

# Management of Diabetes Mellitus

## Guideline for Primary Health Care Providers



Non Communicable Disease Unit  
Ministry of Health, Nutrition and Indigenous Medicine

# **Management of Diabetes Mellitus Guideline for Primary Health Care Providers**



**Non Communicable Disease Unit  
Ministry of Health, Nutrition and Indigenous Medicine**

© Non Communicable Disease Unit,  
Ministry of Health, Nutrition and Indigenous Medicine

First Edition 2018

Electronic version is available on [www.health.gov.lk](http://www.health.gov.lk)

**Management of Diabetes Mellitus  
Guideline for Primary Health Care Providers**

Prepared by the Non Communicable Disease Unit, Ministry of Health, Nutrition and Indigenous Medicine in collaboration with the Sri Lanka College of Endocrinologists, Sri Lankan Society of Internal Medicine and Ceylon College of Physicians

ISBN 978-955-3666-31-4

Printed by :

**K.S.U. Graphic (Pvt) Ltd.**

No. 510, Rajagiriya Road, Rajagiriya.

Tel: 011 2884701

E-mail: [ksugraphicpvt@gmail.com](mailto:ksugraphicpvt@gmail.com) | [ksugraphic@yahoo.com](mailto:ksugraphic@yahoo.com)

## List of contents

List of Abbreviations

Introduction to Diabetes	1
Indications for screening for undiagnosed diabetes	2
Screening tool	3
Diagnostic criteria	5
Treatments	6
Pharmacological treatments	7
Oral hypoglycaemics	9
Insulin	10
Treatment goals	11
Referral to specialist clinics	12
Annexure I -Diabetic Foot Risk Assessment Form	13
List of contributors	15

## **Management of Diabetes Mellitus Guideline for Primary Health Care Providers**

List of Abbreviations:

DM – diabetes mellitus

CV – cardiovascular

IFG – impaired fasting glucose

IGT – impaired glucose tolerance

BMI – body mass index

BP – blood pressure

HbA1c – glycosylated haemoglobin

FBS – fasting blood sugar

RBS – random blood sugar

PPBS – post prandial blood sugar

OGTT – oral glucose tolerance test

DPP4 - dipeptidyl peptidase-4 inhibitor

GLP-1 RA –glucagon-Like protein-1 receptor agonist

SGLT2 – sodium-glucose transport protein -2

TZD –thiazolidinediones

BIDS – basal insulin daytime sulfonylurea

GFR – glomerular filtration rate

ACEI –angiotensin converting enzyme inhibitor

TIA – transient ischemic attack

PVD - peripheral vascular disease

GDM - gestational diabetes mellitus

# **Management of Diabetes Mellitus Guideline for Primary Health Care Providers**

## **Introduction to Diabetes**

Diabetes mellitus (DM) is a metabolic disorder characterized by chronic hyperglycaemia due to defects in insulin secretion and/or insulin action and/or other metabolic derangements. In 1980, WHO published the first widely accepted classification of diabetes and in 1997 updated classification system focused on the specific underlying aetiology was introduced. Symptoms of high blood glucose include frequent urination, increased thirst, increased hunger, general fatigue and weight loss. Some people with hyperglycaemia may not have any symptoms.

This manual focus on screening, diagnosis and treatment of diabetes mellitus in primary care level.

## **Screening should include**

01. Screening for undiagnosed diabetes
02. Identifying complications due to diabetes in newly diagnosed patients
03. Identifying co-morbidities to assess the total Cardiovascular (CV) risk

**Screening should be done by taking a relevant history, targeted examination and investigations**

## Indications for screening for undiagnosed diabetes

- a. Age  $\geq$  35 years
- b. Age between 20 – 35 years if they have any of the following
  - ◆ Overweight (waist circumference - male  $\geq$ 90cm, female  $\geq$ 80cm or BMI  $\geq$  25 kg/m<sup>2</sup>)  
However, BMI of  $\geq$ 23kg/m<sup>2</sup> up to 24.9kg/m<sup>2</sup> is considered as an increased risk for overweight. Therefore it is recommended to adopt healthy life style interventions aiming to achieve `desired weight when BMI $\geq$ 23kg/m<sup>2</sup>.
  - ◆ Sedentary life style
  - ◆ Raised BP ( $\geq$ 140/90mmHg in individuals )
  - ◆ Symptoms suggestive of diabetes mellitus
  - ◆ History of diabetes in first degree relatives
  - ◆ Dyslipidaemia
  - ◆ History of Gestational Diabetes mellitus (GDM) or baby delivered with birth weight > 3.5 kg
  - ◆ Features of poly cystic ovarian syndrome /insulin resistance (eg: oligomenorrhoea, hirsutism, acanthosis)
  - ◆ Previously identified prediabetes (IFG,IGT or HbA1c)  
**IFG- when fasting glucose >100-125 mg/dL and**  
**IGT - when 2 hour OGTT value is >140-199mg/dL**  
**HbA1c > 5.7 %**

