cardiology

The candidate must:

Card1. know the anatomy and embryology of the normal heart

Card2. know the anatomy of the commoner types of congenital heart disease

Card3. understand the development of the heart and know the abnormalities that are associated with the common congenital heart diseases

Card4. know the genetic and environmental factors in the aetiology of heart disease

Card5. know the normal fetal circulation and transitional changes after birth

Card6. understand the physiological basis of myocardial function

Card7. understand how the anatomy of the heart relates to changes in physical signs, including what underlies the heart sounds and murmurs

Card8. understand the pathophysiology of cardiac conditions, including cyanosis, heart failure, shock, syncope and unexpected cardiac death

Card9. be able to select and interpret appropriate investigations in a child with suspected cardiac pathologies

Card10. understand how the electrical activity of the heart translates to the ECG

Card11. understand how blood pressure is generated, measured and interpreted

Card12. understand the pharmacology of drugs used to treat common cardiac conditions, including duct-dependent cyanosis, heart failure and arrhythmias

Card13. know the possible cardiac complications of other system disorders.
Dermatology

The candidate must:

Derm1. understand the anatomy of the skin

Derm2. know how abnormalities in skin anatomy and physiology relate to appearance, dysfunction and disease

Derm3. understand how injuries to the skin, including burns, affect function

Derm4. understand the role of infective agents in skin disease

Derm5. understand the pharmacology of agents used to treat common skin diseases

Derm6. know the possible associations between disorders of the skin and other systems.
Diabetes and endocrinology

The candidate must:

**Endo1.** understand the anatomy, embryology and function of the important endocrine organs, eg brain, thyroid, parathyroid, pancreas, adrenals and gonads

**Endo2.** understand the physiological basis of growth and puberty

**Endo3.** understand the basis of growth measurement and charting

**Endo4.** understand the genetic and environmental factors that influence growth and puberty

**Endo5.** understand the pathophysiological basis of endocrine diseases such as diabetes and disorders of the pituitary and adrenal glands

**Endo6.** understand the pathophysiological basis of endocrine emergencies, including diabetic ketoacidosis, adrenal crisis, hypoglycaemia and hyperglycaemia

**Endo7.** understand the appropriate investigation of endocrine disease

**Endo8.** understand the pharmacological basis of treatment of endocrine disorders

**Endo9.** know the possible impact on endocrine organs of other system disorders and vice versa

**Endo10.** understand the assessment, epidemiology and public health consequences of obesity.
Gastroenterology and hepatology

The candidate must:

**Gast1.** know the anatomy and embryology of the gastrointestinal tract and how variation relates to specific disorders, eg malrotation, atresias, Hirschprung’s

**Gast2.** know the basic histopathology and cellular dysfunction of important disorders, including coeliac disease

**Gast3.** understand the anatomical, physiological and hormonal changes in gut and liver that occur throughout childhood

**Gast4.** understand the physiological basis of normal gut and liver function, including motility, absorption and secretion

**Gast5.** understand the role of the gut in homeostasis and its dysfunction

**Gast6.** know the genetic and environmental factors in the aetiology of gut and liver disease

**Gast7.** understand the pathophysiology of infective agents in the gut and liver

**Gast8.** understand the pharmacological basis of therapy in gut and liver disorders

**Gast9.** know the possible impact on this system of other system disorders and vice versa.
Genetics and dysmorphology

The candidate must:

Gen1. understand the scientific basis of genetic disorders and inheritance

Gen2. be able to construct a family tree and interpret patterns of inheritance

Gen3. understand the basis of molecular genetics, including fluorescent in-situ hybridisation (FISH), uniparental disomy (UPD) and epigenetics

Gen4. understand the chromosomal and molecular basis of genetic disorders

Gen5. know the environmental factors which may effect prenatal development

Gen6. know the basis of genetic screening and diagnosis, the conditions for which they are used and the ethical dilemmas they pose.
Haematology and oncology

The candidate must:

Haem1. know the anatomy of the reticuloendothelial system

Haem2. understand the changes in haematopoiesis that occur throughout childhood

Haem3. understand the molecular basis of cell growth and regulation

Haem4. know the genetic and environmental factors in the aetiology of haematological disorders and malignancies

Haem5. understand the physiological basis of haematopoiesis and how diseases, including infections, impact upon this

Haem6. understand the role of major and minor blood antigens

Haem7. understand the pathophysiology of disorders of haematopoiesis, coagulation and malignancy

Haem8. be able to interpret commonly reported clotting studies

Haem9. know the clinical features of common malignancies of childhood, including retinoblastoma, Wilms tumour, lymphoma, neuroblastoma and leukaemia

