

# NATIONAL MEDICAL COMMISSION

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## GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR DM IN ENDOCRINOLOGY

### Preamble

The programme aims at training a physician in the specialty of Endocrinology encompassing the related knowledge, skills and attitudes so as to enable him/her to function as an independent clinician/consultant and a teacher well acquainted with research methods in endocrine medicine.

A post graduate student pursuing DM (Endocrinology) course must acquire adequate knowledge of (a) Basic Sciences as applied to Endocrinology, Diabetes and Metabolism, (b) clinical, experimental, comparative, investigative, relevant surgical and applied aspects of Endocrinology and Metabolism, as well as (c) recent advances in this field.

### Eligibility Requirements

Students who have completed MD/DNB in General Medicine or Pediatrics are eligible for DM in Endocrinology

### *SUBJECT SPECIFIC LEARNING OBJECTIVES*

At the end of the course the candidate who is eligible for a DM degree in Endocrinology should acquire:

- a. knowledge in the basic, comparative and translational and clinical endocrinology, diabetes and metabolism,
- b. clinical diagnostic critical thinking, problem solving, self-directed learning and procedural skills,
- c. Skills as related to formulating research questions, initiating, conducting and analysing translational, clinical and epidemiologic research,
- d. Team leadership and networking skills,
- e. Communication skills necessary for working with and educating patients and team members,

- f. Attitudes and values that will allow him or her to provide compassionate, responsive and respectful ethical care to the patient.

**A. Theoretical Knowledge:**

- The post graduate student in Endocrinology must acquire knowledge in all aspects relevant to the practice of Endocrinology. This includes training and expertise in Endocrinology capable of providing specialist care, being a teacher and guiding researcher in Endocrine medicine.
- She/ He should acquire and be able to impart necessary knowledge, skills and attitudes to diagnose and manage in a cost effective manner various clinical problems in endocrinology as seen in the community and at secondary and tertiary care centers. Special emphasis should be placed on preventive Endocrinology.

**B. TEACHING SKILLS:**

Should be able to teach relevant aspects of endocrine diseases to resident doctors, junior colleagues, nursing and para-medical staff.

**C. RESEARCH METHODOLOGY:**

Should be able to identify and investigate a research problem in Endocrinology using appropriate methodology.

**E. GROUP APPROACH:**

Should participate in multi-disciplinary meetings with experts in General Medicine, Radiology, Pathology, Oncology, Laboratory Medicine and other allied clinical disciplines.

## ***SUBJECT SPECIFIC COMPETENCIES***

**At the end of the course, the DM student should acquire the following competencies under the three domains:**

**A. Cognitive domain (Knowledge domain)**

By the end of the course, the DM student should be able to:

- i. Demonstrate that he/she is well versed with the past and current literature on relevant aspects of basic, preventive, investigative, clinical and interventional endocrinology, including diabetology that should include practical aspects of handling the diabetes foot and ocular problems.
- ii. Demonstrate a thorough knowledge of epidemiology, natural history, pathological abnormalities, etiopathogenesis, clinical manifestations and principles of management of various endocrine disorders of adults and children.
- iii. Plan appropriate investigations applicable for diagnosis and management of patients in a cost-effective manner and interpret correctly the results of various routine and specialized investigations necessary for proper management of the patients with endocrine diseases. Should be able to provide best management even in resource-limited settings as well
- iv. Recognize and manage endocrine emergencies.
- v. Acquire adequate knowledge of application of various endocrine laboratory techniques, especially, immunoassays and other methods of hormonal assay and interpretation of laboratory values and a basic knowledge of molecular genetics.
- vi. Acquire knowledge of the functioning of various equipments in routine use in the Endocrinology lab.
- vii. Be able to plan and conduct a research proposal in the specialty in accordance with guidelines of Ethics Committee and critically evaluate published literature in medical journal.
- viii. Be able to establish a research laboratory.
- ix. Acquire relevant knowledge of biostatistics so as to be able to critically read and judge new literature.
- x. Recognize the value of ethical principles of patient care and research.
- xi. Be able to take decisions regarding hospitalization or timely referral to other consultants of various specialties recognizing his/her limitations in these areas.
- xii. Have a basic knowledge of data science as it applies to endocrinology and diabetes - including artificial intelligence machine learning devices and wearables.

