SEMDSA
Society for Endocrinology, Metabolism and Diabetes of South Africa

THE 2012 SEMDSA GUIDELINE FOR THE MANAGEMENT OF TYPE 2 DIABETES MELLITUS: SUMMARY

INTERPRETATION OF TESTS USED FOR SCREENING AND DIAGNOSIS OF TYPE 2 DIABETES

Fasting plasma glucose	<5.6mmol/L Diabetes excluded	6.0 to 6.9mmol/L Impaired fasting glucose[1]	⩾7.0mmol/L Diabetes[1]
2hr-plasma glucose	<7.8mmol/L Normal glucose tolerance	7.8 to 11.0mmol/L Impaired glucose tolerance[1]	⩾11.1mmol/L Diabetes[1]
Random plasma glucose	<5.6mmol/L Diabetes excluded	5.6 to 11.0mmol/L Inconclusive[2]	⩾11.1mmol/L Diabetes[1]
HbA_{1C}[3]	<5.7% Diabetes excluded	5.7 to 6.4% Inconclusive[2]	⩾6.5% Diabetes[1]

[1]A single abnormal test result confirms the diagnosis of diabetes in non-pregnant individuals with classic symptoms of diabetes (polyuria, polydipsia and weight loss) or metabolic decompensation (ketoacidosis or hyperosmolar non-ketotic state). In asymptomatic individuals the diagnosis of diabetes, impaired fasting glucose (IFG) and/or impaired glucose tolerance (IGT) or must be confirmed with a repeat measurement as soon as is convenient.
[2]The OGTT is the preferred test in high-risk individuals and in those with inconclusive results from other tests.
[3]HbA_{1C} : refers to glycated haemoglobin measurement performed in the absence of conditions that preclude its accurate measurement, and using a DCCT standardised assay from an NGSP certified laboratory. Refer to the fulltext guideline for details.
When 2 or more tests yield discordant results the patient is classified as having the more abnormal disorder of glucose regulation.

SCREENING FOR TYPE 2 DIABETES

Patient profile	Start screening at age
Adult without risk factors for diabetes	45yrs
Overweight adult with ≥ 1 other risk factor* for diabetes	18yrs
Obese children (BMI > 85th centile) with 2 or more other risk factors (family history, high risk ethnic group, clinical features of insulin resistance)	10yrs
Obese children (BMI ≥ 99th centile)	10yrs

*Other risk factors for diabetes include physical inactivity, family history of diabetes, high-risk ethnic group, history of cardiovascular disease, previous gestational diabetes or baby > 4 kg, central obesity, hypertension, dyslipidaemia, previous IFG or IGT, acanthosis nigricans and polycystic ovarian syndrome.
If the screening test excludes diabetes then the test should be repeated at least every 2-3 years.

GLYCAEMIC TARGETS

Patient profile	Target HbA_{1C}	Target FPG	Target PPG
Young, newly diagnosed no cardiovascular disease or low CV risk	≤ 6.5%	4.0 - 7.0 mmol/l	4.4 - 7.8 mmol/l
Majority of patients	≤ 7%	4.0 - 7.0 mmol/l	5.0 -10.0 mmol/l
Elderly, hypoglycaemic unaware, poor short-term prognosis, established CV disease or high CV risk	≤ 7.5-8.0%	5.0 - 8.0 mmol/l	< 12.0 mmol/l

Aim to achieve the lowest HbA_{1C} without causing hypoglycaemia.
Estimated average glucose (EAG) is more relevant to patient education and laboratories should report EAG in addition to HbA_{1C}.

TARGETS FOR BLOOD PRESSURE, LIPID AND WAIST CIRCUMFERENCE

Blood Pressure
Systolic BP target: 120 to 140mmHg
Diastolic BP target: 70 to 80mmHg
Target blood pressure has changed since the 2009 guideline. The new targets include a lower limit as blood pressures lower than these targets may increase morbidity.

Waist Circumference
<80cm: Women
<90cm: Men of South Asian descent
<94cm: Other men

Lipids
Total cholesterol: < 4.5mmol/L
LDL cholesterol: < 1.8mmol/L[a]
HDL cholesterol: > 1.0 mmol/L (men)
> 1.2 mmol/L (women)
Triglycerides: < 1.7mmol/L

[a]The LDL-cholesterol goal is < 2.5 mmol/l in patients with type 2 diabetes who meet all of the following criteria:
1. No cardiovascular disease and no chronic kidney disease
2. Less than 40 years old OR duration of diabetes less than 10 years
3. No other cardiovascular risk factors

