

**STUDENT WORKBOOK
IN ENDOCRINOLOGY**

**Department of Medicine
Faculty of Medicine
Sabaragamuwa University of Sri Lanka**

First Edition 2021

*2021 Department of
Medicine Faculty of
Medicine
Sabaragamuwa University of Sri Lanka*

ALL rights are reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise without the prior permission in writing from the author.

ISBN 978-624-97640-5-7

CONTENTS

CHAPTER	<i>Page</i>
Preface	03
Authors	04
1. Introduction	05
2. Core Clinical Knowledge and Skills	08
3. History taking and Symptom Analysis of a patient with an Endocrine Disorder	10
4. Examination of a patient with an Endocrine Disorder	12
5. Common Investigations	16
6. Exercises	20
7. Example Case Scenario	34

PREFACE

Students of the Faculty of Medicine, Sabaragamuwa University of Sri Lanka, study Endocrinology as a separate appointment of one week at the Teaching Hospital, Ratnapura. During this period, they will be attached to the Endocrine unit under the Consultant Endocrinologist appointed by the Ministry of Health.

This workbook in Endocrinology is compiled to help students achieve essential knowledge and skills in endocrine which are expected from an undergraduate when they become qualified to work in medical wards as intern house officers. Thus, the workbook will guide the student during their endocrinology short appointment.

This workbook is a joint effort of academic staff of the Department of Medicine, SUSL and the current Consultant Endocrinologist of the Teaching Hospital, Ratnapura. Students are expected to organize their classes and do self-studies in order to complete the tasks set out in the workbook.

We value your feedback to improve the workbook.

Dr Champika Gamakaranage

Dr Udayangani Ramadasa

Professor Saroj Jayasinghe

AUTHORS

Dr. Champika Gamakaranage (CG). MBBS, MD (Col), MRCP (Lond), FRCP (Lond)

Consultant Physician

Senior Lecturer (Grade I), Department of Medicine, Sabaragamuwa University of Sri Lanka

Dr. G. Udayangani Ramadasa (UR). MBBS, MD, FCCP, Dip Pall Med (Clinical) RACP

Consultant Physician

Head and Senior Lecturer (Grade I), Department of Medicine, Sabaragamuwa University of Sri Lanka

Dr Kamani Liyanarachchi (KL). MBBS, MD, MRCP (UK)

Consultant Endocrinologist

Teaching Hospital Ratnapura

Emeritus Prof. Saroj Jayasinghe (SJ). MBBS, MD, MD (Bristol), FRCP (Lond), FCCP, PhD (Col)

Consultant Physician

Consultant to the Department of Medicine, Sabaragamuwa University of Sri Lanka

Former Chair Professor, Department of Clinical Medicine, University of Colombo

OTHER CONTRIBUTORS

Dr. K. S.N. Prasangani (KP) – Contributed with language editing

BA (Hons) in Languages (SUSL), MA in Linguistics (Kelaniya), PhD in Applied Linguistics (UNIMAS, Malaysia)

Dr. U.U.K. Udumulla (UUK) – Contributed with designing mind maps and document editing (MBBS), Demonstrator at Department of Medicine, Sabaragamuwa University of Sri Lanka.

CHAPTER 1

INTRODUCTION

Dear Students,

We have prepared a series of workbooks to guide you during your medical appointments. These include 3rd year workbook, 4th year workbook and workbook for each short appointment and a workbook for the professorial appointment.

The appointments in finer specialties are organized based on the University Grants Commission guidelines and according to the needs of the Ministry of Health.

The short appointment in Endocrinology will give you the opportunity to study Endocrinology with exposure to specific case scenarios in more detail. This workbook is prepared to provide guidance to the students during the Endocrinology appointment to cover the essential areas expected from an undergraduate. You are expected to learn the management plans in further detail. This includes the investigation, treatment of common medical conditions, management of common emergencies, which are essential clinical topics for an intern medical officer. This knowledge, skills and experience you gather during the short appointments will help you to understand patient problems in greater depth.

Your continuous assessments will be based on these workbooks.