**B. Affective domain (Attitudes including Communication and Professionalism)**

The DM student should:

- Have empathy for patients and their family and should address them as worthy human beings.
- Discuss options, including advantages and disadvantages of each investigation and treatment. She/He should be able to discuss medical issues with them in layperson's language.
- Become confident communicators and should be well accomplished professionals.
- Have developed skills to debate, deliver scientific lecture, participate in panel discussions, and hold group discussions and be ready to deliver the knowledge received by him/her during the course. .
- Be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
- Always adopt ethical principles and maintain proper etiquette in dealing with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
- Develop communication skills to write reports and give professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

### **C. Psychomotor domain**

At the end of the course, the student should have acquired following skills:

***C.1. The student should be able to perform independently the following procedures and/ or interpret the results of:***

**A. Should be able to perform:**

1. Endocrine stimulation and suppression tests. (Dynamic testing eg., ACTH & LHRH stimulation tests, water deprivation test, Prolonged (72 hr) fast).
2. Hormone and metabolic assays,
3. Autonomic Function Testing,
4. Creation and usage of electronic medical record,

5. Formulation of nutrition plan, counseling and patient education in diabetes,
6. Foot examination of a diabetic patient

B. Should be able to interpret:

1. Radiologic studies for diagnosis and treatment of endocrine and metabolic diseases including:

- i) Plain X-ray/ USG, CT scan/MRI
- ii) radionuclide imaging including PET scan
- iii) DXA for osteoporosis and body composition studies.
- iv) Bone age assessment from radiographs **or atlas**

2. Ancillary tests: like Perimetry, Visual Evoked Potential (VEP), DFA, Optical Coherence Tomography (OCT), Karyotype and basic molecular genetic techniques

C. 2. *The student should be able to observe or perform under supervision the following procedures –desirable skills*

- a. Fine needle aspiration cytology
- b. Thyroid ultrasound
- c. *Inferior petrosal sinus sampling (if available)*
- d. Offloading techniques for diabetic foot (hands on training)

## *Syllabus*

**Course contents:**

### **I. Cognitive domain**

#### **A. Basic Sciences as applied to Endocrinology and Metabolism**

1. History of Endocrinology
2. General principles of hormone synthesis, action, degradation, receptors, analogues and antagonists
3. Receptors, biorhythms
4. Endocrine Anatomy, Biochemistry and Physiology
5. Endocrine Pharmacology and Pharmacokinetics
6. Metabolism of fat, protein, carbohydrates and other nutrients

7. Endocrine Pathology and Cytology
8. Endocrine functions from foetal to adult life
9. Genetics including cytogenetics and applied genetics including principles of Sanger sequencing and the importance of next generation sequencing and applied inherited basis of disease
10. Principles and performance of biostatistics
11. Basic applied immunology

## **B. Clinical Endocrinology, Diabetes and Metabolism**

### **1. Diabetes:**

Genetics and pathophysiology, classification, epidemiology and pathogenesis and management of type 1 diabetes, type 2 diabetes, gestational diabetes/diabetes in pregnancy, monogenic diabetes, secondary diabetes; specific aspects of diabetes in the sub-continent. Should include principles of life style management and details of various oral & injectable agents as well devices used in the treatment of diabetes mellitus, , screening and management of all acute and chronic complications of diabetes and management of diabetes in special situations.

### **2. Epidemiology, pathogenesis, clinical features, diagnosis and management of endocrine disorders in pediatric (including neonatal) and adult age groups in the following diseases:**

#### **i. Hypothalamus and pituitary:**

- a) genetic and acquired (including infective, neoplastic, vascular and inflammatory) pituitary dysfunction,
- b) functional pituitary tumors (including prolactinomas, GH, ACTH and TSH secreting tumors),
- c) nonfunctional pituitary adenomas and other sellar/ suprasellar/ parasellar masses,
- d) posterior pituitary dysfunction (including diabetes insipidus, syndrome of inappropriate ADH secretion).

#### **ii. Thyroid:**

- a) thyrotoxicosis (including Graves disease, Toxic multinodular goiter, Toxic adenoma, transient thyrotoxicosis due to various forms of thyroiditis, drug induced thyrotoxicosis, thyrotoxicosis due to thyrotropin secretion, thyrotoxicosis due to extra-thyroidal tissue and thyrotoxicosis facticia,

- b) hypothyroidism and thyroiditis,
- c) Thyroid nodules and thyroid malignancies including medullary thyroid carcinoma.