## Screening tool

### 01. History

Age, gender, occupation

Symptoms of diabetes (polyuria, polydipsia, unintentional weight loss)

Recurrent infections (skin , genitourinary infections )

If previously diagnosed for diabetes / duration of diabetes

Does the patient have chest pain and /or breathlessness on exertion, pain in the calf on walking?

Is there any numbness in the extremities ?

Does the patient have a history of hypertension, heart disease, stroke, transient ischemic attack, peripheral vascular disease or kidney disease?

If yes, whether being followed up at a specialist unit

Does the patient has past history of ulceration or amputation?

Has the patient ever been told to have diabetic eye disease (In patient with existing diabetes)?

Is there a family history of ischemic heart disease, premature cardiovascular diseases and diabetes in first degree relatives (*male relative:<55years, female relative:<65years*)

What are the medicines that the patient is currently taking?

Has she/he smoked any tobacco products such as cigarettes, cigars, pipes, within 1 year?

Has she/he consumed alcohol in the past 30 days (no use, occasional, heavy)?

Is the patient engaged in regular physical activity ( $\geq 30$  minutes per day at least 5 days a week)?



## 02. Examinations

Weight

Height

BMI

Waist circumference

Blood pressure

If BP is  $\geq 140/90$  mmHg repeat measurement at the same visit after 20 minutes.

Retinal examination

Foot examination (Inspect feet in all individuals for deformities, callosities, ulcers in growing toe nails . In already diagnosed diabetes patients refer : annexure no 1)

Other system examinations as relevant

## 03. Investigation

### a. For diagnosis

FBS – venous glucose level after 8 -10 hours overnight fasting, has to refrain from caloric food or drink. Can take water. (If lipid profile is performed along with FBS, fasting should be 12hrs )

RBS – Random venous glucose level

PPBS – venous glucose level 2 hours after a meal. Timing should count from the start of the meal. Usual anti-diabetic drugs should be taken on regular intervals.

HbA1c – when available, should be done only by a standard method.

OGTT– venous glucose level 2hours after taking 75mg of glucose dissolved in 250ml of water (overnight fasting of 8 hours is recommended before the test)

## **b. Identifying complication**

Urine dipstick for protein – presence of albumin or protein is significant when there is no urinary sepsis at the time of urine collection.

In females, urine samples should not be collected during menstruation to avoid contamination.

### *Serum creatinine*

Urine Albumin/Creatinine ratio – early morning spot urine sample is preferred.

\* Microalbuminuria is defined as excretion of 30–300 mg of albumin per 24 hours (or 20–200 mcg/min or 30–300 mcg/mg creatinine) on 2 of 3 urine collections

## **c. Other basic investigations to screen for total CV risk reduction**

Total Cholesterol –

Lipid profile – 12 hours overnight fasting is recommended.

\*\*CV risk using WHO ISH risk prediction chart

## **Diagnostic Criteria**

FBS  $\geq 7$  mmol/l (126 mg/dl) or RBS  $\geq 11.1$  mmol/l (200 mg/dl) with symptoms of diabetes

75g OGTT 2 hour value  $\geq 11.1$  mmol/l (200 mg/dl)

HbA1C  $\geq 6.5\%$  ( use a standardized method)

- \* In symptomatic patients single abnormal test is diagnostic
- \* In primary health care institutions FBS or in symptomatic patients RBS is encouraged.
- \* In asymptomatic patients a repeat test should be performed.

## Treatments

### Treatment of Type 2 Diabetes

#### Lifestyle modification

Interventions targeted at changing the dietary habits, physical activity, losing weight to achieve desired body mass index and cessation of smoking are key elements in the management of diabetes.

#### Medical nutrition therapy

Should be individualized and ideally given by trained health professionals.

