

Recommended ESE-UEMS Curriculum/European Training Requirement in Endocrinology

**FROM THE ESE EDUCATION COMMITTEE AND THE COMMITTEE ON
EDUCATION AND PROFESSIONAL DEVELOPMENT (EPD) OF THE UEMS
SECTION AND BOARD OF ENDOCRINOLOGY**

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Key Abbreviations:

ADA: American Diabetes Association

ATA: American Thyroid Association

EAA: European Academy of Andrology

EASD: European Association for the Study of Diabetes

EASO: European Association for the Study of Obesity

EBEEDM: European Board Examination in Endocrinology, Diabetes and Metabolism

ECAS: ESE Council of Affiliated Societies

EMAS: European Menopause and Andropause Society

ENETS: European Neuroendocrine Tumor Society

ETA: European Thyroid Association

ETR: European Training Requirement

ESE: European Society of Endocrinology

ESPE: European Society for Paediatric Endocrinology

ESSM: European Society of Sexual Medicine

EU: European Union

EYES: ESE Young Endocrinologists & Scientists

UEMS: Union Europeene des Medecins Specialistes (European Union of Medical Specialists)

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1. Definition of Endocrinology

Endocrinology is the branch of Medicine concerned with structural and functional disorders of the endocrine glands (pituitary, thyroid, parathyroids, adrenals, gonads, pineal gland, pancreas), of hormone action and the metabolic consequences thereof. The specialty of Endocrinology also comprises Diabetes, Metabolism, Nutrition, Andrology, Reproductive and Sexual Medicine, Bone and Mineral Disorders and Endocrine Cancers.

2. General information and Purpose of the Curriculum/ETR

This ESE-UEMS Curriculum/European Training Requirement (ETR) is based on the ESE Recommended Curriculum of Specialisation in Clinical Endocrinology, Diabetes and Metabolism published in 2017, and updated in 2019, which was endorsed by 53 national societies of Endocrinology, and on the ETR which was endorsed by the delegates of the UEMS Section and Board of Endocrinology and ratified by the UEMS Council in 2018.

The ESE Curriculum has been developed by the ESE Education Committee, which reviewed and compared curricula from across Europe and established the key criteria required to practice as a clinical endocrinologist, listing the areas in which an endocrinologist should be expected to be proficient. The Working Group appointed by the ESE Education Committee to complete this task comprised Jens Bollerslev (Norway), Michal Krsek (Czech Republic), Karim Meeran (UK), and Misa Pfeifer (Slovenia).

The UEMS ETR has been collated by the Standing Committee on Education and Professional Development of the Section and Board of Endocrinology comprising Maeve Durkan (Ireland), Anton Luger (Austria), Hans Perrild (Denmark), Richard Quinton (UK), and Graham Roberts (Ireland) based on the information on post-graduate training in Endocrinology provided by the national delegates. The UEMS ETR was approved and ratified by the UEMS Council all Specialty Sections and all National Medical Associations.

The constant development of specialist training and clinical practice dictates the need for a periodical review of the curriculum and the ETR to ensure that they are consistent with current practice and fit for purpose. In 2023, the ESE and the UEMS Section and Board of Endocrinology agreed to develop common recommendations for a curriculum for postgraduate training in Endocrinology. The core Working Group to undertake this task was appointed by the ESE Education Committee and comprised Anton Luger and Maeve Durkan (on behalf of UEMS and ESE), as well as Mirjam Christ-Crain and Pedro Marques (on behalf of ESE). The ESE-UEMS Curriculum/ETR benefited from the input of ESE Focus Areas, EYES Committee, ESE Education Committee, ESE Executive Committee, UEMS delegates from the Section and Board of Endocrinology, and ESE Council of Affiliated Societies (ECAS). This Curriculum/ETR was ratified by the ESE Executive Committee and by the UEMS Section and Board of Endocrinology, and then endorsed by all ECAS.

The main purpose of the ESE-UEMS Curriculum/ETR is to provide updated recommendations concerning the process and areas of knowledge and training in Endocrinology, as well as to list the different competencies and skills needed by a medical specialist in Endocrinology.

3. Scope of the common ESE-UEMS recommendations for Postgraduate Training in Endocrinology

The ESE-UEMS Curriculum/ETR does not aim to be imposed over established national curricula, but may complement them by offering a comprehensive and robust training framework created by medical specialists and based on assembled EU-wide educational and training experience. Another advantage of specialists trained according to the ESE-UEMS Curriculum/ETR is to facilitate professional mobility across Europe. Qualifications will automatically be recognised in other EU countries as established by EU law (Directive 2005/36/EC).

The implications of the ESE-UEMS Curriculum/ETR are aimed at the content of the European Board Examination in Endocrinology, Diabetes and Metabolism (EBEEDM), as well as for the Hospital Training Accreditation Programmes.

The ESE-UEMS Curriculum/ETR represents the current training practice in most European countries and supports a high level of a medical training standard that will pave the way to patient safety and first-class quality of care for the benefit of all European citizens with endocrine diseases. The listed competencies in general core domains should be achievable by most national training programmes, even in the presence of considerable national variations due to, e.g. infrastructure, resources, manpower, laws, financing, and traditions. Basic competence levels proposed in specific core domains may stimulate implementation of education and training plans in clinical bottleneck areas. European hospitals not offering training possibilities in specific core domain competencies may search for upgrading training quality, e.g. by forming training units with other training hospitals. Thereby, the ESE-UEMS Curriculum/ETR may foster future clinical exchange programmes between hospitals and may encourage the use of novel learning modalities, e.g. medical simulation centres.

Not all competencies listed in this document will be possible to meet. Attaining full competencies in all domains of the broad discipline of Endocrinology in the minimum training timeframe would be an ideal but an impossible demand in any European country. Training after accreditation as an Endocrinologist will enrich both the number and level of competencies.

