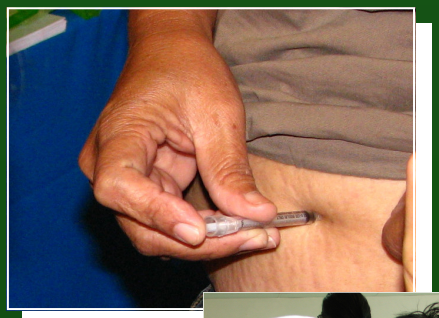
Guide to Type 2 Diabetes Primary Care



A Collection of
Clinical Practice Recommendations and Algorithms
for Davao City's
Primary Health Care Setting

Guide to Type 2 Diabetes Primary Care

Produced with support from Sanofi Aventis to
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The **Consultative Group** is a multidisciplinary group composed of the Diabetes Project stakeholders and specialty organizations that went through the process of implementation planning specifically to:

- Define the general parameters of the recommendations ;
- Determine the clinical practice recommendations that would best fit Davao City's primary health care setting based on its needs, capabilities and limitations; and
- Evaluate, revise and approve the draft of the Guide to Type 2 Diabetes Primary Care;

The Consultative Group was supported by the **Steering Group** which oversaw each step of the process and served as the secretariat providing administrative support and documentation as well as performing systematic literature search, technical writing, lay-outing and editing. It is composed of the Handicap International Diabetes Project team.

Methodology

The Consultative Group met in September and December 2007 in 4-hour sessions. Members were also conferred with individually between and after the two meetings. The draft was then circulated among the members for approval before printing. The Consultative Group will meet after the first 6 months of implementation for evaluation and revisions if necessary.

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I - APPROACH TO DIABETES MANAGEMENT

Introduction

Diabetes management is an active partnership between people with diabetes, their family and their healthcare team. Essential to this management is self-management education which has been proven effective in improving treatment outcomes.

Team Approach to Diabetes Management

Diabetes education is an integration of clinical care and self-management education for people with diabetes provided by a multidisciplinary healthcare team. The *core diabetes education team consists of the physician, the nurse, the nutritionist-dietitian* and may also include health workers, lay educators, psychologists, pharmacists, podiatrists. This health care team and the person with diabetes together develop goals and a plan for the management of diabetes appropriate to the individual's needs.

In the primary health care setting center-based diabetes education is provided by the core diabetes team composed of the physician, nurse / midwife and the nutritionist-dietitian while community-based diabetes education service is provided by its extension team of community health workers (barangay health workers and barangay nutrition scholars) supervised by the barangay's assigned midwife or nurse.

Equipment and Facility Requirements

Physical space, equipment and facilities must be conducive to learning and allows for members of the diabetes team to carry out their respective functions. The following is the minimum equipment requirement for the primary health care level:

1. Clinical Practice Guidelines
2. Blood Glucose meter with appropriate strips
3. Urine strips for glucose / ketones /proteins
4. Sphygmomanometer with adult and pediatric cuff sizes
5. Stethoscope
6. Weight Scale and height measure
7. Tape measure
8. Monofilament
9. Information and education materials (posters, leaflets, toolkits)
10. Refrigerator for storage of insulin
11. Emergency treatment tray (containing insulin, glucose tablets, glucagon)
12. Inventory book detailing all clinic equipment including literature for use.
13. Records of patients and monthly clinic statistics

Diabetes Self-Management

Diabetes self-management requires that a person with diabetes has adequate knowledge and skills to make adjustments to their daily management of medication, meal plan, exercise and other factors that impact on blood glucose. It is the empowerment of persons with diabetes to have better control over their disease.

The person with diabetes should know:

1. The nature of the disorder
2. Symptoms of diabetes
3. Risk of complications and its prevention
4. Individual targets of treatment
5. Individual lifestyle requirements and meal planning
6. Importance of regular exercise in treatment
7. Interaction of food intake, physical activity and their medications
8. Coping with emergencies such as illness, hypoglycemia, stress and surgery

And learn skills such as:

1. Monitoring blood or urine glucose
2. Quantify food intake
3. Make adjustments in food, medication and activity
4. Problem solving
5. Establishing realistic short and long term goals

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1. Asia-Pacific Type 2 Diabetes Policy Group and International Diabetes Federation Western Pacific Region, Type 2 Diabetes Practical Targets and Treatments. International Diabetes Institute:Melbourne, Australia, 2005.
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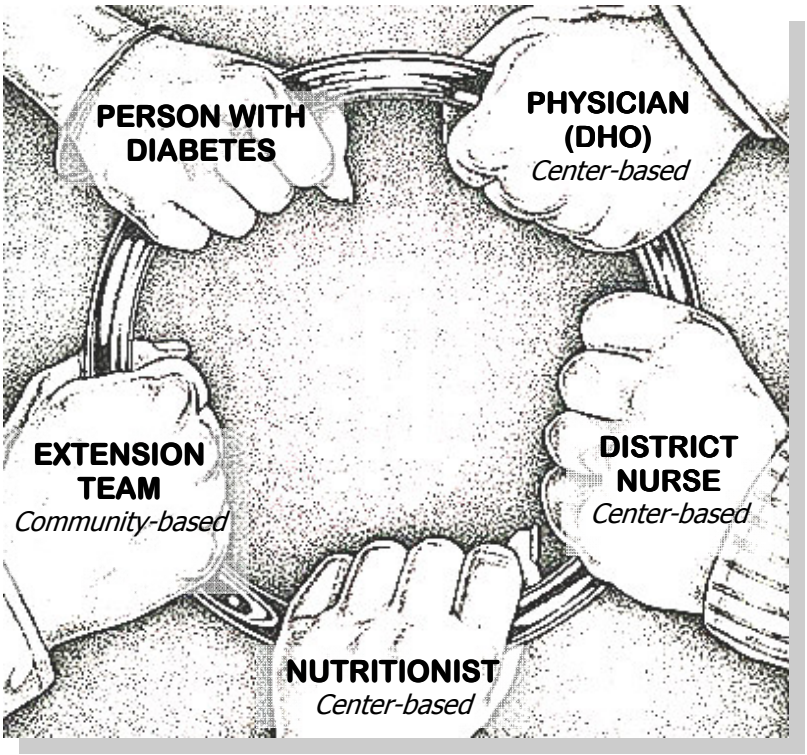
Functions of the Diabetes Management Team



THE PERSON WITH DIABETES

- Performs self-management practices (self-monitoring of blood glucose, proper diet and exercise, adjustment of insulin dosage, records progress in the patient diary, attends education sessions)
- Provides peer education and support.

THE DISTRICT NUTRITIONIST-DIETITIAN

- Assesses patient's dietary habits
- Develops specialized medical nutrition therapy
- Develops the patient's meal plan
- Provides advise on the adjustment of food intake in relation to physical activity and medications
- Provides continuous dietary management and counseling
- Provides patient/ family education including food preparation methods.

THE EXTENSION TEAM
Assigned Midwife / Nurse of the Barangay, BHWs', BNSs'

- Performs selected or targeted primary screening
- Recommends screening and diagnostic tests for diabetes suspects
- Identify diabetes suspects based on defined diagnostic criteria
- Refers to the physician for diagnosis and initiation of management
- Provides community-based diabetes-self management education
- Monitors diabetes cases endorsed by the nurse for cooperation to management as well as for development of complications
- Refers diabetes cases with poor cooperation to management and with suspected complications to the physician.
- Administers diabetes education to the general population and high risk groups
- Prepares and updates records and reports

THE DISTRICT HEALTH OFFICER

- Leads and coordinates the activities of the entire diabetes team
- Performs opportunistic primary screening and initial assessment
- Advices screening and diagnostic procedures
- Establishes diagnosis and identifies existing complications
- Provides initial diabetes education and orientation to team management
- Initiates and adjusts pharmacologic therapy (OHA or insulin)
- Prescribes specialized medical nutrition therapy based on computed caloric requirements, dietary needs and restrictions
- Prescribes specialized physical activity
- Initiates the use of patient monitoring tools (eg. diaries) and explain its importance
- Determines when and where to refer patients for further assessment or management
- Makes referrals to other specialized health care providers

THE DISTRICT NURSE OR MIDWIFE

- Provides structured diabetes self-management education
- In the absence of the physician performs opportunistic primary screening ,advices screening and diagnostic procedures and refers to nutritionist for dietary assessment
- Performs monitoring procedures (weight, BP, blood glucose, foot examination)
- Assesses patient's self-management practices (eg. through patient diary, return demo, interview, etc), identify potential treatment problems, and discuss with the patient the ways for improvement
- Monitor prescription for compliance and drug interactions
- Assess patient for signs of physical / mental problems
- Discuss concerns and fears with patient and family
- Provide patient/ family support
- Bring to the physician's and nutritionist's attention any patient concerns relevant to their roles
- Interface with physicians and other diabetes management team members
- Endorses patients to the barangay extension team for monitoring.
- Prepares and updates records and reports
- Property custodian of team equipment

II - PREVENTION AND SCREENING

Introduction

The areas of diabetes prevention and screening are closely linked since both deal with identification of risk factors for two main purposes: For primary screening and for initiating prevention interventions focusing on **modifiable risk factors**

Screening Methods

Screening tests for type 2 diabetes include a **combination of risk assessment questionnaires** *(refer to Appendix 1)* **and biochemical tests**. Primary screening for potential type 2 diabetes is done using a non-invasive risk-factor based screening questionnaire to limit the proportion of the population that needs to undergo diagnostic glucose measurement as a second step. Questionnaires are also less labor intensive and more acceptable to patients than biochemical tests.

Risk Factors for Type 2 Diabetes in Adults

Modifiable Risk Factors:

1. BMI of **≥ 23**
2. Abdominal obesity with waist circumference of **≥ 90 cm** for males and **≥ 80 cm** for females
3. Prediabetes *(refer to Table 1 on page 9)*
4. Hypertension (**≥ 140/90** mmHg)
5. Increased triglyceride levels (**> 250 mg/dl or 2.82 mmol/l**)
6. Low HDL cholesterol level (**< 35 mg/dl or 0.09 mmol/l**)
7. Sedentary Lifestyle
8. Cigarette Smoking
9. Alcohol Drinking

Non-modifiable Risk Factors:

1. **≥ 35** years of Age
2. Parent or sibling diagnosed with diabetes
3. Previous gestational diabetes
4. Female gender
5. History of giving birth to an infant with a birth weight of > 9 pounds (4.0 kg)
6. Cardiovascular disease
7. Polycystic ovarian syndrome
8. Small for gestational age (SGA), intrauterine growth retardation (IUGR) or large for gestational age at birth

Risk Factors for Type 2 Diabetes in Children

Only children who have risk factors for the development of type 2 diabetes need to undergo biochemical testing.

- What is the screening criteria for children?

  Screening is initiated in obese children with:
  - A body mass index (BMI) of greater than the 85th percentile for age and sex *(refer to Appendix 9 and 10 on pages 36 to 41)*
  - Weight greater than 120% of ideal for height

  Plus **<u>any 2</u>** of the following risk factors are present:
  1. Family history of Type 2 diabetes in a first or second degree relative
  2. Ethnic background of African-American, Hispanic, American Indian, Asian, or Pacific Islander origin
  3. Signs of insulin resistance
  4. Presence of conditions associated with insulin resistance: e.g., acanthosis nigricans, polycystic ovary syndrome, high blood pressure, and blood fat disorders.

- When should you screen? **Started at 10 years old and repeated every 3 years if test result is normal**
- How should you screen? **Fasting blood sugar**

II– PREVENTION AND SCREENING

Biochemical Tests

Oral Glucose Tolerance Test **(OGTT)**

- OGTT should be recommended first (if acceptable to the patient) before alternative tests are considered.
- WHO recommends it as the standard test to define glycemic status.
- Intermediate hyperglycemia (prediabetes) and asymptomatic type 2 diabetes are best diagnosed by this test because it determines both fasting and 2-hour plasma glucose values.

Fasting Blood Sugar **(FBS)**

- Less commonly known as Fasting Plasma Glucose **(FPG)**
- It is more convenient to patients, more reproducible, less costly, and easier to administer than OGTT.
- It should also be noted that FPG does not detect patients with Impaired Glucose Tolerance (IGT) a form of prediabetes detected by OGTT.
- If FBS is opted as initial screening test for non-pregnant adults an OGTT may be considered in patients with Impaired Fasting Glycemia (IFG) a form of prediabetes detected by FBS. This is to better define the risk of diabetes.

Capillary Blood Glucose **(CBG)**

- Ideally only for self-monitoring of diagnosed diabetes patients using a portable blood glucose meter.
- Venous plasma glucose should be the standard method for measuring and reporting glucose concentrations in blood. However in recognition of the widespread use of capillary sampling, especially in under-resourced settings determination of CBG using a portable blood glucose meter can be done provided that it is **determined in the fasting state**. This is an indirect way of determining Fasting Plasma Glucose (FPG) since fasting values for venous and capillary plasma glucose are identical.
- If glucose values fall on prediabetes or diabetes *(refer to Table 1-Levels of Glycemia on page 9)* levels, OGTT or FBS should be recommended on a subsequent day to establish diagnosis.

Prevention Interventions

For those with risk factors for developing diabetes, safe and clinically proven **lifestyle interventions** and **initiation of pharmacologic therapy** target modifiable risk factors for diabetes.

- Refer patients to a registered dietitian for counseling in energy intake reduction and nutritional strategies; goals include:
  Weight reduction goal: **5% to 10%** of total body weight
  Nutrition goals:
  1. Reduce fat intake to **less than 30%** of total energy intake
  2. Reduce saturated fat intake to **less than 10%** of total energy intake
  3. Increase fiber intake to **15g/1000 kcal** or more.
- Prescribe regular moderate physical activity (approximately 30 minutes a day 3 times a week).
- Counsel patients about cardiovascular risk factors such as tobacco use, hypertension, and dyslipidemia.
- Treat hypertension and dyslipidemia aggressively; these conditions are responsive to lifestyle modifications and pharmacologic therapy.

