Philippine Practice Guidelines on the Diagnosis and Management of Diabetes Mellitus

UNITE for Diabetes Philippines

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Outline

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PART 1: Screening and Diagnosis

How is Diabetes Classified?

- **Type 1 diabetes mellitus (formerly insulin dependent diabetes mellitus or Juvenile diabetes mellitus)**
  - results from auto-immune beta-cell destruction, leading to absolute insulin deficiency
  - Typically but not exclusively in children
- **Type 2 diabetes mellitus (formerly non-insulin dependent diabetes mellitus or adult-onset DM)**
  - results from a progressive insulin secretory defect on the background of insulin resistance
- **Gestational diabetes mellitus (GDM)**
  - diabetes first diagnosed during pregnancy
- **Secondary diabetes**
  - e.g., genetic defects in beta cell function or insulin action, diabetes of the exocrine pancreas (pancreatitis, cystic fibrosis), drug- or chemical-induced diabetes (such as from the treatment of AIDS, after organ transplantation, glucocorticoids), other endocrine diseases (Cushing's syndrome, hyperthyroidism)

References:
1.) Diabetes Care, Volume 31, Suppl 1, January 2008.|2.) Diabetes Care, Volume 32, Suppl 1, January 2009. | 3.) Standards of Medical Care in Diabetes- 2010. Diabetes Care, Volume 33, Suppl 1, January 2010

Table 1. Differentiation between Type 1 and Type 2 Diabetes Mellitus (especially in younger individuals)		
Characteristics	**Type 1 Diabetes Mellitus**	**Type 2 Diabetes Mellitus**
Onset	Acute - symptomatic	Slow – often asymptomatic
Clinical Picture	Weight loss, polyuria, polydipsia	If symptomatic, similar picture as T1 DM – weight loss, polyuria, polydipsia • Obese • Strong family history of T2DM • Polycystic ovary syndrome (PCOS)
Ketosis	Almost always present	Usually absent
C-Peptide	Low / absent	Normal / elevated
Antibodies	• ICA positive • Anti – GAD positive • ICA 512 positive	• ICA negative • Anti – GAD negative • ICA 512 negative
Therapy	Insulin	Lifestyle, oral anti - diabetic agents, insulin
Associated auto-immune diseases	Yes	No

Reference: International Diabetes Federation Western Pacific Region Guidelines 2005

Screening and Testing in Asymptomatic Individuals

- **Should universal screening be done and how should screening be done?**
  - All individuals being seen at any physician's clinic or by any healthcare provider should be evaluated annually for risk factors for type 2 diabetes and pre-diabetes.
  - Universal screening using laboratory tests is not recommended as it would identify very few individuals who are at risk.
- **Who should undergo laboratory testing for diabetes/prediabetes?**
  - Laboratory testing for diabetes and prediabetes is *recommended for individuals with any of the risk factors* for Type 2 diabetes mellitus.

Screening and Testing in Asymptomatic Individuals

- Laboratory Testing should be considered in all adults >40 years old
- Consider earlier testing if with at least one other (other than age) risk factor for diabetes
- Obesity, pre-diabetes, components of the metabolic syndrome, PCOS, previous GDM, family history and schizophrenia are some of the risk factors for DM
    - Among the risk factors enumerated, **presence of IGT, IFG, PCOS, and history of GDM are correlated strongly with DM occurrence**

Table 2. Demographic and Clinical Risk Factors for Type 2 DM

- Testing should be considered in all adults ≥40 yo
- Consider earlier testing if with at least one other risk factor as follows:
    - History of IGT or IFG
    - History of GDM or delivery of a baby weighing 8 lbs or above
    - Polycystic ovary syndrome (PCOS)
    - Overweight: Body Mass Index (BMI)[2] of ≥23 kg/m^2 or Obese: BMI of ≥25 kg/m^2, or
    - Waist circumference ≥80 cm (females) and ≥90 cm (males), or Waist-hip ratio (WHR) of ≥1 for males and ≥0.85 for females
    - First degree relative with Type 2 diabetes
    - Sedentary lifestyle
    - Hypertension (BP ≥140/90 mm Hg)
    - Diagnosis or history of any vascular diseases including stroke, peripheral arterial occlusive disease, coronary artery disease
    - Acanthosis nigricans
    - Schizophrenia
    - Serum HDL <35 mg/dL (0.9 mmol/L) and/or
    - Serum Triglycerides >250 mg/dL (2.82 mmol/L)

Screening and Testing in Asymptomatic Individuals

- **In what setting/s should testing for diabetes be done?**
  - Testing should ideally be carried out within the healthcare setting (clinics, hospitals, local health centers) because of the need for follow-up and discussion of abnormal results by qualified health care professionals (nurse, diabetes educator, physician).
  - Testing at any setting should be supervised by a qualified health care professional.
- **If initial test/s are negative for diabetes, when should repeat testing be done?**
  - Repeat testing should ideally be done annually
  - If initial test/s are negative for diabetes, then repeat testing should ideally be done annually for those with risk factors

Screening and Diagnosis in Children

- **Should screening be done for Type 1 diabetes mellitus?**
  - Screening for Type 1 DM is not recommended at the moment for the following reasons:
    - The disease is of low prevalence although an increasing trend is observed. Exact prevalence/incidence has yet to be established.
    - Screening using serologic markers are not readily available and expensive, thus, making screening not cost-effective.
    - Since clinical trials for interventions to prevent or delay Type 1 diabetes have not been proven effective, screening for T1 diabetes is NOT recommended.

