Subspecialty Training Programme on

Paediatric Endocrinology

(effective from 2 January 2020)

Paediatric Endocrinology Subspecialty Board

Adopted from the Proposal of Subspecialty Training Programme on Paediatric Endocrinology submitted by the Hong Kong Society of Paediatric Endocrinology and Metabolism on 13 May 2018

Scope of the subspecialty

Paediatric Endocrinology (PE) is the branch of medicine concerned with the study and research of the diseases of the endocrine organs, disorders of hormone systems and their target organs as well as growth, skeletal health and metabolism.

The subspecialty of PE encompasses all aspects on the diagnosis, assessment and management of paediatric patients with endocrine +/- metabolic disorders.

Objectives

The training programme intends to:

1. Provide a structured training curriculum and broad experience in paediatric endocrinology and metabolism
2. Ensure a thorough and up-to-date understanding of the normal physiology of the endocrine systems and metabolic pathways of the body
3. Establish clearly defined standards of knowledge, skills and attitudes required to practise endocrinology and metabolism at secondary and tertiary care levels
4. Improve the standard of care for children with complicated endocrine and metabolic diseases
5. Encourage critical thinking, self-learning and a commitment to continuing medical education in endocrine and metabolic diseases
6. Promote research and facilitate the translation of research findings into clinical practice.

Structure

Subspecialty training in paediatric endocrinology is a 3-year full time programme. Candidates must have completed the basic paediatric training and passed the MRCPCH (HK) / Intermediate Examination recognised by the Hong Kong College of Paediatricians. During their 3 years of higher training in general paediatrics, they are eligible for commencing the subspecialty training for up to one year with the approval of the Subspecialty Board of PE.

The 3-year training programme on PE includes at least 24 months of core clinical training in Endocrinology and up to 6 months of highly recommended optional clinical training in Inborn Error of Metabolism (IEM). The core clinical training is a hospital-based training on paediatric endocrinology. Trainees should acquire knowledge and fully understand the etiology and pathophysiology of a disease in order to make informed decisions concerning the diagnosis and management of a patient. Clinical experience must involve patients in all categories of paediatric endocrine +/- metabolic diseases, both acute and chronic. This should consist of a minimum of 3 sessions of outpatient clinics per week including endocrinology and diabetes, clinical meetings

such as joint clinical and radiology meetings, case discussions, joint laboratory / clinical meetings, journal club, inpatient care, peri-operative management of pituitary, thyroid, adrenal and other endocrine diseases, consultations, daily ward rounds and on emergency call duties. At least 6 months and preferably 12 months of training in an overseas institution (tertiary care centre) with a well recognised training programme subject to approval by the Subspecialty Board is highly recommended and encouraged. This enables trainees to gain sufficient breadth of exposure and experience. Some outpatient experience in an adult endocrine unit (e.g. a weekly clinic for 3-6 months) is desirable but not essential.

Trainee must acquire knowledge in laboratory techniques, use of laboratory methods, interpretation of the results and recognise the limitations / pitfalls in the interpretation of laboratory results. Practical experience in an endocrine and metabolic laboratory is highly desirable. Trainee should also be equipped with the ability to utilise current diagnostic procedures of paediatric endocrinology and metabolism. Experience in research relevant to endocrinology may be accredited for a maximum of 3-6 months. Obtaining the qualification of a postgraduate diploma or degree (e.g. MSc, MPhil, PhD or MD) related to endocrinology may also be recognised as completion of training for up to a maximum of 6 months subject to approval by the Subspecialty Board. Trainees are advised to undertake endocrine-related educational activities such as journal clubs or case discussions during periods of non clinical training.

Training Syllabus

At the completion of training, trainees should demonstrate competencies and ability in the following aspects as a subspecialist in paediatric endocrinology and metabolism.