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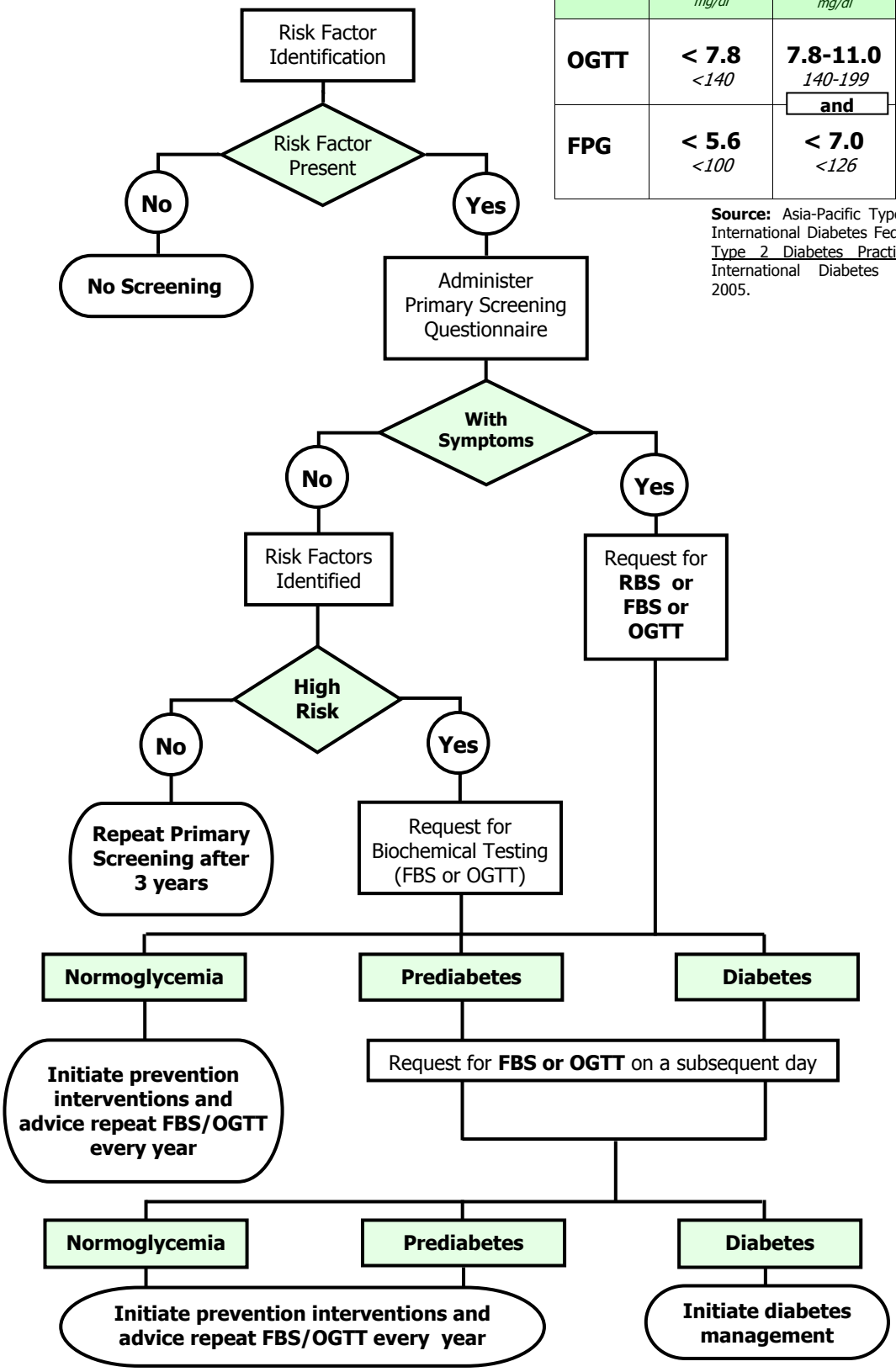
Screening and Diagnosis for Adults

Table 1. Levels of Glycemia ***(plasma venous values)***

Test	Normo-glycemia mmol/L mg/dl	Prediabetes		Diabetes mmol/L mg/dl
		IGT mmol/L mg/dl	IFG mmol/L mg/dl	
			If measured must be	
OGTT	**< 7.8** *<140*	**7.8-11.0** *140-199*	**< 7.8** *<140*	**≥ 11.1** *≥200*
		and		
FPG	**< 5.6** *<100*	**< 7.0** *<126*	**5.6-6.9** *100-125*	**≥ 7.0** *≥126*

Source: Asia-Pacific Type 2 Diabetes Policy Group and International Diabetes Federation Western Pacific Region, Type 2 Diabetes Practical Targets and Treatments. International Diabetes Institute:Melbourne, Australia, 2005.



III - DEFINITIONS AND DIAGNOSIS

Introduction

In diagnosing diabetes, the clinician must feel confident that the diagnosis is fully established since the consequences for the individual are considerable and lifelong. In the absence of a more specific biological marker to define diabetes, the measurement of glucose in blood remains the basis of the diagnostic criteria.

Definitions

The term **diabetes mellitus** describes a metabolic disorder of multiple etiology characterized by chronic hyperglycemia, with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both. Severe hyperglycemia detected under conditions of acute infection, traumatic, circulatory or other stress may be transitory and should not in itself be regarded as diagnostic of diabetes.

Normoglycemia

Since there are insufficient data to accurately define normal glucose levels, the term "normoglycemia" should be used for glucose levels associated with low risk of developing diabetes or cardiovascular disease, that is levels below those used to define prediabetes *(refer to Table 1 on page 9).*

Prediabetes

Prediabetes is a state of intermediate hyperglycemia not meeting the diagnostic criteria of diabetes but is higher than normoglycemia. It is not a clinical entity but is a risk factor for future diabetes and/or adverse outcomes such as premature mortality and cardiovascular disease. There are two forms of intermediate hyperglycemia: impaired fasting glycemia and impaired glucose tolerance *(refer to Table 3 on page 11).*

Metabolic Syndrome

The clustering of hyperglycemia, obesity, dyslipidemia and hypertension has been labeled the metabolic syndrome, dysmetabolic syndrome or insulin resistance. This clustering indicates common etiological factors. Its clinical importance is its high cardiovascular risk association. Recognition of these features in people with type 2 diabetes indicates the need for aggressive CVD risk reduction which includes lifestyle intervention strategies and pharmacologic treatment. *(refer to Table 4 on page 11).*

Diagnosis

The clinical diagnosis of diabetes is often prompted by symptoms such as increased thirst and urine volume, recurrent infections, unexplained weight loss and, in severe cases, drowsiness and coma; high levels of glycosuria are usually present. A **single blood glucose estimation** in excess of the diagnostic values *(refer to Table 2 on page 11)* establishes the diagnosis in such cases. **The diagnosis of diabetes in an asymptomatic patient on the other hand should never be made on the basis of a single abnormal blood glucose value.** At least one additional plasma/blood glucose test with a value in the diabetic range is essential.

Diagnostic Tests

- **Venous Plasma Glucose**

OGTT should be the first choice for diagnosis in asymptomatic people since **FBS** alone fails to diagnose approximately 30% of cases of previously undiagnosed diabetes while **RBS** (Random Blood Sugar) can be used aside from FBS to establish diagnosis of those with symptoms.

- **Capillary Sampling using portable glucose measuring devices**

In under-resourced settings where there is no access to venous plasma glucose testing capillary sampling can be used provided that the sample is taken in a fasting state or the portable glucose measuring device is calibrated to report in plasma values.

- **HbA1c**

Currently HbA1c is not considered as suitable diagnostic test for diabetes or prediabetes.

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3. World Health Organization, Definition, Diagnosis and Classification of Diabetes Mellitus and its Complications. Geneva, Switzerland: 1999

Diagnostic Criteria

Table 2. Diagnostic Criteria for Diabetes

Test	Values		Remarks
	mmol/l	mg/dl	
OGTT	**≥ 11.1**	*≥ 200*	for asymptomatic patients**
FBS	**≥ 7.0**	*≥ 126*	for asymptomatic patients**
RBS*	**≥ 11.1**	*≥ 200*	Symptomatic patients (polydypsia, polyuria, polyphagia, weight-loss)

* Random Blood Sugar or Casual Plasma Glucose- plasma glucose determined anytime of the day regardless of time of last meal
** For asymptomatic patients a repeat test should be done on a subsequent day to establish diagnosis

Source: World Health Organization and International Diabetes Federation, Definition and Diagnosis of Diabetes Mellitus and Intermediate Hyperglycemia. Geneva, Switzerland: WHO Document Production Serrvices, 2006.

Table 3. Diagnostic Criteria for Prediabetes

Prediabetes	Diagnostic Values		Etiology	Risks
	FBS **mmol/L** *mg/dl*	**OGTT** **mmol/L** *mg/dl*		
Impaired Glucose Tolerance (IGT)	**<7.0** *<126*	**AND** **7.8-11.0** *140-199*	Associated with: muscle insulin resistance defective insulin secretion	6 x increased risk for progression to diabetes. 2 x increased risk for fatal cardiovascular outcome 1.5 x increased risk for all-cause mortality
Impaired Fasting Glucose (IFG)	**5.6-6.9** *100-125*	*If measured must be* **<7.8** *<140*	Associated with: impaired insulin secretion impaired suppression of hepatic glucose output.	5 x increase risk for progression to diabetes. 1.5 x increase risk for non-fatal myocardial infarction, non-fatal cardiovascular disease, cardiovascular mortality and all-cause mortality

Source: Asia-Pacific Type 2 Diabetes Policy Group and International Diabetes Federation Western Pacific Region, Type 2 Diabetes Practical Targets and Treatments. International Diabetes Institute:Melbourne, Australia, 2005.

Table 4. The IDF Consensus Worldwide Definition of the Metabolic Syndrome

Characteristics	Values
Central Obesity	Waist Circumference : **≥ 90cm** for males and **≥ 80 cm** for females *Note: If BMI is > 30 kg/m², then central obesity can be assumed, and waist circumference does not need to be measured*
Plus any two of the following	
Raised triglycerides	**≥ 1.7 mmol/L (150 mg/dl)** or specific treatment for this lipid abnormality
Reduced HDL-cholesterol	**< 0.9 mmol/L (40 mg/dl)** in males **< 1.1 mmol/L (50 md/dl)** in female or specific treatment for this lipid abnormality
Raised blood pressure	**≥ 130mmHg systolic or ≥ 85 mmHg diastolic** or treatment of previously diagnosed hypertension
Raised fasting blood sugar	**FBS of ≥ 5.6 mmol/L (100mg/dl)** or previously diagnosed with type 2 diabetes

Source: Asia-Pacific Type 2 Diabetes Policy Group and International Diabetes Federation Western Pacific Region, Type 2 Diabetes Practical Targets and Treatments. International Diabetes Institute:Melbourne, Australia, 2005.

IV - MANAGEMENT

Introduction

The ultimate goal of management is to improve quality of life and productivity of people with diabetes by: early diagnosis, prevention of complications, prevention of premature death, promotion of self-care practices and reduction of personal, family and societal burden of disease.

The successful establishment of the diabetes health care team and infrastructure to support it is critical for the achievement of these goals. This includes provision of education for health-care professionals and for people with diabetes.

Essential Components of Care

The care of a person with diabetes does not only mean pharmacologic management. Equally important is the simultaneous application of non-pharmacologic interventions– dietary, physical activity, education and psychosocial support to:

1. Control Hyperglycemia
2. Treat co-existing abnormalities such as hypertension and dyslipidemia
3. Prevent and treat complications (microvascular and macrovascular)

Initial Evaluation

On the patient's first visit after a diagnosis is confirmed, a complete medical evaluation should be performed to:

1. Classify the patient.
2. Detect complications.
3. Assist in formulating a management plan.
4. Provide a basis for continuing care.

If the patient is previously diagnosed with diabetes, the evaluation should review the previous treatment and the past and present degrees of glycemic control.

Dietary Management

Carbohydrates

- Carbohydrate should approximate **55-70%** of calories/day.
- Total carbohydrate content rather than type should be considered.
- When added to monounsaturated fats, carbohydrates should make up **70%** of total calories/day.
- **25-50 grams** of carbohydrates from fiber per day may be given.
- Sucrose need not be restricted and could be substituted as carbohydrate as long as total energy requirement (TER) is not exceeded. However sucrose should be eaten in the context of a healthy diet.
- Non caloric sweeteners are acceptable within prescribed levels.
- Sugar alcohols may be used with caution and should not be taken in amounts of **>10g/day**.
- Fructose consumption should be limited to **60g/day** for a patient with a daily caloric requirement of 2000.

Proteins

- Should approximate **10-15%** of calories/day
- If patient has good glucose control, there is no need to decrease amount of protein intake.
- In cases where hyperglycemia is present, protein intake may be **> 0.8 g/kg** of body weight but no more than **1g/kg BW** per day.
- If patient has renal problems, protein intake should not be less than **40g per day**, and can be as much as **0.8 g/kg BW/day** (10-15% of TER).
- If the patient has cardiovascular risk factors, replace animal-sourced protein with plant sources.
- If source of protein has limited amino acids, complementing proteins should be added.

Fats

- Should approximate **20-30%** of calories/day
- Saturated fat, trans fatty acids should be **< 10%** of TER
- Dietary cholesterol should be **< 300mg/day**
- Polyunsaturated fatty acids should be **10% of TER**.
- Monounsaturated fatty acids ahould be **>10% of TER.**
- Use mono- and polysaturated fats in place of saturated fat

Physical Activity

Before starting an exercise program, a patient has to be screened for presence of risk factors in which exercises may be contraindicated *(refer to Appendix 4. Contraindications to Exercise Participation on page 34).*

MANAGEMENT

Patients are screened and evaluated for these contraindications to prevent potential complications of exercise *(refer to Appendix 5. Complications of Exercise in Type 2 Diabetes on page 34)*. It is for this reason that exercise prescriptions are best done in consultation with exercise specialists.

Exercise Prescription

An appropriate exercise prescription formulates a person's physical activity program that suits the present physical condition and status (*refer to page 16).* Parameters of the exercise prescription are:

- **Intensity - Amount of exertion** done in terms of ***Target heart rate*** and ***perceived exertion***.
  - Target Heart Rate should be **50 – 70%** of the maximum heart rate **(moderate physical activity)**
  - For the Middle aged – start at **50-60%** of maximum heart rate
  - For 50 years old and above – start at **40-50%** of maximum heart rate
  - For Weight loss – **60-75%** of maximum heart rate for 20-30 minutes
  - **75-85%** of maximum heart rate should be reserved for a training goal
  - The objective measurement of the heart rate must be balanced with the subjective perception of how hard one feels when exercising. There is a need to observe and listen to the body's breathing, leg and arm fatigue or a general feeling of being tired. If these are felt there is a need to slow down and seek appropriate consultation.
- **Duration** - **How long** a certain physical activity is done.

  High intensity exercises should only last for a short period of time. Persons with diabetes should avoid longer exercise sessions because they result to greater decrease in blood glucose levels. The recommended duration is a total of **"30 minutes of moderate physical activity on most days of the week."**
- **Frequency** - **How often** an exercise program is done.

  As a general rule, short duration activities must be done with more frequency to achieve desired effects. On the contrary, heavy activities (70% of HRmax) must be done less frequently to avoid fatigue. The recommended frequency is: **3 non-consecutive days in a week.**

  Obese patients may need to exercise 6-7 days a week.
  Patients on insulin may exercise everyday to decrease difficulty in balancing insulin and caloric needs
- **Timing** - **Time of the day** an exercise is done.

  Generally, the schedule for exercising depends on convenience. However, patients who are taking anti-diabetic medications should avoid exercising during peak drug absorption as it may lead to hypoglycemia during and after the exercise.
- **Mode** - **Type** of physical activity done.

  Provided that there are no contraindications, the choice of activity is completely based on personal preference. The patient must be involved in planning the program so that he/she could choose activities that are of interest and therefore avoid boredom. Frequently, exercises consist of a combination of aerobic and anaerobic exercises *(refer to Appendix 6. Two Basic Types of Exercises on page 34)*.

  It is also equally important to start with **a 20-30 minute warm-up** of low intensity aerobic and static stretching activities and end the exercise with a **10-15 minute cool** down gradually slowing down the intensity of activity.