Weight loss is recommended (at least 5-10%) for all overweight or obese individuals.

Calorie restricted diet is recommended for weight loss. (this may have to be modified based on individual response)

Routine supplementation with antioxidants and vitamins is not recommended.

Alcohol is best avoided.

#### Physical Activity

A mixture of aerobic, resistance training and muscle strengthening activities are recommended.

Moderate intensity aerobic physical activity is recommended.

At least 150min/week (eg. Brisk walk for 30minutes a day, 5 days a week).

Resistance training is recommended at least twice a week.

eg. Push ups, dumbbells

Encourage muscle-strengthening activities that involve all major muscle groups, 2 or more days per week.

eg. Exercise for abdominal muscles, back muscles and the muscles around the pelvis.

Individuals with diabetes, should be encouraged to reduce sedentary time, particularly by breaking up extended amounts of time (90 min) spent sitting.

---

### **Caution for Physical Activity**

Patients with proliferative diabetic retinopathy, severe non proliferative diabetic retinopathy, uncontrolled hypertension or severe cardiovascular disease should take advice from medical professional before embarking on resistance training.

For those who are unable to walk i.e. open ulcer, foot injury, peripheral neuropathy or osteoarthritis; non-weight bearing exercises eg. Upper limb exercises, lower limb exercises in seated position are suggested.

## **Pharmacological treatments**

### **Initiation of pharmacotherapy**

Metformin is the preferred first-line oral therapy unless contraindicated. It has longstanding evidence for efficacy, safety and cardiovascular risk protection.

At diagnosis, monotherapy with metformin along with lifestyle interventions is the preferred choice as most patients cannot achieve recommended targets on lifestyle interventions alone.

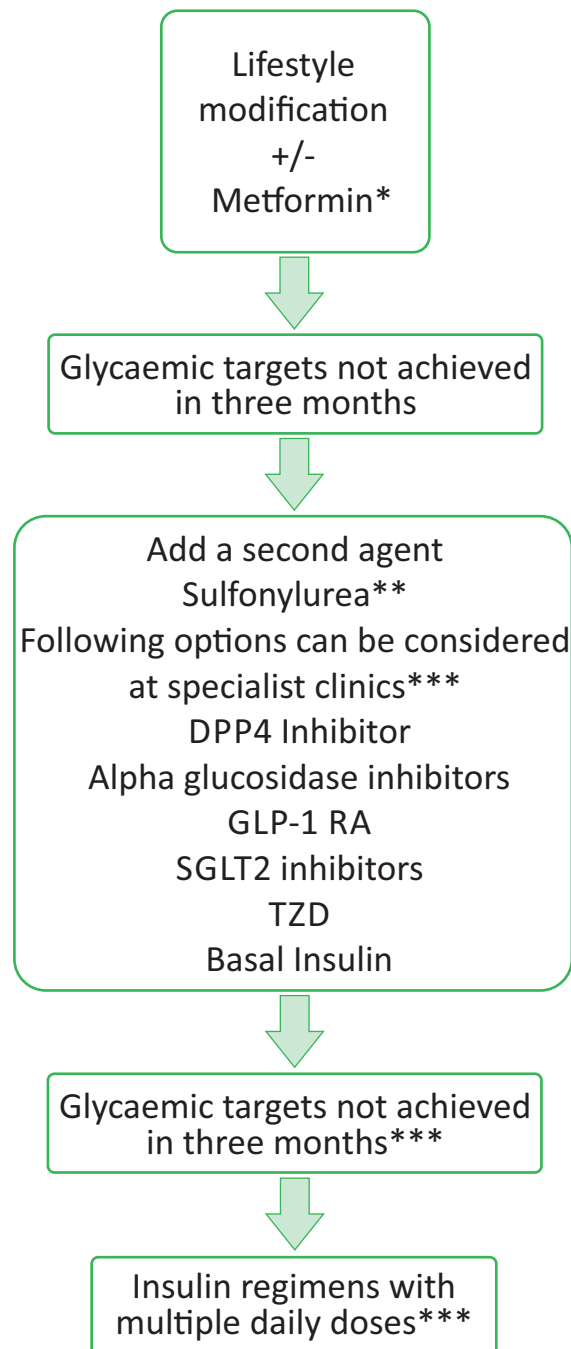
If the FPG is  $>200\text{mg/dL}$  at diagnosis consider starting with two drugs.