KEY RECOMMENDATIONS FOR DIABETES VISITS

Blood pressure, weight, waist, BMI, foot inspection	Every routine diabetes visit
Comprehensive Foot Examination	Annually; more frequently in patients with high-risk foot conditions
Eye examination for retinopathy	Annual direct fundoscopy, indirect fundoscopy or fundus photographs; more frequently if significant retinopathy is present.
Referral to diabetes educator and dietician	Annually; more frequently if needed.
HbA_{1C}	Every 3 months or whenever therapy changes, if not at target. At least 6-monthly if HbA_{1C} is at target.
Lipid Profile	Annually; more frequently if lipids are high or treatment has been altered.
Microalbuminuria	Annual measurement of urinary albumin:creatinine ratio (ACR) if dipstick proteinuria is negative. Repeat ACR for confirmation if positive.
Serum potassium, creatinine and eGFR	Annually (at least); more frequently if abnormal.
ECG	Annually

LIFESTYLE MODIFICATION

Diabetes self-management education (DSME) is the cornerstone of diabetes care. An evidence-based, structured education programme should be offered to all patients at the time of diagnosis, and consolidated at regular intervals thereafter. The aim is to promote patient self-management. The programme should be presented by appropriately trained diabetes educators.

Medical nutrition therapy (MNT) is important for the prevention, treatment and self-management of diabetes. Weight loss is an important therapeutic intervention in overweight individuals with type 2 diabetes, and significant weight loss can result in diabetes remission. Referral to a dietician/nutritionist is recommended. Patients should be encouraged to implement healthy lifestyle changes, including reducing caloric intake, consuming less saturated fats, trans fats, cholesterol and sodium, and increasing physical activity (at least 150 minutes of moderate intensity exercise per week e.g. brisk walking, cycling or dancing). Even moderate weight loss (5 to10% of body weight) can significantly improve blood glucose control, dyslipidaemia and blood pressure.

Cessation of cigarette smoking is mandatory for all type 2 diabetes patients.

BLOOD PRESSURE TREATMENT RECOMMENDATIONS

Diagnosis of hypertension: SBP ≥ 140mmHg or DBP ≥ 80mmHg on 2 separate occasions. Ambulatory blood pressure monitoring should be used when "white-coat hypertension" is suspected. The target blood pressure for most patients should NOT be lower than 120mmHg systolic and 70mmHg diastolic.

At diagnosis, initiate drug therapy simultaneously with lifestyle measures (exercise, weight loss, low sodium, high fibre diet).

The 3 main drug classes for treatment of hypertension are ACE-inhibitors (ACE-I) or angiotensin receptor blockers (ARB's), thiazide diuretics and calcium-channel blockers (CCB's).

When microalbuminuria is absent and eGFR is normal, then initial monotherapy should begin with ANY 1 of these 3 drug classes although thiazides and CCB's are more effective initial drugs in Black patients.

When eGFR is reduced, or when mico- or macro- albuminuria is persistent then an ACE-I (or ARB) is the preferred initial drug, and non-dihyropyridine CCB's (verapamil or diltiazem) may be preferred over dihydropyridine CCB's as second-line agents.

When eGFR is < 50ml/min then a loop diuretic (furosemide or torasemide) is preferred to thiazides.

If blood pressure remains above target, then the remaining unused drug classes can be added consecutively. Patients with elevated blood pressure despite the use of these 3 drug classes (ACE-I/ARB, CCB and diuretic) should be referred for specialist evaluation.

Monitor potassium and serum creatinine levels within 2 weeks of initiating ACE-I, ARB or diuretic therapy for worsening renal function and hypo/hyper-kalaemia. Avoid any combination of ACE-I, ARB or spironolactone because of the risk of hyperkalaemia.

Poedal oedema is not uncommon with amlodipine and nifedipine.

LIPID TREATMENT RECOMMENDATIONS

Modification of the diet and lifestyle are essential for lipid management. Referral to a nutritionist / diabetes educator is recommended.

The primary goal of lipid therapy is to achieve the LDL-C target, and statins are the first-line drugs to achieve this target. The initial choice of statin should be based on potency and ability to achieve the LDL-C target.

Regardless of baseline lipid levels, statins are indicated for all type 2 diabetes patients who:
- Have existing cardiovascular disease
- Have chronic kidney disease (eGFR < 60 ml/minute/1.73m^2).
- Are older than 40 years of age or have diabetes of longer than 10 years' duration, with one or more additional cardiovascular risk factor, i.e. hypertension, cigarette smoking, low HDL-cholesterol level, family history of early coronary heart disease, and micro- or macro-albuminuria.