Haem10. understand the scientific basis of radiological, imaging and physiological investigations in management of oncological conditions, eg specific (MIBG) and non-specific (technecium bone scan), radionucleotide imaging, functional imaging (PET)

Haem11. understand the disease associations of specific syndromes with propensity to malignancy, eg hemihypertrophy, Fanconi anaemia

Haem12. understand the basis of treatment for anaemias, disorders of coagulation and malignancies

Haem13. understand the pharmacology of drugs used in the treatment of childhood malignancies, including monoclonal antibodies.
Infection, immunity and allergy

The candidate must:

IIA1. know the classification and essential features of infectious agents

IIA2. understand host defence mechanisms and their pattern of development

IIA3. know the causes and common presentations of vulnerability to infection, including primary/secondary immunodeficiency

IIA4. know the mechanisms of maternal to fetal transmission of infection

IIA5. understand the pathophysiology of fever and sepsis and the scientific rationale for treatment

IIA6. know the epidemiology, pathology and natural history of common infections of childhood

IIA7. understand the scientific basis of immunisation

IIA8. understand the pharmacology and rational use of antimicrobials

IIA9. know the genetic and environmental factors in the aetiology of allergic and autoimmune disorders

IIA10. understand the scientific basis of atopy and anaphylaxis and the rationale for treatments

IIA11. know the epidemiology and natural history of atopic disease.
Metabolic medicine

The candidate must:

Met1. understand the biochemistry of metabolism, including urea cycle, Krebs cycle and fatty acid cycle

Met2. understand the pathophysiology of metabolic disorders, eg electrolyte and acid base disturbance, hyperammonaemia, hypoglycaemia

Met3. know the genetic and environmental factors in the aetiology of metabolic disorders

Met4. know the clinical and biochemical features of electrolyte and acid base disturbances and metabolic diseases

Met5. understand the investigations that are used in the screening and diagnosis of metabolic disorders

Met6. know the causes and investigation of metabolic bone disease

Met7. understand the principles of dietary, vitamin and pharmacological treatment of metabolic diseases.
Musculoskeletal

The candidate must:

- **Msk1.** know and understand the anatomy of the musculoskeletal system
- **Msk2.** know the histology and understand the physiology of normal muscle and understand how structure relates to function
- **Msk3.** understand the pathophysiological changes which occur in muscle and joint disorders
- **Msk4.** know the genetic and environmental factors in the aetiology of musculoskeletal disorders
- **Msk5.** know the investigations used in the diagnosis of musculoskeletal disorders
- **Msk6.** understand the pharmacology of agents, including monoclonal antibodies, used in the treatment of musculoskeletal disease
- **Msk7.** understand the disease associations of rheumatological conditions with other conditions, including eye disease and metabolic disorders.
Neonatology

The candidate must:

Neo1. understand the embryology of the human fetus from conception to birth and how errors in this process can lead to diseases or congenital anomalies

Neo2. understand the normal physiological processes occurring during the perinatal period

Neo3. understand the physiological basis of neonatal resuscitation

Neo4. understand the scientific basis of common diseases and conditions affecting the newborn, including the consequences of prematurity

Neo5. know and understand the common acquired and congenital infections in the newborn period

Neo6. understand the physiology and principles of treatment of jaundice in the neonatal period

Neo7. understand the causes and mechanism of brain injury in term and preterm infants and its relationship to short- and long-term neurodevelopmental sequelae

Neo8. understand the principles of mechanical ventilation, including the interpretation of blood gases

Neo9. understand the principles of fluid and electrolyte management and nutrition in the neonate

Neo10. understand the advantages of breast feeding and issues related to lactation during various maternal disorders

Neo11. understand the principles and practice of newborn screening.
Nephro-urology

The candidate must:

Neph1. know the anatomy and embryology of the renal tract

Neph2. understand the physiology of normal kidney and bladder

Neph3. understand the pathophysiology and the histopathological changes that occur in renal disorders

Neph4. understand the pathophysiological mechanisms resulting in hypertension

Neph5. know the genetic and environmental factors in the aetiology of renal and bladder disorders

Neph6. understand the scientific basis of imaging and physiological investigations used in renal disorders

Neph7. understand the pharmacology of agents commonly used in renal disorders

Neph8. understand the physiological basis of renal dialysis and haemofiltration

Neph9. understand the disease associations of renal conditions with other conditions, eg HUS, deafness, hepatorenal syndrome.
Neurology and neurodisability

The candidate must:

Neuro1. know the anatomy and understand the physiology of the central and peripheral nervous systems

Neuro2. know the genetic and environmental factors in the aetiology of neurological disorders and neurodisability

Neuro3. understand the physiological basis of brain function and how this relates to electrical activity, including that seen on the EEG

