Management of Diabetes Mellitus

Guideline for Primary Health Care Providers

Directorate of Non Communicable Diseases (NCD)

Ministry of Health

After completing this session participants will be able to:

- Identify the eligible clients for screening for diabetes in primary health care setting
- Screen clients and diagnose diabetes at primary health care setting
- Manage diabetes at primary health care setting
- Follow up patients with diabetes at primary health care setting
- Refer to specialist clinics from primary health care setting

Introduction to Diabetes

Diabetes mellitus (DM) is a metabolic disorder characterized by chronic hyperglycemia due to defects in:

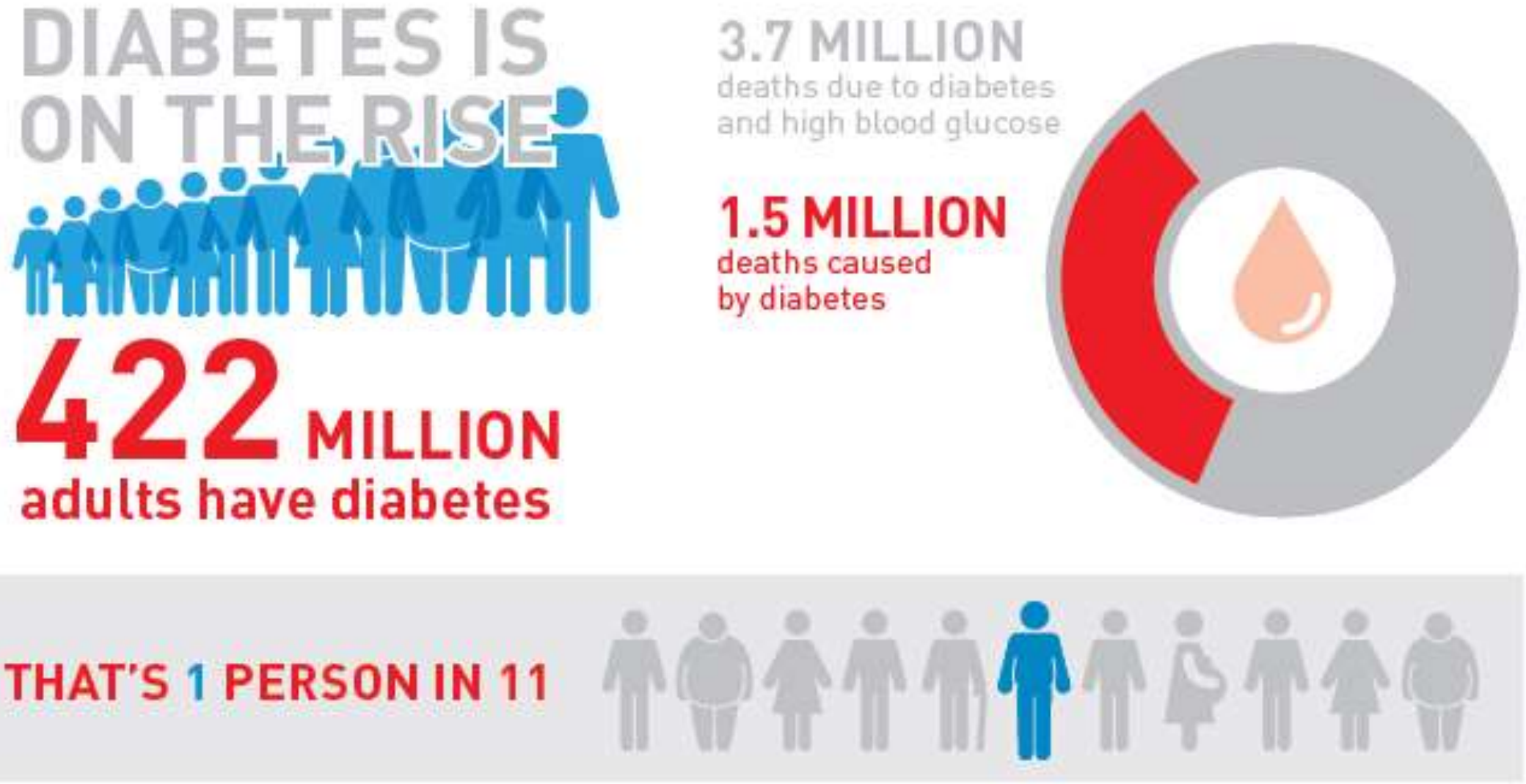
- insulin secretion and/or
- insulin action and/or
- other metabolic derangements (including *disturbances of carbohydrate, fat and protein metabolism*)