Learning Outcomes in Endocrinology

At the end of the appointment students will be able to

1. Describe the anatomy and physiology of the endocrine system, pathogenesis of its disorders and scientific basis of their management
2. Diagnose common endocrine problems explaining pathophysiology, relevant investigations and plan management
3. Obtain histories, elicit physical signs and interpret physical signs, describe pathophysiology, arrive at a clinical diagnosis, principles of management and prognosis of patients having the following conditions
 - i. Obesity
 - ii. Diabetes, Diabetic complications including Diabetic foot
 - iii. Hypogonadism
 - iv. Goiter and Thyroid nodules
 - v. Graves ophthalmopathy, diabetic retinopathy and cataracts
 - vi. Acne, changes of myxedema, hair loss patterns, hirsutism, and striae
4. Plan individualized patient care with multi-disciplinary team considering multi morbidity and complications of diabetes mellitus
5. Describe the indications, limitations and be able to interpret findings of investigations that are relevant
 - i. ACTH stimulation Test
 - ii. DEXA-scan
 - iii. Fasting and postprandial glucose and home blood glucose monitoring
 - iv. Thyroid function tests
 - v. Blood glucose test
 - vi. Gonadotrophin levels
 - vii. Insulin Tolerance test and Glucagon stimulation test
6. Describe the emergency management of following conditions
 - i. Adrenal crisis
 - ii. Diabetic Ketoacidosis
 - iii. Hyperosmolar coma
 - iv. Hypoglycemia
 - v. Severe hypo- or Hypercalcemia
 - vi. Thyroid storm and Myxedema coma
7. Perform patient preparation and identify the indications, describe the necessary preparations and interpretation of clinical and laboratory endocrine tests to identify common endocrine disease
8. Obtain consent for investigations and treatment and communicate the prognosis of common endocrine disorders

9. Communicate with patient on primary and secondary prevention of cardiovascular complications, life style modifications and foot care in relation to diabetes mellitus. Options of hormone therapies.
10. Write case notes, daily status, referrals, discharge summaries, clinic notes and prescriptions.
11. Demonstrate empathy and maintain high ethical standards
12. Be an effective member of the healthcare team and know the health facilities and social support available for endocrine disorders in Sri Lanka.

CHAPTER 2

CORE CLINICAL KNOWLEDGE AND SKILLS

At the end of the endocrinology appointment, you should be competent in the technique of history taking, physical examination (general examination and examination of abdomen) and clinical reasoning at a level of a student about to enter the final year.

In addition to the cases, you are allocated during the appointment, you are advised to see the following presentations given in the next section on “Topics to cover during Endocrinology Appointment”

2.1 Clinical Presentations: Endocrinology appointment

These are some of the key presentations that ought to be ‘covered’ during the Endocrinology Appointment.

- Hyperglycemia on routine clinical check up
- Hypoglycemia
- Hypoglycemia in non-diabetic patient
- Obesity
- Dyslipidemia
- Goiter
- Myxedema
- Thyrotoxicosis
- Osteopenia/ Osteoporosis

2.3 EMERGENCIES

Following is a list of common Endocrine emergencies

- Diabetic Ketoacidosis
- Hyperosmolar non-ketotic coma
- Hypocalcemia with symptoms
- Hypercalcemia
- Myxedema coma
- Thyrotoxic crisis
- Hypo adrenal crisis
- Hyponatraemia
- Pituitary apoplexy

2.2 Topic in Endocrinology

These topics are often termed as the theoretical aspects of endocrinology and require didactic teaching (e.g., lectures) or self-studies using standard textbooks.

1. Common clinical presentations (obesity, polyuria, loss of weight)
2. Diabetes mellitus 1
3. Diabetes mellitus 2
4. Diabetic Emergencies: DKA, HONK, Hypoglycemia
5. Thyroid disorders pathology, investigations and management
6. Disorders of bone and calcium metabolism
7. Obesity, metabolic syndrome, lipid metabolism
8. Disorders of hypothalamus and pituitary
9. Water and electrolytes disorders (potassium, sodium and calcium)
10. Adrenal disorders and Cushing's syndrome
11. Acromegaly/PCOS
12. Radiological investigations of endocrine disorders

CHAPTER 3**HISTORY TAKING AND SYMPTOM ANALYSIS**

Following are common presentations of patients with endocrine disorders

Mention 2 conditions for each symptom

Symptom	Endocrine disorder
Weight gain	
Weight loss	
Poor appetite	
Increased appetite	
Diarrhea	
Constipation	
Vomiting	
Abdominal pain	
Polydipsia	
Polyuria	
Excessive sweating	