In the presence of severe hyper glycaemia ( $>300\text{mg/dL}$ ) consider treatment with dual/triple therapy with insulin.

Consider Insulin therapy if there are severe symptoms or complications.

Early combination therapy is preferred than prolonged monotherapy in achieving glycaemic targets

## Algorithm for glucose lowering in type 2 diabetes



\*if metformin is not tolerated or contraindicated: sulfonylureas, DPP4 Inhibitor, GLP-1 receptor agonist or acarbose can be used as first line medication.

\*\*Sulfonylurea the preferred second choice due to cost, and absence of robust data on superiority of other agents.

\*\*\* Refer to the specialist

## Oral hypoglycaemics

Table 1: Oral hypoglycaemic agents for type 2 diabetes

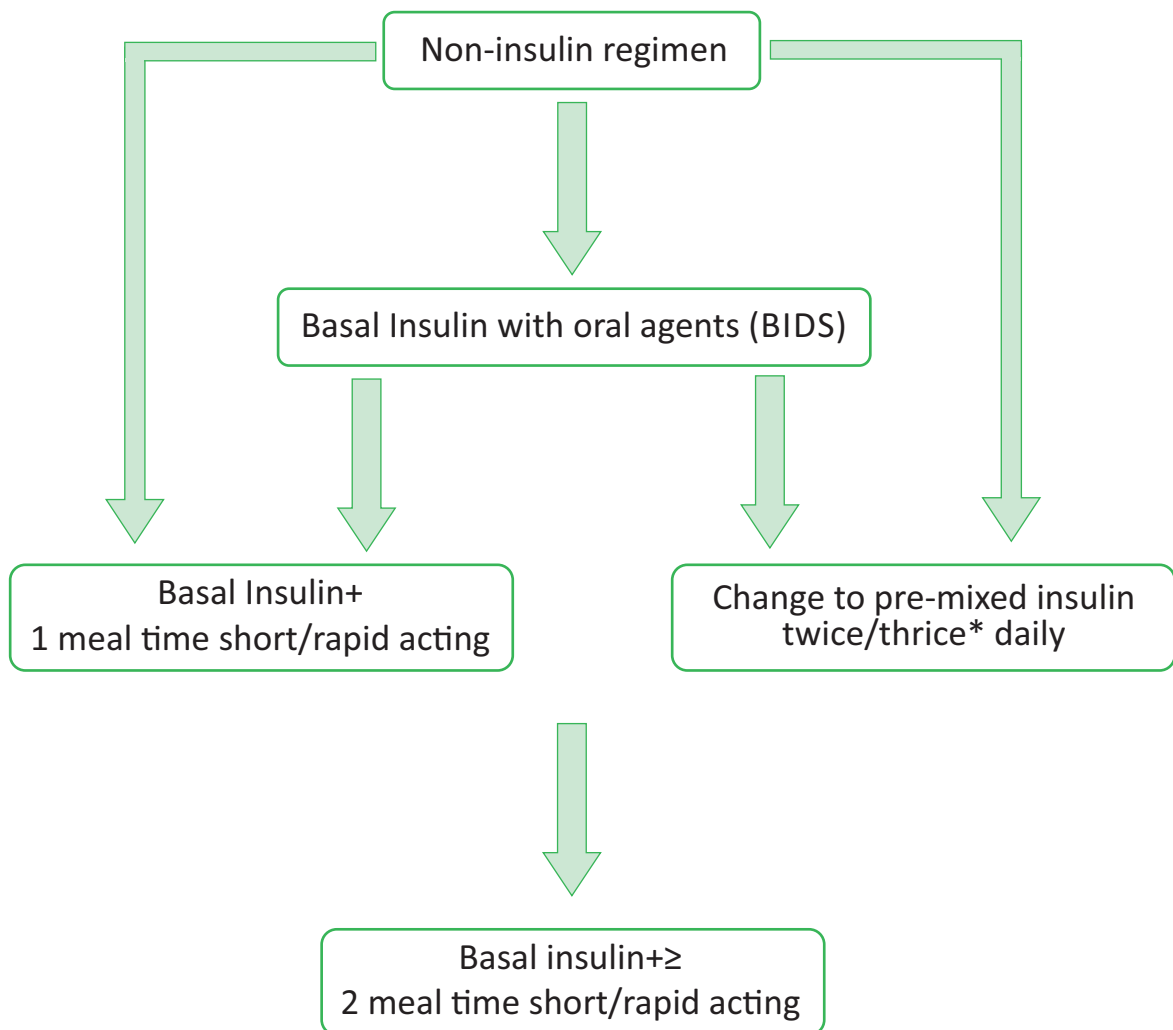
Class/compound	Dose	Advantage	Disadvantage
<b>Metformin</b>	500-2000mg in divided doses Start at a low dose after meals	Extensive experience No weight gain No hypoglycaemia likely Reduced CVD events	GI side effects (diarrhea, abdominal cramping) Lactic acidosis risk (extremely rare) Vitamin B12 deficiency (rare) Multiple contraindications:CKD, Acidosis, hypoxia, dehydration
<b>Sulfonylureas</b>			
<b>Tolbutamide</b>	500 – 2500 mg in 2-3 divided doses	Extensive experience Reduced Microvascular risk	Hypoglycaemia Weight gain? Glibenclamide, Tolbutamide may blunt myocardial ischemic preconditioning Low durability
<b>Gliclazide</b>	40-320mg in 1-3 divided doses		
<b>Gliclazide MR</b>	30-120mg daily		
<b>Glipizide</b>	2.5-20mg in divided doses		
<b>Glibenclamide</b>	2.5-15mg daily		
<b>Glimepiride</b>	1-6mg daily		
<b>Alpha-Glucosidase inhibitors Acarbose</b>	150-600mg in divided doses before meals	No hypoglycaemia Reduced postprandial glucose excursions? Reduced CVD risks	GI side effects (Flatulence, diarrhea) Frequent dosing schedule