CLASSIFICATION OF DIABETES MELLITUS 2019 WHO

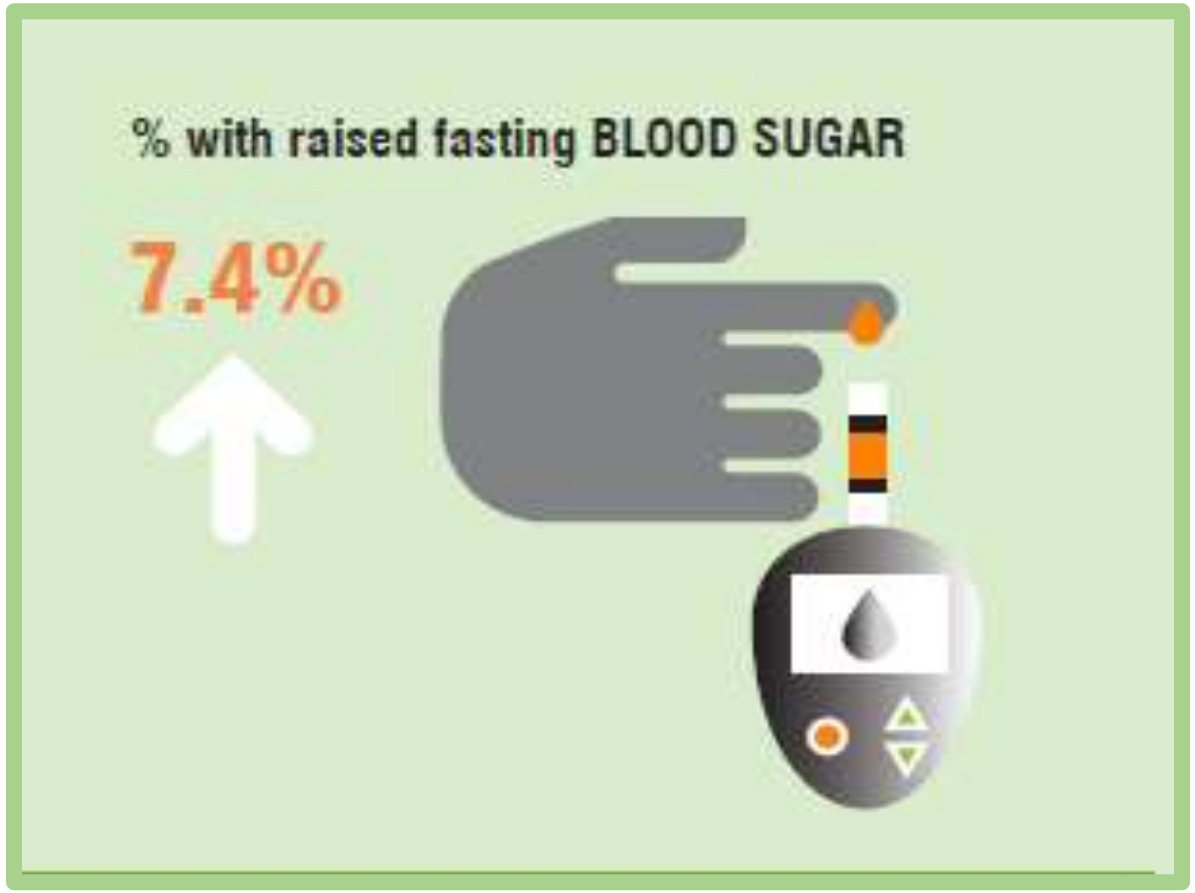
Types of Diabetes

Type	Common presentation	Characteristics
Type 1	• Only 10% of all people with diabetes have type 1 diabetes • Usually develops in children or young adults	• Autoimmune reaction • body produces very little or no insulin • Need daily injections of insulin • cannot be prevented • Triggering factor for destruction of insulin-producing cells is unclear
Type II	• Accounting for around 90% of all diabetes cases. • Most commonly diagnosed in older adults, but is increasingly seen in children, adolescents and younger adults due to rising levels of obesity, physical inactivity and poor diet.	Involves insulin resistance in nearly all cases Treatment is healthy lifestyle!!! Over time most will require oral drugs and/or insulin to control blood glucose levels
GDM	high blood glucose during pregnancy associated with complications to both mother and child.	GDM usually disappears after pregnancy but women affected and their children are at increased risk of developing type 2 diabetes later in life.

Burden of disease



STEPS survey 2015 –NCDs - DM



Services at primary health care setting

1. Screening
2. Diagnosis
3. Treatment and follow up
4. Refer to the specialist care for management of complications

1. Screening

Screening should include

I. Screening for undiagnosed diabetes
II. Screening for complications of diabetes in newly diagnosed patients
III. Screening for co-morbidities to assess the total Cardiovascular (CV) risk

- **Screening of all 3 above aspects should be done**
  A. during history taking
  B. targeted examination
  C. investigations

1. Indications for screening for undiagnosed diabetes

a.) Age ≥ 35 years

b.) Age between 20 – 35 years if they have any of the following

- Overweight (waist circumference - male ≥90cm, female ≥80cm or BMI ≥ 25 kg/m)
- Sedentary life style
- Raised BP (≥140/90mmHg in individuals)