4. The Practice of Endocrinology

The ESE-UEMS Curriculum/ETR shall reflect the holistic approach - expert clinician, academic scholar, professional leader, inspired humanitarian. Since hormones act on virtually every organ and cell type in the body, the Endocrinologist has to apply a wide experience in general medicine. Some

disorders lie clearly and completely within the domain of the Endocrinologist (for example diabetes or thyroid disease). Other disorders are not exclusively endocrine in origin, but have important endocrine aspects (for example osteoporosis, infertility and cancer). The Endocrinologist is thus often the most appropriate physician to provide medical care, or to coordinate it where a multidisciplinary approach is needed. Thus, the Endocrinologist will need to develop and maintain skills in acute and chronic aspects of General Internal Medicine. Faced with an increasing proliferation of tests and new diagnostic and therapeutic procedures, the Endocrinologist often has an important role in defining the most efficient and cost-effective strategy for their use in patient care. High-level communication skills are central to the practice of Endocrinology both in relation to direct patient care and to the work of multidisciplinary teams.

5. Training Needs of European Endocrinologists

The training of Clinical Endocrinologists in Europe should involve the principles, practice and ethical aspects of the following:

- Foundation or core training in general internal medicine
- Higher training in core areas of Endocrinology, including diabetes, lipid disorders, obesity, nutrition, pituitary, thyroid, parathyroid and bone and mineral disorders, adrenal, reproductive and sexual medicine, andrology, transition in Endocrinology, electrolyte and fluid balance disorders, endocrine cancer, laboratory and diagnostic techniques in Endocrinology
- Multidisciplinary training in a number of areas where the trainee should have responsibility for the care of patients
- Relevant research, or competence and ability to review and interpret relevant research
- Clinical laboratory experience

6. Foundation or Core Training in General Internal Medicine

It is of great importance that training involves adequate experience in General Internal Medicine. This must be in the capacity of a practitioner working in a hospital, with an accepted postgraduate training programme, where he/she should have responsibility for the care of patients with a wide variety of medical disorders. Further details regarding training in the specialty of Internal Medicine, as defined in the UEMS ETR on Internal Medicine, can be accessed [here](#). It may also be useful to include shorter periods of practice in other disciplines such as Paediatrics, Obstetrics and Gynaecology, Laboratory Medicine, Nuclear Medicine and Radiology.

7. Core Training in Endocrinology

7.1. Endocrinology training should be based on:

- Syllabus, curriculum and assessment
 - Reference to published guidelines from recognised societies, such as ESE, EASD, ETA, Endocrine Society, ADA, ATA, Pituitary Society, EASO, EAA, ESSM, ESPE, ENETS, EMAS (as it is not in the scope of this Curriculum/ETR to produce guidelines)
 - Reference to reliable educational materials relating to each expected area of knowledge and training in Endocrinology, including scientific articles published in high-impact endocrine journals and textbooks
- Defined competencies
- Defined accredited national centers
- Variety of training activities, including fellowships and exchanges to national and international expert centers
- Assessment should be linked to outcome, specialty knowledge and overall professional development

7.2. Training in Core areas of Endocrinology should involve:

Physiology and function of the endocrine system

A thorough modern grounding in the normal function of the endocrine system, including the physiology and biochemistry of hormones and their actions, and reflecting advances in molecular medicine.

Endocrinology

Extensive first-hand practical experience in a recognised training centre, of the management of diseases primarily involving the endocrine system.

Diabetes Mellitus

Extensive practical experience in all aspects of diabetes mellitus and its complications.

Lipid disorders

Extensive experience in diagnosing and managing lipid disorders, including secondary dyslipidaemias.

Metabolism, Obesity and Nutrition

Extensive experience on nutrition in healthy and sick individuals, including obesity, malnutrition, inborn errors of metabolism and eating disorders.

Andrology, Reproductive and Sexual Medicine

Extensive experience with gonadal dysfunction, reproductive disorders/infertility or sexual dysfunction, as well as menopause, contraception, disorders of sexual development and gender dysphoria.

Bone and Mineral disorders

Extensive experience in diagnosing and managing bone and mineral disorders.

Endocrine cancers

Extensive experience in diagnosing and managing endocrine cancers, including neuroendocrine tumours, adrenal cancer, thyroid cancer, parathyroid cancer.

Transition in Endocrinology

An understanding of the unique endocrine-related health care needs in children and adolescents with endocrinopathies, including the management of pubertal disorders, diabetes, obesity, growth and development issues, in order to ensure a smooth and adequate transition from paediatric to adult endocrine services.

Laboratory Endocrinology

An understanding of the principles and practice of hormone assay methods, the use of diagnostic tests, as well as molecular genetic testing is essential. Training should therefore include some exposure to endocrine laboratory services.

Diagnostic techniques in Endocrinology

Extensive experience in the interpretation of the results, usefulness and limitations of ultrasound, CT, MRI, scintigraphy, PET, angiographic techniques with venous sampling, is critical for a trainee in Endocrinology. The trainee may acquire competence and aspire to perform autonomously some of these, including thyroid ultrasound with fine needle aspiration, a technique becoming more often performed by Endocrinologists in some EU countries.

Multidisciplinary Training

This is important and mandatory, because Endocrinologists typically function at the centre of a network of other medical specialists and allied health professionals.

Research Experience

Training should preferably include direct involvement in scientific research into one or more of the subject areas outlined below. It is acknowledged that it is difficult to produce high quality research in these shorter time frames, and so equal emphasis is expected in appreciation and interpretation of research methodologies, publications, statistical analysis, critical appraisal, and extensive reading of the literature.

8. Requested Knowledge and Experience in Endocrinology

The list below aims to provide an overview of the requested areas of knowledge, experience, and training in Endocrinology, and is not intended to provide specific details of disorders or their treatment. The trainee should demonstrate knowledge and understanding of the physiology, epidemiology and pathology, appropriate patient consultation, diagnostic techniques, treatment options and follow-up procedures for each of the disorders listed below. This represents the minimum expected criteria that may be deemed necessary to be covered by national training programmes in Endocrinology, however diagnostic tools and treatments may vary depending on local availability or regulations, and thus should be defined locally.