1. **To acquire knowledge and experience in the underlying pathological and biochemical changes, clinical symptoms, investigations and management of the following which include both simple, intermediate and complex conditions (Appendix I):**

1.1 Endocrine disorders

A) Disorders of growth and development including
- Intrauterine growth retardation
- Failure to thrive
- Skeletal dysplasia
- Chromosomal abnormalities and growth problems caused by Turner Syndrome, Noonan Syndrome, SHOX gene disorders, Prader Willi Syndrome and Silver Russell Syndrome
- Genetic short stature
- Constitutional delay in growth and puberty
- Growth hormone and IGF-1 deficiency and resistant states
- Delayed puberty

- Premature thelarche
- Premature adrenarche
- Pubertal gynaecomastia
- Precocious Puberty
- Excess growth and tall stature

B) Disorders of the thyroid gland and thyroid metabolism including
- Hypothyroidism,
- Hyperthyroidism,
- Goitre
- Thyroid cancer

C) Disorders of the adrenal gland including
- Congenital adrenal hyperplasia
- Addison's disease/hypoadrenalism
- Phaeochromocytoma
- Multiple endocrine neoplasia syndromes
- Cushing's syndrome
- Hypoaldosteronism
- Hyperaldosteronism

D) Disorder of the pituitary and hypothalamus including
- Craniopharyngioma, intracranial germ cell tumours and other pituitary tumours
- Congenital hypopituitarism and associated genotypes
- Hypothalamic syndromes
- Pituitary hormone replacement (acute and chronic)
- Diabetes Insipidus
- Syndrome of inappropriate antidiuretic hormone
- Treatment of hypernatremia and hyponatremia
- Hyperprolactinaemia

E) Disorders of sexual development including
- Assessment of ambiguous external genitalia
- Disorders of steroidogenesis
- Disorders of gonadal determination and differentiation
- Disorders of androgen action
- Counselling of parents and patients
- Leading multidisciplinary team in management and understanding the ethics behind it

F) Disorders of the reproductive system
- Female hypogonadism

- Male hypogonadism
- Adolescent menstrual disorders

G) Disorders of bone and mineral metabolism including
- Hypercalcaemia
- Hypocalcaemia
- Parathyroid diseases
- Disorders related to vitamin D metabolism
- Disorders of bone mineralization and metabolism
- Osteoporosis and chronic steroid use
- Osteogenesis imperfecta
- Bisphosphonate therapy

H) Follow up of adverse endocrine effects of childhood malignancy (growth and weight, puberty and bone density)

1.2 Diabetes and related disorders
- Type 1 diabetes mellitus
- Type 2 diabetes mellitus
- Other types of diabetes including maturity onset diabetes of the young (MODY), neonatal diabetes and diabetes associated with endocrinopathies and genetic syndromes
- Role of nutrition, exercise and pharmacological management including insulin pump therapy
- Inpatient care of diabetic emergencies including diabetic ketoacidosis and hypoglycaemia
- Complications of diabetes including ophthalmic, renal, vascular and neurological
- Obesity and metabolic syndrome
- Lipid disorders

1.3 Optional module on Inborn Errors of Metabolism (Highly recommended)
- Disorders of aminoacid and peptide metabolism
  (Phenylketonuria, homocystinuria, tyrosinaemia, etc)
- Disorders of organic acid metabolism
  (Propionic acidaemia, methylmalonic acidaemia, isovaleric acidaemia etc)
- Hyperammonaemia and urea cycle disorders
- Disorders of carbohydrate metabolism
  (Glycogen storage disease, galactosaemia, fructosaemia, etc)
- Disorders of fatty acid oxidation (MCAD, LCHAD, etc)
- Disorders of ketone body metabolism
- Lysosomal storage disorders (MPS, Pompe disease, Fabry disease etc.)
- Peroxisomal disorders (Adrenoleucodystrophy, Zellweger syndrome, etc.)
- Disorders of purine and pyrimidine metabolism

- Disorders of metal metabolism (Wilson disease, Menkes syndrome, etc)
- Congenital lactic acidosis and metabolic myopathies
- Mitochondrial disorders
- Porphyria
- Disorders of cholesterol, sterol and bile acid metabolism
- Disorders of vitamin metabolism (biotin, cobalamin, etc)
- Defects of membrane transport (lysinuric protein intolerance, etc)
- Congenital disorders of glycosylation
- Neuro-metabolic diseases

Trainees are not expected to have in depth knowledge of all inherited metabolic disorders but should be aware of the pathophysiology, presentation, investigation, newborn screening for IEM and principles of treatment for the above metabolic disorders.