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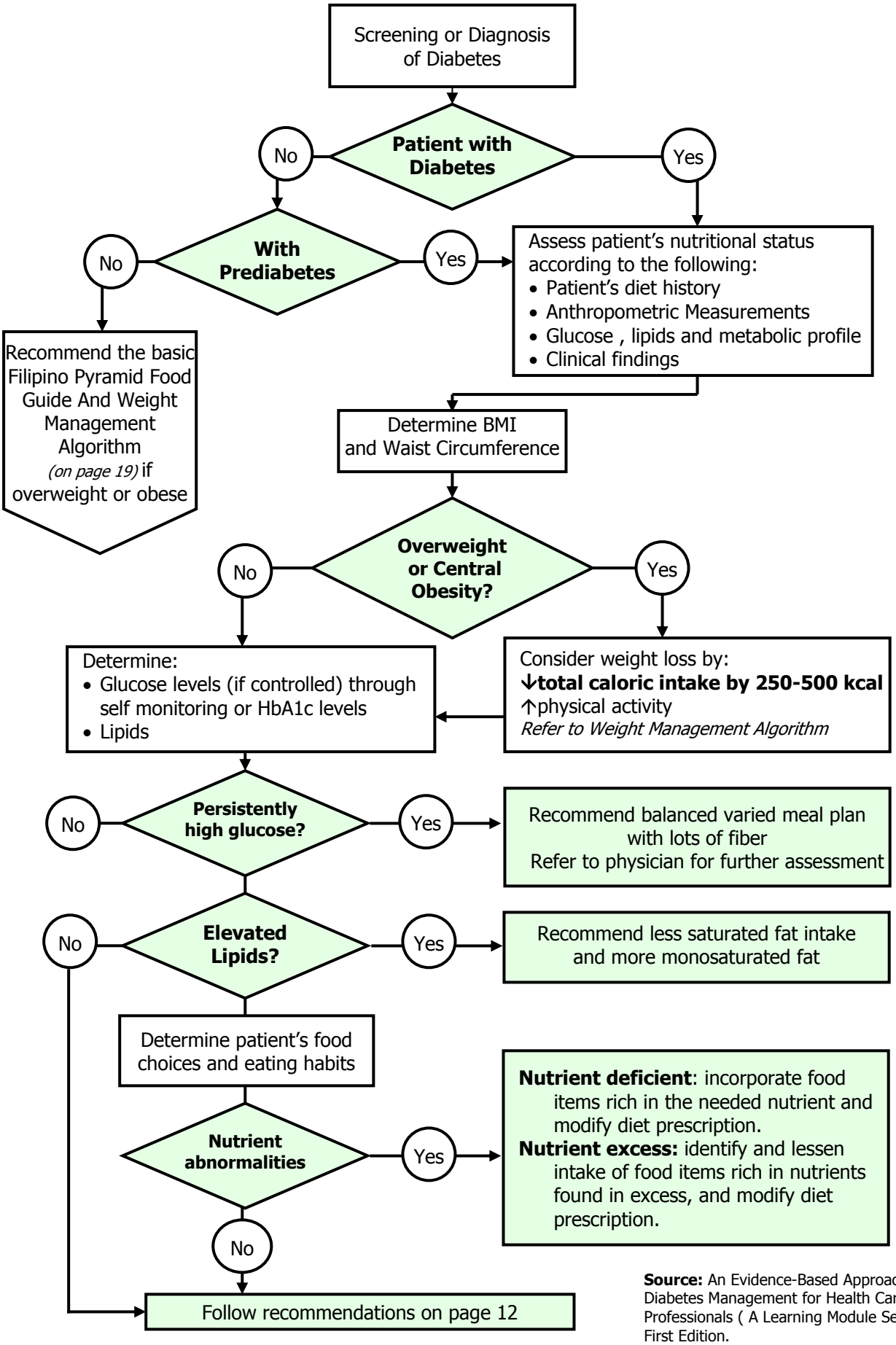
Setting Dietary Management Goals



Source: An Evidence-Based Approach to Diabetes Management for Health Care Professionals (A Learning Module Series), First Edition.

Calculating Individualized Dietary Prescription

Calculate the patient's Desirable Body Weight **(DBW)**

Tannhauser's (Broca) Method:
[Height (cm) – 100] – 10% of difference= DBW in kg
(**eg.** [165cm-100] – 6.5 = 58.5 kg)

Get the Total Energy Requirement **(TER)**

DBW in kg x Energy requirement based on physical activity

Table 5. Energy Requirement Based on Physical Activity

Classification	Description	kcal/kg DWB/day
Bed rest	Hospital patients	**27.5**
Sedentary	Mostly sitting	**30**
Light	Tailor, nurse, physician, driver	**35**
Moderate	Carpenter, painter, housework	**40**
Heavy	Swimming, lumberman	**45**

Source: Food Exchange Lists For Meal Planning Food and Nutrition Research Institute and Department of Science and Technology.
FOR DETAILED DEFINITION OF PHYSICAL ACTIVITY REFER TO APPENDIX 2

(**eg**. 58.5 x 35 = 2048 kcal)

Determine the carbohydrate, protein and fat percentage distribution of the TER. Consider the health and nutritional status of the patient.

Eg.	Carbohydrates	65%
	Protein	10%
	Fat	25%

Note:
No single "diabetic diet" is appropriate for the general population of patients with diabetes. Such patients have different needs depending on their nutritional and health status, physical activity and lifestyle. A short method of diet computation is based on the prescribed caloric contributions of carbohydrates, proteins and fats distributed as:

CARBOHYDRATE = 55-70% (65% - normal diet **)**
PROTEINS = 10-15% (15% - normal diet **)**
FATS = 20-30% (20% - normal diet **)**

Translate the percent distribution into **kilocalories.**

Eg.	2048 x 0.65	= 1331 kcal CHO (Carbohydrates)
	2048 x 0.10	= 205 kcal CHON (Proteins)
	2048 x 0.25	= 512 kcal FATS

Convert calories into **GRAMS.**

Eg.	1331 kcal / **4**	= 333g CHO (Carbohydrates)
	205 kcal / **4**	= 51 g CHON (Proteins)
	512 kcal / **9**	= 57g FATS

Plan a menu distributing the serving portions for values at breakfast, lunch and dinner
MEAL PLANNING BY THE NUTRITIONIST-DIETITIAN

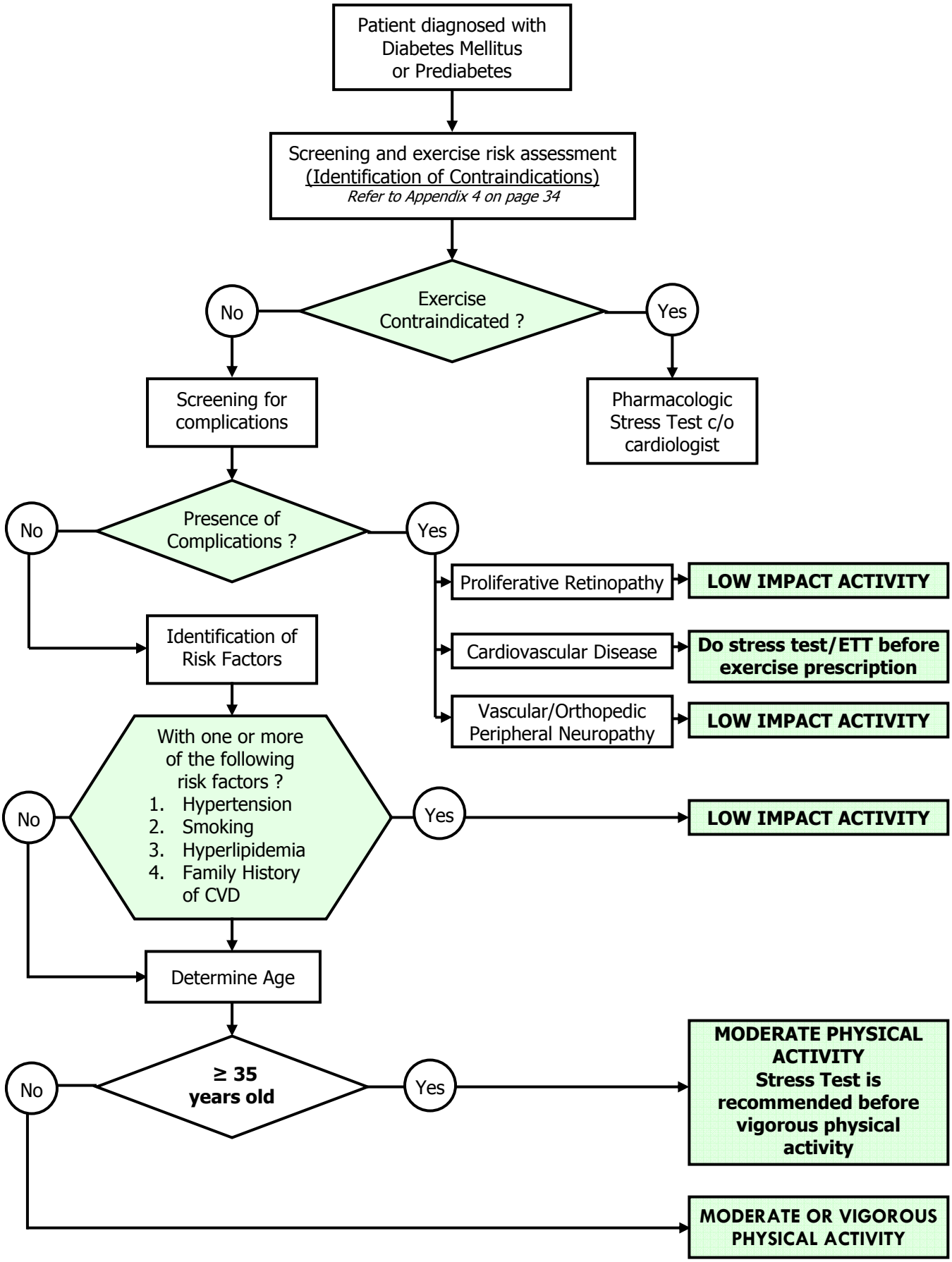
For simplicity and practicality of the diet prescription, round off calories to the:
Nearest <u>50</u> for Carbohydrates
Nearest <u>5</u> for proteins and fats

Refer to the following tools for meal planning:
1. Food Exchange list by FNRI and DOST
2. Nutritional Guidelines
3. Food Pyramid

Diet Rx
TER : 2050 kcal
350g carbohydrates
50g proteins
60g fat

Source: An Evidence-Based Approach to Diabetes Management for Health Care Professionals (A Learning Module Series), First Edition.

Exercise for Type 2 Diabetes



Source: An Evidence-Based Approach to Diabetes Management for Health Care Professionals (A Learning Module Series), First Edition. Adapted from Texas Diabetes Council.

MANAGEMENT

Weight Management

The achievement of a normal weight is often unrealistic and does not have to be the ultimate goal of a weight reduction strategy. Moderate weight loss can have significant benefits. Long term goals for weight management include:

1. Reduction of excess weight by 5-6 kg or 10% of the initial body weight
2. Maintenance of BMI < 23 kg/m²
3. Any reduction of blood pressure
4. Any reduction of blood glucose
5. Any improvement of glycemic control
6. Any reduction of the modifiable risk factors

Before initiating weight loss management patients should have a full medical assessment to evaluate the following:

1. Presence of co-morbidities such as diabetes, hypertension and dyslipidemia. These should be managed accordingly.
2. Age older than 40 years, or who have a history of heart disease, a cardiovascular examination may be necessary prior to exercise prescription.
3. Secondary causes of obesity including Cushing's syndrome, hypogonadism and hypothryoidism that should be referred to specialists and managed accordingly.
4. Symptomatic complications of severe obesity such as obstructive sleep apnea, osteoarthritis, reflux esophagitis, gravitational edema should be treated actively regardless of whether the patient is losing weight.

Pharmacologic Management

Pharmacologic treatment of hyperglycemia uses two types of drugs which address the underlying metabolic abnormalities: oral hypoglycemic agents (**OHAs**) and **insulin**. The following are general principles of pharmacologic therapy:

Prediabetes

For individuals with IFG, IGT or both, health care providers should first actively counsel patients to maintain normal weight and exercise regularly. Because of potential side effects and cost, there is insufficient evidence to support the use of drug therapy as a substitute for, or routinely used in addition to, lifestyle modification to prevent diabetes.

Initiation of OHA

Metformin therapy should be initiated (if there are no contraindications) concurrent with lifestyle intervention at diagnosis. This is the first step in treating new-onset type 2 diabetes. Metformin should be titrated to its maximally effective dose over 1-2 months as tolerated.

Monotherapy vs Combination Therapy

If lifestyle intervention and maximal tolerated dose of metformin fail to achieve or sustain glycemic goals, another medication should be added within 2 to 3 months of the initiation of therapy or at any time when the A1c goal is not achieved *(refer to Pharmacologic Treatment Algorithm on page 20).* Combination therapy options include:

- Metformin + Secretagogue (sulfonylurea or meglitinide)
- Metformin + Thiazolidinedione
- Metformin + Secretagogue + Thiazolidinedione
- Secretagogue + Thiazolidinedione
- Secretagogue + α-glucosidase inhibitor

OHA in Children

Patients who are not ill at diagnosis can be managed initially with medical nutrition nutrition therapy and exercise, but most will eventually require drug therapy. Although insulin is the only drug approved for treatment of diabetes in children pediatric diabetologists use oral agents for children with type 2 diabetes. If pharmacologic therapy is indicated and if insulin is not available the first oral agent used is metformin.

OHA in Pregnancy

No oral agent should be used in pregnancy. If a patient becomes pregnant or if a pregnant patient develops diabetes it is best to refer for initiation of insulin therapy.

Initiation of Insulin

If lifestyle, metformin, and a second medication do not result in goal glycemia, the next step should be to start, then intensify insulin therapy. Insulin can be titrated rapidly and is associated with greatest likelihood of returning blood glucose rapidly to target levels. After symptoms are relieved, oral agents can often be added and it may be possible to withdraw insulin, if preferred.

- Indications for the Use of Insulin in Type 2 Diabetes:

1. Fasting Blood Sugar of **> 13.9 mmol/l (250 mg/dl)**
2. Random Blood Sugar of **> 16.7 mmol/l (300 mg/dl)**
3. HbA1c of **> 10%**
4. Presence of ketonuria
5. Symtomatic diabetes with polyuria, polydipsia and weight loss
6. Failure to meet glycemic targets with OHAs
7. Presence of contraindications to OHAs
8. Hyperglycemic emergency
9. Pregnancy
10. Peri-operative period especially major or emergency surgery
11. Other medical conditions requiring tight glycemic control
12. Organ failure (eg. Renal, liver, heart)

- Guidelines for Commencing Insulin:

1. Continue oral hypoglycemic agents
2. Start with intermediate acting / long-acting insulin at bedtime
3. Initial dose of **0.2 units / kg**
4. Monitor premeal glucose (fasting plasma glucose-FPG)
5. Aim for FPG of **4-8 mmol/L (72-144 mg/dl),** individualize
6. Adjust insulin by **2-4 units every 3-4 days** until FPG target is met. Proceed to twice-daily insulin if daytime blood sugars or HbA1c are elevated, and nocturnal hypoglycemia is occurring.