A. Diabetes mellitus

A.1. Type 1 diabetes

A.1.1. Latent autoimmune diabetes in adults (LADA)

A.2. Type 2 diabetes

A.3. Other specific types of diabetes

A.3.1. Monogenic diabetes syndrome

A.3.2. Diseases of the exocrine pancreas

A.3.3. Drug- or chemical-induced diabetes

A.4. Gestational diabetes

A.5. Pre-diabetes and diabetes prevention

A.6. Diabetic emergencies

1.6.1. Diabetic ketoacidosis

1.6.2. Hyperosmolar hyperglycaemic state

1.6.3. Hypoglycaemia

A.7. Management of patients with diabetes during acute illness or surgery

A.8. Contraception, conception and pregnancy in diabetes

A.9. Complications of diabetes

A.9.1. Screening for the complications of diabetes

A.9.2. Cardiovascular macrovascular complications

A.9.3. Eye disease

A.9.4. Renal disease and hypertension

A.9.5. Neuropathy and erectile dysfunction

- A.9.6. Autonomic neurological complications
- A.9.7. Diabetic foot
- A.9.8. Dyslipidaemia and atherogenesis
- A.9.9. Hypoglycaemia unawareness
- A.10. Nutrition and metabolic support
- A.11. Physical exercise as therapy for diabetes
- A.12. Diabetes technology
 - A.12.1. Insulin pumps
 - A.12.2. Continuous glucose monitoring
 - A.12.3. Closed loop systems
- A.13. Diabetes and driving

B. Lipid disorders

- B.1. Advanced lipoprotein testing
- B.2. Genetic lipid disorders
- B.3. Lipodystrophy syndromes
- B.4. Secondary dyslipidaemia

C. Obesity and Nutrition

- C.1. Etiology and pathogenesis of obesity
- C.2. Clinical presentation and complications of obesity
- C.3. Treatment of obesity
 - C.3.1. Diet and psychobehavioural approach
 - C.3.2. Physical Exercise
 - C.3.3. Pharmacotherapy
 - C.3.4. Bariatric surgery
- C.4. Physiology of nutrition, and assessment of the nutritional status
- C.5. Inborn errors of metabolism
- C.6. Endocrine consequences of eating disorders
 - C.6.1. Anorexia nervosa
 - C.6.2. Bulimia nervosa
- C.7. Nutrition in healthy individuals and in patients with metabolic diseases
- C.8. Enteral and parental nutrition

D. Pituitary and Neuroendocrinology

- D.1. Pituitary tumours and hyperfunction of pituitary gland
 - D.1.1. Prolactinoma and hyperprolactinaemia
 - D.1.2. Acromegaly and gigantism
 - D.1.3. Cushing's syndrome
 - D.1.3.1. Cushing's disease
 - D.1.3.1.1. Nelson's syndrome

- D.1.3.2. Ectopic ACTH syndrome
- D.1.3.3. Pseudo-Cushing's syndrome
- D.1.3.4. Iatrogenic Cushing's syndrome
- D.1.4. Thyrotrophinoma
- D.1.5. Gonadotrophinoma
- D.1.6. Non-functioning pituitary tumours
- D.1.7. Pituitary incidentalomas
- D.1.8. Aggressive or metastatic pituitary tumours
- D.1.9. Genetics and inherited forms of pituitary tumours
- D.1.10. Syndrome of inappropriate antidiuresis (SIAD)
- D.2. Hypopituitarism
 - D.2.1. Anterior pituitary deficiency
 - D.2.2. Posterior pituitary deficiency
 - D.2.3. Hypothalamic dysfunction
 - D.2.4. Pituitary dysfunction in systemic disorders
 - D.2.5. Drug-induced hypopituitarism
 - D.2.6. Traumatic brain injury-induced hypopituitarism
- D.3. Craniopharyngioma
- D.4. Rathke's cleft cyst
- D.5. Empty sella syndrome
- D.6. Pituitary apoplexy
- D.7. Infiltrative pituitary disorders
- D.8. Non-pituitary sellar masses
- D.9. Pituitary disorders during pregnancy

E. Thyroid

- E.1. Primary Hyperthyroidism
 - E.1.1. Graves-Basedow
 - E.1.1.1. Graves' orbitopathy
 - E.1.2. Toxic adenoma
 - E.1.3. Toxic multinodular goitre
 - E.1.4. Subclinical hyperthyroidism
 - E.1.5. Other causes of thyrotoxicosis
 - E.1.5.1. Thyrotoxicosis factitia
 - E.1.5.2. Thyrotoxicosis due to amiodarone or other medications
 - E.1.5.3. Ectopic thyroid tissue
 - E.1.5.4. Iodine excess
- E.2. Primary Hypothyroidism
 - E.2.1. Autoimmune hypothyroidism
 - E.2.2. Iatrogenic hypothyroidism
 - E.2.3.1. Thyroidectomy

- E.2.3.2. Radioactive iodine therapy
 - E.2.3.3. External radiotherapy
 - E.2.3.4. Hypothyroidism due to medications or exogenous substances
 - E.2.3. Subclinical hypothyroidism
 - E.2.4. Congenital hypothyroidism
 - E.2.5. Iodine deficiency
- E.3. Thyroid emergencies
 - E.3.1. Thyroid crisis or storm
 - E.3.2. Myxoedema coma
- E.4. Thyroiditis
 - E.4.1. Subacute thyroiditis
 - E.4.2. Autoimmune thyroiditis
 - E.4.3. Riedel's thyroiditis
 - E.4.4. Acute bacterial thyroiditis
 - E.4.5. Postpartum thyroiditis
- E.5. Thyroid neoplasms
 - E.5.1 Benign lesions
 - E.5.1.1. Thyroid follicular nodular disease
 - E.5.1.2. Follicular thyroid adenoma
 - E.5.1.3. Oncocytic adenoma
 - E.5.2. Low-risk neoplasms
 - E.5.2.1. NIFTP (Non-invasive follicular thyroid neoplasm with papillary-like nuclear features)
 - E.5.2.2. Thyroid tumours of uncertain malignant potential
 - E.5.2.3. Hyalinizing trabecular thyroid tumour
 - E.5.3. Malignant thyroid neoplasms
 - E.5.3.1. Follicular thyroid carcinoma
 - E.5.3.2. Invasive encapsulated follicular variant papillary thyroid carcinoma
 - E.5.3.3. Papillary thyroid carcinoma
 - E.5.3.4. Oncocytic carcinoma of the thyroid
 - E.5.3.4. Differentiated high-grade thyroid carcinoma
 - E.5.3.5. Poorly differentiated thyroid carcinoma
 - E.5.3.6. Anaplastic thyroid carcinoma
 - E.5.4. Thyroid C-cell-derived carcinoma
 - E.5.4.1. Medullary thyroid carcinoma
- E.6. Thyroid hormone resistance
- E.7. Non-thyroidal illness syndrome
- E.8. Thyroid diseases in fertility and pregnancy
- E.9. Iodine-related disorders