Screening and Diagnosis in Children

- **Should screening for Type 2 DM be done in children?**
  - According to ADA, screening for pre-diabetes and Type 2 DM is recommended among asymptomatic children commencing at age 10 years or at onset of puberty, if puberty occurs at a younger age (ADA) with the following risk factors:
    - Overweight (BMI >85th percentile for age and sex, weight-for-height >85th percentile, or weight >120% of ideal for height);
    - Obese: BMI >95th centile or > +2SD
    - Plus any 2 of the following risk factors:
      - Family history (especially parents and grandparents) of Type 2 DM
      - Signs of insulin resistance (Acanthosis nigricans, hypertension, dyslipidemia, PCOS, or small for gestational age birth weight)
      - Maternal history of diabetes or GDM during the child's gestation

Diagnosis of Diabetes

- **<u>What tests and criteria should be used to diagnose diabetes?</u>**
  - The diagnosis of Diabetes Mellitus can be made based on the following criteria*:
    - Plasma glucose >126 mg/dL (7.0 mmol/L) after an overnight fast
      - Fasting is defined as no caloric intake for at least 8 hours up to a maximum of 14 hours,

    OR
    - Two-hour plasma glucose >200 mg/dl (11.1 mmol/l) during an Oral Glucose Tolerance Test
      - The test should be performed as described by the World Health Organization, using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water after an overnight fast of between 8 and 14 hours,

    OR

(*Among ASYMPTOMATIC individuals with positive results, any of the three tests should be REPEATED within two weeks for confirmation.)

Diagnosis of Diabetes

- **<u>What tests and criteria should be used to diagnose diabetes?</u>**
  - The diagnosis of Diabetes Mellitus can be made based on the following criteria*:

    OR

    - A random plasma glucose >200 mg/dl (11.1 mmol/l) in a patient with classic symptoms of hyperglycemia (weight loss, polyuria, polyphagia, polydipsia) or with signs and symptoms of hyperglycaemic crisis

(*Among ASYMPTOMATIC individuals with positive results, any of the three tests should be REPEATED within two weeks for confirmation.)

Diagnosis of Diabetes

- **Who should undergo the OGTT as the preferred initial test for screening for diabetes?**
    - A 75-gram OGTT is preferred as the first test in the following individuals who have:
        - A previous FBS showing Impaired Fasting Glucose (100 to 125 mg/dL or 5.6 to 6.9 mmol/L)
        - Previous diagnosis of Cardiovascular Disease (Coronary Artery Disease, Stroke, Peripheral Arteriovascular Disease) or who are at high risk for cardiovascular disease.
        - A diagnosis of Metabolic Syndrome

Diagnosis of Diabetes

- **Can other laboratory tests be used for the diagnosis of diabetes?**
  - At the present time, we cannot recommend the routine use of the following tests for the diagnosis of diabetes:
    - HBA1c
    - Capillary Blood Glucose
    - Fructosamine
  - However, if a result is available upon consultation due to prior testing, it should be interpreted with caution and should be confirmed by any of the 3 tests that are considered standard: **fasting plasma glucose, oral glucose tolerance test or random plasma glucose**.
  - We do not recommend the following tests for the diagnosis of diabetes:
    - Urine glucose
    - Plasma Insulin

Diagnosis of Pre-Diabetes

- **What criteria can be used to diagnose pre-diabetes?**
  - The criteria for pre-diabetes is:
    - Impaired Fasting Glucose defined as FBS of 5.6 mmol/L (100 mg/dL) up to 125 mg/dL or 6.9 mmol/L
    - Impaired Glucose Tolerance defined as Random/casual blood glucose of 7.7 up to 11.0 mmol/L (140-199 mg/dL) OR 2-hr blood sugar in the 75-gm OGTT equal to 7.7 (140 mg/dL) up to 11.0 mmol/L (199 mg/dL)
- **What is the criteria for normal blood sugar?**
  - Normal blood is sugar is defined as:
    - An FBS <5.6 mmol/L (100 mg/dL), OR
    - Random/casual blood glucose <7.7 (140 mg/dL), OR
    - 2-hr blood sugar in the 75-gm OGTT <7.7 (140 mg/dL)

Screening and Diagnosis in Pregnant Women

- **Should universal screening for diabetes be done among pregnant women?**
  - All pregnant women should be screened for gestational diabetes
  - Screening is undertaken to detect disease and to provide early care that morbidity and mortality may be avoided.
    - Gestational diabetes has been associated with increased risk of perinatal morbidity: macrosomia, shoulder dystocia, birth injuries and hypoglycemia. Subsequently these infants have a higher risk of abnormal glucose tolerance and obesity.
    - Gestational diabetes has also been associated with preeclampsia/gestational hypertension and an increased rate of cesarean sections. Women with a history of gestational diabetes are also at an increased risk to develop type 2 diabetes.

Screening and Diagnosis in Pregnant Women

- **When should screening be done for pregnant women?**
  - All pregnant women should be evaluated at the first prenatal visit for risk factors for diabetes
    - Prior history of GDM
    - Glucosuria
    - Family history of diabetes
    - First-degree relative with type 2 diabetes
    - Prior macrosomic baby
    - Age >25 years old
    - Diagnosis of polycystic ovary syndrome
    - Overweight/obese before pregnancy
    - Macrosomia in current pregnancy
    - Polyhydraminos in current pregnancy
    - Intake of drugs affecting carbohydrate metabolism

Screening and Diagnosis in Pregnant Women

- **When should screening be done for pregnant women?**
  - **High-risk women should be screened at the soonest possible time**
    - women who have had gestational diabetes in a previous pregnancy should be offered early self-monitoring of blood glucose or an OGTT at 16-18 weeks

Screening and Diagnosis in Pregnant Women

- **When should screening be done for pregnant women?**
  - Routine testing for gestational diabetes is recommended at **24 to 28 weeks age of gestation for women with no risk factors**
  - Testing for gestational diabetes should still be carried out in women at risk, even beyond 24 to 28 weeks age of gestation
- **Which tests should be used to screen pregnant women for gestational diabetes?**
  - An oral glucose tolerance test (OGTT), preferably the 75-g OGTT, should be used to screen for gestational diabetes

Screening and Diagnosis for Pregnant Women

- **<u>What criteria will be used to interpret the 75-g OGTT?</u>**
    - The criteria put forth by the International Association of Diabetes & Pregnancy Study Groups (IADPSG) will be used to interpret the 75-g OGTT

Interpreting the 75g OGTT Results.

75-g OGTT	Threshold(s) for diagnosing gestational diabetes (mg/dL)			
	IADPSG*	ADA**	ASGODIP & DIPSI	POGS*
FBS	92	95	NA	92
1-hour	180	180	NA	NA
2-hour	153	155	140	NA
3-hour	NA	140	NA	140

* Any one value meeting threshold is considered gestational diabetes.
** Two values must meet thresholds to be considered gestational diabetes.