- Insulin Dosage:

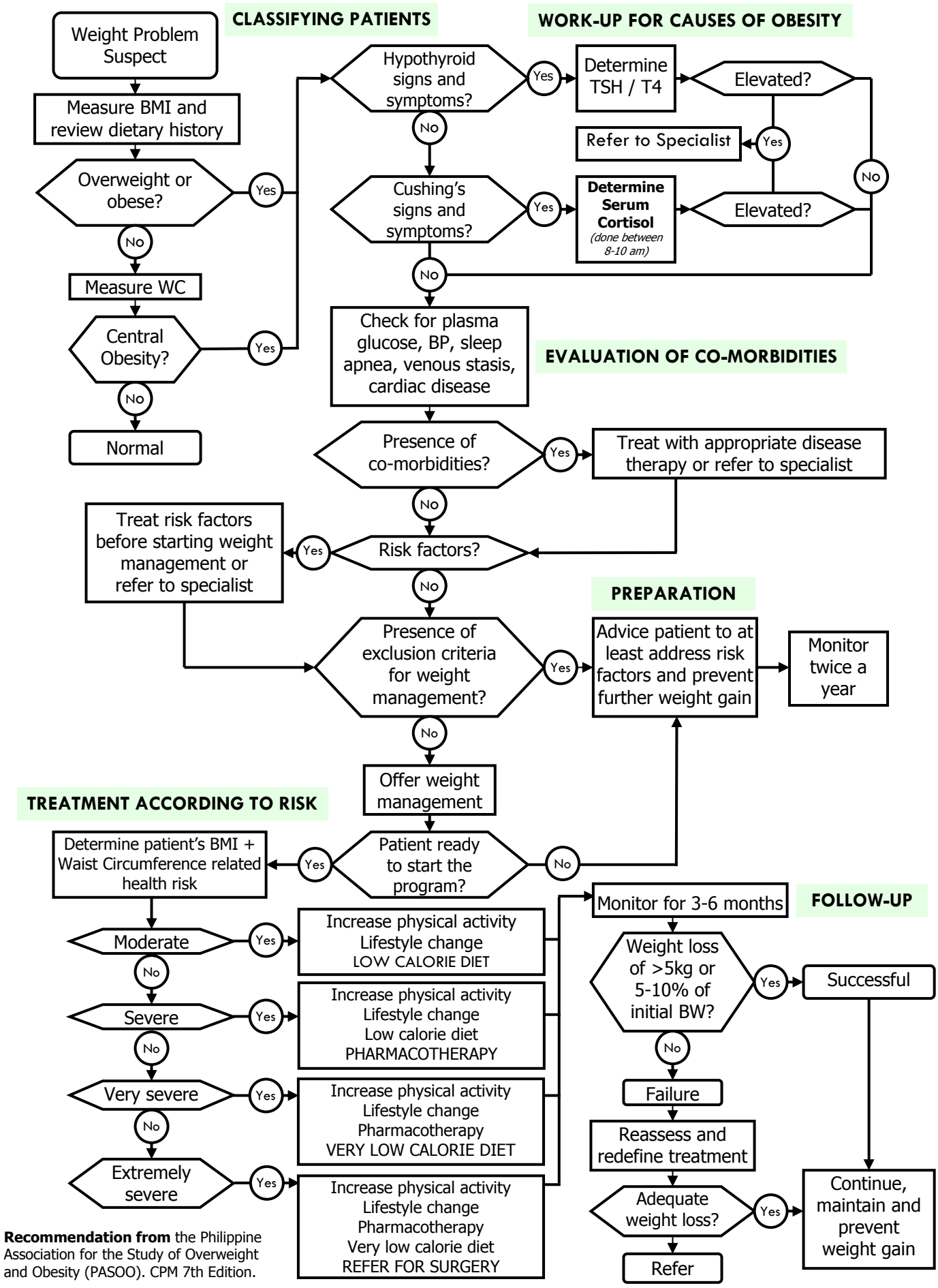
The correct dose of insulin is that which achieves the best attainable glycemic control without causing obvious hypoglycemic problems.

For Children and Adolescents:		
Partial remission phase	**< 0.5**	IU/kg/day
Prepubertal children	**0.7—1.0**	IU/kg/day
Puberty	**1-2**	U/kg/day
For Adults		
Adult	**0.5—1**	U/kg/day

Sources

1. International Diabetes Institute, World Health Organization-WPRO, International Association for the Study of Obesity, International Obesity Task Force, The Asia-Pacific Perspective: Redefining Obesity and its Treatment. Australia: Health Communications Australia Pty Limited, 2000.
2. Medicomm Pacific Inc. , Compendium of Philippine Medicie . 7th Edition. Pasig City Philippines: Medicom Pacific Inc., 2005.
3. American Diabetes Association. Standards of Medical Care in Diabetes-2007. Diabetes Care. Volume 30, Supplement 1, January 2007.
4. Asia-Pacific Type 2 Diabetes Policy Group and International Diabetes Federation Western Pacific Region, Type 2 Diabetes Practical Targets and Treatments. International Diabetes Institute:Melbourne, Australia, 2005.
5. Nathan, David M., John B. Buse, Mayer B. Davidson, Robert J. Heine, Rury R. Holman, Robert Sherwin, Bernard Zinman. "Management of Hyperglycemia in Type 2 Diabetes: A Consensus Algorithm for the Initiation and Adjustment of Therapy, A Consensus Statement of the American Diabetes Association and the European Association for the Study of Diabetes." Diabetes Care Volume 29, Number 8(August 2006): 1963 - 1972.
6. American Diabetes Association, "Consensus Statement: Type 2 Diabetes in Children and Adolescents." Diabetes Care 23(3)(2000) 381-389. 21 Nov 2007.
7. International Diabetes Federation and World Diabetes Foundation. Type 2 Diabetes Clinical Practice Guidelines for Sub-saharan Africa. IDF Africa Region Task Force on Type 2 Diabetes Clinical Practice Guideline. July 2006.
8. International Society for Pediatric and Adolescent Diabetes, "ISPAD Clinical Practice Consensus Guidelines 2006-2007." Pediatric Diabetes Vol. 72006-2007 28 Nov 2007 <www.ispad.org>.
9. Johnson and Johnson, An Evidence-Based Approach to Type 2 Diabetes Management for Health Care Professionals A Learning Module Series. First Edition. 2003.

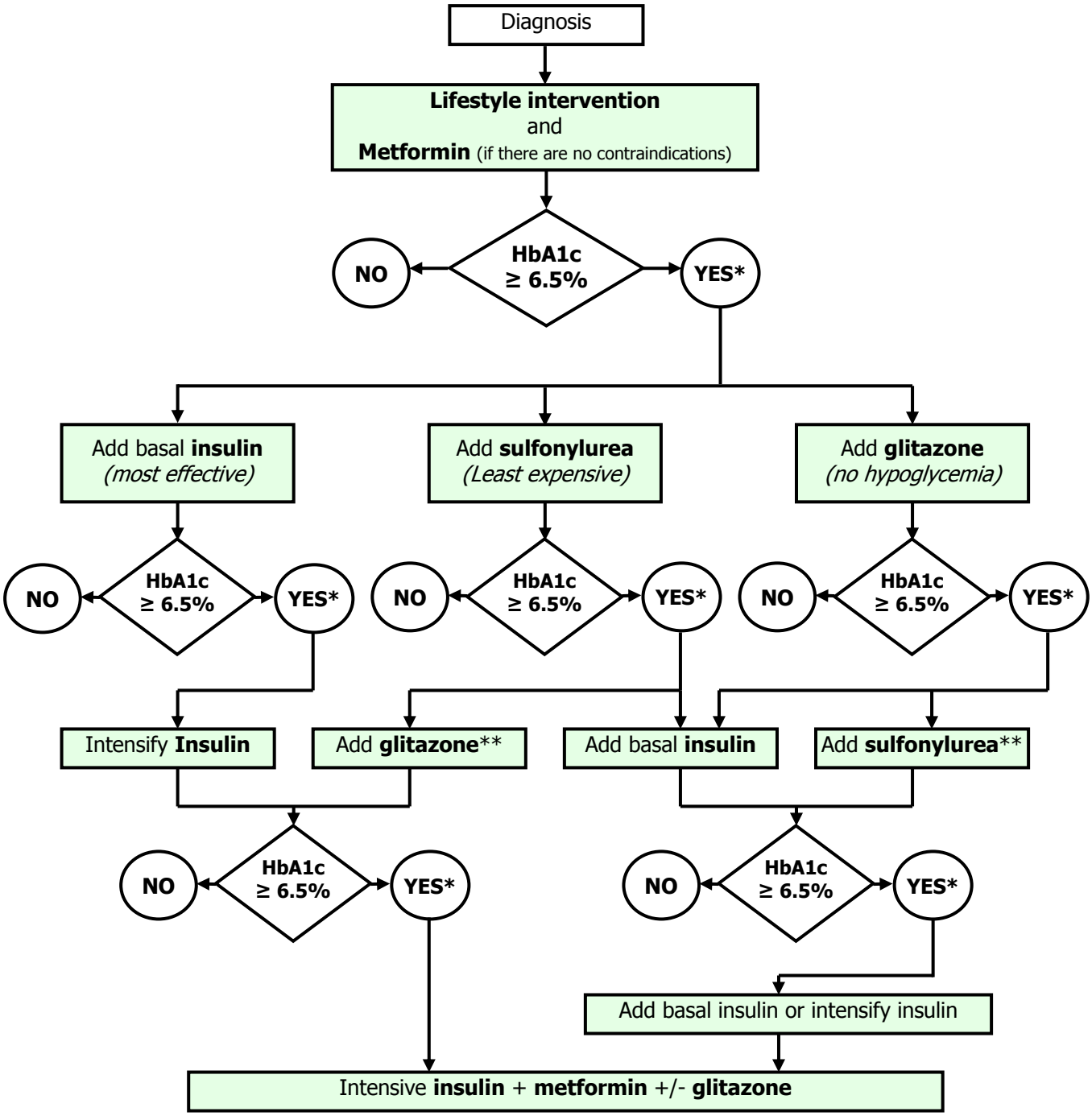
Weight Management



Recommendation from the Philippine Association for the Study of Overweight and Obesity (PASOO). CPM 7th Edition.

Pharmacologic Treatment

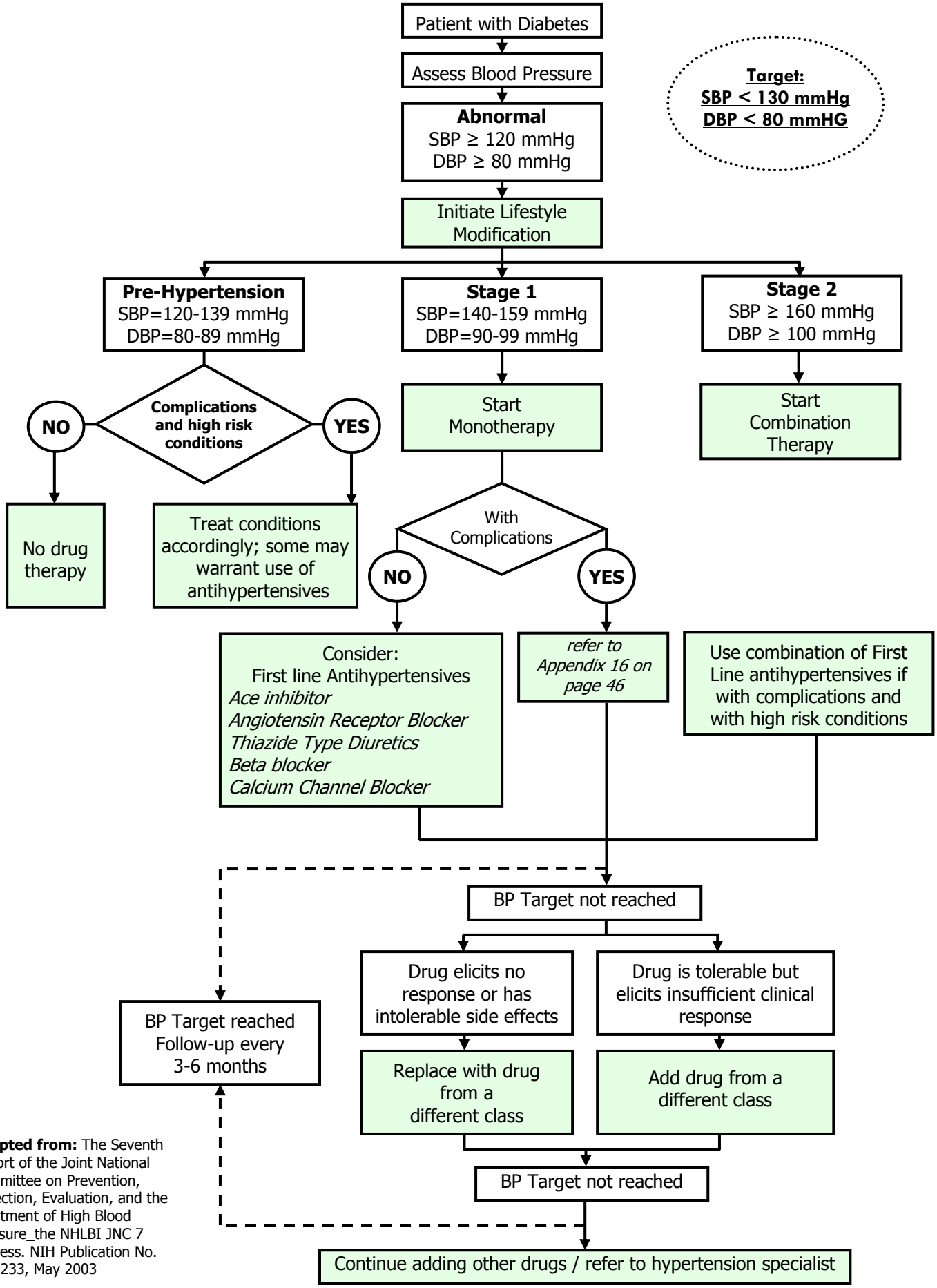
Modified from
THE 2006 ADA/EASD CONSENSUS



* Check HbA1c every 3 months until HbA1c is 6.5% and then at least every 6 months
** Although three oral agents can be used, initiation and intensification of insulin therapy is preferred based on effectiveness and expense.

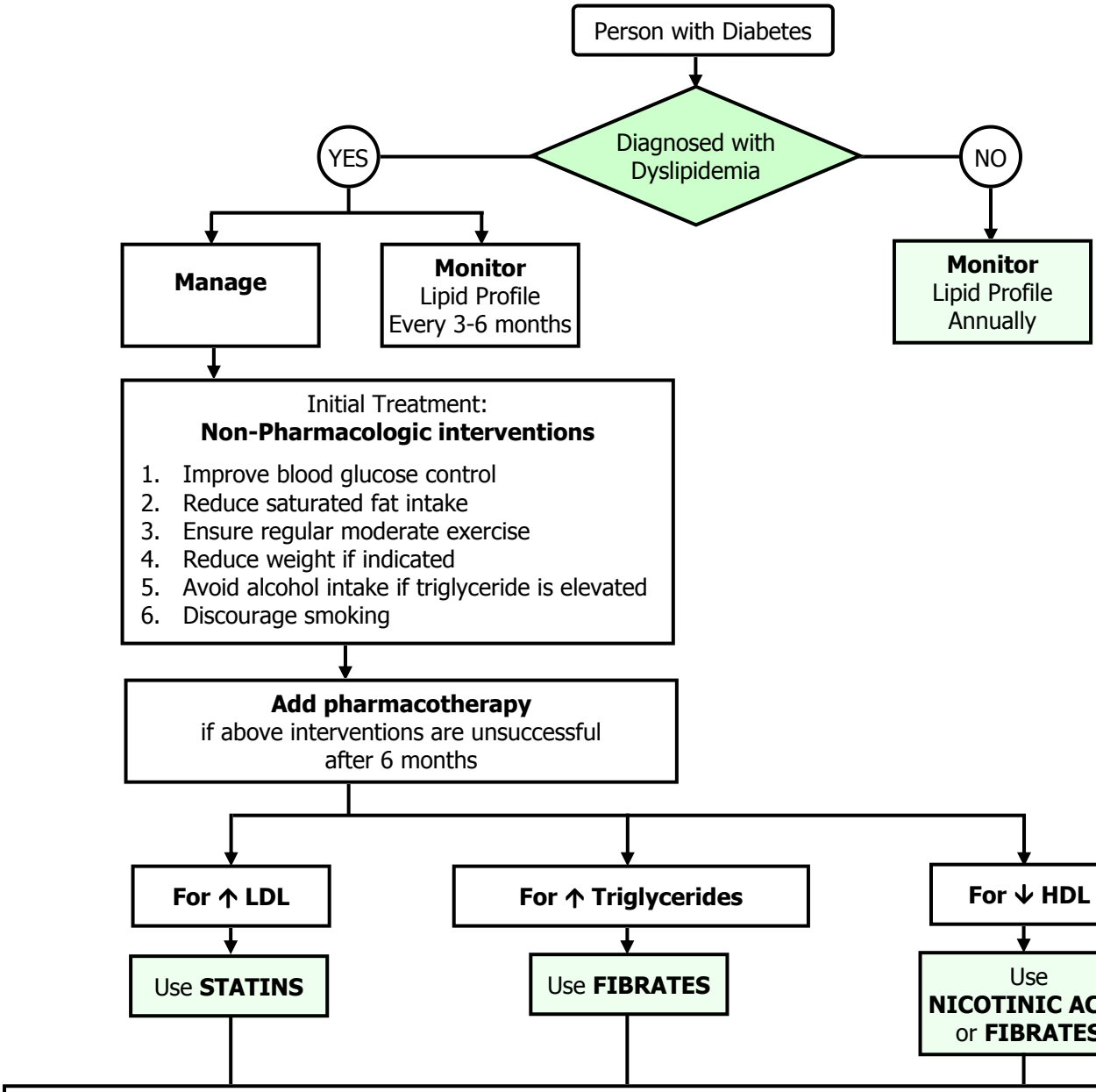
Source : Nathan, David M., John B. Buse, Mayer B. Davidson, Robert J. Heine, Rury R. Holman, Robert Sherwin, Bernard Zinman. "Management of Hyperglycemia in Type 2 Diabetes: A Consensus Algorithm for the Initiation and Adjustment of Therapy, A Consensus Statement of the American Diabetes Association and the European Association for the Study of Diabetes." Diabetes Care Volume 29, Number 8(August 2006): 1963 - 1972.