F. Parathyroid, calcium and bone

- F.1. Hyperparathyroidism and other disorders of parathyroid gland
 - F.1.1. Primary hyperparathyroidism
 - F.1.1.1. Normocalcaemic primary hyperparathyroidism
 - F.1.2. Familial hypocalcaemic hypercalcaemia
 - F.1.3. Secondary hyperparathyroidism
 - F.1.4. Tertiary hyperparathyroidism
 - F.1.5. Parathyroid carcinoma
- F.2. Hypoparathyroidism
 - F.2.1. Idiopathic hypoparathyroidism
 - F.2.2. Post-surgical hypoparathyroidism
 - F.2.3. Pseudohypoparathyroidism
 - F.2.3.1. Pseudopseudohypoparathyroidism
 - F.2.4. Inherited forms of hypoparathyroidism
- F.3. Vitamin D deficiency
- F.4. Osteoporosis
 - F.4.1. Postmenopausal osteoporosis
 - F.4.2. Osteoporosis in men
 - F.4.3. Secondary osteoporosis
 - F.4.4. Pregnancy and lactation-induced osteoporosis
- F.5. Measurement of bone mass, bone turnover and fracture risk assessment
 - F.5.1. Tools for fracture risk assessment
 - F.5.2. Biochemical markers of bone turnover
 - F.5.3. Dual-energy X-ray Absorptiometry and Trabecular bone score (TBS)
- F.6. Bone and mineral disorders
 - F.6.1. Other causes of hypercalcaemia and hypocalcaemia
 - F.6.2. Hypophosphataemia
 - F.6.3. Rickets and osteomalacia
 - F.6.4. X-linked hyperphosphaturic hypophosphataemia
 - F.6.5. Hypophosphatasia
 - F.6.6. Osteogenesis imperfecta
 - F.6.7. Paget's disease of bone
 - F.6.8. Fibrous dysplasia
 - F.6.9. High bone mass disorders

G. Adrenal

- G.1. Primary adrenal insufficiency
 - G.1.1. Addison's disease
 - G.1.2. Mineralocorticoid deficiency
 - G.1.3. Other causes of adrenal deficiency

- G.2. Congenital adrenal hyperplasia
- G.3. Adrenal tumours and hyperfunction of the adrenal gland
 - G.3.1. Adrenal incidentaloma
 - G.3.2. Nonfunctioning adrenal adenoma
 - G.3.3. Primary aldosteronism
 - G.3.3.1. Aldosterone-producing adenoma
 - G.3.3.2. Bilateral adrenal hyperplasia
 - G.3.3.3. Familial forms of primary aldosteronism
 - G.3.4. Adrenal Cushing's syndrome
 - G.3.4.1. Cortisol-producing adenoma (with overt Cushing's syndrome)
 - G.3.4.2. Mild autonomous cortisol secretion (MACS)
 - G.3.4.3. Bilateral adrenal hyperplasia (including micronodular and macronodular hyperplasia)
 - G.3.4.4. Cortisol-producing adrenocortical carcinoma
 - G.3.5. Adrenocortical carcinoma
 - G.3.6. Pheochromocytoma and paraganglioma
- G.4. Pseudohyperaldosteronism
- G.5. Adrenal hormone resistance syndromes

H. Reproductive Endocrinology, andrology and sexual function

- H.1. Hypogonadotropic hypogonadism (HH)
 - H.1.1. Inherited
 - H.1.1.1. Kallmann's syndrome and other genetic HH
 - H.1.2. Acquired
- H.2. Growth and development
- H.3. Puberty
 - H.3.1. Delayed puberty
 - H.3.2. Precocious puberty
- H.4. Transition in Endocrinology
- H.5. Polycystic ovary syndrome
- H.6. Hirsutism
- H.7. Hormonal contraception
- H.8. Menopause
 - H.8.1. Early menopause
 - H.8.2. Ovarian hyperthecosis
 - H.8.3. Hormone replacement therapy
- H.9. Primary ovarian failure
 - H.9.1. Turner's syndrome
- H.10. Ovarian tumours
- H.11. Testicular dysfunction

- H.11.1. Klinefelter syndrome
- H.11.2. Other chromosomal aberrations
- H.11.3. Sertoli cell only syndrome
- H.11.4. Cryptorchidism
- H.11.5. Anorchia
- H.12. Testicular tumours
- H.13. Erectile dysfunction
- H.14. Gynaecomastia
- H.15. Management of the infertile couple
 - H.15.1. Ovulation induction
 - H.15.2. Induction of spermatogenesis
 - H.15.3. Assisted reproduction
- H.16. Disorders of sexual development
- H.17. Transgender and gender diversity
- H.18. Endocrine disorders in pregnancy
- H.19. Peptide hormones, testosterone and anabolic steroids abuse to enhance physical performance

I. Electrolytes and fluid balance

- I.1. Hyponatraemia
 - I.1.1. Syndrome of inappropriate antidiuresis (SIAD)
 - I.1.2. Other causes
- I.2. Polyuria and polydipsia
- I.3. Hypokalaemia
- I.4. Hypomagnesaemia

J. Neuroendocrine tumours

- J.1. Thymus and mediastinal neuroendocrine tumours
- J.2. Pulmonary neuroendocrine tumours
- J.3. Gastroenteropancreatic neuroendocrine tumours
- J.4. Functional neuroendocrine tumours
 - J.4.1. Insulinoma
 - J.4.2. Gastrinoma
 - J.4.3. Glucagonoma
 - J.4.4. Somatostatinoma
 - J.4.5. VIPoma
 - J.4.6. Ectopic ACTH syndrome
 - J.4.7. Ectopic GHRH secretion
 - J.4.8. Ectopic PTH-rP secretion and hypercalcemia
 - J.4.9. Multiple/acquired hormonal secretion
- J.5. Other neuroendocrine tumours

J.6. Carcinoid syndrome

K. Inherited endocrine tumour syndromes

K.1. Multiple endocrine neoplasia (MEN)

K.1.1. MEN1

K.1.2. MEN2

K.1.3. Other MEN variants

K.1.4. Familial medullary thyroid cancer (FMTC)