**iii. Adrenal cortex and medulla:**

- a) Cushing syndrome,
- b) Adrenal insufficiency,
- c) Congenital adrenal hyperplasia,
- d) Adrenal adenomas, carcinomas and incidentalomas,
- e) Pheochromocytoma and Paraganglioma
- f) Primary hyperaldosteronism and other adrenal causes of endocrine hypertension.

**iv. Pancreas:**

- a) Pancreatic endocrine disorders including diabetes, insulinomas, glucagonomas, VIPomas,
- b) Pancreatic exocrine insufficiency including fibrocalcific pancreatic disease and chronic pancreatitis,
- c) Pancreatic neoplasms and malignancies, particularly neuroendocrine tumours.

**v. Gonads:**

- a) Delayed or early puberty,
- b) Chronic anovulatory disorders including polycystic ovary disease,
- c) Hirsutism,
- d) Premature ovarian failure and menopause,
- e) Male hypogonadism -primary and secondary,
- f) Disorders of sex development.

**vi. Parathyroid:**

- a) Hyperparathyroidism,
- b) Hypoparathyroidism.

3. Reproductive Biomedicine
4. Endocrine Dysfunction in other systemic disorders
5. Endocrinology of aging, transition care (from adolescent to young adult)
6. Oncologic Endocrinology
7. Drug hormone interaction
8. Radiology and Radiation Therapy in Endocrinology
9. Clinical Metabolic disorders
10. Endocrinology of pregnancy and foetus

11. Adolescent and development endocrinology including growth and development, sexual differentiation, and pubertal maturation
12. Clinical epidemiology
13. Ethics, economics and psychosocial aspects of management of endocrine diseases
14. Obesity and lipid disorders including bariatric surgery
15. Endocrine Hypertension
16. Endocrine aspects of cardiovascular disease
17. Any other related areas:- Multiple endocrine neoplasia, polyglandular autoimmunity
18. Surgical aspects of Endocrinology.

**C. Laboratory and Experimental Endocrinology**

1. Principles of Nuclear medicine as applied to Endocrinology
2. Hormone Measurements, *in vitro* and *in vivo*
3. Principles and practice of immunoassay of hormones
4. Principles of quality control and quality assurance in laboratory estimations
5. Principles of Radioisotope safe handling and disposal
6. Endocrine Biochemistry investigations including semen analysis
7. Animal models in Endocrinology
8. Laboratory evaluation of Endocrine and Metabolic disorders
9. Any other related areas.

**D. Recent Advances**

1. Molecular Endocrinology
2. Recent advances in Clinical, Comparative, Experimental and Investigative Endocrinology and Metabolism
3. Review of recent literature in the field of Endocrinology, Metabolism and Reproductive Biomedicine
4. Any other related areas.

**II. Psychomotor domain**

1. **Clinical care of the following aspects of diabetes in adults and children including but not limited to:**
  - i. evaluation and management of acute, life threatening complications of hyper- and hypo-glycemia (diabetic ketoacidosis, non-ketotic hyperosmolar coma, severe hypoglycemia).



- ii. evaluation and management in critical care and surgical patients with diabetes mellitus including insulin therapy for critical and non-critically ill hospitalized patients.
- iii. counseling and education of patients with diabetes mellitus regarding diabetic diet, physical activity, blood glucose monitoring, CGMS and pumps, short term and long term targets of glycemic control and screening for complications. Practical aspects of setting up an integrated diabetes education system
- iv. chronic care of diabetes mellitus in the ambulatory setting
- v. prevention and surveillance of microvascular and macrovascular complications in diabetes mellitus
- vi. diabetes detection and management before, during and after pregnancy including gestational diabetes.
- vii. patient-centered care in patients with diabetes mellitus
- viii. Integrated foot care and foot wear in patients with diabetes mellitus, aspects of setting up an integrated foot clinic and developing a basic orthotic center.

**2. Clinical care including the following aspects of metabolism in adults and children including but not limited to:**

- i. evaluation and management of patients with disorders of fluid, electrolyte, and acid-base metabolism;
- ii. patients with disorders of bone and mineral metabolism including all metabolic bone disorders
- iii. patients with calcium, phosphorus, and magnesium imbalance.

Besides the above, post graduate students in DM (Endocrinology) should be involved in patient care and management of Endocrine Emergencies apart from bedside and didactic teaching of undergraduate and postgraduates, as assigned to them.