Legend: IADPSG: International Association of Diabetes and Pregnancy Study group
ADA: American Diabetes association
POGS: Philippine Obstetrics and Gynecology Society
ASGODIP: AFES Study Group on Diabetes in Pregnancy

Screening and Diagnosis for Pregnant Women

- **<u>Can we use other tests to screen pregnant women for diabetes?</u>**
  - The following tests should not be used for the diagnosis of diabetes in pregnancy:
    - FBS alone
    - Capillary Blood Glucose
    - RBS
    - HbA1c
    - Fructosamine
    - Urine Glucose
  - However, **if patients already have RBS** at the time of consultation, **thresholds for DM will be the same as nonpregnant individuals**, while **FBS should be interpreted based on the IADPSG cut-off 92 mg/dL,** with levels lower than 92 warranting 75-gram OGTT.
  - Those with **glucosuria, elevated CBG or HbA1c should undergo OGTT**

Screening and Diagnosis for Pregnant Women

- **How should we follow up women who develop diabetes during pregnancy?**
  - **Postpartum recommendation**. A 75-gram oral glucose tolerance test should be done 6–12 weeks after delivery in GDM women who do not have diabetes immediately postpartum.
  - Women with previous GDM should also **undergo screening for other cardiovascular risk factors and components of metabolic syndrome**

Metabolic Assessments Recommended after GDM

Time	Test	Purpose
Post-delivery (1-3 days)	Fasting or random plasma glucose	Detect persistent, overt diabetes
Early post-partum (around the time of post-partum visit)	75 –gm 2-hr OGTT*	Post=partum classification of glucose metabolism**
1 –year post-partum	75 –gm 2-hr OGTT	Assess glucose metabolism
Annually	Fasting plasma glucose	Assess glucose metabolism
Tri-annually	75 –gm 2-hr OGTT	Assess glucose metabolism
Pre-pregnancy	75 –gm 2-hr OGTT	Classify glucose metabolism

* OGTT Oral glucose tolerance test
** Classification of glucose metabolism by criteria recommended by the ADA

Screening and Diagnosis for Pregnant Women

- **How should we follow up women who develop diabetes during pregnancy?**
  - An **FBS or RBS is not recommended for the long term follow-up and reclassification** of women with previous GDM. However, if **patients already have FBS or RBS** at the time of consultation, **thresholds for DM will be the same as non-pregnant individuals**

Metabolic Assessments Recommended after GDM

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* OGTT Oral glucose tolerance test
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PART 2: Outpatient Management of Type 2 Diabetes Mellitus

Diabetes Care Delivery in the Philippines

- Diabetes care in the Philippines should be organized at different levels
  - At the barangay health station level, the health worker should be able to deliver diabetes self-management education (DSME) and do BP and weight/BMI monitoring
  - At the RHU or City/Provincial Health Office, diabetes clubs may be set up
  - Strategy should be **patient empowerment**: care centered on the **person** with diabetes focusing on **self-management**
- Who comprises the **diabetes team**?
  - Multidisciplnary
  - At the hospital level: nurses, pharmacists, educators, dietitant, dentist, physician (general physician, internist, or diabetes specialist), exercise specialists, mental health professional
  - At the local health center level: midwife, primary health nurse, barangay health worker, lay health workers, or even patients may deliver DSME under supervision of the clinic doctor

Initial Evaluation of a Diabetic Patient

- Initial evaluation should include a comprehensive medical history and physical examination
- Medical history may follow the diabetes care checklist
  - “Due to the high prevalence of dental and oral diseases among diabetics, a thorough dental history should be elicited so that appropriate referrals to dentists can be made. (Grade A, Level 1)”

Table 1. Diabetes Care Checklist (Medical History)

The following points should be elicited in the initial medical history

- Age and characteristics of onset of diabetes (e.g., history of Diabetic ketoacidosis, asymptomatic laboratory finding)
- Nutritional status and weight history
- Growth and development in children and adolescents
- History of Smoking
- Diabetes education history
- Review of previous treatment regimens and response to therapy (A1C records)
- Current treatment of diabetes: medications, meal plan or eating patterns; physical activity patterns, and; results of glucose monitoring and patient’s use of data
- DKA frequency, severity, and cause
- Hypoglycemic episodes and risk for hypoglycemia
- Hypoglycemia awareness
- Any severe hypoglycemia: frequency and cause
- Symptoms or history of diabetes-related complications:
  - Microvascular: retinopathy, nephropathy, neuropathy, autonomic, including sexual dysfuction and gastro-paresis
  - Macrovascular: stroke, coronary artery disease, peripheral vascular disease
- Others: psychosocial problems, dental disease

Initial Evaluation of a Diabetic Patient

- Cardiovascular risk assessment should be done
  - Assess obesity/overweight, waist circumference cutoffs
- Assess for risk for diabetic foot disease, such as:
  - Peripheral vascular disease
  - Peripheral neuropathy
  - Previous amputation
  - Previous ulceration
  - Presence of callus
  - Joint deformity
  - visual/mobility problems

Table 2. Diabetes Care Checklist (Physical Examination)

- Height, weight, BMI, waist circumference
- Blood pressure determination, including orthostatic measurements when indicated
- Skin examination (for acanthosis nigricans and insulin injection sites)
- Comprehensive foot examination
  - Inspection,
  - Palpation of dorsalis pedis and posterior tibial pulses,
  - Presence/absence of patellar and Achilles reflexes,
  - Determination of proprioception, vibration, and mono-filament sensation
- Tests for autonomic dysfunction
- Testing for heart rate variability, if indicated, which may include expiration-to-inspiration ratio and response to the Valsalva maneuver and standing.
- Fundoscopic examination
- Thyroid palpation

Initial Evaluation of a Diabetic Patient

- Thyroid disease screening is recommended if there are “signs and symptoms of metabolic syndrome, or when an autoimmune etiology is suspected (Grade C, Level 3)”