Treatment of Hypertension



Adapted from: The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and the Treatment of High Blood Pressure_the NHLBI JNC 7 Express. NIH Publication No. 03-5233, May 2003

Treatment of Dyslipidemia



Specifications:

- Statins should be used in all those with previous CVD, irrespective of current lipid levels, with the aim of achieving LDL < 2.5 mmol/L.
- For those without CVD and > 40 years of age, statins should be used if LDL ≥ 2.5 mmol/L or if total cholesterol ≥ 4.5 mmol/L. For those < 40 years old, statins should be considered if other cardiovascular risk factors (hypertension, smoking,microalbuminuria, family history of premature CVD) are also present.
- Once LDL targets are achieved, fibrates should be considered if triglycerides are ≥ 1.5 mmol/L or HDL ≤ 1.1 mmol/L.
- Triglyceride lowering agents should be used if triglycerides are > 4.5 mmol/L to prevent pancreatitis.
- Consideration should be given to the use of other lipid-lowering drugs (e.g. ezetemibe, sustained release nicotinic acid, concentrated omega 3 fatty acids) in those who fail to reach lipid targets or who are intolerant of conventional drugs.
- All patients with abnormal lipid levels should have intensified lifestyle interventions.

Source :

1. Asia-Pacific Type 2 Diabetes Policy Group and International Diabetes Federation Western Pacific Region, Type 2 Diabetes Practical Targets and Treatments. International Diabetes Institute:Melbourne, Australia, 2005.
2. International Diabetes Federation and World Diabetes Foundation. Type 2 Diabetes Clinical Practice Guidelines for Sub-saharan Africa. IDF Africa Region Task Force on Type 2 Diabetes Clinical Practice Guideline. July 2006.

V - MONITORING AND SCREENING OF CHRONC COMPLICATIONS

Introduction

The overriding goal for diabetes management is to lower all glucose parameters to as near to normal as safely possible. These goals provide a framework for initiating and monitoring clinical management. However, targets should be individualized. All improvements are beneficial whether or not a target is reached.

Key Concepts in Setting Glycemic Goals

1. **HbA1c** is the primary target for glycemic control.
2. The goal of diabetes therapy should be to achieve glycemic status as near to normal as safely possible in all three measures of glycemic control **(HbA1c, fasting premeal and postmeal plasma glucose).**
3. Certain populations (children, pregnant women, and elderly) require special considerations.
4. More stringent glycemic goals (eg. A1c of <6%) may further reduce complications at the cost of increased risk of hypoglycemia.
5. Less intensive glycemic goals may be indicated in patients with severe or frequent hypoglycemia.
6. Postprandial glucose may be targeted if A1c goals are not met despite reaching pre-prandial glucose goals.

Self Monitoring of Blood Glucose (SMBG)

Self monitoring of blood glucose using a glucose meter is currently the optimal method for assessing plasma glucose levels. It allows people with diabetes and the diabetes management team to obtain and use information about "real-time" plasma glucose levels to facilitate timely intervention to achieve and maintain near-normal blood glucose levels.

Frequency

- The frequency of monitoring will depend upon available resources, either to the individual or the community concerned. *(refer to Table 8. Recommended Frequency of SMBG on page 24)*
- Extra tests should be performed during illness or prior to strenuous activity.

Quality Control

Self monitoring technique should be checked once or twice per year by the physician or healthcare team.
Quality control of tests is essential, particularly if results are inconsistent with HbA1c or clinical state.

Other Parameters

Blood or urine ketone tests should be performed during illness or when blood glucose is > 20 mmol/L (. 360 mg.dl)

Screening of Complications

Retinopathy and Blindness

- Refer to ophthalmologist for a comprehensive, dilated eye examination at the time of diagnosis.
- Assess visual acuity every 1-2 years
- More frequent examinations are required if retinopathy is detected;
  - Mild Non-proliferative diabetic retinopathy - every 6-12 months
  - More severe retinopathy - every 3-6 months

Nephropathy

- Screening should be performed annually
- The minimum requirement is to dipstick the urine for protein that will detect overt proteinuria.
- The simplest test for microalbuminuria is a urinary albumin:creatinine ratio.
- If levels are abnormal the test should be repeated within 3 months to confirm the diagnosis.
- Serum creatinine should be measured annually.

Diabetic Foot

- Foot screening should be performed annually in all patients with diabetes.
- Risk of neuropathic foot ulceration is most easily detected using a 5.07/10 g Semmes Weistein monofilament.
- Palpation of foot pulses (dorsalis pedis and posterior tibial) is the simplest means of identifying peripheral arterial disease.
- Check for skin cracks, infection, state of nails, callus, deformities and suitability of footwear during each visit.

Sources

1. Asia-Pacific Type 2 Diabetes Policy Group and International Diabetes Federation Western Pacific Region, Type 2 Diabetes Practical Targets and Treatments. International Diabetes Institute:Melbourne, Australia, 2005.
2. American Diabetes Association. Standards of Medical Care in Diabetes-2007. Diabetes Care. Volume 30, Supplement 1, January 2007.
3. International Diabetes Federation, Guideline for Management of Postmeal Glucose. Brussels, Belgium: International Diabetes Federation, 2007.

Targets, Parameters and Frequency

Table 6. Targets of Management for Type 2 Diabetes

Goals	Parameters	Values
Glycemic Goals	HbA1c	**< 6.5%**
	Premeal (fasting)-*capillary*	**< 5.6 mmol/l** *(100 mg/dl)*
	2-hour post meal-*capillary*	**< 7.8 mmol/l** *(140 mg/dl)*
Blood Pressure		**< 130 / 80 mmHg**
Lipid Goals	Total Cholesterol	**≤ 4.5 mmol/l** *(174 mg/dl)*
	LDL-Cholesterol	**< 2.5 mmol/l** *(97 mg/dl)*
	HDL-Cholesterol	**> 1.0 mmol/l** *(39 mg/dl)*
	Triglycerides	**< 1.5 mmol/l** *(133 mg/dl)*
Urinary albumin:creatinine		**2.5 mg/mmol** *(22 mg/g)– men* **3.5 mg/mmol** *(31 mg/g) - women*

Table 7. Monitoring Parameters

Parameter	Minimum Frequency	Procedure
Glycemic Control	6 months	HbA1c
Lipids	1 year	Blood Lipids
Blood Pressure	Each visit	Measure seated after 5 minutes rest
Feet	Each Visit*	Inspection of feet and footwear
	1 year	Clinical neurological and vascular assessment
Eyes	2 years	Fundus Exam through dilated pupils Visual acuity
Kidney	1 year	Urinary Albumin measurement Serum Creatinine

Table 8. Recommended Frequency of SMBG

Treatment Regimen	Frequency	Timing
On insulin	At least **3 x a day**	Before each meal At bedtime 2-hours post-prandial (optional)
On Oral agents	Individualized to each person's treatmen and level of control • Well controlled/stable patients: 1-2 days per week and can be less frequent in consistently well-controlled patients • Poorly controlled/unstable patients, or patients during illness, daily until targets of control are achieved.	

Source: Asia-Pacific Type 2 Diabetes Policy Group and International Diabetes Federation Western Pacific Region, Type 2 Diabetes Practical Targets and Treatments. International Diabetes Institute:Melbourne, Australia, 2005.

VI - MANAGEMENT OF ACUTE STATES, CHRONIC COMPLICATIONS AND ILLNESS

Introduction

Acute states in diabetes are due to severe decrease or increase in blood glucose levels. An example is the deterioration of metabolic control during illness. A primary health care provider must be able to recognize these conditions and provide interim management especially if access to specialized care is not immediate or difficult.

Management of Acute States

Hypoglycemia

If hypoglycemia is suspected, a blood glucose level measurement is needed to confirm the diagnosis. The blood glucose is usually **2.5-2.8 mmol/l (40-50 mg/dl)** with symptoms that are either adrenergic or neuroglycopenic. If blood glucose levels cannot be measured, treat the acute state as hypoglycemia.

- For the **conscious patient** administer an oral carbohydrate such as sugar or glucose.
- For the **unconscious patient** administer **20 ml of 50% glucose** intravenously or **0.5-1 mg glucagon** intramuscularly. Provide oral carbohydrates as soon as the patient is conscious. Monitor glucose levels for at least 24-48 hours after the patient regains consciousness.

Acute Hyperglycemic States

- Insert IV cannula and start IV normal saline, minimum of 1 liter in the first hour unless contraindicated.
- Give **10 U** short-acting insulin IM.
- Arrange immediate transfer to an emergency unit and inform the referral unit.

Management of Chronic Complications

Retinopathy and Blindness

- Aggressive control of hyperglycemia, hypertension and dyslipidemia prevents development, and slows progression of retinopathy.
- Refer to an ophthalmologist if possible.

Nephropathy

- An ACE inhibitor or angiotensin II receptor blocker should be used, even if blood pressure is normal. Serum creatinine and potassium levels should be checked within 1-2 weeks of starting these agents.
- Blood pressure should be managed aggressively, aiming for a target of **< 130/80 mmHg**.
- Aggressive management of other cardiovascular risk factors, especially lipids, and of blood glucose is needed.
- Metformin should not be used once the serum creatinine is **>160 µmol/l (1.8 mg/dl).**
- Treat urinary tract infections aggressively.
- Avoid drugs toxic to the kidney and smoking must be stopped.

Diabetic Foot

- A detailed foot education reinforced regularly should be provided to all people with previous ulceration or evidence of peripheral neuropathy or peripheral arterial disease.
- Principles of treatment of diabetic foot ulcers:
    1. Pressure relief—where repetitive pressure has caused the ulcer, this must be relieved by removal of callus and wearing of appropriate shoes or a pressure-relieving cast/ footwear.
    2. Improvement of vascular supply.
    3. Regular debridement of infected and necrotic tissue.
    4. Aggressive treatment of infection.

Management During Illness

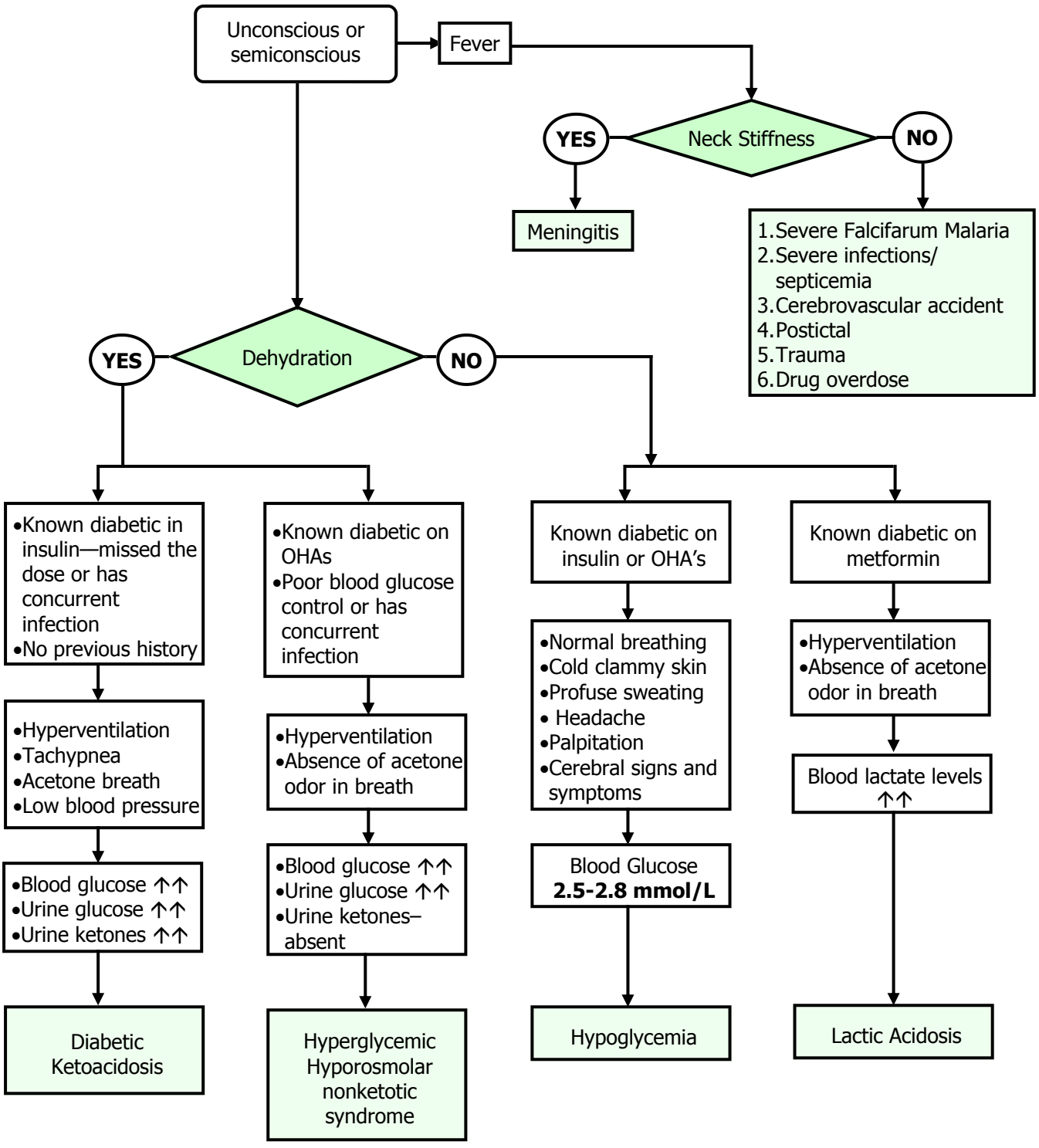
The following instructions should be given to a patient during illness:

1. Do not stop diabetes tablets or insulin.
2. Maintain fluid intake– clear soups, water, weak tea, etc.
3. If unable to take food, substitute with fruit juice, regular soft drinks or other fluid containing glucose.
4. Check blood glucose levels at least four times daily.
5. Check for urine ketones at least twice daily.
6. If vomiting, diarrhea or drowsiness persists, the patient should be brought to a physician immediately.