- Symptoms suggestive of diabetes mellitus
- History of diabetes in first degree relatives
- Dyslipidemia
- History of Gestational Diabetes mellitus (GDM) or baby delivered -birth weight> 3.5 kg
- Features of poly cystic ovarian syndrome /insulin resistance
- 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 tools

A. History
B. Examination
C. Investigation

I. Screening for undiagnosed diabetes

A. History	B. Ex	C. Ix
1. Symptoms of diabetes • Frequent urination (polyuria) • Increased thirst (polydipsia) • Increased hunger • Unintentional weight loss • General fatigue (Which is very nonspecific BUT COMMON • Recurrent infections (skin , genitourinary infections)	Weight; Height BMI Waist circumference BP Other systems	FBS PPBS RBS HbA1c OGTT
2. Risk factors • Age, gender, occupation • Family history of Diabetes, IHD, or premature cardiovascular diseases in first degree relatives (male <55years, female <65years) • Smoker within 1 year .... • Alcohol intake • Physically active or sedentary • Diet (Fast food, salt, sugar, habits)		

II. Screening for complications of diabetes clients

Why patients may present with complications when diagnosed for the first time?

II. Screening for complications of diabetes clients

- Majority (90% of the cases) belong to the T2Dm
- T2DM symptoms are often not severe, or may be absent, owing to the slow pace at which the hyperglycemia is worsening.
- As a result, **in the absence of biochemical testing**, hyperglycemia sufficient to cause pathological and functional changes may be present for a long time before a diagnosis is made, resulting in the presence of complications at diagnosis.
- **It is estimated that a significant percentage of cases of diabetes (30–80%, depending on the country) are undiagnosed.**

II. Screening for complications of diabetes clients

- What are the common complications of T2DM?
- What need to be asked from the client in the history to elicit complications?