Table 2. Diabetes Care Checklist (Physical Examination)

- Height, weight, BMI, waist circumference
- Blood pressure determination, including orthostatic measurements when indicated
- Skin examination (for acanthosis nigricans and insulin injection sites)
- Comprehensive foot examination
  - Inspection,
  - Palpation of dorsalis pedis and posterior tibial pulses,
  - Presence/absence of patellar and Achilles reflexes,
  - Determination of proprioception, vibration, and mono-filament sensation
- Tests for autonomic dysfunction
- Testing for heart rate variability, if indicated, which may include expiration-to-inspiration ratio and response to the Valsalva maneuver and standing.
- Fundoscopic examination
- Thyroid palpation

Initial Evaluation of a Diabetic Patient

- Minimal tests should be requested during the initial consultation
  - FBS
  - Lipid profile (including triglycerides and total, HDL, and LDL cholesterol)
  - HbA1c
  - Liver enzymes/transaminase tests (AST/ALT)
- Optional tests (if indicated)
  - Electrocardiogram (resting) and treadmill exercise tests
  - Thyroid-stimulating hormone in type 1 DM, dyslipidemia, or females over age 50 years

Elements of Diabetes Self-Management Education

- Who (should receive DSME)
  - **ALL** diabetic patients
  - Their carers and family
- When
  - Ideally for newly diagnosed patients at the time of diagnosis
  - For those who have not had the benefit of undergoing DSME, at any consult
  - Those who require reinforcement, at any consult
  - Should not be time-limited but ongoing, and should be done whenever the health professional sees the need for reinforcement
- How
  - Using a structured, evidence-based, individualized program combined with group education

Elements of Diabetes Self-Management Education

- What
  - Areas/aspects of DSME: self-management attitudes, knowledge and skills for the learner and their family and carers
  - Interpreting and acting on the results of self-monitoring of blood glucose
  - Making informed management decisions about insulin, medications, nutrition, physical activity and other lifestyle issues
  - Daily preventive practices such as foot care, exercise
  - Targets for CV risks: BP, lipids
  - Sick day management
- Who should deliver DSME?
  - Any member of the diabetes health team who has adequate training

Targets for Glycemic Control

- What is the rationale for controlling blood sugar?
  - Glycemic control is proven to decrease microvascular disease complications and to have a modest benefit on the long-term prevention of cardiovascular diseases
- What should we monitor and target?
  - Ideal target is **HbA1c**
  - Should be monitored at 3-6-month intervals, tailored according to the patient's needs and access to laboratory facilities
  - HbA1c measurements may be inaccurate or invalid in the following conditions:
    - Pregnancy
    - Hemolysis
    - Blood loss
    - Hemoglobinopathies

Targets for Glycemic Control

- What are some of the other methods for monitoring glycemic control?
  - **FBS, RBS** - when HbA1c is not possible or may be invalid; when short term control of blood sugar is to be assessed
  - Capillary testing - point-of-care or clinic-based CBG monitoring is not recommended, but if there are no other means then this may have a role
  - Colorimetric glucose strips - under minimal standards of care, in emergency and remote situations where maintenance of functional meters is not feasible

Targets for Glycemic Control

- What are the targets for glycemic control?
  - Should be **individualized**
  - Target HbA1c < 7.0% should be considered in all patients with T2DM
    - Fasting or preprandial plasma glucose of 4.0-7.0 mmol/L (72-126 mg/dL)
    - A 2-hour postprandial plasma glucose of 5.0-10.0 mmol/L (90-180 mg/dL)
    - OR FPG 90-130 mg/dL and postprandial PG <180 mg/dL (ADA)
  - A target of <6.5% may be optimal for certain patients
    - Those with short duration of DM, long life expectancy, no significant active cardiovascular disease, no serious co-morbid risk factors, and at low risk for cardiovascular events that may be triggered by hypoglycemia
    - Fasting PG <6.0 mmol/L (<110 mg/dL)
    - Postprandial PG <8.0 mmol/L (<145 mg/dL)

Targets for Glycemic Control

- Who should be required to do self-monitoring of blood glucose?
  - The following patients should be encouraged to do self-monitoring of blood glucose (SMBG)
    - All patients on insulin therapy
    - Those at risk of hypoglycemia on oral therapy
- How frequent should SMBG be done?
  - Frequency should be **individualized**

Targets for Glycemic Control

- How frequent should SMBG be done?
  - Frequency should be **individualized**
    - **Intensive insulin therapy** with 2 or more injections
      - Test at least 3x a day, including pre- and post-prandial, at bedtime, and when there are symptoms of hypoglycemia
      - Occasionally test at 2 or 3 AM if there are nocturnal hypoglycemic episodes
      - Test before driving if there are frequent hypoglycemic episodes
    - **Once daily insulin** plus oral meds with high HBA1c
      - Test at least 2x a day, including pre- and post-prandial glucose
    - **Stable diabetes**
      - Test before meals and at bedtime at least 1-2 days a week AND test before breakfast and 2 hrs after each meal at least 1-2 days a week

Targets for Glycemic Control

- How frequent should SMBG be done?
  - Frequency should be **individualized**
    - **Newly diagnosed** patients
      - Test as part of self-management education and instruction on how to interpret results and targets
    - **ALL** T2DM regardless of therapy, **on days with sickness** and when there are **changes in daily physical activity**
      - Test at least 3x a day during intercurrent illness or travel period
- How soon should targets be achieved?
  - Ideally, targets should be achieved within **six months** of initiation of treatment

Targets for Decreasing Cardiovascular Risks

Blood Pressure Targets

- Goal BP is <140/80 mmHg
  - Lower systolic targets (e.g., <130 mmHg) may be appropriate for certain individuals, such as younger patients, if it can be achieved without undue treatment burden
- Lifestyle therapy for hypertension
  - Weight loss, DASH diet (reducing sodium, increasing potassium), moderation of alcohol intake, and increased physical activity