## Insulin

Initiation of Insulin therapy should be done at the specialist clinic.

Please adhere to the dose-adjustment advices given by the specialist clinic once referred back.

Figure 2: Sequential insulin strategy in type 2 diabetes

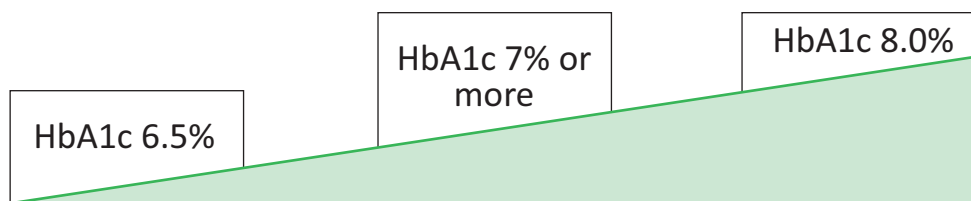


\*Three doses of premixed analogues.

## Treatment goals

### Individualized Glycaemic Targets

Goals should be individualized based on the duration of diabetes, age/ life expectancy, other co-morbid conditions, known cardiovascular disease or advanced microvascular complications, hypoglycaemia unawareness and individual patient concerns.



New onset diabetes

Advanced age

Young age

Multiple co-morbidities

Well motivated patients

Patients with no other co-morbidities

## Glycaemic control-Glycaemic targets

HbA1c	7.0%
Pre-prandial capillary plasma glucose	80-130mg/dl(4.4-7.2 mmol/L)
Peak post-prandial capillary plasma glucose	<180mg/dl (<10.0mmol/L)



## Referral to specialist clinics

### Refer the patient to a specialist clinic for specialist opinion in following conditions

- If complication of diabetes such as diabetic retinopathy, diabetic foot disease (Annexure), diabetic nephropathy (presence of proteinuria or elevated creatinine or  $GFR \leq 60$ )
- DM with two consecutive fasting blood glucose  $> 7.2$  mmol/l (130 mg/dl) despite good compliance with life style modification and drug therapy with maximum tolerated doses of metformin + sulphonylurea
- DM with recent deterioration of vision or no eye examination in past 2 years
- Persistently raised BP  $\geq 140/90$  for any patient in spite of optimum treatment with the combination of 3 drugs including a diuretic (thiazides, calcium channel blockers, ACEI<sup>\*\*</sup>)
- Total cholesterol  $\geq 7$ mmmol/l (270 mg/dl) in individuals less than 35yrs
- Known heart disease, stroke, TIA, PVD or kidney disease who are not being followed up by specialist clinic
  - *this is to obtain a plan of management which can be continued at the primary level*
- To evaluate additional symptoms like angina, shortness of breath on exertion, Intermittent claudication
- Management of complications
- Management of co-morbidities & Total risk factor management