Sources

1. Asia-Pacific Type 2 Diabetes Policy Group and International Diabetes Federation Western Pacific Region, Type 2 Diabetes Practical Targets and Treatments. International Diabetes Institute:Melbourne, Australia, 2005.
2. International Diabetes Federation and World Diabetes Foundation. Type 2 Diabetes Clinical Practice Guidelines for Sub-saharan Africa. IDF Africa Region Task Force on Type 2 Diabetes Clinical Practice Guideline. July 2006.
3. Dennis L. Kasper, Eugene Braunwald, Anthony S. Fauci, Stephen L. Hauser, Dan L. Longo, J. Larry Jameson, and Kurt J. Isselbacher, Eds., Harrison's Principles of Internal Medicine. 16th Edition. USA: The McGraw-Hill Companies, Inc., 2005.

Differential Diagnosis of Acute Metabolic Complications of Diabetes



Source: International Diabetes Federation and World Diabetes Foundation. Type 2 Diabetes Clinical Practice Guidelines for Sub-saharan Africa. IDF Africa Region Task Force on Type 2 Diabetes Clinical Practice Guideline. July 2006.

And

Dennis L. Kasper, Eugene Braunwald, Anthony S. Fauci, Stephen L. Hauser, Dan L. Longo, J. Larry Jameson, and Kurt J. Isselbacher, Eds., Harrison's Principles of Internal Medicine. 16th Edition. USA: The McGraw-Hill Companies, Inc., 2005.

VII - SPECIAL SITUATIONS AND ISSUES

Fasting for Religious Purposes

Fasting for religious purposes is practiced by both Christianity and Islam. This is possible in certain circumstances in people with diabetes.

General Principles:

- A total fast is not recommended for anyone with diabetes. Adequate hydration is important even during the period of fasting.
- Check the level of glycemic control using HbA1c or fasting blood sugar. Those with very poor control should be discouraged from fasting.
- People who fast should have access to their heath-care providers during the period of fast.
- Fasting should be terminated should frequent hypoglycemia occur or intercurrent infection exists.
- Drug dosage adjustment is required for patients with FBS of **4.4 mmol/L**.
- If on insulin or insulin secretagogues, drug dosages and timing will require adjustment during the period of fasting.
- SMBG is mandatory for people who choose to fast. Once-a-day monitoring is adequate for patients on dietary management and metformin. In patients on insulin secretagogues, SMBG should be done ate least 3x a day.
- Vigorous activity should be avoided during period of fast.

Ramadan

- Fasting is possible.
- Usual dietary advice should be followed at this time.
- Patients on metformin, α-glucosidase inhibitors and thiazolidinediones can continue taking the usual doses at the usual times.
- If on second or third generation sulfonylurea, this should be taken before breaking the fast and not before dawn.
- If on once-daily insulin at bedtime: this can be given as usual.
- If on twice daily short and intermediate acting insulin:
  Before the dawn meal: give usual evening dose of short acting insulin without intermediate acting insulin.
  Before the evening meal: give the usual morning dose of short and intermediate acting insulin.
- If on basal bolus regimen: the usual doses of the short acting insulin can be given before the dawn and evening meals, and usual doses of the intermediate-acting insulin can still be given at 10 pm.

Alternative Medications for Diabetes

Momordica Charantia (Ampalaya)

Below is the position statement on ampalaya use in diabetes mellitus by four major professional diabetes institutions in the Philippines– The Philippine Society of Endocrinology and Metabolism, Philippine Diabetes Association, Institute for Studies on Diabetes Foundation Inc., and Philippine Center for Diabetes Education Foundation, Inc. published in the PDA publication Diabetes Watch, May-August 2007 Issue.

"Prevention and treatment of diabetes mellitus are the major concerns of our organizations. We welcome a truly medicinal plant like ampalaya if scientifically proven and accepted in the treatment of diabetes.

In 2003, we issued our position statement cautioning the public against indiscriminate use of the ampalaya-derived products in people with diabetes due to lack of sufficient evidence to support its efficacy and safety for diabetes. We sounded the call for more clinical studies so physicians and patients will be guided.

The ampalaya leaf tablet Makiling variety has undergone pre-clinical studies in animals as well as Phase I and II clinical trials. A recent unpublished trial (Phase III) involving 260 uncomplicated diabetic patients using ampalaya leaf tablets formulated using young leaves of the Makiling variety showed a blood glucose lowering potential comparable with that of low dose glibenclamide, a standard anti-diabetic drug. This ampalaya leaf tablet is being registered as a new prescription drug under monitored release as part of post-marketing surveillance. We believe that this post marketing surveillance on ampalaya leaf tablet will generate more clinical data on a broader range of diabetic subjects.

Our position remains unchanged. Amplaya-derived products as supplements / nutraceuticals still cannot be considered standard care for diabetes mellitus at this time. The public is cautioned against indiscriminate use of any part of the ampalaya plant, especially if there is no efficacy and safety data on that particular product."

Sources

1. International Diabetes Federation and World Diabetes Foundation. Type 2 Diabetes Clinical Practice Guidelines for Sub-saharan Africa. IDF Africa Region Task Force on Type 2 Diabetes Clinical Practice Guideline. July 2006.
2. Philippine Diabetes Association, Philippine Society of Endocrinology and Metabolism, Institute for Studies on Diabetes Foundation Inc., Philippine Center for Diabetes Education Foundation Inc. , "Position Statement on Ampalaya Use in Diabetes Mellitus." Diabetes Watch May to August 2007:35.

APPENDICES

Appendix 1. Primary Screening Questionnaire

The Diabetes Project
Primary Screening Questionnaire
Para lamang sa walay diabetes

Pangalan *(Name):* _____ Edad *(Age):* ____ Gender: ____ Gipangutana ni *(Administered by)*: _____
Complete Address: _____ Contact Number:_____

Palihog ug check sa kahon kung aduna ning mga mosunod:
(Please check the corresponding box if present:)

Mga Sintomas *(Symptoms):*

Major

- ☐ 1. Sige ug pangihi *(Polyuria)*
- ☐ 2. Uhawon pirmi *(Polydipsia)*
- ☐ 3. Gutomon primi *(Polyphagia)*

Minor

- ☐ 1. Paspas nga pagpayat *(significant weight loss)*
- ☐ 2. Dali kapuyon *(easily fatigued)*
- ☐ 3. Amigason ang ihi *(ants in the urine)*
- ☐ 4. Paghanap sa panan-aw *(blurring of vision)*
- ☐ 5. Samad nga dugay maayo *(slow-healing wound)*
- ☐ 6. Pangatol sa kinatawo *(vaginal itchiness)*

ASSESSMENT	ACTION
☐ **DIABETES SUSPECT (DS)** kung adunay duha hangtud tulo *(2-3)* nga major sintomas	☑ RBS o FBS ☑ Paadtua sa District Health Center dala ang resulta sa blood test *(Refer to the District Health Center with the blood test result)*
☐ 1 major sintomas ☐ 1 major sintomas + minor sintomas ☐ 1 o mas daghan *(1 or more)* pang minor sintomas	☑ Paadtua sa District Health Center para ma-checkup*(Refer to the District Health Center for check-up)*

IPADAYON ANG QUESTIONNAIRE...
Mga Risgo nga Mamahimong Bag-ohon *(Modifiable Risk Factors):*

- ☐ 1. Sobra sa timbang ug dako ang tiyan
  *(Overweight **with** abdominal obesity)*
  - ☐ 1a. BMI = _____ (overweight if **≥23 kg/m²**)
  - ☐ 1b. WC = _____ (abdominal obesity if **≥ 90 cm** sa lalaki ug **≥ 80 cm** sa babae)
- ☐ 2. Kung aduna ning duha: *(Both the characteristics below)*
  - ☐ 2a. Sedentary Lifestyle
  - ☐ 2b. Nagasigarilyo kada adlaw *(smokes everyday)*
- ☐ 3. Adunay high blood (***Hypertension ≥140/90*** *mmHg)*
  Kung oo:
  Kanus-a na diagnose? _____
  Pinakataas na BP _____
  Kinaulahi-an nga BP _____
  Mga tambal _____
- ☐ 4. Na-diagnose nga dunay labaw sa normal nga blood sugar
  (Diagnosed with Prediabetes)
  Kung oo:
  Kanus-a na diagnose? _____
  Matang sa blood test _____
  Resulta sa blood test _____
  Mga tambal kung naa:_____
- ☐ 5. Na-diagnose nga dunay ***Dyslipidemia***
  (Taas ang triglycerides, bad cholesterol ug ubos ang good cholesterol)
  (High triglycerides and LDL cholesterol, low HDL cholesterol)
  Kung oo:
  Kanus-a na diagnose? _____
  Matang sa blood test _____
  Resulta sa blood test _____
  Mga tambal kung naa:_____

ASSESSMENT	ACTION
☐ **HIGH RISK (HR)** kung adunay duha o mas daghan *(2 or more)* na risk factors	☑ FBS o OGTT, kung normal ang resulta usabon kada tuig *(if blood test result is normal repeat once a year)*
☐ **HIGH RISK (HR)** kung adunay *(if there is)* Prediabetes o GDM	☑ Paadtua sa District Health Center dala ang resulta sa blood test *(Refer to the District Health Center with the blood test result)*
☐ **LOW RISK (LR)** kung wala o 1 lang ang risk factor nga dili Prediabetes ug GDM *(none or only 1 risk factor which is not prediabetes or GDM)*	☑ Usabon kining questionnaire kada tulo ka tuig *(repeat this questionnaire every three years)*
☐ Kung adunay risgo nga mamahimong bag-ohon*(If there are modifiable risk factors)*	☑ Tudlu-i mahitungod sa healthy lifestyle ug isugyot nga ipatambal ang iyang high blood ug dislipidemia *(Educate about healthy lifestyle and encourage treatment of hypertension and dyslipidemia*

Mga Risgo nga Dili na Mabag-o *(Non-Modifiable Risk Factors):*

- ☐ 1. Edad *(age)* ≥ 35 years old
- ☐ 2. Mga ginikanan o igsoon nga na-diagnose ug diabetes *(Parents or siblings diagnosed with diabetes)*
- ☐ 3. Adunay sakit sa kasing-kasing *(Cardiovascular disease)*
- ☐ 4. Gipanganak nga sobra sa timbang o kulang sa timbang *(low bith weight or overweight at birth)*

Sa babae lamang:

- ☐ 5. Adunay diabetes sa dihang nagbuntis *(Gestational Diabetes Mellitus or GDM)*
- ☐ 6. Adunay anak nga **≥ 9 pounds** (**4.0 kgs**) ang timbang pagkatawo *(Gave birth to a baby weighing ≥ 9 lbs)*
- ☐ 7. Na-diagnose nga dunay Polycystic Ovarian Syndrome *(Diagnosed with PCOS)*

Appendix 2. Selected Physical Activities Defined by Level of Intensity

Light Activity *Less than 3.0 METs* *(<3.5kCal/min)*	**Moderate Activity** *3.0 to 6.0 METs* *(3.5-7kCal/min)*	**Vigorous Activity** *Greater than 6.0 METs* *(> 7 kCal/min)*
Walking casually , < 3 mph • In the house or yard • Window shopping	**Walking** at a moderate or brisk pace, 3-4.5 mph on a level surface, inside or outside, such as • To class, work or store • For pleasure • As a break from work Walking downstairs or down a hill Racewalking, < 5mph Hiking Roller skating, leisurely pace	**Racewalking and aerobic walking**, 5 mph or faster Jogging or running Walking and climbing briskly up a hill Marching rapidly (military) Mountain climbing, rock climbing, rapelling Roller skating, fast pace
Bicycling, < 5 mph Stationary bicycling, using very light effort	**Bicycling** 5-9 mph, level terrain Stationary bicycling, using moderate effort	**Bicycling**, > 10mph , or bicycling on steep uphill terrain Stationary bicycling, using vigorous effort
Stretching exercises, slow warmup	**Calisthenics**, light gymnastics **General home exercises**, light or moderate effort, getting up and down from the floor Jumping on a trampoline	**Calisthenics**, push-ups, vigorous effort **Karate**, judo, tae kwondo, jujitsu Jumping rope Performing jumping jacks
	Boxing, punching bag	**Boxing**, in the ring, sparring Wrestling, competitive
Ballroom dancing, very slowly	**Ballroom dancing** Folk dancing Modern dancing, disco, Ballet	**Professional ballroom** dancing, energetically Folk dancing, energetically
Table tennis or Ping-pong, leisurely	**Table tennis**, competitive Tennis, doubles	**Tennis**, singles Wheelchair tennis
Golf, riding a powered golf cart Golf, driving range Playing miniature golf	**Golf**, wheeling or carrying clubs	
Playing catch, football or baseball Throwing a baseball	**Softball,** fast or slow pitch Basketball, shooting baskets Coaching children or adult sports	Most competitive sports Football game Basketball game Wheelchair basketball Soccer, Rugby, Kickball
Volleyball, recreational	**Volleyball**, competitive	**Beach volleyball**, on sand court
Billiards Darts Pistol or rifle target practice Throwing a Frisbee Bowling, or lawn bowling	**Badminton** Fencing Archery (non hunting) Playing Frisbee Juggling	**Handball**, general or team Racquetball
Swimming, floating	**Swimming**, recreational Treading water, slowly ,moderate effort Aquatic aerobics Diving, springboard or platform Water skiing Snorkeling Surfing, board or body	**Swimming**, steady paced laps Synchronized swimming Treading water, fast vigorous efforts Water jogging Water basketball Scuba diving
Boating, powerboat Yachting	**Paddle boating** Canoeing or rowing a boat, at < 4 mph Sailing, recreational or competition Kayaking, on a lake, calm water	Canoeing or rowing, 4 or more mph Kayaking, in whitewater rapids