Heat intolerance	
Cold intolerance	
Precocious puberty	
Delayed puberty	
Hirsutism	
Reduces body hair	
Gynecomastia	
Short stature	
Erectile dysfunction	
Loss of libido	
Galactorrhea	
Hyper pigmentation	
Abdominal striae	

CHAPTER 4**EXAMINATION OF A PATIENT WITH ENDOCRINE DISORDER**

General examination of a patient with thyroid disease

Complete the following table on features of thyroid diseases

Examination	Hyperthyroidism	Hypothyroidism
General appearance		
Skin		
Hands		
Pulse		
Face		
Eyes		
Legs		
Reflexes		

Examination of the endocrine-metabolic system is required in relation to four main syndromes: Diabetes mellitus, Thyroid disorders, Cushing syndrome, Acromegaly, Obesity and Insulin Resistance.

THYROID DISORDERS

Examination

Introduce yourself and get permission from the patient to examine the neck describing the procedure briefly. Patient should be in seated position and you should be able to examine the patient from all sides of the seated person.

Inspection

Look for any scars of thyroid surgery, erythema of skin, abnormal enlargement of thyroid gland, asymmetry or any visible lumps (Thyroid nodules, goiter, or lymph nodes). Then ask the patient to swallow, better if you could offer a glass of water. Observe movements of any masses when swallowing. Ask the patient to protrude the tongue if there is visible lump in the midline. Lumps which move up are thyroglossal cysts. The lump will not move up if it is a thyroid nodule or a lymph node. Look for enlarged blood vessels and pulsations. Ask the patient to elevate upper limbs to check whether there will be prominence of enlarged veins. (Pemberton's sign)

Palpation

You need to stand behind the patient and ask the patient to slightly flex the neck and relax. Begin palpation from the thyroid cartilage (Adam's Apple) with both your hands. When you move your fingers down you will feel the cricoid cartilage. Below the cricoid cartilage is the thyroid isthmus. Palpate the isthmus and move your hands laterally to feel the thyroid lobes. Feel for enlargement, contour, asymmetry and any masses. Ask the patient to swallow again and feel the mass better while swallowing. Ask to protrude the tongue, thyroglossal cyst will move up.

Palpate for enlarged lymph nodes.

Assess the tracheal deviation in large goiters.

Percussion

Percuss on the chest from the root of the neck downwards to find out whether there is retrosternal extension of the goiter.

Auscultation

Auscultate each lobe of the thyroid for bruits suggestive of increased vascularity in Grave's disease. You may even feel thrills.

DIABETES MELLITUS

Key features to elicit in a patient having diabetes. A simple categorization helps to remember the features.