2 Skills:

- Perform a comprehensive physical examination and medical history relevant to the endocrine and metabolic problem
- Use of laboratory tests and screening of endocrine and metabolic disorders
- Understanding of the principles and practice of hormone assay methods and molecular biology techniques
- Interpretation of results of hormonal assays in basal, stimulated and suppressed states
- Use and interpretation of radiographic imaging and radio-isotopic scanning in the diagnosis and management of endocrine and metabolic disorders

3. Attitudes

- Ability to provide adequate information, appropriate support and counselling to patients and families with chronic endocrine and metabolic diseases
- Appreciation of patients' perception of health, concerns and the impact of the disease on the patient and family
- Ability to lead a multi-disciplinary team in the care of patients with complex endocrine or metabolic disorders
- Understanding of the importance of communication among health care providers
- Ability to liaise with adult endocrinologists to provide transition care
- Ability to liaise with colleagues in Primary and Secondary Care Paediatrics for the provision of high quality health care
- Ability to promote and to advance the health and well-being of individual patients, communities and populations

4. Managerial

- Ability to contribute to the effectiveness and efficiency of services in a health care organisation

- Ability to identify problem areas and improve service outcomes
- Ability in administrative issues including assigning duty rotations and organizing teaching programmes/ meetings
- Recognizing the importance of fair allocations of healthcare resources and budget control.
- Ability to inspire or enlighten others to share the vision, mission and goals of the organisation

5. Academic/Research

- Understanding of the pathophysiology and molecular basis of endocrine and metabolic disease
- Acquire knowledge in statistical methodologies, epidemiological principles and evidence-based medicine
- Critically appraise sources of medical information
- Conduct clinical audits
- Acquire knowledge of principles in clinical research and reporting
- Contribute to the development of new knowledge in endocrinology and metabolism through research
- Ability to conduct teaching and presentations on research

6. Professional

- Understand the principles of medical ethics related to patient care and research
- Exhibit appropriate professional behaviours in practice, including honesty, integrity, commitment, compassion, respect and altruism
- Recognise the principles and limitations of patient confidentiality as defined by professional practice standards and the law
- Undertake continuing professional development

Requirements for Training Institutions

A training centre can be a single institution or a group of related establishments (clustering). The Subspecialty Board will determine the duration of subspecialty training accredited to a training centre which is dependent on the clinical activity load, case mix, allied health and other support and the number of accredited subspecialty trainers working in that centre. The detailed criteria of accreditation of a training centre are listed in Appendix II.

A training centre must provide adequate experience in all fields of endocrinology including emergency care, inpatient service and outpatient specialist care. The quantity and quality of activities must be sufficient to provide adequate experience and exposure for a trainee.

The centre must have easy access and close relationships with other relevant specialists such as

paediatric intensive care, genetic services (preferable), nuclear medicine, imaging facilities, surgery, neurosurgery, gynaecology and laboratory facilities. Supportive service provided by dietitians, diabetic nurse educators, podiatrists, social workers, psychologists and others who may contribute to the quality of care of patients with endocrine diseases is essential for accreditation.

The training centre must provide in-service and continuing medical education / continuing professional development in that subspecialty in the form of regular journal club, grand rounds, seminars, joint clinical and radiology meetings and case audit meetings in accordance with College / Academy Guidelines. Regular audits of clinical activities in the subspecialty must be performed.

The centre must provide evidence of ongoing clinical research. Basic textbooks in endocrinology and metabolism should be easily available and there should be easy access to a comprehensive reference library either in paper or electronic format.

A trainer can supervise no more than two subspecialty trainees. If the trainer has to supervise one subspecialty trainee and one general paediatric trainee (basic or higher), prior approval by PE Subspecialty Board, Committee of Subspecialty Board (CSB) and Accreditation Committee (AC) of the Hong Kong College of Paediatricians has to be obtained. To facilitate the approval procedure, upon receipt of application from COSs, it is aimed to approve the application within 2 weeks. A subspecialty trainee should receive supervised training in at least two but not more than four accredited training centres. An individual trainee should be under the supervision of at least 2 accredited trainers during the 3-year subspecialty training programme. Accreditation of training centres will be undertaken by the Hong Kong College of Paediatricians every 5 years.

Requirements for Subspecialty Board

The subspecialty is supervised by a Subspecialty Board which is under the supervision of the Director of Subspecialty Boards of the Hong Kong College of Paediatricians and is represented by the Hong Kong College of Paediatricians at the Academy.