K.2. von Hippel-Lindau disease

K.3. Familial paraganglioma syndromes

K.4. Carney complex

K.5. Familial isolated pituitary adenoma syndrome (FIPA)

K.6. Hyperparathyroidism-jaw tumour syndrome

K.7. Other syndromes: Neurofibromatosis type 1, Tuberous sclerosis, Cowden syndrome, Familial adenomatous polyposis, Lynch syndrome

L. Autoimmune and other polyendocrine syndromes

L.1. Autoimmune polyglandular syndrome type 1

L.2. Autoimmune polyglandular syndrome types 2/3

L.3. IgG4-related disease

L.4. Immunodysregulation, Polyendocrinopathy, and Enteropathy X-linked (IPEX) syndrome

L.5. Polyneuropathy, organomegaly, endocrinopathy, M-protein, skin changes (POEMS) syndrome

M. Treatment-induced endocrine dysfunction

M.1. Amiodarone

M.2. Antiepileptics

M.3. Antidepressives and antipsychotics

M.4. Lithium

M.5. Corticosteroids

M.6. Opioids

M.7. Interferon

M.8. Immune checkpoint inhibitors

M.9. Tyrosine kinase inhibitors

M.10. Late effects in long-term cancer survivors

M.11. Misuse of endocrine treatments and hormone supplementation

N. Endocrine-disrupting chemicals

N.1. Types of chemicals and sources of exposure

N.2. Modes of action and adverse endocrine effects

N.3. Special features of endocrine-disrupting chemicals

O. Diagnostic techniques in Endocrinology

O.1. Assessment of hormones and pitfalls of laboratory testing

O.2. Dynamic endocrine function testing

O.3. Conventional Imaging

O.3.1. Ultrasound

O.3.1.1. Thyroid ultrasound including fine needle aspiration

O.3.2. CT

O.3.3. MRI

O.4. Functional imaging

O.5. Angiographic techniques and localisation with venous sampling

O.5.1. Bilateral inferior petrosal sinus sampling for ACTH

O.5.2. Adrenal venous sampling for aldosterone

O.5.3. Parathyroid venous sampling

O.6. Molecular genetic testing

9. Content and Duration of Training

Endocrinology has evolved as a specialty to include numerous subspecialties, all having important contributions to various areas of Internal Medicine. The traditional role as a medical specialty, included assessment and evaluation, appropriate investigation in that target area and recommendation of appropriate diagnostic, therapeutic and interventional procedures. The practice of Endocrinology has changed towards more holistic competencies in the ambulatory setting, in intensive care medicine, in emergency medicine, in surgical and procedural care, as well as in the inpatient-hospital setting. Thus, appropriate training requires a broad base training in Internal Medicine.

The process of training, attaining defined competencies and applying them safely and efficiently in clinical practice requires time. Specialist training should start after 1-3 years (preferably 2-3 years) of supervised hospital clinical practice, mainly General Internal Medicine. The minimum total duration of such training before accreditation as a specialist should be 6 years full-time (or recognised equivalent) in a mixture of General Internal Medicine for 1-3 years (preferably 2-3 years) and Endocrinology (3-5 years).

9.1. The Common Trunk

The training should start with 1-3 years (preferably 2-3 years) full-time period of practical clinical experience (Foundation and/or Core) in General Internal Medicine and major medical disciplines in nationally approved centres. Since this

trunk will be common with other medical specialties, high priority should be given to definition of the requirement and duration of the Common Trunk (as iterated in the UEMS ETR Internal Medicine Document, see [here](#)).

9.2. Specialist Training in Endocrinology

This involves a further 3-5 years of specialist training in Endocrinology, inclusive of Diabetes, Nutrition, Andrology, Reproductive and Sexual Medicine, Bone and Mineral disorders, Transition in Endocrinology, as well as Laboratory and Diagnostic Techniques in Endocrinology. This time should include the equivalent of 2 years full-time in Endocrinology as defined in section 7. The remaining 1-3 years can either be spent at a department/institution of Endocrinology or used to acquire further experience in relevant medical disciplines and other clinical, laboratory and research activities.

Specialist training is competence-based and not number- or count-based. Endocrine societies of EU member states may define minimum average numbers required for imparting and internalizing clinical skills at a recommended competence level in the specific local/national training setting. Training may include a variety of training activities including procedures, clinics, ward rounds, multidisciplinary meetings, clinical research, attendance of training courses, and medical simulation training, as well as clinical and research exchange programmes. Training activities are not uniform throughout Europe and depend on the national structures and processes. However, the common goal of specialist training should be the development of professional competency in the domains and competencies as described below. Trainers should accompany trainees, monitoring and ensuring the gradual attainment of sufficient competence that would allow to entrust activities to trainees by continuous assessments.

10. Domains and competencies in the ETR

Definition of domains

To fulfil the four professional roles of a specialist in Endocrinology, the following list of domains of expertise and related competencies are to be obtained during training.

Learning objectives

Training includes acquisition of knowledge and expertise in all relevant disease groups, including those in the context of critical illness and trauma. For each domain, learning objectives are divided into “knowledge, skills and attitudes” that are deemed necessary to achieve the required level of competencies:

- **A:** observer level (has knowledge of, describes)
- **B:** performs, manages, demonstrates under direct supervision
- **C:** performs, manages, demonstrates under distant supervision
- **D:** trainee can be reliably trusted to independently carry out the procedure or task

a. Knowledge competencies are per definition required at **competence level A**.

b. Clinical skills (competence level D):

Skills uniform in all clinical settings are reported only here and apply throughout.

- Management of electrolyte emergencies (hyponatremia, hypercalcemia, hypocalcaemia, hyperkaliaemia, hypokalaemia), diabetic ketoacidosis, hyperglycaemic hyperosmolar state, adrenal crisis, pituitary apoplexy, thyroid emergencies, carcinoid crisis.
- Accurate record keeping

Skills required at various locations (intraoperatively in the operation room, postoperative in the recovery room, in the emergency room, intensive care unit, ward, outpatient clinic, prehospital,) are listed only once upon first appearance.

c. Specific attitudes (competence level D):

Attitudes common to all clinical settings are reported only here and apply throughout. Effectively communicate and interact with patients and their relatives, including patients with impaired capacity of discernment and consent, and language barriers, treat them with respect and courtesy in answering all questions and concerns they may have.

d. Independence (competence level D):

The trainee can be reliably trusted to independently carry out the procedure or task.