Targets for Decreasing Cardiovascular Risks

Blood Pressure Targets

- When should treatment be started?
  - **Lifestyle therapy alone** can be given for 3 months in those with **pre-hypertension** (SBP 130-139 mmHg / DBP 80-89 mmHg)
  - **Pharmacologic and lifestyle therapy** should be started for those with **hypertension** (SBP ≥ 140 mmHg / DBP ≥ 90 mmHg) or **pre-hypertension uncontrolled by lifestyle therapy** alone

Targets for Decreasing Cardiovascular Risks

Blood Pressure Targets

- What drugs should be started for diabetics with hypertension?
  - **ACE inhibitors** and **ARBs** are generally recommended as initial therapy
  - If one class is not tolerated, substitute the other
  - Multiple drug therapy (two or more agents) is generally required for diabetics to achieve BP targets

Targets for Decreasing Cardiovascular Risks

Diabetic Dyslipidemia

- LDL is the primary target for dyslipidemia management in diabetes
- Statin therapy should be added to lifestyle therapy regardless of baseline lipid levels for diabetic patients:
  - With overt cardiovascular disease (CVD)
  - Without CVD who are over the age of 40 years and have one or more other CVD risk factors
- For patients at lower risk, statin therapy should still be considered in addition to lifestyle therapy if the LDL remains >100 mg/dL, or in those with multiple CVD risk factors

Targets for Decreasing Cardiovascular Risks

Diabetic Dyslipidemia

- Goals for Therapy: 100-70 Rule
  - In individuals without overt CVD, primary goal is LDL cholesterol <100 mg/dL (2.6 mmol/L)
  - In individuals with overt CVD. a lower LDL cholesterol of <70 mg/dL (<1.8 mmol/L) using a high-dose statin is an option
- Goals for Therapy: Alternative target
  - If target is not reached on maximal tolerated statin therapy, an LDL reduction of 30-40% from baseline is an alternative therapeutic goal

Targets for Decreasing Cardiovascular Risks

Diabetic Dyslipidemia

- Triglycerides and HDL cholesterol targets
  - Triglycerides <150 mg/dL (1.7 mmol/L) and HDL >40 mg/dL (1.0 mmol/L) for males and <50 mg/dL (1.3 mmol/L) for females
- LDL cholesterol-targeted statin therapy remains the preferred strategy

Targets for Decreasing Cardiovascular Risks

Aspirin Use

- Consider aspirin therapy (75-162 mg/day) as primary prevention in those with increased cardiovascular risk (10-year risk >10%)
  - Most males >50 years old or females >60 years old with at least one major risk factor (family history of CVD, smoking, hypertension, dyslipidemia, or albuminuria)
- No sufficient evidence to recommend aspirin as primary prevention in lower risk individuals
  - Males <50 or women <60 without other major risk factors (for patients in this age group with multiple other risk factors, clinical judgment is required)
- Combination ASA (75-162 mg/day) and clopidogrel (75 mg/day) is reasonable for up to a year after an acute coronary syndrome

Targets for Decreasing Cardiovascular Risks

Weight Management

- Ideal body weight or normal BMI (<23 following Asia-Pacific standards) should be maintained whenever possible, as cardiovascular risk is lowest
- Target initial body weight loss of 5-10%
  - Lesser degree of weight loss may still be of benefit
  - Greater degree of weight loss will be advantageous in the long term
- Healthy target is 0.5-1kg (1-2lbs) per week
- Caloric restriction (independent of weight loss) improves glycemic control within days of initiation
  - Also decreases FPG, free fatty acid and triglyceride levels, hepatic glucose production, and increases insulin sensitivity and insulin secretion

Therapeutic Lifestyle Change

Medical Nutrition Therapy

- All individuals at risk for diabetes, those with prediabetes or diabetes, and overweight individuals with metabolic syndrome should be advised regarding MNT to help attain treatment targets
- MNT should preferably be provided by a registered dietitian/nutritionist or other healthcare professional trained in the principles of nutrition

Therapeutic Lifestyle Change

Medical Nutrition Therapy

- At the barangay health station, the following simple nutrition messages are to be emphasized:
  - Food choices
    - Misconceptions such as skipping meals and completely avoiding rice, sugar, or fruit should be addressed
    - Asian-Pacific Type 2 Diabetes Policy Group reminders*
  - Idaho Plate method*
    - Helps patient visualize how different foods can be proportionally arranged on a plate for different meals

Therapeutic Lifestyle Change

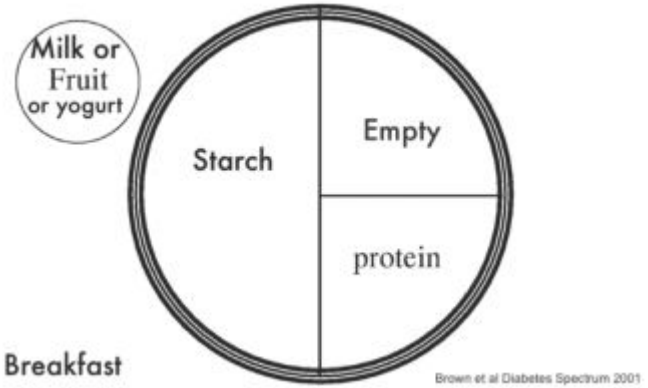
Medical Nutrition Therapy

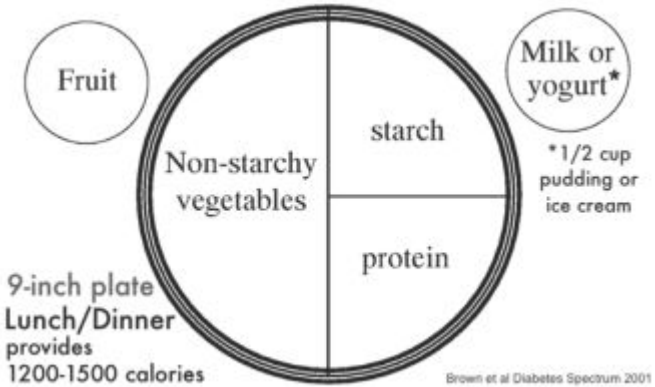
- Asian-Pacific Type 2 Diabetes Policy Group reminders
  - EAT MOST
    - Use one or more of these foods as the basis of every meal
    - Vegetables, legumes, lentils, noodles, rice, bread, grains, barley, wholegrain cereals, fresh fruit (non-sweet)
  - EAT MODERATELY
    - Have small servings of protein-rich foods
    - Fish, seafood, eggs, lean meat, skinless chicken, low-fat cheese/yogurt/milk, nuts
  - EAT LEAST
    - Minimise fats, sugars, salt, and alcohol
    - Butter, oil, cream, coconut milk and cream, processed meat, fried foods, preserved or processed food, pastries, sweets, biscuits, softdrinks