II. Screening for complications of diabetes clients

Complication		A. History	B. Examination	C. Investigations
Eye	Glaucoma	Gradual deterioration of vision	Vision impairment Ophthalmoscopy - Retinal examination	
	Cataracts	eye's clear lens clouds, blocking sight.		
	retinopathy:	Vision impairment		
	Macular edema	vision blurs and can be lost entirely		
Nephropathy		Non specific, malaise, tired Loss of appetite Urine output/Frothy urine etc	Pallor Peri-orbital/ankle edema Body itching	Urine dipstick for protein S.Creatinine Hb S. Electrolytes

1. 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.
2. 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

II. Screening for complications of diabetes clients ctd..

Complication		A. History	B. Examination
Neuropathy	1. Peripheral neuropathy	○ Tingling ("pins and needles" in feet) ○ Pain or increased sensitivity (burning, stabbing or shooting pains feet; ○ Numbness or weakness ○ Unsteady when walking	Foot examination (blood flow, check for numbness deformities, Callosities, ulcers, ingrowing toe nails)
	2. Autonomic neuropathy	○ bladder control problems, ○ urinating very often or not often enough, ○ frequent bladder infections	
		○ small intestine ○ Indigestion or heartburn, Bloated ○ Nauseous / vomit undigested food ○ diarrhea, constipated	
		○ erectile dysfunction	
		○ Heart and blood vessels ○ Fainted after getting up or changing of position, or suddenly for no reason, palpitation at rest	

III. Screening for comorbidities of diabetes clients

A. History	B. Ex	C. Investigations
• Is there a family history of ischemic heart disease, premature cardiovascular diseases and diabetes in first degree relatives (male relative:<55years, female relative:<65years)	Blood pressure	1. Total Cholesterol 2. Lipid Profile (12 hours overnight fasting is recommended) 3. CV risk using WHO ISH risk prediction chart
• 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 (≥30 minutes per day at least 5 days a week)?	BMI	

2. Diagnosis

Diagnostic Criteria			
Test	mmol/l	mg/dl	
Fasting blood glucose (FBG)a,b	≥7	≥126	venous glucose level after 8 -10 hours overnight fasting. Has to refrain from caloric food or drink. Can take water. (If lipid profiles performed along with FBS, fasting should be 12hrs)
Random plasma glucose (RPG)b	≥11.1	≥200	Random venous glucose levels
Plasma glucose two hours after a 75 g Oral glucose load-OGTT	≥11.1	≥200	venous glucose level 2 hours after taking 75mg of glucose, dissolved in 250ml of water (overnight fasting of 8 hours is recommended before the test)
HaemoglobinA1c		≥6.5%	No need of fasting
PPBS	≥11.1	≥200	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.

* 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.

3. Treatment of Type 2 Diabetes

1. Lifestyle modification
2. Medical nutrition therapy
3. Physical Activity
4. Pharmacological treatments

3. Treatment of Type 2 Diabetes

1. Lifestyle modification	• Changing the dietary habits • Physical activity, • Achieve desired body mass index (BMI) • Cessation of smoking
2. Medical nutrition therapy	• Should be individualized • 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.

3. Treatment of Type 2 Diabetes

3. Physical activity	A mixture of aerobic, resistance training and muscle strengthening activities are recommended. • Moderate intensity aerobic physical activity -At least 150min/week (e.g.. Brisk walk for 30minutes a day, 5 days a week) • Resistance training is recommended at least twice a week. e.g.. Push ups, dumbbells • Muscle-strengthening activities that involve all major muscle groups, 2 or more days per week. e.g.. Exercise for abdominal muscles, back muscles and the muscles around the pelvis. • Reduce sedentary life style -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.

4. Pharmacological treatments

Initiation of pharmacotherapy

- At diagnosis, monotherapy with metformin along with lifestyle interventions is the preferred choice
- Metformin is the preferred first-line oral therapy unless contraindicated.
- If the FPG is >200mg/dL at diagnosis, consider starting with two drugs.
- In the presence of severe hyperglycaemia (>300mg/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 mono therapy in achieving glycemic targets

Algorithm for glucose lowering in type 2 diabetes

Diagnose

- Lifestyle modification+/-Metformin
- if metformin is not tolerated or contraindicated: sulfonylureas, DPP4 Inhibitor, GLP-1 receptor agonist or acarbose can be used as first line medication.