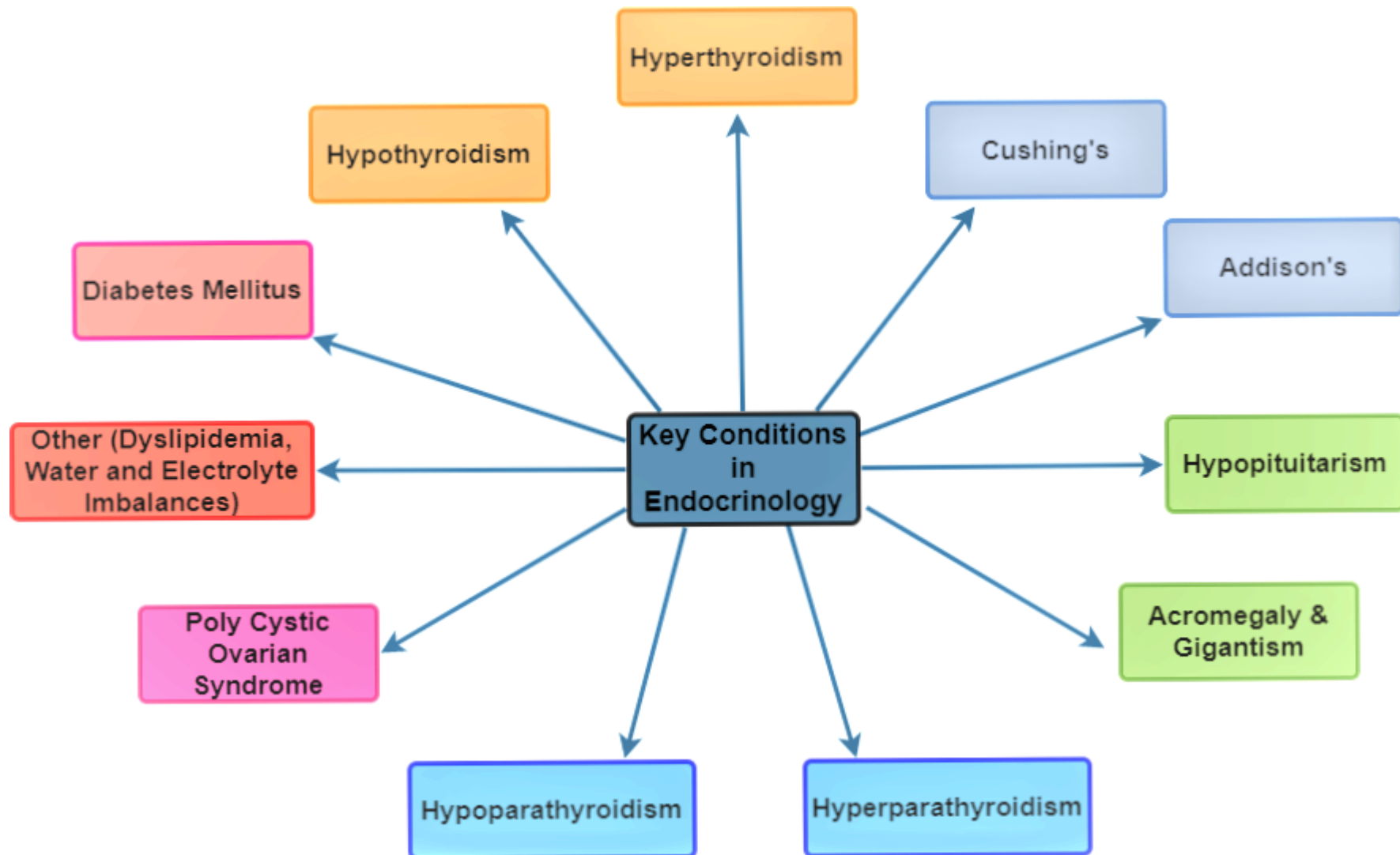
- Those related to diabetes: thirst, loss of weight, polyuria and nocturia, pruritus of genital area, features due to complications (see below) and past medications (e.g., corticosteroids), family history
- Features of type 1 and type 2
- Complications
 - Macrovascular
 - Microvascular
- Foot diseases
- Control of glycemia
- Drugs including side effects

CUSHING SYNDROME

- Exogenous Cushing's
- Endogenous Cushing's

OBESITY

- Definitions
- Severity (overweight, obese, morbid obesity)
- Types of obesity based on anthropometry
- Associations with Obesity
- Management



CHAPTER 5

COMMON INVESTIGATIONS

1) Explain how you are going to advise a patient to prepare and perform the following investigations?

- i. FBS
- ii. PPBS
- iii. HbA1C
- iv. Lipid profile
- v. Thyroid function tests (Thyroid profile)
- vi. Serum calcium level

2) Answer the following questions on HbA1C test

- i. What is the rationale of testing HbA1C to diagnose and monitor diabetes?

- ii. What are the conditions that could interfere with the interpretation of HbA1C value?

-
- 3) Answer the following questions on lipid profile.
- i. Draw a diagram to explain the metabolism of lipids (you should be able describe the process by looking at this picture)

 - ii. Explain the function of different types of lipid products involved during lipid metabolism.
- 4) Answer the questions on thyroid profile (thyroid function test – TFT)
- i. Draw a diagram to explain the regulation of thyroxine balance in human body

- ii. Following are situations you should be cautious when interpreting the TFT.
Explain why the TFT is altered in each condition?
 - a. During an acute febrile illness

- b. Pregnancy

5) Mention few medications that could interfere the TFT

- 6) Complete the section below on serum electrolytes?
- a) List main causes for following electrolyte changes
 - (i) Hyponatraemia

 - (ii) Hypernatraemia

 - (iii) Hyperkalaemia

 - (iv) Hypokalaemia

 - (v) Hypercalcaemia

 - (vi) Hypocalcaemia

 - (vii) Hypomagnesaemia

 - (viii) Hypermagnesaemia

- b) Collect ECGs showing changes of above electrolyte disturbances and explain the possible consequences and briefly mention the immediate management of each situation.