**When patient is referred back by the specialist clinic continue the management with recommendation**

## Annexure1 - Diabetic Foot Risk Assessment Form

### A. information



Name: \_\_\_\_\_ Age: \_\_\_\_\_ yrs Gender: M F

Hospital/Clinic No: \_\_\_\_\_ Contact info: \_\_\_\_\_

DM Type: \_\_\_\_\_ Duration: \_\_\_\_\_ yrs Treatment: None/ OHD/ Insulin HbA1C: \_\_\_\_\_

Impaired vision IHD HT CKD CVA PVD Smoking: present/ Past/ None Other: \_\_\_\_\_

General Assessment

Skin and Nails					
Dry Skin	R	L	Web space infection	R	L
Callus/corns	R	L	Nail bed infection	R	L
Fissures/ cracks	R	L	In growing toe nails	R	L
Mark on the following diagram					
Right			Left		
					
C=Callus F=Fissure E=Cellulitis M=Maceration U=Ulcer A=Amputation					

### B. Risk Category

Deformity (Any 1 of the following)	R	L	Neuropathy (any 1 of the Following)	R	L
Hammer toes	R	L	Reduced ankle reflex	R	L
Claw toes	R	L	Positive Monofilament Test-if	R	L
Overlapping digits	R	L	unable to feel less than 8 - (+)		
Bunion	R	L	Positive Vibration Test	R	L
Arch deformities	R	L	Abnormal Biothesio meter Test -	R	L
Charcot	R	L	loss of protective sensation		
Vasculopathy (No palpable DP & PT)			Other	R	L
Absent Dorsalis pedis	R	L	Previous ulceration	R	L
Absent Posterior tibial	R	L	Previous amputation	R	L
ABPI	.....	.....	Specify- .....		
CLI (IF ABPI = <0.5)	R	L	On renal Replacement therapy	Y	N

R	L	Low Risk	No risk factors present except callus alone	Annual follow up
R	L	Moderate Risk	Deformity or Neuropathy or Non critical limb ischemia	6 months follow up
R	L		High Risk	

C. Emergency acute foot conditions

Acute Diabetic Foot					
Cellulitis	R	L	Gangrene	R	L
Acute Ulcer	R	L	Acute Charot	R	L
Sepsis	R	L	Other	R	L

D. Foot care & Footwear

Foot care			Footwear		
Satisfactory Foot hygiene	Y	N	Appropriate footwear	R	L
Education received	Y	N	Normal shoe	R	L
Satisfactory adherence	Y	N	Diabetic Shoe	R	L
			Therapeutic shoe	R	L

E. Referrals & Treatment

Treatment	Referrals
Debridement of callus	Diabetic clinic
Offloading shoe	Vascular clinic
Medication	Ulcer clinic
Education	Orthotist
Physiotherapy	Other

Comments: : .....

: .....

: .....

: .....

: .....

: .....

: .....

: .....

: .....

## List of contributors

### Representatives from Non Communicable Disease Unit

- Dr. S.C Wickramasinghe - Deputy Director General (NCD)
- Dr. V.T.S.K.Siriwardana - Director/ NCD Unit
- Dr. D. S. Virginie Mallawaarachchi - Consultant Community Physician/ NCD Unit
- Dr. Shanthi Gunawardana - Consultant Community Physician/ NCD Unit
- Dr. Kaushalya Edirisuriya - Medical Officer/ NCD Unit
- Dr. Rishmi Hewawasam - Medical Officer/ NCD Unit

### Representatives from the Sri Lanka College of Endocrinologists

- Dr. Manilka Sumanatilleke - Consultant Endocrinologist
- Dr. Noel Somasundaram - Consultant Endocrinologist
- Dr. Prasad Katulanda - Consultant Endocrinologist
- Dr. Uditha Bulugahapitiya - Consultant Endocrinologist

### Representatives from the Sri Lankan Society of Internal Medicine

- Dr. Suranga Ravinda Manilgama - Consultant Physician
- Dr. N Madhuwanthi Hettiarachchi - Consultant Physician

### Representatives from the Ceylon College of Physicians

- Dr. Chaminda Garusinghe - Consultant Physician
- Dr. Asanka Rathnayake - Consultant Physician



---

**Management of Diabetes Mellitus  
Guideline for  
Primary Health Care Providers**