Review 3 months

- Add a second agent Sulfonylurea if poor glycemic targets
- Sulfonylurea the preferred second choice due to cost, and absence of robust data on superiority of other agents.

Review 3 months

- If poor glycemic control, refer to the specialist (for insulin regimens with multiple daily doses)

Oral hypoglycaemics T2DM

Class/compound	Dose	Advantage	Disadvantage
Metformin	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
Sulfonylureas			
Tolbutamide	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
Gliclazide	40-320mg in 1-3 divided doses		
Gliclazide MR	30-120mg daily		
Glipizide	2.5-20mg in divided doses		
Glibenclamide	2.5-15mg daily		
Glimepiride	1-6mg daily		
Alpha-Glucosidase inhibitors Acarbose	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

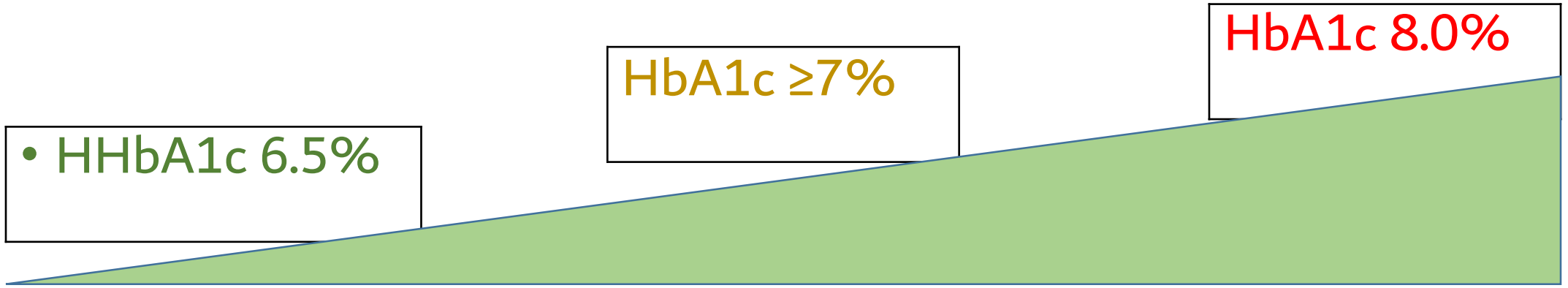
- **Initiation of Insulin therapy should be done at the specialist clinic.**
- **Please adhere to the dose-adjustment advices given by the specialist clinic once referred back.**
- **Sequential insulin strategy in T2DM (pg. 10)**

Treatment goals- Individualized Glycemic Targets

Goals should be individualized based on

- Duration of diabetes
- Age
- Other co-morbid conditions
- Known CVD or advanced microvascular complications
- Hypoglycemia
- Unawareness and individual patient concerns.

Treatment goals



- Newly onset diabetes
- Young age
- Well motivated patients
- Patients with no other co-morbidities

Advanced age

Multiple co-morbidities

Glycemic control-Glycemic targets

Test	Target value
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

- If complication –
  - diabetic retinopathy
  - diabetic foot disease
  - diabetic nephropathy (proteinuria or elevated creatinine or GFR ≤ 60)
- DM with 2 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 y
- Persistently raised BP ≥140/90 for any patient in spite of optimum treatment with the combination of 3 drugs including a diuretic (thiazides, calcium channel blockers, ACEI)

Referral to specialist clinics

- Total cholesterol ≥7mmmol/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 / HD 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			
R	L	Low Risk	No risk factors present except callus alone	Annual follow up
R	L	Moderate Risk	Deformity or	6 months follow up
			Neuropathy or	
			Non critical limb ischemia	
R	L	High Risk	Previous ulceration or	3 months follow up
			Previous amputation or	
			On renal replacement therapy or	
			Non critical limb ischemia in combination with callus and/or deformity	

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 : _____

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