Specialist referral for additional therapy is recommended if:
- LDL-C remains above target despite the highest tolerated dose of the most potent statin
- Serum triglycerides (TG) >15mmol/L at diagnosis,
- TG >5mmol/L despite good glycaemic control
- TG >2mmol/L despite achieving the LDL-C target

ASPIRIN THERAPY

Aspirin (75 to 300mg once daily) is indicated for secondary prevention in all patients with established cardiovascular disease.

Aspirin for primary prevention (in those patients without known cardiovascular disease) is indicated in patients with a >10% CV risk over 10 years i.e.
- Men >50yrs or women >60yrs old with one more of the following. risk factors:
  - Family history of premature CVD
  - Smoker
  - Hypertension
  - Hypercholesterolaemia
  - eGFR < 60ml/min

Glycaemic control: SEMDSA 2012 algorithm for type 2 diabetes

Use this algorithm only if the patient does NOT have features of severe decompensation[a].
Progress down this algorithm within 3 months if HbA_{1C} remains above 7% (or individualised target).
Choose therapies that are likely to produce the HbA_{1C} reduction required to achieve the target[b]
Do not proceed with drug therapy without annual serum eGFR measurement

LIFESTYLE MEASURES PLUS	PREFERRED THERAPIES	ALTERNATIVE THERAPIES FOR SPECIAL CIRCUMSTANCES[c]		
Step 1: Initiate at least one oral drug at diagnosis	Metformin	SU	DPP4i	Acarbose
↓				
STEP 2: Combine any 2 drugs[d]	Metformin + SU	Incretin	Acarbose	Basal Insulin
↓				
Step 3: Combine 3 drugs	Metformin + SU + Basal Insulin (or Metformin + Premix Insulin)	Metformin + SU + Incretin	Metformin + SU + Acarbose	
↓				
Step 4: More Advanced Therapies	Refer for basal bolus insulin ± additional therapies	Metformin + Pre-mix insulin (if not used yet)		

SU = sulphonylurea but not glibenclamide ; DPP-4i = Dipeptidyl peptidase-4 inhibitor
[a]Severe decompensation includes any of: FPG > 15mmol/L, HbA_{1C} > 11%, marked polyuria & polydipsia, weight loss > 5% or ketoacidosis. Refer this patient for specialist care (Step 4).
[b,c] Refer to full-text guideline (www.semdsa.org.za)
[d]If at diagnosis, the patient's HbA_{1C} is >9% without features of severe decompensation, consider initiating therapy at STEP 2.

Pharmacotherapy for hyperglycaemia

Initiate drug therapy with metformin (unless contraindicated) at diagnosis. Consider initial therapy with 2 oral agents when the HbA_{1C} >9%. Initiate insulin therapy at diagnosis for decompensated hyperglycaemia.

Metformin optimum dose is 2000mg/d (1g BID); maximum dose should not exceed 2550mg/day (850mg TID). Do not exceed 1000mg/d when eGFR <45ml/min; discontinue metformin when eGFR < 30ml/min. GI side effects are common but often transient. The extended release formulation should be used for intolerable GI side effects. Lactic acidosis is uncommon in the absence of metformin contraindications. Be aware that vitamin B12 deficiency may occur.

Sulphonylureas (SU's) are the preferred 2nd line oral agent. Glibenclamide should not be used because of the increased risk of severe and prolonged hypoglycaemia. The preferred SU's are gliclazide (and its modified release formulation), glimepiride and glipizide. Be aware of the greater hypoglycaemia risk and dose adjustments with renal impairment. Modest weight gain may occur with SU's.

Incretin based therapies: DPP4 and GLP-1 agonist therapy carry a low risk of hypoglycaemia. DPP4i are weight neutral, while injectable GLP-1 agonists can cause weight loss. However they lack outcomes data and are more expensive than SU's. They are preferred in situations where the risk of potential hypoglycaemia or weight gain with other therapies is significant, or when insulin therapy is not feasible. Therapy beyond 6 months should only continue if there has been an adequate therapeutic response.

Insulin therapy: May be indicated at any stage when glycaemic control is suboptimal. Basal (intermediate or long-acting) insulin can be initiated at a dose of 10u at bedtime, and up-titrated by 2u every 3-7 days until the target fasting glucose is attained. Insulin therapy must always be accompanied with adequate education. self blood glucose monitoring (SBGM), and titration algorithms. Weight gain and hypoglycaemia can be significant complications of insulin therapy.

Glitazones (thiazolidenediones) are not recommended therapies.

Specialist referral is appropriate at any stage if glycaemic targets are not met.

Refer to full text guideline (www.semdsa.org.za) for more details.