Neuro4. understand the scientific principles of other neurophysiological studies, eg EMG, BAER, otoacoustic emissions

Neuro5. understand the physiological and pathophysiological changes that occur in neurological disorders, including migraine, raised intracranial pressure, idiopathic intracranial hypertension and epilepsy

Neuro6. know the current theories of the pathophysiology of neurodevelopmental disorders, including cerebral palsy

Neuro7. understand the importance of CSF analysis for diagnosis of neurological conditions, including infections

Neuro8. understand the pharmacology of agents commonly used in neurological disease, including antiepileptic drugs

Neuro9. understand the scientific basis of non-pharmacological treatments for the management of neurological disorders and neurodisability, eg ketogenic diet

Neuro10. understand the disease associations of neurological conditions with other conditions, eg eye disease, metabolic disorders

Neuro11. understand the scientific basis of normal and disordered neurodevelopment in childhood.
Nutrition

The candidate must:

Nutr1. understand the principles of body composition in children and its basic assessment, eg weight, BMI

Nutr2. understand the scientific basis of nutrition

Nutr3. understand the physiological basis of normal enteral nutrition and its variation throughout childhood

Nutr4. know the constituents of a healthy diet at all ages, including the breast and formula feeding in infancy

Nutr5. know the constitution of infant feeds commonly used in health and disease

Nutr6. know the principles and methods of dietary supplementation, eg calories, vitamins, minerals

Nutr7. know the principles of nutritional management in childhood disease, eg neonates, intensive care, cystic fibrosis

Nutr8. know the possible nutritional consequences of being underweight and overweight on other body systems, eg cardiac, and on long-term health

Nutr9. know the epidemiology of obesity and malnutrition in global child health.
Ophthalmology

The candidate must:

Ophth1. know and understand the anatomy and embryology of the eye

Ophth2. understand how the structure of the eye relates to function

Ophth3. understand the normal development of vision and the pathophysiology of visual impairment

Ophth4. know the physiology of the eye and its movement, eg pupillary reflexes, anisocoria, strabismus, refractive errors, nystagmus

Ophth5. know the genetic and environmental factors in the aetiology of eye disorders

Ophth6. understand the pharmacology of agents commonly used in eye disease, including antimicrobials and mydriatics

Ophth7. know about the eye manifestations of common systemic and genetic diseases.
Palliative care and ethics

The candidate must:

Pall1. understand the physiology of brainstem death

Pall2. understand the principles of pharmacological and non-pharmacological interventions in symptom control for children with life-limiting conditions

Pall3. be aware of the ethical issues in therapeutic intervention in children with life-limiting conditions

Pall4. be aware of the ethical issues concerning organ donation

Pall5. understand the ethical principles in withdrawing or withholding care.
Pharmacology, poisoning and accidents

The candidate must:

PPA1. understand the mode of action, physiological and metabolic mechanisms of therapeutic agents, including intravenous fluids

PPA2. understand the planned and undesired effects of therapeutic agents

PPA3. understand the pharmacokinetics of commonly used medicines and the relationship to renal and other organ function

PPA4. understand the mode of action, physiological and metabolic mechanisms and consequences of substances taken without medical advice for recreational use or self-poisoning

PPA5. understand the epidemiology of drug and substance abuse in children and young people

PPA6. understand the psychosocial links with drug and substance abuse in children and young people

PPA7. understand the physiological and metabolic mechanisms and consequences of accidents, including trauma, drowning and inhalation

PPA8. understand the epidemiology and psychosocial links of accidents in children.
Respiratory medicine and ENT

The candidate must:

Resp1. know and understand the anatomy and embryology of the respiratory tract and the ear

Resp2. understand the physiology of respiration in health and disease

Resp3. understand the physiology of mechanical ventilation

Resp4. understand the changes that occur in the respiratory system during sleep

Resp5. understand the physiological, pathophysiological and histological changes that occur in respiratory disease

Resp6. know the genetic and environmental factors in the aetiology of respiratory diseases and disorders of the ears, nose and throat

Resp7. be able to interpret and select appropriate respiratory investigations, eg blood gases, spirometry, body plethysmography, transfer factor

Resp8. understand the pharmacology of agents commonly used in respiratory disease, eg asthma, infections

Resp9. understand the scientific basis of non-pharmacological interventions in respiratory disease, eg physiotherapy

Resp10. understand the disease associations of respiratory conditions with systemic conditions, eg sarcoidosis, SLE
The science of practice

The candidate must:

SOP1. understand the principles and use of statistical testing

SOP2. understand the principles of research methodologies

SOP3. understand the principles of evidence based medicine and its limitations

SOP4. understand the principles of clinical audit

SOP5. understand the principles of population screening and epidemiology

SOP6. know the main indices of population child health and their significance