Appendix 2. Selected Physical Activities Defined by Level of Intensity

Light Activity *Less than 3.0 METs* *(<3.5kCal/min)*	**Moderate Activity** *3.0 to 6.0 METs* *(3.5-7kCal/min)*	**Vigorous Activity** *Greater than 6.0 METs* *(> 7 kCal/min)*
Sitting and **playing a board** game or video game Sitting while reading, writing, coloring, painting, using a computer	**Playing on school playground** equipment, moving about, swinging, or climbing Skateboarding Roller-skating or in-line skating, leisurely pace	**Jumping rope** Running Skipping Performing jumping jacks Roller-skating or in-line skating, fast pace
Sitting and **playing most musical instruments**	**Playing instruments** while actively moving; playing in a marching band; playing guitar or drums in a rock band Twirling a baton in marching band Singing while actively moving about- as on stage or in church	**Playing heavy musical** instrument while actively running in a marching band
Gardening and yard work: weeding while sitting or kneeling, pruning Using a riding mower or driving a tractor on firm ground	**Gardening and yard work**: raking the lawn, digging, hoeing, light shoveling (< 10 lbs/min), weeding while standing or bending Planting trees, trimming shrubs and trees, hauling branches, stacking wood Pushing a power lawn mower	**Gardening and yard work**: heavy or rapid shoveling (> 10 lbs/min), digging ditches, or carrying heavy loads Felling trees, carrying large logs, swinging an ax, hand- splitting logs, or climbing and trimming trees Pushing a non motorized lawn
Light housework: dusting, sweeping floors, making beds, cooking or serving food, washing dishes, folding and putting away laundry , sewing Most other household tasks done while sitting or standing	**Moderate housework**: scrubbing the floor or bathtub while on hands or knees, hanging laundry on a clothesline, sweeping an outdoor area, washing windows, moving light furniture, walking and putting household items away , carrying water or firewood General household tasks requiring considerable effort	**Heavy housework**: moving or pushing heavy furniture (75 lbs or more), carrying household items weighing 25 lbs or more up a flight of stairs, or shoveling coal in a stove Standing, walking, or walking down a flight of stairs carrying objects weighing 50 lbs or more
Sitting and **playing with children** **Child care**: dressing, bathing, feeding or occasionally lifting young children	**Actively playing with children**: walking, climbing, running Walking while carrying a child < 50 lbs Walking while pushing or pulling a child in a stroller or an adult in a wheelchair Carrying a child weighing < 25 lbs up a flight of stairs Child care: handling uncooperative young children (chasing, dressing) or handling several young children at one time Bathing and dressing an adult	**Vigorously playing with children**: running longer distances or playing strenuous games with children Carrying an adult or a child weighing 25 lbs or more up a flight of stairs Standing or walking while **carrying an adult or a child** weighing 50 lbs or more
Light **home repair**: wiring, plumbing, or repairing appliances	**Home repair**: cleaning gutters, refinishing furniture, sanding floors with power sander, or laying or removing carpet or tiles **General home construction** work: roofing, painting inside or outside the house, wall papering, scraping, plastering, remodeling	**Home repair or construction**: very hard physical labor, standing or carrying heavy loads of 50 lbs or more, taking heavy loads of 25 lbs or > up a flight of stairs or ladder (e.g. carrying roofing materials to the roof), or concrete or masonry work.
Workshop **carpentry**	**Outdoor carpentry**, sawing wood with power saw	**Hand-sawing** hardwoods
Light **automobile repair** Motorcycle or bicycle repair	**Automobile bodywork** Hand washing and waxing a car	Pushing a **disabled car**

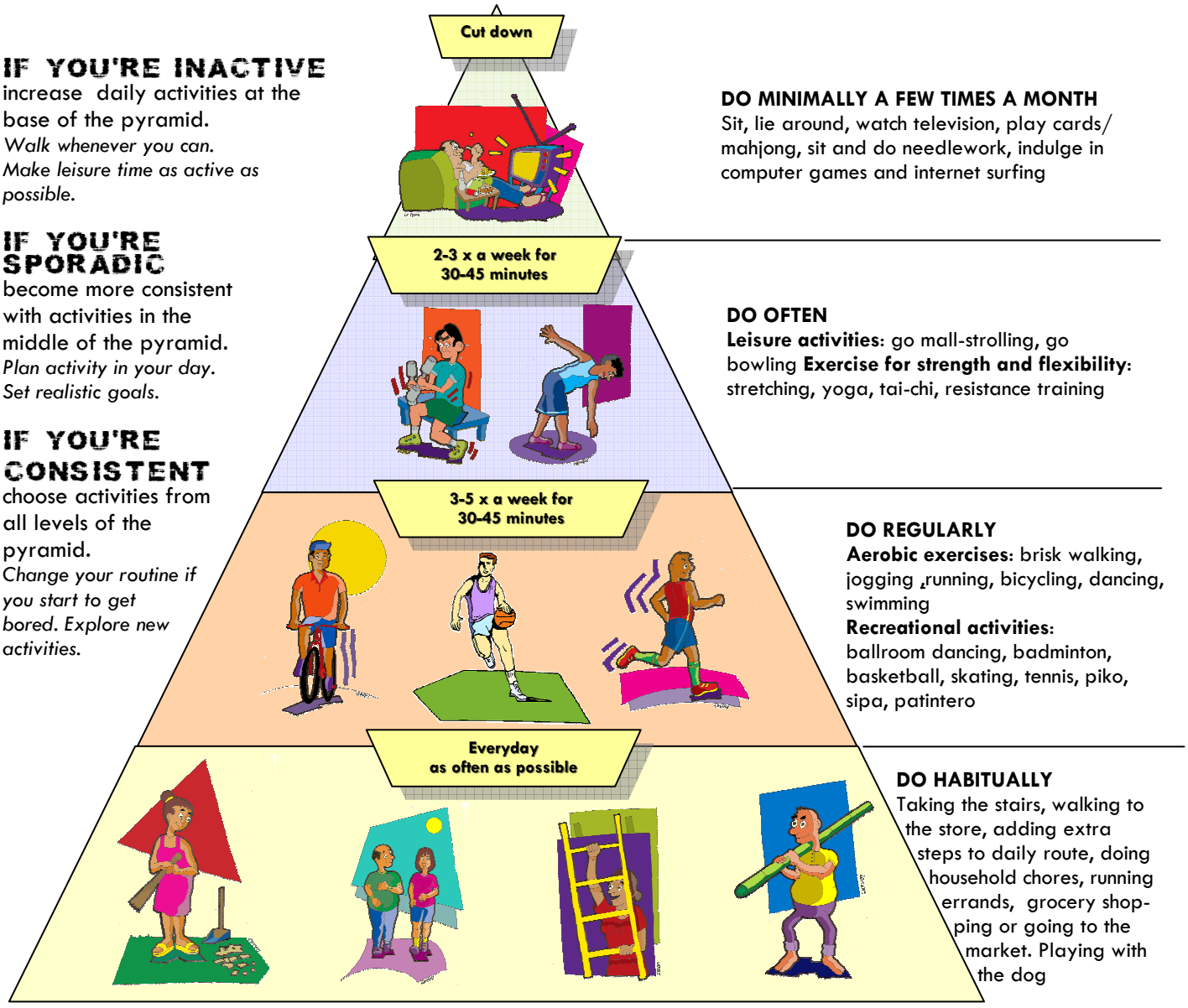
Appendix 2. Selected Physical Activities Defined by Level of Intensity

Light Activity *Less than 3.0 METs* *(<3.5kCal/min)*	**Moderate Activity** *3.0 to 6.0 METs* *(3.5-7kCal/min)*	**Vigorous Activity** *Greater than 6.0 METs* *(> 7 kCal/min)*
Occupations that require extended periods of sitting or standing. Tasks frequently requiring movement of little more than hands and fingers *For example*: • Office work: sitting in meetings or classes, laboratory work, computer terminal work • Sales, while sitting or standing • Driving a car, light truck, airplane or heavy equipment that is fully automated with a smooth ride • Operating most machinery from sitting or standing position (e.g. forklift or crane operation) • Appliance or automotive repair, light • Most light-to-moderate assembly line work, working with hands • Directing traffic • Patient care and nursing	**Occupations that require extended periods of walking, pushing or pulling objects** weighing < 75 lbs, standing while lifting objects weighing < 50 lbs, walking while carrying objects weighing < 50 lbs, or carrying objects of < 25 lbs up a flight of stairs Tasks frequently requiring moderate effort and considerable use of arms, legs, or occasional total body movements *For example:* • Briskly walking on a level surface while carrying a suitcase or load weighing up to 50 lbs • Maid service or cleaning services • Waiting tables or institutional dishwashing • Driving or maneuvering heavy vehicles (e.g. semi-truck, school bus, tractor, harvester) nor fully automated and requiring extensive use of arms and legs • Operating heavy power tools (e.g. drills and jackhammers) • Many homebuilding tasks (e/g/ electrical work, plumbing, carpentry, dry wall, painting • Farming: feeding and grooming animals, milking cows, shoveling grain; picking fruit from trees, or picking vegetables • Packing boxes for shipping and moving • Assembly -line work: tasks requiring movement of the entire body, arms, or legs with moderate effort • Mail carriers: walking while carrying a mailbag • Patient care: bathing, dressing, and • moving patients or physical therapy	**Occupations that require extended periods of running, rapid movement, pushing or pulling objects** weighing 75 lbs or more, standing while lifting objects of 50 lbs or >, or carrying heavy objects of 25 lbs or > up a flight of stairs. Tasks frequently requiring strenuous effort and extensive total body movements *For example:* • Running up a flight of stairs while carrying a suitcase or load weighing 25 lbs or more • Teaching a class or skill requiring active and strenuous participation, such as aerobics or physical education instructor • Firefighting • Masonry and heavy construction work • Coal mining • Manually shoveling or digging ditches • Using heavy non powered tools • Most forestry work • Farming: forking straw, baling hay, cleaning barn, or poultry work • Loading and unloading a Truck

Source: Ainsworth BE, Haskell WL, Leon AS et al. Compendium of physical activities: classification of energy costs of human physical activities. Medicine and Science in Sports and Exercise 1993; 25(1):71-80. In Promoting Physical Activity A Guide for Community Action (1999). U.S.Department of Health and Human Services, Public Health Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Nutrition and Physical Activity. Human Kinetics Publishers. And Department of Health Philippines, University of the Philippines Manila., A Training Manual for Health Workers on Promoting Healthy Lifestyles. Manila Philippines: Publications Unit of WHO-WPRO, 2003.

The Activity Pyramid

A simple guide to increasing physical activity



IF YOU'RE INACTIVE
increase daily activities at the base of the pyramid.
Walk whenever you can.
Make leisure time as active as possible.

IF YOU'RE SPORADIC
become more consistent with activities in the middle of the pyramid.
Plan activity in your day.
Set realistic goals.

IF YOU'RE CONSISTENT
choose activities from all levels of the pyramid.
Change your routine if you start to get bored. Explore new activities.

DO MINIMALLY A FEW TIMES A MONTH
Sit, lie around, watch television, play cards/ mahjong, sit and do needlework, indulge in computer games and internet surfing

DO OFTEN
Leisure activities: go mall-strolling, go bowling **Exercise for strength and flexibility:** stretching, yoga, tai-chi, resistance training

DO REGULARLY
Aerobic exercises: brisk walking, jogging ,running, bicycling, dancing, swimming
Recreational activities: ballroom dancing, badminton, basketball, skating, tennis, piko, sipa, patintero

DO HABITUALLY
Taking the stairs, walking to the store, adding extra steps to daily route, doing household chores, running errands, grocery shopping or going to the market. Playing with the dog

Appendix 4. Contraindications to Exercise Participation

Cardio-Pulmonary	Renal	Others
Absolute Contraindications		
Abnormal ECG readings Unstable angina pectoris Abnormal heart rhythm Severe symptomatic aortic stenosis Abnormal dilatation Heart infections Presence of atherosclerosis Sudden blockage of pulmonary arteries	Acute or inadequate controlled kidney failure	Untreated high-risk diabetic retinopathy Recent significant retinal hemorrhage. Infections
Relative Contraindications		
Uncontrolled hypertension with resting blood pressure of **>200mmHg** systolic or **>110 mmHg** diastolic Severe autonomic neuropathy with exertional hypotension. Functional abnormalities of the heart Other forms of outflow tract obstruction Abnormal heart rate Abnormal impulse conduction dilatation in any of the heart chambers	electrolyte abnormalities (eg. Hypokalemia, hypomagnesemia)	FBS of > 300mg/dl or > 250 mg/dl with urinary ketone bodies. Hypoglycemia Uncontrolled metabolic disease (eg. Thyrotoxicosis, myxedema) Chronic infectious disease (eg. Hepatitis, TB, AIDS) Neuromuscular, musculoskeletal, or rheumatoid disorders that are aggravated by exercise Complicated pregnancy

Appendix 5. Complications of Exercise in Type 2 Diabetes

Cardiovascular	Microvascular	Metabolic	Musculoskeletal
Cardiac dysfunction abnormal rhythm due to ischemia Very high or low blood pressure during exercise Decrease of blood pressure when changing body position	Bleeding of the retina Increased protein in urine (proteinuria) Aggravation of lesions	Worsening of hyperglycemia (high blood glucose) and increase in ketone formation Hypoglycemia (low blood glucose) in patients maintained on diabetes drugs	Foot ulcers Bone and muscle injuries Joint diseases Eye injuries

Appendix 6. Two Basic Types of Exercises

Aerobic	Anaerobic
Uses large group of muscles in rhythmic motion for an extended period of time	Short burst of energy, quick or of very high intensity
Uses oxygen as muscles burn a greater percent of fat for fuel	Burns mostly glycogen and glucose for fuel.
Improves cardiovascular conditioning and overall physical fitness	Minimal conditioning benefits for the cardiorespiratory system
Improves muscle efficiency and tone	Improves muscle strength and spped of activity
Helps lose fat weight	Builds muscle tissue, ineffective for fat loss
Examples: Walking, jogging, cycling, dancing, skating, rope skipping	Examples: Weight lifting, sprinting, calisthenics (push-ups, sit-ups), resistance training programs
Short term effects usually not felt in healty adults especially if done in low intensities and volumes	May cause orthopedic and vascular problems, may also be bad for patients with poor metabolic control, and those with active proliferative

Source: Johnson and Johnson, An Evidence-Based Approach to Type 2 Diabetes Management for Health Care Professionals A Learning Module Series. First Edition. 2003.

Appendix 7. Body Mass Index Table

Body Mass Index Table for Asians

Classification			Normal				Pre-obese							Obese									Extreme obesity				
BMI			19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
Height																												
(m)	(in)	(ft, in)	Body Weight (kg)																									
1.47	58	4'10"	41	44	45	48	50	52	54	56	59	61	63	65	67	70	72	74	76	78	80	82	85	87	89	91	93	95
1.49	59	4'11"	43	45	47	50	52	54	56	58	60	63	65	67	70	72	74	76	79	81	83	85	88	89	92	95	96	99
1.52	60	5'	44	46	49	51	54	56	58	60	63	65	67	70	72	74	76	79	81	84	86	88	90	93	95	98	100	102
1.54	61	5'1"	45	48	50	53	55	58	60	62	65	67	70	72	75	77	79	82	84	86	89	91	94	96	99	101	103	105
1.57	62	5'2"	47	50	52	55	57	60	62	65	67	70	72	75	77	80	82	85	87	89	92	94	97	99	102	104	107	109
1.59	63	5'3"	49	51	54	56	59	61	64	66	69	72	74	77	80	82	85	87	90	92	95	97	100	102	105	108	110	113
1.62	64	5'4"	50	53	55	58	61	64	66	69	71	74	77	79	82	84	87	90	93	95	98	100	103	105	108	111	114	116
1.64	65	5'5"	52	55	57	60	63	65	68	71	74	76	79	82	85	87	90	93	55	98	101	104	106	109	112	115	117	120
1.67	66	5'6"	54	56	59	62	65	67	70	73	76	79	81	85	87	90	93	95	98	101	104	107	110	112	115	118	121	124
1.69	67	5'7"	55	58	61	64	66	70	72	75	78	81	84	87	90	93	96	99	101	105	107	110	113	116	119	122	125	127
1.72	68	5'8"	57	60	63	65	69	72	75	78	80	84	86	90	92	95	98	101	105	107	110	113	116	119	122	125	128	131
1.74	69	5'9"	58	61	65	68	70	74	77	80	83	86	89	92	95	98	101	105	107	110	114	117	120	123	126	129	132	135
1.77	70	5'10"	60	63	66	70	73	76	79	82	85	89	92	95	98	101	104	107	110	114	117	120	123	126	130	133	136	139
1.80	71	5'11"	62	65	68	71	75	78	81	85	88	91	95	98	101	104	107	110	114	117	120	124	127	130	133	137	140	143
1.82	72	6'	64	67	70	74	77	80	84	87	90	94	97	100	104	107	110	114	117	120	124	127	130	134	137	140	144	147
1.85	73	6'1"	65	69	72	75	79	83	86	90	93	96	100	103	107	110	114	117	120	124	127	131	134	137	141	145	148	151
1.89	74	6'2"	67	70	74	78	81	85	88	92	95	99	102	106	110	113	116	120	124	127	130	134	138	141	145	148	152	155
1.90	75	6'3"	69	73	76	80	84	87	91	95	98	102	105	109	113	116	120	124	127	130	134	138	141	145	149	152	156	160
1.92	76	6'4"	71	75	78	82	86	90	93	97	100	105	108	112	115	120	123	127	130	134	138	142	145	149	153	156	160	164

Appendix 8. Classification of Weight by BMI in Adult Asians

Classification of Weight by BMI in Adult Asians and
Co-morbidities risk associated with the combination of BMI and Waist Circumference

Classification	**BMI**	**Risk of co-morbidities**	
		Waist circumference	
		< 90 cm men	**≥ 90 cm men**
		< 80 cm women	**≥ 80 cm women**
Underweight	< 18.5	Low (but increased risk to other clinical problems)	Average
Normal Range	18.5 – 22.9	Average	Increased
Overweight	≥ 23		
At risk	23 – 24.9	Increased	Moderate
Obese I	25 – 29.9	Moderate	Severe
Obese II	≥ 30	Severe	Very Severe

Source: International Diabetes Institute, World Health Organization-WPRO, International Association for the Study of Obesity, International Obesity Task Force, The Asia-Pacific Perspective: Redefining Obesity and its Treatment. Australia: Health Communications Australia Pty Limited, 2000.