Therapeutic Lifestyle Change

Medical Nutrition Therapy

- Idaho Plate method





Therapeutic Lifestyle Change

Medical Nutrition Therapy

- Hospital-based nutrition advice should include the following:
  - Calculation of caloric requirements and macronutrient distribution
    - Fat: no more than 30% (saturated fat <10%)
    - Carbohydrate: 50-55% (sucrose <10%)
    - Protein (15-20%)
    - Salt intake reduced to <6 g/day for those with hypertension
    - Higher intake of dietary fiber (25-50g/day) for individuals with diabetes
  - Exchanges or carbohydrate counting
  - How to read food lables
  - Glycemic index
  - Meal replacement

Therapeutic Lifestyle Change

Medical Nutrition Therapy

- Are sucrose and sucrose-containing foods allowed?
  - Individuals with diabetes need not avoid sucrose or table sugar, but when consumed it should replace other carbohydrates in the meal plan
- Are sugar alcohols and nonnutritive sweeteners safe?
  - Xylitol, sorbitol, saccharin, aspartame, cyclamate, and sucralose are allowed in the diet of individuals with diabetes as these have negligible effects on postprandial blood glucose
- Is vitamin supplementation needed?
  - Routine supplementation with vitamin E and C or carotene as antioxidants or chromium is not advised

Therapeutic Lifestyle Change

Alcohol and Smoking

- Is alcohol intake allowed?
  - Avoid alcohol intake, as it may cause hypoglycemia in those taking sulfonylureas or insulin, especially when taken without food
  - Should adults with diabetes decide to consume alcohol, daily intake should be limited to one drink per day for females and 2 drinks per day for males
  - A standard drink contains 10g of alcohol: 285 mL beer, 375 mL light beer, 100 mL wine, 30 mL spirits
- Smoking
  - Advise all individuals with diabetes not to smoke
  - Refer those who smoke to smoking cessation programs

Therapeutic Lifestyle Change

Physical Activity

- General recommendations
  - People with Type 2 DM should undertake aerobic physical activity at least 150 mins per week, of moderate to vigorous intensity, spread out 3 days over the week with no more than 2 consecutive days between bouts of activity
  - Moderate to vigorous resistance training at least 2-3 days a week should be undertaken by persons with T2DM

Therapeutic Lifestyle Change

Physical Activity

- Definitions
  - **Aerobic exercise**: rhythmic, repeated, and continuous movement of the same large muscle groups for at least 10 minutes at a time
  - **Resistance exercise**: activities that use muscular strength to move a weight or work against a resistant load
    - Examples: exercise with weight machines, weightlifiting

Therapeutic Lifestyle Change

Physical Activity

- Intensity of Physical Activity
  - **Moderate physical activity**: activities with energy expenditure of 3-6 METs
  - **Moderate intensity**: should result to an increase of heart rate to 50-70% of the maximum heart rate (approximately 220-age)
    - Biking, brisk walking, continuous swimming, dancing, raking leaves, water aerobics
  - **Vigorous physical activity**: activities with energy expenditure greater than 7 METs
  - **Vigorous intensity**: >70% of a person's maximum heart rate
    - Brisk walking up an incline, jogging, aerobics, hockey, basketball, fast dancing, fast swimming

Therapeutic Lifestyle Change

Physical Activity

- Precautions during exercise
  - Persons with T2DM may undergo physical activity with caution when blood glucose is >300mg/dL without ketosis as long as they feel well with adequate hydration ensured
  - Persons on insulin and insulin secretagogues should take CHO supplement as needed to prevent hypoglycemia during and after exercise
  - Intake of beta-blockers, diuretics, and statins should be noted and corresponding precautionary measures be undertaken
  - Individuals with long-term complications of diabetes may undergo supervised physical activity

Therapeutic Lifestyle Change

Physical Activity

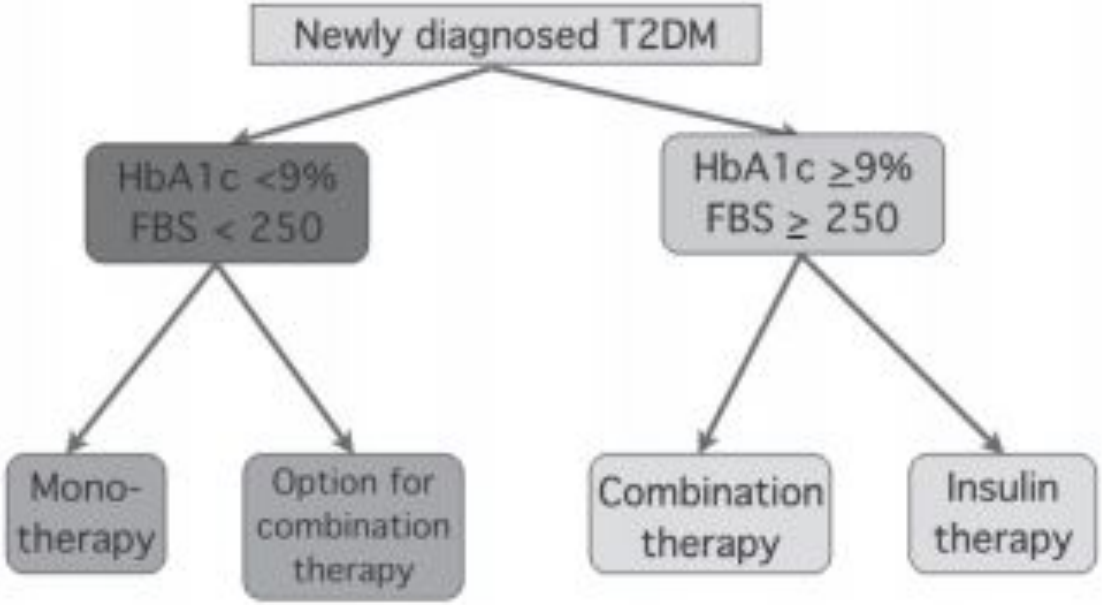
- Pre-exercise assessment/evaluation
  - Resting ECG
  - Stress testing
  - Screening for CAN (cardiovascular autonomic neuropathy)
    - Battery of autonomic tests like heart rate variability