7) Write short notes on following:

- i. OGTT

- ii. DEXA scan

CHAPTER 6

EXERCISES

1. Obtain a complete history from a patient with type 2 diabetes (with complications) and answer the questions based on your patient,

a) Write a summary of the patient's history and examination.

b) Illustrate the complications of diabetes under the following headings

i. Macrovascular

ii. Microvascular

iii. Other

c) Draw a diagram of natural history of diabetes explaining the following aspects

- i. Beta cell mass/ function
- ii. Insulin level
- iii. Insulin resistance
- iv. Development of complications like nephropathy

Now explain at which stage your patient lies at the moment and try to predict his/ her future about diabetes and its complications.

- d) Explain the pathophysiology of development and progression of diabetic nephropathy.
- e) What are the stages of diabetic retinopathy? Draw or paste pictures of each stage.
- f) Outline the advice you are going to give to the patient with regard to foot care to prevent the progress of diabetic foot disease.
2. Treatment of diabetes
- i. Write an example of the prescription of the drugs given to your above patient with diabetes.

- ii. What are the commonly used classes of drugs for the treatment of diabetes? Give examples and briefly outline their mechanism of action, reason to treat and most common complications. You may use a table for this.

- iii. Outline the management of a patient who developed hypoglycaemia.

iv. Briefly describe Injecting insulin, types of insulins, storage and transport of insulins

3. Obtain a history from a patient with hypothyroidism and complete the following section based on your patient.
- i. Write the summary of your history and examination findings

v. What is the advice you give to the patient when you start him/ her on thyroxine therapy?

4. Complete the following section on hyperthyroidism.

i. Outline the symptoms and signs of hyperthyroidism

ii. What are the complications likely to develop in hyperthyroidism?

iii. Outline the drugs with their mechanism of action, use to treat hyperthyroidism

iv. What is thyroid storm? (Thyrotoxic crisis)

5. Obtain a history from a patient with Cushing's syndrome

i. What are the clinical features that suggested Cushing's syndrome in your patient?

ii. What are the likely complications that could develop?

iii. How do you confirm clinical diagnosis?

- iv. Briefly explain how you investigated your patient to arrive at an aetiological diagnosis?

- v. What are the therapeutic options available for patients with Cushing's syndrome?

- 6. Meet a patient who has developed Addisonian crisis and complete the section below.
 - i. What are the features that suggested the diagnosis of Addisonian crisis in your patient?

 - ii. What is the immediate management you do at the presentation?

iii. How do you confirm the Addison's disease?

iv. What are the likely etiologies of Addison's disease?

v. What advice would you give to the patient following the diagnosis of Addison's?

7. Obtain history and examine a patient presented with Diabetic Ketoacidosis (DKA) and complete the section below

i. Write a summary of the presentation of your patient

iii. How do you investigate to find the aetiology?

iv. Write short notes on SIADH

10. Hypocalcemia

i. What are the clinical presentations of hypocalcemia?

ii. Give 3 conditions which a patient can present with hypocalcemia

iii. What is your immediate management?

iv. How do you investigate for an etiology and for further evaluation?

- v. Write your follow up plan

CHAPTER 7

CASE SCENARIOS

In this section we expect you to write histories (minimum of 3 cases as complete documentations) of patients that you encountered during your endocrinology appointment.

This book is reviewed and recommended as a teaching and learning material for the Department of Medicine, Faculty of Medicine Sabaragamuwa University of Sri Lanka, by the following experts,

1. Dr. Niroshan Lokunarangoda

MBBS (Col). MD Medicine (Col), MRCP(UK), PGCME(Col),

MRCP (Acute Medicine), MSc (Med Toxicology). MRCP (London), FRCP(Edin)

Head and Senior Lecturer and consultant Cardiologist

Department of Medicine

Rajarata University of Sri Lanka

2. Dr. Dumitha Govindapala

MBBS. MD (Col). MRCP (UK). FRCP (Lon). FACP (USA)

Head and Senior Lecturer and consultant Physician

Department of Medicine

Faculty of Medicine

General Sir John Kotelawala Defence University, Sri Lanka