The Subspecialty Board is responsible for

1. Setting the accreditation guidelines for the training programme of paediatric endocrinology and metabolic medicine
2. Accreditation of the subspecialty programme
3. Setting the criteria for accreditation of training modules (one module is defined as a 6-month period) within the training programme
4. Accreditation of an institution for the duration and type of training allowed
5. Accreditation of Subspecialty Training Programme Director and Subspecialty Trainers
6. Ensuring a high standard of practice in that subspecialty comparable to that in centres overseas by arranging peer reviews of the proposed Subspecialty Training Programme

7. Appointment of examiners and organisation of subspecialty board examinations
8. The administration, organisation and validation of continuing medical education / continuing professional development (CME/CPD) which must be fulfilled by all Fellows in paediatric endocrinology and metabolic medicine within the CME requirements of the Hong Kong College of Paediatricians.

The composition of the Subspecialty Board should include 5 Fellows of the College (6 Fellows for the first 3 years):

1. Five Fellows in Paediatric Endocrinology should be appointed preferably from the University, Hospital Authority, Department of Health and the private sector
2. One Fellow (not in that subspecialty) appointed by Council (in the first 3 years of this new Subspecialty)
3. The Chairman of the Subspecialty Board will be elected by the Subspecialty Board members and appointed by Council
4. No more than 2 co-opted members may be appointed for specific purposes, with endorsement from the Committee for Subspecialty Boards and the Council. The term of service would be one year and eligible for re-appointment.

Requirements for Subspecialty Training Programme Director

The Subspecialty Programme Director should:

1. Be a Fellow of the College in the subspecialty
2. Have at least 10 years of experience of good practice excluding the training period in the subspecialty
3. Be actively involved in teaching as evidenced by teaching of postgraduates in the subspecialty
4. Be actively participating in clinical audits and establishment of management guidelines
5. Be active in research with a track record in scientific publications
6. Participate and fulfill the continuing medical education / continuing professional development requirements of paediatric endocrinology
7. Have local or international standing in paediatric endocrinology as evidenced by membership of learned societies, invitations for lectures and participation in local and international meetings / organisations
8. Be in full-time employment in an accredited institution and spend more that 50% of his / her activities in the practice of paediatric endocrinology
9. Be re-accredited once every 3 years
10. A deputy can be appointed to help with the duties of the subspecialty programme director.

Requirement of Subspecialty Trainers

The Subspecialty Trainer should:

1. Be a Fellow of the Subspecialty of the Hong Kong College of Paediatricians
2. Have at least 3 years of experience of good practice excluding the training period. This rule will be exempted in the first three years after the establishment of a new subspecialty.
3. Be actively involved in teaching, research and clinical service in paediatric endocrinology
4. Be in full-time employment in an accredited institution and spend more than 50% of his / her activities in the practice of paediatric endocrinology
5. Participate and fulfill the continuing medical education / continuing professional development requirement of paediatric endocrinology
6. Be re-accredited once every 3 years.

Assessment and Exit Examination

The training programme for the trainee should be worked out by accredited subspecialty trainer in accordance with the trainee's own interests and available facilities of the institution. The plan should be submitted to the Programme Director and the Subspecialty Board for approval. The application for subspecialty training and possession of certificate of Intermediate Examination or equivalent might be submitted at the start of the first year of Higher Training in General Paediatrics. The trainee admitted into a subspecialty training programme must undergo full-time subspecialty training. Regular review every 6 months will be required to allow for flexibility and early identification of problems or deficiencies. Annual assessment should be undertaken to state competencies achieved and to monitor progress within the teaching programme. Trainees should keep a written record of patients seen by them, procedures conducted, therapeutic interventions and follow-up in a logbook which should be kept up-to-date and endorsed by his / her trainer. The logbook should also contain information on educational activities, training received and problems encountered. Appendix III provides the checklist of minimal clinical experience and skills which trainee is expected to have acquired by the end of training to practice as a competent paediatric endocrinologist.

The trainee should attend and provide evidence of attendance at local and/or international endocrine meetings or training courses at least once per year. At least two presentations at meetings are required. In addition, trainee should actively participate and provide evidence of participation in at least one audit project.

Trainee should submit 2 dissertations on scientific papers relevant to endocrinology for assessment of which at least one is accepted for publication in an international or local peer-reviewed journal upon completion of subspecialty training. The trainee should be prepared to discuss the dissertations in detail during a viva examination which will be held within the last 3 months of completion of PE subspecialty training. The competence and ability in various aspects of the trainee as a specialist in paediatric endocrinology will be assessed during the viva examination.

Trainees who successfully pass the Portfolio assessment and Viva examination will be conferred Fellowship in the subspecialty of paediatric endocrinology.