Pharmacologic Therapy

- Individuals with newly diagnosed T2DM should be classified according to severity based on glycemic levels and presence of symptoms and complications
  - Those who are asymptomatic with relatively lower levels of blood sugar (HbA1c<8.0%, FBS<140 mg/dL, RBS<200 mg/dL) should be advised to undertake MNT, physical activity, and weight reduction, with an option of starting pharmacologic therapy (metformin)
  - If glycemic targets are not reached within 3 months, pharmacologic treatment will be started
  - Those who have higher blood sugar levels or are symptomatic should be started on one or more pharmacologic agents as applicable

Pharmacologic Therapy

- The following algorithm may be followed in deciding between mono- or combination therapy or insulin therapy



Pharmacologic Therapy

- When should combination therapy be considered?
  - When glycemic targets are not achieved with one drug given at the maximum effective dose (optimal dose or half maximum), another drug from another class should be added rather than increasing the first drug to its maximum dose
- Initiate treatment with metformin unless with contraindications or intolerant of its ADEs
- When optimization of therapy is needed, a second drug can be chosen according to the following considerations: (see next two slides)
  - Amount of HbA1c lowering
  - Hypoglycemia risk
  - Weight gain
  - Patient profile (dosing complexity, renal and hepatic problems, age, other contraindications

Pharmacologic Therapy

Table 5. Types of Antidiabetic Agents and their Glycemic Efficacy

Drug Class	Action	Examples	Amount of HbA1c lowering
Sulfonyl-ureas (SUs)	Stimulate pancreatic ß-cells to release insulin into the bloodstream	*Chlorpropamide* *Glipizide* *Glimepiride* *Gliclazide* *Glibenclamide*	1-2%
Meglitinides	Also an insulin secretagogue (but short acting)	*Repaglinide* *Nateglinide*	0.5-1.5%
Biguanides	Decrease the amount of glucose made by the liver Increases insulin sensitivity of mm & adipose	*Metformin*	1-2%
Thiazolidi-nediones (TZDs)	Improves insulin sensitivity by stimulating PPAR$_\gamma$ receptors;	*Rosiglitazone* *Pioglitazone*	0.5-1.4
Alpha-Glu-cosidase Inhibitors (AGIs)	Block α-glucosi-dase enzymes that break down complex carbo-hydrates into a more absorbable form (simple sugars)	*Acarbose* *Voglibose*	0.5-0.8%
Dipeptidyl Dipeptidase Inhibitors (DPP4-inhibitors)	Inhibits the action of the DPP4 enzyme which breaks down GLP-1, effectively increasing the levels of GLP-1; causes glucose-dependent increase in insulin secretion	*Sitagliptin* *Vildagliptin* *Saxagliptin*	0.5-1.0%

Pharmacologic Therapy

Table 6. Safety and Tolerability of Anti-diabetic Agents

Safety Issues	Anticipate this adverse drug reaction for these drugs	Comments
Hypoglycemia	Sulfonylureas, Megletinides, Insulin (esp. human insulins)	Especially true for first generation sulfonylureas and for the second gen SU glibenclamide/ glyburide.
Weight gain	Sulfonylureas, Megletinides, Thiazolidinediones, Insulin	———
Gastrointestinal symptoms (gastric upset, nausea, loose bowel movements, diarrhea)	Metformin, Alpha-glucosidase inhibitors (acarbose), DPP4-inhibitors	For the DPP-4 inhibitors, the expected GI adverse effects are only anorexia, bloatedness, nausea
Lactic Acidosis	Rare ADR from metformin	Avoid metformin among patients already at inherent risk of lactic acidosis e.g., respiratory failure (hypoxemia), severe infections, symptomatic or acute CHF, and those with decreased creatinine clearance. In the US the recommendation is to stop metformin at SCr ≥1.5 (1.4 women) and in the UK to decrease the of metformin dose by half for GFR <45 mL/min & stop for GFR <30
Congestive Heart failure, edema	Thiazolidinediones (pioglitazone)	Avoid this drug among those with existing congestive heart failure or those at risk of CHF
Others: Bone Fractures (osteoporosis), Bladder CA	Thiazolidinediones (pioglitazone)	Pioglitazone is contraindicated among those with a history of bladder cancer; because of the risk for osteoporosis, calcium + vit D supplementation might be needed

Pharmacologic Therapy

- Ideally, all patients on insulin or will be started on insulin should be under the care of diabetes specialists, especially those who are on MDII. These are patients who are inadequately controlled on oral antidiabetic agents or who have medical conditions that neccesitate insulin administration
    - e.g., those needing surgery, presence of infections, pregnancy

Table 7. Types of Insulin - Clinical Use and Pharmacokinetics

Type of Insulin	Onset of action	Approximate Peak	Duration of Action	Brand Names
Prandial insulin				
Human regular	0.5-1 hour (inject 30 mins before meals)	2-4 hours	6-8 hours	Humulin R, Actrapid, Generic brands
Rapid acting analogues				
Lispro	10-15 minutes (inject 10-15 mins before meals)	1 hour	3-4 hours	Humalog
Aspart				Novorapid
Glulisine				Apidra
Basal Insulin				
NPH (Human insulin inter-mediate acting)	1-3 hours	6-8 hours	12-16 hours	Humulin N, Insulatard, Generic brands
Glargine	1-2 hours Inject anytime, preferably in the morning	Flat (no peak) but maximal effect in 5-6 hours	24 hours	Lantus
Detemir			16-24 hours	Levemir