- Knowledge already gained during undergraduate medical studies are not explicitly listed (e.g., anatomy, physiology, pathophysiology, pharmacology, toxicology, biochemistry, biology, psychology, statistics) but are understood as a prerequisite and requirement for Endocrinology-specific knowledge. During residency, basic medical knowledge must be refreshed and enlarged by Endocrinology-specific content
- General skills already gained during undergraduate trainings are not explicitly listed (e.g., ECG monitoring and interpretation)
- Redundancy has been avoided in listing uniform skills and specific attitudes only once in the document

11. Domains of Specialty: Details

a. Knowledge

- Anatomy, physiology, pharmacology, toxicology, biochemistry, biology, psychology, statistics
- Aetiology, pathophysiology, diagnosis and treatment according to international standards of specific critical conditions in all patient cohorts including paediatric patients, geriatric patients, perioperative patients after elective and emergency surgery, critically ill and trauma patients

b. Laboratory experience and dynamic tests

The trainee in Endocrinology should have access to an up-to-date endocrine laboratory service, and learn about hormone assay methods and, if trained to do so, contribute to its management. The trainee should be exposed to dynamic endocrine tests, which are often performed in dedicated facilities and/or day care hospitals. The trainee should be familiarized with most important preanalytical sources of hormonal results variability, as well as with the relativity of hormonal reference values depending on patient's clinical context, and other relevant factors, such as age or population specificities. Endocrinologists should also understand the basic concepts and methodologies, as well as the impact of the increasingly-available tests, the domains of molecular biology and genetics which are relevant for the clinical practice in Endocrinology.

c. Multidisciplinary Team (MDT) Training

MDT training is important and mandatory, because Endocrinologists typically work at the centre of a network of other medical specialists and health professionals. Below are some of the key MDT areas:

- Reproductive Endocrinology and infertility (jointly with gynaecologists and urologists)
- Growth disorders, Disorders of Sexual Differentiation (DSD), and precocious/delayed puberty (jointly with paediatric Endocrinologists)
- Neuroendocrinology and pituitary diseases (jointly with neurosurgeons, neuroradiologists, neuropathologists, neuro-ophthalmologists, radiotherapists)
- Adrenal, thyroid, or parathyroid diseases (jointly with endocrine surgeons, radiologists, pathologists and nuclear medicine physicians)
- Endocrine-related cancers, including thyroid cancer, adrenal cancer, neuroendocrine tumours (jointly with oncologists, surgeons, nuclear medicine physicians, radiologists, radiotherapists, gastroenterologists)

- Diabetes and obesity (jointly with dieticians, psychologists, endocrine nurses, bariatric surgeons)

12. Endocrinology non-technical skills

a. Knowledge

- Psychological aspects of team function for successful performance
- Crisis resource management
- Human error research
- Behavioural marker systems, relevant for successful training

b. Clinical skills

- Task management
 - Planning and preparing
 - Prioritizing
 - Providing and maintaining standards
 - Identifying and utilizing resources
 - Ensuring effective joint task completion
- Team working
 - Coordinating activities with team members
 - Exchanging information
 - Effective communication
 - Using authority and assertiveness
 - Assessing capabilities
 - Supporting others
 - Assessing team satisfaction
- Situation Awareness
 - Gathering information
 - Recognizing and understanding
 - Anticipating
- Decision making
 - Identifying options: individual case plans, long-term scheduling plans (under normal conditions and time-pressure crisis situations)
 - Balancing risks and selecting options
 - Re-evaluating
- Leadership
 - Organizing tasks

c. Specific attitudes

c.1. As expert clinician:

All Endocrinologists must be familiar with device and medical technology. Experts in Endocrinology should acquire all necessary competences enabling them to fulfil this expert role and function in the multidisciplinary settings in intensive care, emergency medicine, peri-surgical care and inpatient hospital management.

The domain of perioperative medicine comprises the continuum in patient care, starting before the operative procedure and lasting well into the postoperative period; it concerns all patient categories and comprises the following tasks, which practice should be evidence-based:

- Preoperative evaluation and preparation of the patient, appropriate choice and relevant use of preoperative laboratory tests and all other complementary examinations/investigations, as well referral to interdisciplinary consultations when required
- Preoperative discussion and information of the patients
- MDT discussion with both anaesthetists and surgeons, as best suited to the conditions of the patient and to the operative procedure (e.g. phaeochromocytoma and paraganglioma, Cushing's syndrome, or neuroendocrine tumour resection)
- Knowledge and appropriate use of clinically-relevant devices (e.g. insulin pumps, continuous glucose monitoring devices)
- Safe and appropriate perioperative management of problems, incidents and complications (e.g. hyponatraemia, hyperglycaemia, carcinoid crisis)
- Appropriate selection of postoperative management and care, including transfer to other specialized structures such as ICUs (e.g., post-pituitary surgery, post-surgery for a phaeochromocytoma, paraganglioma, Cushing's syndrome or neuroendocrine tumour)
- Management in specific endocrine-related conditions (e.g., diabetic ketoacidosis and hyperglycaemic hyperosmolar state, adrenal crisis, electrolyte disturbances, AVP deficiency, syndrome of inappropriate antidiuresis (SIAD), thyroid storm, pituitary apoplexy)
- Pre- and in-hospital resuscitation
- Acute and chronic glycaemia management (Diabetes type 1 and type 2)

c.2. As professional leader:

The specialist in Endocrinology should have competences in communication and in effective organization and task management. The main aspects are:

- Effective, open, empathic and respectful communication with patients and family/relatives
- Effective and professional communication with colleagues and other collaborators to ensure optimal patient care

- Multidisciplinary and inter-professional team working in acute care (operating theatre, intensive care unit, emergency room, labour wards), as well as in the context of protocol implementation
- Effective communication in the setting of MDT in the resolution of conflicts, decision-making skills, giving feedback, taking and assuming leadership
- Implementation and use of quality assurance programmes according to recognized national and international standards
- Implementation and use of local, national and international practice guidelines and standards
- Promotion of and participation in better and safer patient care
- Knowledge of administrative, medico-legal, ethical, and economical aspects of Endocrinology practice
- Cost-effective and relevant use of diagnostic, prophylactic and therapeutic means and measures (health economics)
- Encourage interactions with patients' associations and advocacy groups

c.3. As academic scholar:

The specialist in Endocrinology should develop and maintain a high degree of professional competence, to facilitate development of colleagues and other professionals, and to promote development of the specialty. Different aspects comprise:

- Life-long learning and reflective thinking; critical reading and appraisal of updated information relevant to clinical Endocrinology as well as inpatient and ambulatory medicine
- Acquisition of basic tools for teaching (including supervision), skills for research and education presentations, teaching of young colleagues, residents and allied healthcare professionals
- Contribution to research, development, and implementation/transmission of new medical knowledge as well as auditing
- Contribution to education of patients, students and healthcare professionals

c.4. As inspired humanitarian:

The specialist in Endocrinology will exhibit irreproachable behaviour and be aware of duties and responsibilities inherent to his/her role as a professional:

- Provision of high-quality care with empathy, integrity, honesty and compassion
- Recognition of personal limits and abilities, and appropriate consultation with/or delegation to others when caring for the patient

- Medical decision-making based on thorough consideration of ethical aspects in patient care, management of ethical conflicts

13. Professionalism and ethics

a. Knowledge

- Principles of medical ethics: autonomy, beneficence, non-maleficence, and justice
- The Geneva Declaration and Helsinki protocol
- Legal principles and medico-legal obligations defining medical practice and the use of patient data
- Governmental regulations relevant for Endocrinology practice
- Principles of communication with patients including:
 - Rights and responsibilities of patients, doctors and other medical staff
 - Informed consent
 - Patient confidentiality and privacy
 - Error and incidents disclosure
- Principles of communication with colleagues including:
 - Methods (verbal, written, consultation or referral)
 - Manner (courtesy, integrity, respect)
 - Adequate record keeping (including medico-legal implications)
- Personal issues including:
 - Balancing family and work, and the importance of non-professional activities
 - Depression; recognition and care plans
 - Substance abuse; recognition and access to appropriate referral
 - Mentoring and teaching
- Leadership responsibilities and styles; team behaviours
- Stress and crisis management
- Principles underpinning conflict resolution
- Principles of role model
- Principles of teaching and patient empowerment

b. Clinical skills

- Applying principles of medical ethics
- Attaining attributes in the four roles of a specialist in Endocrinology: medical expert, leader, scholar, and professional
- Applying the principles of evidence-based medicine to clinical practice
- Use of information technology to optimize clinical care, including literature searches

- Basic appraising journal articles including the interpretation of study design, statistics, results, and conclusions
- Awareness of medico-legal obligations related to medical practice
- Commitment to the main ethical principles and professional values, such as altruism, fidelity, social justice, honour, integrity, and accountability
- Commitment to the rights of patients to autonomy, confidentiality, informed consent, comprehension of the risks of medical techniques (patient-centeredness) irrespective of race, culture, gender, sexual orientation, and socio-economic status

c. Specific attitudes

- Commitment to lifelong continuing professional development and education, refreshment of competencies in reflective learning, and maintaining an inquisitive attitude

14. Patient safety and health economics

a. Knowledge

- Recommendations of quality of care and patient safety from national, European and international authorities
- Fundamentals in patient safety including:
 - Human limitations
 - Stress, fatigue, decision making, fixation errors, prospective memory
 - The role of the teams, hierarchy
 - Safety culture, principles of High Reliability Organizations (HROs), the five common principles of HROs:
 - Preoccupation with failure
 - Reluctance to simplify interpretation
 - Sensitivity to operations
 - Commitment to resilience
 - Deference to expertise
- Tools for quality assurance and error management:
 - Analysing the problem:
 - Reporting systems
 - Critical incident monitoring
 - Different methods of event-analysis
 - Root-cause analysis
 - Tackling the problem:
 - Main topics in safety problems
 - Medication error (prescribing: wrong drug, wrong dose)

- Wrong side/site procedures
- Hospital acquired infections
- Patient-handover
- Open disclosure communication
- Economic aspects:
 - Demographic data and resource utilization data relevant for Endocrinology practice
 - Basic knowledge on financial aspects of Endocrinology practice
 - Basic knowledge on organizational and budgeting aspects of Endocrinology practice (Principles of business management)

b. Clinical skills

- Application of standards of quality of care and patient safety in daily practice
- Use of checklists and guidelines
- Providing data for both local and national data systems
- Considering cost-effectiveness

c. Specific attitudes

- Commitment to critical incidents reporting

15. Education, Self-directed Learning, Research

a. Knowledge

- Trainees will understand the scientific approach to analysis and solving questions worthy of scientific investigation
- Information search and literature review
- Proposing a hypothesis; research design, bias and appropriate methods of measurement; data collection and storage; good record keeping
- Common statistical tests and application of statistics relevant to the project; Interpretation of results
- Know and adhere to the content of the Declaration of Helsinki and ICH ([International Council for Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use](#)) Guideline for Good Clinical Practice (GCP)
- Monitoring of studies and post study surveillance
- Copyright and intellectual property
- Responsibilities of Institutional Review Board/independent ethics committee, and of investigator to the ethics committee; ethical principles
- Principles of writing a scientific paper, and of doing an oral or poster presentation of a paper/study

- Principles of evidence-based medicine (including levels of evidence)
- The process of obtaining funding and writing a basic grant application

b. Clinical skills

- Conducting and appraising literature searches
- Appraising journal articles including the application of statistics
- Applying the principles of evidence-based medicine to clinical practice
- Carrying out oral presentations and professional communication
- Presenting quality assurance exercises or projects
- Developing facilitation skills, such as tutoring in small-group learning and conducting small-group meetings

c. Specific attitudes

- Valuing educational and scientific processes
- Distinguishing between practice with a sound scientific basis and that which requires further objective assessment
- Committing to informed consent, confidentiality and all other ethical principles of research
- Critical appraisal of own limitations, abilities and areas of expertise
- Committing to lifelong continuing professional development

16. Assessment and Governance of Training

For each trainee there should be a structured programme supervised by a trainer, and all the steps properly documented in a portfolio.

Portfolio

In the portfolio, the trainee keeps a record of all the activities and perspectives related to his/her development.