Appendix I

Definition of case profile

Simple

Conditions which are relatively common, simple and can be managed by general paediatricians with special interest in endocrinology. Assessment and endocrine test procedures may be required for diagnosis of specific endocrine conditions. These include

Growth retardation
Short stature
Tall stature
Obesity
Goitre
Hypothyroidism
Delayed puberty
Menstrual disorders
Gynaecomastia
Vitamin D deficiency

Intermediate

Conditions which required more detailed assessment, periodic review or expensive treatment. The condition may be cared jointly by general paediatricians with special interest in paediatric endocrinology and paediatric endocrinologist. These include

Hyperthyroidism/Thyrotoxicosis
Thyroid hormone resistance
Precocious puberty
Abnormal thyroid function test
Abnormal glucose tolerance test

Complex

Conditions which are rare or complex requiring surgical intervention, molecular laboratory support or multidisciplinary management. These include

Hypopituitarism
Diabetes Insipidus
Craniopharyngioma/brain tumor
Post-operative management of brain tumor and other conditions with involvement of neurosurgery
Acromegaly
Hyperprolactinaemia
Disorders of sex development
Gender identity dysphoria
Congenital adrenal hyperplasia

Adrenal insufficiency
Cushing syndrome
Hyperaldosteronism
Pseudohypoaldosteronism
Polycystic ovarian syndrome
Ovarian failure
Testicular hypofunction
Klinefelter syndrome
Hypoparathyroidism
Pseudohypoparathyroidism
Hyperparathyroidism
McCune-Albright syndrome
Osteoporosis
Skeletal dysplasia
Metabolic bone disease
Osteogenesis impecfecta
Rickets
Disorders of phosphate metabolism
Prader Willi syndrome
Turner syndrome
Noonan syndrome
Polyglandular endocrine disorder
Cancer of thyroid
Cancer of adrenal gland
Congenital hyperinsulinism
Disorders of lipid metabolism
Endocrinology of chronic diseases particularly inflammatory diseases and cancer survivors

Appendix II

Requirements for Training Centre:

A. Details of support from other subspecialties/specialties

1. PICU and NICU
2. On-site Neurosurgery
3. Surgery support
4. Genetic services (preferable)
5. ENT, Eye and Orthopaedic support
6. Endocrine laboratory, molecular laboratory and chemical pathologist support
7. Nuclear medicine services
8. Allied health support including dietitian, DM nurse and clinical psychologist

B. Case load and profile

1. ≥ 3 Clinic per week
2. >2000 out-patient attendance per year
3. >200 complex cases (active headcounts, ~30-50% of total caseload)
4. >50 diabetes mellitus (active headcounts)

C. At least 2 Trainers

D. Regular educational activities and audit

Appendix III

Checklist of clinical experience and procedures for log book on Subspecialty Training in Paediatric Endocrinology

The following is a checklist of minimal clinical experience and skills which trainee is expected to have acquired by the end of training to practice as a competent paediatric endocrinologist.

1. Bone age assessment and height prediction in 50 patients with different growth disorders

2. Exposure to and Interpretation of 30 different endocrine tests procedures eg growth hormone stimulation test, water deprivation test, ACTH stimulation/suppression test, GnRH/LHRH test and etc.

3. Management of
   - 50 cases with significant growth disorders and therapeutic management and monitoring in 15 cases
   - 15 cases with hypothyroidism
   - 15 cases with precocious puberty and 15 cases of pubertal delay with therapeutic intervention and monitoring in 5 cases
   - 10 cases of hypoglycemia
   - 15 cases of hyperthyroidism*
   - 10 cases with hypothalamic pituitary disorders (excluding isolated growth hormone deficiency) which must include post-operative management of pituitary surgery
   - 10 cases with adrenal disorders
   - 5 cases of disorders of bone or calcium/phosphorus metabolism
   - 4 cases of different types of disorders of sex development
   - 4 cases of adverse endocrine effects of childhood malignancy
   - 5 cases of type 1 diabetes mellitus and 5 cases of type 2 diabetes mellitus* including emergency care of diabetic ketoacidosis/hyperosmolar hyperglycemia syndrome and exposure to insulin pump therapy

4. Multi-disciplinary care to patients with complex endocrine problems including endocrine surgery

5. Understanding the adolescent perspectives of chronic illness and provide transition care

6. Understanding the psychosocial basis of endocrine patients and their care

*Benchmark with European Society of Paediatric Endocrinology (ESPE) except 10 cases of hyperthyroidism and 40 cases of diabetes mellitus in ESPE