## ***TEACHING AND LEARNING METHODS***

### **Post graduate teaching programme**

#### **General principles**

Acquisition of practical competencies being the keystone of post graduate medical education, PG training should be skills oriented. Learning in PG program should be essentially self-directed and primarily emanating from clinical and academic work. The formal sessions are merely meant to supplement this core effort.

#### **Teaching Methodology**

The post graduate student should be given the responsibility of managing and caring for patients in a gradual manner under supervision.

## Formal teaching sessions

This should include regular bedside case presentations and demonstrations, didactic lectures, seminars, journal clubs, clinical meetings, and combined conferences with allied departments.

This will comprise of the following:

### Minimum sessions

- |  |                                 |
|--|---------------------------------|
| • Bedside rounds   | - Three days per week           |
| • Seminar  | - once in 4 weeks               |
| • Journal club   | - once in two weeks             |
| • Endocrine -histology conference                                      | - once in 4 weeks (if feasible) |
| • Endocrine - Surgery conference                                       | - once in 8 weeks (if feasible) |
| • Endocrine-radiology conference                                       | - once in 4 weeks               |
| • Endocrine –Nuclear Medicine conference                               | -once in 4 weeks (if feasible)  |
| • Endocrine – Neurosurgery conference                                  | -once in 4 weeks (if feasible)  |
| • Clinical case discussion   | - once a week                   |
| • Outpatient Endocrine & Metabolic /Diabetic clinic *                  | - thrice a week                 |
| • Integrated diabetes foot clinic                                      | - once a week                   |
| • GDM/diabetes in pregnancy clinic                                     | - twice a month (if available)  |
| • Pediatric endocrinology clinic                                       | - once a week                   |
| • Reproductive endocrinology clinic                                    | - twice a month (if available)  |
| • Mortality meeting  | - once a month                  |
| • Combined Grand rounds/ Clinical meetings/CPCs (at Institution level) | - once a month                  |
| • Student project presentation   | - once in 6 months              |

All above may refer to sessions conducted in given Department and not for each trainee.

\*should include a dietician and diabetes educator

## Didactic Lectures

In addition, 10 lectures per year covering recent advances in all aspects of endocrine diseases would be taken by faculty. All post graduate students will be required to attend these lectures as well and short term basic and clinical courses on:

- Bio-statistics
  - Research methodology and experimental lab medicine relevant to endocrinology
  - Use of computers in medicine
  - Bioethics, ethical issues in endocrine practice including Diabetes care
- In addition, student should attend accredited scientific meetings (CME, symposia, and conferences) once or twice a year.
  - Additional sessions on Research methodology, experimental Laboratory Medicine relevant to Endocrinology, use of computers in Medicine, Biostatistics, ethical and legal issues in endocrine practice including diabetes care, teaching methodology, hospital waste management, health economics, are suggested.
  - The post graduate students shall be required to participate in the teaching and training programme of undergraduate and post graduate students and interns (if available).
  - A post graduate student of a post graduate degree course in super specialties would be required to present one poster presentation or read one paper at a national/state conference; should write a research paper from his/her work which should be published/accepted for publication/sent for publication during the period of his postgraduate studies
  - **Log Book:** During the training period, the post graduate student should maintain a Log Book indicating the duration of the postings/work done in Endocrinology Wards, OPDs and Casualty. This should indicate the procedures assisted and performed, and the teaching sessions attended. The purpose of the Log Book is to:
    - a) Help maintain a record of the work done during training,
    - b) Enable Consultants to have direct information about the work; intervene if necessary,
    - c) Use it to assess the experience gained periodically.

The Log Book should be used to aid the internal evaluation of the student. The Log book shall be checked and assessed periodically by the faculty members imparting the training. It should be signed by the Head of the Department. A proficiency certificate from the Head of Department regarding the clinical competence and skillful performance of procedures by the student will be necessary before he/she would be allowed to appear in the examination.