Pharmacologic Therapy

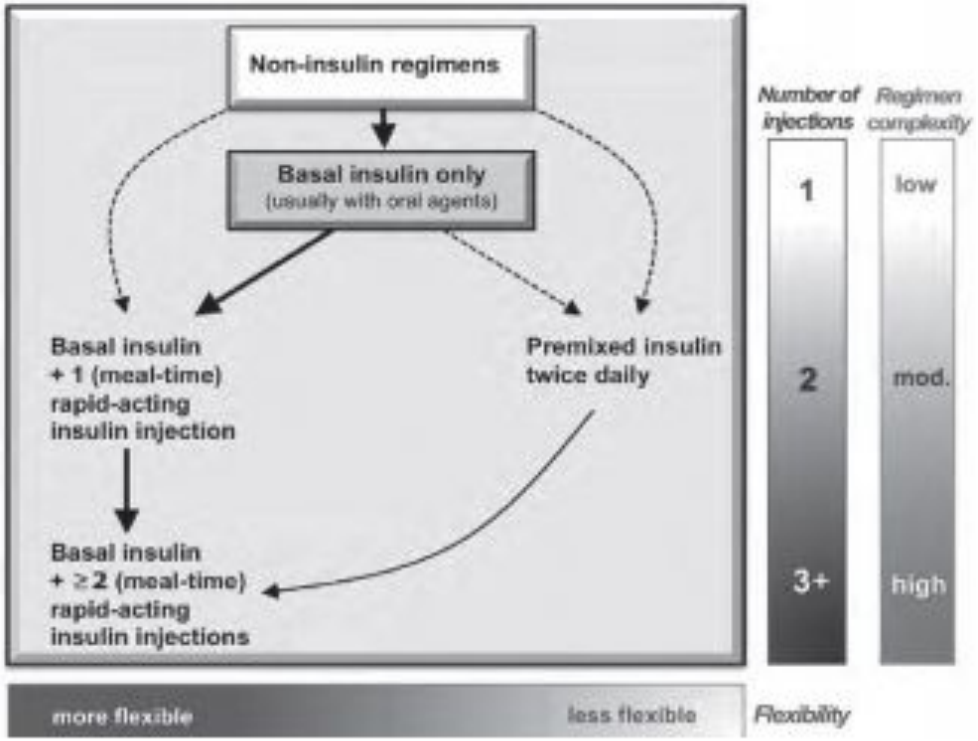


Figure 5. Sequential Insulin Strategies in T2DM

Sick Day Management

- How does illness affect glycemic control?
  - The stress of illness can increase basal insulin requirements in all types of persons with diabetes.
  - Being ill may also render the person with diabetes unable to monitor and manage their condition as they normally would

Sick Day Management

- Should the patient adjust/hold their oral antidiabetic medications? If so, when and how?
  - The patient should take the tablets at the usual dosage provided they can still take in carbohydrates either in solid or liquid form
  - The dose of sulfonylurea should be reduced if carbohydrate intake is expected to be less
  - Glucose monitoring should ideally be done
  - If glucose levels increase beyond 230 mg/dL (13 mmol/L) and/or the patient feels unwell, they should see a doctor
  - Metformin should be stopped if the patient is becoming dehydrated

Sick Day Management

- For the patient on insulin, should the patient adjust their insulin? If so, when and how?
  - **Insulin should not be stopped.**
  - Sick day rules for insulin dosage should follow those agreed upon with the specialist units at the time of initiation of insulin, or otherwise follow local guidelines
  - The following rule of thumb may also be followed:
    - Blood glucose less than 13mmol/L (<230 mg/dL) - continue current dosage
    - Blood glucose 13-22 mmol/L (230-390 mg/dL) - patient should increase insulin by 2 units per injection, even if unable to eat
    - Blood glucose greater than 22 mmol/L (>390 mg/dL) - patient should increase insulin by 4 units per injection, even if unable to eat
    - Return dose to normal when blood glucose returns to normal

When to consult or go to the hospital immediately

- Patient should be advised to seek medical advice if they:
  - Are unable to eat or drink
  - Have persistent vomiting or diarrhea
  - Have a blood glucose higher than 25 mmol/L (450 mg/dL) despite increasing insulin
  - Have very low glucose levels
  - Have persistent ketones or large amounts of ketones in the urine
  - Become drowsy or confused (make sure carers are aware of this)

When to consult or go to the hospital immediately

- Hospital admission should be considered in the following situations:
  - A suspicion of underlying diagnosis that requires hospital admission
    - E.g., myocardial infarction, intestinal obstruction
  - Inability to swallow or keep fluids down
  - Significant ketosis in a type I diabetic despite optimal management and supplementary insulin
  - Persistent diarrhea
  - Blood glucose persistently >20 mmol/L (>350 mg/dL) despite best therapy

Influenza and Pneumococcal Vaccination

Influenza Vaccination

- Influenza vaccination (inactivated trivalent vaccine) is recommended for all individuals with diabetes >6 months of age, especially those who:
  - Are >65 years old
  - Are residents of chronic care facilities
  - Require regular medical follow-up or hospitalization
  - Have chronic disorders of the cardiopulmonary and renal system
- Vaccination of healthcare workers and family of individuals with diabetes who can transmit influenza is also recommended
- Yearly influenza vaccination is recommended

Influenza and Pneumococcal Vaccination

Pneumococcal Vaccination

- Vaccination with the 23-valent pneumococcal polysaccharide vaccine (PPSV23) or 13-valent pneumococcal conjugate vaccine (PPCV13) is recommended for all individuals with diabetes >2 years of age, especially:
  - Those who are >65 years old
  - Residents of chronic care facilities
  - Those who require regular medical follow-up or hospitalization
  - Those who have chronic disorders of the cardiopulmonary and renal system
- A one-time pneumococcal vaccination is recommended to individuals >65 years of age if the original vaccine was given when they were <65 years of age and more than 5 years prior

Reference

- Philippine Practice Guidelines on the Diagnosis and Management of Diabetes Mellitus. A Project of UNITE FOR Diabetes Philippines: A Coalition of Organizations Caring for Individuals with Diabetes Mellitus