Data are collected from:

A) Learning experiences depicting the learning achievements of the trainee:

- Logbook summarising clinical experience, including diagnoses and treatments
- Courses
- Academic experience, scholarly work, presentations, scientific articles
- Personal development plan, with regular updates of progress in training, reflective reports and reports of discussions with the tutor

B) Assessment:

Supervision of Trainees requires continuing supervision of their clinical duties. In addition, supervision of their training programme and schedule is required to ensure they are making sufficient progress, that milestones are being achieved and that the training curriculum is being covered. Thus, the trainee needs both Clinical and Educational Supervision. One supervisor may undertake both roles, or the roles may be undertaken by separate individuals depending on local arrangements. It is advisable, however, that if there is a separate Educational Supervisor, he/she should be a clinician in the specialty team and not be remote from the clinical environment where the trainee works.

A Clinical Supervisor may be responsible ideally for only one trainee, and the Educational Supervisor ideally should supervise no more than three trainees. A Clinical Supervisor oversees the trainee's ongoing work and provides constructive feedback. Although all elements of work in training posts must be supervised, as training progresses the trainee should have the opportunity for increasing autonomy, consistent with safe and effective patient care.

An Educational Supervisor oversees the trainee's educational progress in the context of the specialty curriculum. He/she reviews the trainee's logbook or e-logbook, sets goals and provides direction and advice on a regular basis. Educational Supervisors should be familiar with the use of assessment tools, how to support trainees in difficulty and how to give effective feedback including goal setting and career advice. Ideally, Educational Supervisors should have attended a 'Train the Trainers' course.

Assessment and Appraisal of Training

Educational Supervisors should have an induction session with their trainees soon after enrolment, during which the training programme and curriculum are explained and how the various clinical aspects of training can be completed. In addition, each trainee should, on a yearly basis, discuss and document a detailed training plan for the forthcoming year with his/her Educational Supervisor.

In the first year of specialized Endocrinology training, after common trunk of General Medicine training, the trainee will require frequent formal feedback from Clinical and/or Educational Supervisor up to 2-3 times.

Established assessment tools for appraisal of clinical knowledge, skills and professional attributes should be used on an ongoing basis during training, and documentation of these appraisals should be maintained in the trainee's

logbook. The assessment of clinical skills, especially problem-oriented history taking, physical examination, diagnostic decision-making ability, appropriate selection of investigations, investigation interpretation and clinical judgement, are particularly important. Different workplace assessment instruments may be used in various countries or institutions to document these skills. Workplace assessment of trainee's behaviour and professionalism is normally carried out by patient surveys and feedback from colleagues and other members of the relevant MDT. Assessment of procedural skills need to be documented by the trainee in conjunction with the trainer. This is normally performed by direct observation of the trainee's procedural skills.

Appraisal of training progression should be performed formally on a yearly basis jointly by the trainee and Educational Supervisor by reviewing the trainee's logbook and confirming evidence of the attainment of competencies in knowledge, clinical skills and professional attributes and discussing other matters of relevance to completion of training. Models based on Entrustable Professional Activities (EPAs) to ensure documented evidence for skill acquisition may be used. The appraisal of training before entering the final year of training is particularly important as deficits in training can be identified and plans for correction made; for this reason, it is advisable that this appraisal involves an external assessor as well as the usual Educational Supervisor.

Formal standardized exams during the training programme and/or at the end of training, and conducted locally, regionally, nationally and/or internationally, constitute important tools for assessing and certifying the general knowledge in Endocrinology of the trainee.

Governance of Training

The governance of an individual's training programme is the responsibility of the Programme Director and the institution(s) in which the training programme is being delivered. A trainer will be responsible to the Programme Director for delivering the required training in his/her area of practice. Training requirements for trainers and a process for recognition as a trainer will be expected. Trainers will be expected to have achieved the appropriate nationally recognized qualification to allow them to practice as a specialist in Endocrinology.

A Programme Director would be someone who has been or still is a trainer and who has considerable knowledge and experience in training doctors. Experienced Trainers and Programme Directors must be active in clinical practice.

The Director of Training should have at least 5 years of experience post specialist accreditation, must have a sound practical knowledge of the broad field of Endocrinology and must be recognised by the national authority. Likewise, the medical staff acting as educational supervisors should be actively practicing in Endocrinology and be committed to residency training.

Core competencies for trainers:

- 1) Know all aspects of the overall Endocrinology curriculum and the problems related to its clinical implementation
- 2) Have experience in teaching theoretical aspects of Endocrinological diseases and acquisition of skills in procedures
- 3) Be familiar with modern medical education principles and receive regular updates in leadership and mentorship
- 4) Understand the needs of the trainees to achieve the goals of the training programme and help them to progress throughout the training period
- 5) Be able to promote in their mentees scientific curiosity as well as professionalism, ethical behaviours and humanistic values

Quality management for trainers should show itself to be committed to specialist education and provide appropriate time, space, facilities and funding to protect the needs of education from the demands of service. The members of the faculty should be experienced Endocrinologists and teachers, committing time, effort and enthusiasm to the training programme. They should regularly attend interdisciplinary meetings with surgeons, pathologists and radiologists. The faculty should be large enough to supervise the clinical and practical work of the trainees.

Training requirements for training centers

Training requirements for training institutions and the process for recognition as a Training Centre in Endocrinology should be based in a University department, a University affiliated institution or in those with an equivalent educational, and/or research programme. The Training Centre should be located in a Hospital or Institution, which also has surgical, intensive care, radiology and access to histopathology, biochemistry, microbiology and haematology laboratory facilities. The Hospital/Institution should also have a broad array of other medical specialty services such as cardiology, pneumonology, gastroenterology, haematology, nephrology, infectious disease and oncology.

The Training Centre should be housed in quality buildings and must have facilities for inpatients and outpatients as well as a Diabetes Unit and an Endocrine Clinical Investigation room/laboratory. Satisfactory premises for education are needed with teaching space, library, and contemporary information technology and audio-visual teaching aids.

Rotation-Training Centres and Single Affiliated/Accredited Training Centres must be recognised by their national authorities to be of such quality and to provide sufficient training for the specialty of Endocrinology. Some Units, with high quality endocrine clinical facilities and training, may lack the full complement of training facilities and opportunities. These Units may be recognised as a Rotation-Training Centre of sufficient merit such that an endocrine trainee will receive sufficient training for a period of 1-2 years. A trainee may therefore fulfil the training by rotating between a number of recognised training centres.