- The **Department should encourage e-learning activities.**
- **Clinical postings: Recommended schedule for three years training**

Each post graduate student will undergo the following rotations in various areas of endocrinology during the three years of training in DM Endocrinology:

- i. **Ward/Indoor service/Out patient clinics/Consultations** : 30 months  
(Should include rotation for 2 weeks each in cardiology and nephrology departments/units; where available a rotation in a reproductive endocrine clinic is desirable)
- ii. **Interventional and investigative Endocrinology** : 3 months\*
  - ultrasonography, CT scan, MRI, Doppler study, IPSS (optional), AVS (optional)
  - Nuclear Medicine: Isotope scans\* including Thyroid scans and radioactive iodine/technetium uptake.
  - Pathology and Cytology
  - Ophthalmoscopy, DFA, OCT, Laser photocoagulation

*\*\*All institutions having DM Endocrinology course should have a Nuclear Medicine Department or one within a radius of 10 km which could serve for peripheral postings Or go for electives for the same.*

- iii. **Endocrine laboratory techniques** : Endocrine and Metabolic Lab: 2.5 months\*  
Genetic Lab\*\* : 2 weeks

*\* This period can be 3-4 hours per day and can be concurrent with clinical care*

*\*Hands -on training in endocrine laboratory is essential*

*\*\*A suitable laboratory within a radius of 20 km, or a designated peripheral posting in another institution should be available for training. The content should include hands-on training for DNA extraction and PCR.*

Provision for elective posting (maximum of 2 months) to reputed departments should be available to gain experience in new areas.

### **Research**

Each post graduate student will be required to undertake research under the guidance of the faculty. He/she will be required to submit a research plan within 6 months after joining the

course. In addition, the post graduate student will participate in various departmental research activities. Should prepare at least 1 original paper accepted for publication/ready for sending to a journal for publication, to be eligible for the exam.

**During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of skills laboratories in medical colleges is mandatory.**

## ***ASSESSMENT***

**FORMATIVE ASSESSMENT, during the training programme**

**Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.**

### **General Principles**

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and practical/clinical examination.

**Six monthly assessment during the DM training should be based on:**

1. Improvement in theory knowledge
2. Patient based /Laboratory or Skill based learning
3. Self directed learning and teaching

Annual formal assessment to be submitted to Dean / Principal, with recommendation from all faculty, as to promotion to second year.

**The student to be assessed periodically as per categories listed in post graduate student appraisal form (Annexure I).**

## **SUMMATIVE ASSESSMENT, namely, assessment at the end of training**

**The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.**

The post graduate examination shall be in two parts and will be as per the details given in Postgraduate Regulations, 2000.

### **1. Theory:**

The examinations shall be organised on the basis of 'Grading' or 'Marking system' to evaluate and to certify postgraduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole.

There will be four theory papers, as below:

Paper I: Basic sciences relevant to the discipline of endocrinology and metabolism

Paper II: Clinical aspects and diagnosis of endocrinology and metabolism disorders

Paper III: Therapeutic aspects of endocrinology and Metabolism and Laboratory technology

Paper IV: Recent Advances in Endocrinology & Metabolism

### **2. Clinical / Practical and Oral/viva voce Examination:**

Oral examination shall be comprehensive enough to test the student's overall knowledge of the subject. The clinical/practical examination shall be held as per norms and as per the prevailing rules of the training institute/ University rules. A broader outline is suggested below:

There would be four examiners for clinical examination. These would comprise of two internal and two external examiners. There should be long/ semi-long/ short/ spot cases covering different aspects of Endocrinology, of which at least one long case must be on Diabetes. The post graduate students may also be assessed on endocrinological histopathology/ cytopathology slides, radiological investigations, ability to evaluate laboratory data in clinical endocrinology and viva-voce. The logbook of procedures and

interventions shall also be assessed in the practical examination. The research paper shall be presented.

**Recommended Reading:**

**Books (latest edition)**

- Williams Text Book of Endocrinology
- Endocrinology - Leslie J De Groot & J Larry Jameson
- Joslin's Diabetes Mellitus
- Text Book Of Diabetes Mellitus - Richard I & G Holt
- RSSDI Text Book Of Diabetes Mellitus
- Paediatric Endocrinology - Sperling
- Pediatric Endocrinology - edited by Fima Lifshitz,
- Thyroid - Werner & Ingbar
- Pituitary Disorders - Shlomo Melmed
- Reproductive Endocrinology - Speroff
- Endocrine & Metabolic Disorders - Robert E Dons & Frank H Wiens  
Clinical Lab Testing Manual
- Manual of Endocrinology & Metabolism - edited by Norman Lavin

**Journals:**

3-5 international and two national journals (all indexed).

## Postgraduate Students Appraisal Form

## Clinical Disciplines

Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Clinical competence										
2.	Academic Presentations										
3.	Laboratory Skills										
4.	Thesis / Research work										
5.	Log Book Maintenance										

Publications

Yes/ No

Remarks\*

**\*REMARKS:** Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 04 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE SIGNATURE OF CONSULTANT SIGNATURE OF HOD