Appendix 9. Body Mass Index for Age Table for Girls

BMI-for-age GIRLS
5 to 19 years (percentiles)

World Health Organization

Year: Month	Months	3rd	15th	Median	85th	97th
5: 1	61	12.9	13.8	15.2	16.9	18.6
5: 2	62	12.9	13.8	15.2	16.9	18.6
5: 3	63	12.9	13.8	15.2	17.0	18.7
5: 4	64	12.9	13.8	15.2	17.0	18.7
5: 5	65	12.9	13.8	15.2	17.0	18.7
5: 6	66	12.8	13.8	15.2	17.0	18.7
5: 7	67	12.8	13.8	15.2	17.0	18.8
5: 8	68	12.8	13.8	15.3	17.0	18.8
5: 9	69	12.8	13.8	15.3	17.0	18.8
5: 10	70	12.8	13.8	15.3	17.0	18.9
5: 11	71	12.8	13.8	15.3	17.1	18.9
6: 0	72	12.8	13.8	15.3	17.1	18.9
6: 1	73	12.8	13.8	15.3	17.1	19.0
6: 2	74	12.8	13.8	15.3	17.1	19.0
6: 3	75	12.8	13.8	15.3	17.1	19.0
6: 4	76	12.8	13.8	15.3	17.2	19.1
6: 5	77	12.8	13.8	15.3	17.2	19.1
6: 6	78	12.8	13.8	15.3	17.2	19.2
6: 7	79	12.8	13.8	15.3	17.2	19.2
6: 8	80	12.8	13.8	15.3	17.3	19.3
6: 9	81	12.8	13.9	15.4	17.3	19.3
6: 10	82	12.9	13.9	15.4	17.3	19.3
6: 11	83	12.9	13.9	15.4	17.3	19.4
7: 0	84	12.9	13.9	15.4	17.4	19.4
7: 1	85	12.9	13.9	15.4	17.4	19.5
7: 2	86	12.9	13.9	15.4	17.4	19.6
7: 3	87	12.9	13.9	15.5	17.5	19.6
7: 4	88	12.9	13.9	15.5	17.5	19.7
7: 5	89	12.9	13.9	15.5	17.5	19.7
7: 6	90	12.9	14.0	15.5	17.6	19.8
7: 7	91	12.9	14.0	15.5	17.6	19.8
7: 8	92	13.0	14.0	15.6	17.6	19.9
7: 9	93	13.0	14.0	15.6	17.7	20.0
7: 10	94	13.0	14.0	15.6	17.7	20.0
7: 11	95	13.0	14.0	15.7	17.8	20.1
8: 0	96	13.0	14.1	15.7	17.8	20.2
8: 1	97	13.0	14.1	15.7	17.9	20.2
8: 2	98	13.1	14.1	15.7	17.9	20.3
8: 3	99	13.1	14.1	15.8	18.0	20.4
8: 4	100	13.1	14.2	15.8	18.0	20.4
8: 5	101	13.1	14.2	15.8	18.1	20.5
8: 6	102	13.1	14.2	15.9	18.1	20.6
8: 7	103	13.2	14.2	15.9	18.2	20.7
8: 8	104	13.2	14.3	15.9	18.2	20.7
8: 9	105	13.2	14.3	16.0	18.3	20.8
8: 10	106	13.2	14.3	16.0	18.3	20.9
8: 11	107	13.3	14.4	16.1	18.4	21.0
9: 0	108	13.3	14.4	16.1	18.4	21.1
9: 1	109	13.3	14.4	16.1	18.5	21.1
9: 2	110	13.3	14.4	16.2	18.5	21.2
9: 3	111	13.4	14.5	16.2	18.6	21.3
9: 4	112	13.4	14.5	16.3	18.7	21.4
9: 5	113	13.4	14.5	16.3	18.7	21.5
9: 6	114	13.4	14.6	16.3	18.8	21.6
9: 7	115	13.5	14.6	16.4	18.8	21.6
9: 8	116	13.5	14.6	16.4	18.9	21.7
9: 9	117	13.5	14.7	16.5	18.9	21.8
9: 10	118	13.6	14.7	16.5	19.0	21.9
9: 11	119	13.6	14.7	16.6	19.1	22.0
10: 0	120	13.6	14.8	16.6	19.1	22.1

Appendix 9. Body Mass Index for Age Chart for Girls *continued*

BMI-for-age GIRLS
5 to 19 years (percentiles)

World Health Organization

Year: Month	Months	3rd	15th	Median	85th	97th
10: 1	121	13.6	14.8	16.7	19.2	22.2
10: 2	122	13.7	14.9	16.7	19.3	22.2
10: 3	123	13.7	14.9	16.8	19.3	22.3
10: 4	124	13.7	14.9	16.8	19.4	22.4
10: 5	125	13.8	15.0	16.9	19.5	22.5
10: 6	126	13.8	15.0	16.9	19.5	22.6
10: 7	127	13.9	15.1	17.0	19.6	22.7
10: 8	128	13.9	15.1	17.0	19.7	22.8
10: 9	129	13.9	15.1	17.1	19.8	22.9
10: 10	130	14.0	15.2	17.1	19.8	23.0
10: 11	131	14.0	15.2	17.2	19.9	23.1
11: 0	132	14.0	15.3	17.2	20.0	23.2
11: 1	133	14.1	15.3	17.3	20.0	23.3
11: 2	134	14.1	15.4	17.4	20.1	23.4
11: 3	135	14.2	15.4	17.4	20.2	23.5
11: 4	136	14.2	15.5	17.5	20.3	23.6
11: 5	137	14.2	15.5	17.5	20.4	23.7
11: 6	138	14.3	15.6	17.6	20.4	23.8
11: 7	139	14.3	15.6	17.7	20.5	23.9
11: 8	140	14.4	15.7	17.7	20.6	24.0
11: 9	141	14.4	15.7	17.8	20.7	24.1
11: 10	142	14.5	15.8	17.9	20.8	24.2
11: 11	143	14.5	15.8	17.9	20.8	24.3
12: 0	144	14.6	15.9	18.0	20.9	24.4
12: 1	145	14.6	15.9	18.1	21.0	24.5
12: 2	146	14.7	16.0	18.1	21.1	24.6
12: 3	147	14.7	16.1	18.2	21.2	24.7
12: 4	148	14.7	16.1	18.3	21.3	24.8
12: 5	149	14.8	16.2	18.3	21.3	24.9
12: 6	150	14.8	16.2	18.4	21.4	25.0
12: 7	151	14.9	16.3	18.5	21.5	25.1
12: 8	152	14.9	16.3	18.5	21.6	25.2
12: 9	153	15.0	16.4	18.6	21.7	25.3
12: 10	154	15.0	16.4	18.7	21.8	25.4
12: 11	155	15.1	16.5	18.7	21.8	25.5
13: 0	156	15.1	16.5	18.8	21.9	25.6
13: 1	157	15.2	16.6	18.9	22.0	25.7
13: 2	158	15.2	16.7	18.9	22.1	25.8
13: 3	159	15.3	16.7	19.0	22.2	25.9
13: 4	160	15.3	16.8	19.1	22.3	26.0
13: 5	161	15.3	16.8	19.1	22.3	26.1
13: 6	162	15.4	16.9	19.2	22.4	26.1
13: 7	163	15.4	16.9	19.3	22.5	26.2
13: 8	164	15.5	17.0	19.3	22.6	26.3
13: 9	165	15.5	17.0	19.4	22.6	26.4
13: 10	166	15.6	17.1	19.4	22.7	26.5
13: 11	167	15.6	17.1	19.5	22.8	26.6
14: 0	168	15.6	17.2	19.6	22.9	26.7
14: 1	169	15.7	17.2	19.6	22.9	26.8
14: 2	170	15.7	17.3	19.7	23.0	26.8
14: 3	171	15.8	17.3	19.7	23.1	26.9
14: 4	172	15.8	17.4	19.8	23.2	27.0
14: 5	173	15.8	17.4	19.9	23.2	27.1
14: 6	174	15.9	17.4	19.9	23.3	27.1
14: 7	175	15.9	17.5	20.0	23.4	27.2
14: 8	176	15.9	17.5	20.0	23.4	27.3
14: 9	177	16.0	17.6	20.1	23.5	27.4
14: 10	178	16.0	17.6	20.1	23.5	27.4
14: 11	179	16.0	17.6	20.2	23.6	27.5
15: 0	180	16.1	17.7	20.2	23.7	27.6

Appendix 9. Body Mass Index for Age Chart for Girls *continued*

BMI-for-age GIRLS
5 to 19 years (percentiles)

World Health Organization

Year: Month	Months	3rd	15th	Median	85th	97th
15: 1	181	16.1	17.7	20.3	23.7	27.6
15: 2	182	16.1	17.8	20.3	23.8	27.7
15: 3	183	16.2	17.8	20.4	23.8	27.7
15: 4	184	16.2	17.8	20.4	23.9	27.8
15: 5	185	16.2	17.9	20.4	23.9	27.9
15: 6	186	16.2	17.9	20.5	24.0	27.9
15: 7	187	16.3	17.9	20.5	24.0	28.0
15: 8	188	16.3	18.0	20.6	24.1	28.0
15: 9	189	16.3	18.0	20.6	24.1	28.1
15: 10	190	16.3	18.0	20.6	24.2	28.1
15: 11	191	16.4	18.0	20.7	24.2	28.2
16: 0	192	16.4	18.1	20.7	24.2	28.2
16: 1	193	16.4	18.1	20.7	24.3	28.2
16: 2	194	16.4	18.1	20.8	24.3	28.3
16: 3	195	16.4	18.1	20.8	24.4	28.3
16: 4	196	16.5	18.2	20.8	24.4	28.4
16: 5	197	16.5	18.2	20.9	24.4	28.4
16: 6	198	16.5	18.2	20.9	24.5	28.4
16: 7	199	16.5	18.2	20.9	24.5	28.5
16: 8	200	16.5	18.3	20.9	24.5	28.5
16: 9	201	16.5	18.3	21.0	24.6	28.5
16: 10	202	16.6	18.3	21.0	24.6	28.6
16: 11	203	16.6	18.3	21.0	24.6	28.6
17: 0	204	16.6	18.3	21.0	24.7	28.6
17: 1	205	16.6	18.3	21.1	24.7	28.6
17: 2	206	16.6	18.4	21.1	24.7	28.7
17: 3	207	16.6	18.4	21.1	24.7	28.7
17: 4	208	16.6	18.4	21.1	24.8	28.7
17: 5	209	16.6	18.4	21.1	24.8	28.7
17: 6	210	16.6	18.4	21.2	24.8	28.8
17: 7	211	16.6	18.4	21.2	24.8	28.8
17: 8	212	16.7	18.4	21.2	24.8	28.8
17: 9	213	16.7	18.5	21.2	24.9	28.8
17: 10	214	16.7	18.5	21.2	24.9	28.8
17: 11	215	16.7	18.5	21.2	24.9	28.9
18: 0	216	16.7	18.5	21.3	24.9	28.9
18: 1	217	16.7	18.5	21.3	24.9	28.9
18: 2	218	16.7	18.5	21.3	25.0	28.9
18: 3	219	16.7	18.5	21.3	25.0	28.9
18: 4	220	16.7	18.5	21.3	25.0	28.9
18: 5	221	16.7	18.5	21.3	25.0	28.9
18: 6	222	16.7	18.5	21.3	25.0	29.0
18: 7	223	16.7	18.6	21.4	25.0	29.0
18: 8	224	16.7	18.6	21.4	25.1	29.0
18: 9	225	16.7	18.6	21.4	25.1	29.0
18: 10	226	16.7	18.6	21.4	25.1	29.0
18: 11	227	16.7	18.6	21.4	25.1	29.0
19: 0	228	16.7	18.6	21.4	25.1	29.0

2007 WHO Reference

Appendix 10. Body Mass Index for Age Chart for Boys

BMI-for-age BOYS
5 to 19 years (percentiles)

World Health Organization

Year: Month	Months	3rd	15th	Median	85th	97th
5: 1	61	13.1	14.0	15.3	16.7	18.1
5: 2	62	13.1	14.0	15.3	16.7	18.1
5: 3	63	13.1	14.0	15.3	16.7	18.1
5: 4	64	13.1	14.0	15.3	16.7	18.1
5: 5	65	13.1	14.0	15.3	16.7	18.1
5: 6	66	13.1	14.0	15.3	16.7	18.1
5: 7	67	13.1	14.0	15.3	16.7	18.2
5: 8	68	13.1	14.0	15.3	16.8	18.2
5: 9	69	13.1	14.0	15.3	16.8	18.2
5: 10	70	13.1	14.0	15.3	16.8	18.2
5: 11	71	13.2	14.0	15.3	16.8	18.3
6: 0	72	13.2	14.0	15.3	16.8	18.3
6: 1	73	13.2	14.0	15.3	16.8	18.3
6: 2	74	13.2	14.1	15.3	16.9	18.4
6: 3	75	13.2	14.1	15.3	16.9	18.4
6: 4	76	13.2	14.1	15.4	16.9	18.4
6: 5	77	13.2	14.1	15.4	16.9	18.5
6: 6	78	13.2	14.1	15.4	16.9	18.5
6: 7	79	13.2	14.1	15.4	17.0	18.5
6: 8	80	13.2	14.1	15.4	17.0	18.6
6: 9	81	13.2	14.1	15.4	17.0	18.6
6: 10	82	13.2	14.1	15.4	17.1	18.7
6: 11	83	13.3	14.2	15.5	17.1	18.7
7: 0	84	13.3	14.2	15.5	17.1	18.8
7: 1	85	13.3	14.2	15.5	17.1	18.8
7: 2	86	13.3	14.2	15.5	17.2	18.8
7: 3	87	13.3	14.2	15.5	17.2	18.9
7: 4	88	13.3	14.2	15.6	17.2	18.9
7: 5	89	13.3	14.2	15.6	17.3	19.0
7: 6	90	13.3	14.3	15.6	17.3	19.0
7: 7	91	13.4	14.3	15.6	17.3	19.1
7: 8	92	13.4	14.3	15.6	17.4	19.2
7: 9	93	13.4	14.3	15.7	17.4	19.2
7: 10	94	13.4	14.3	15.7	17.4	19.3
7: 11	95	13.4	14.3	15.7	17.5	19.3
8: 0	96	13.4	14.4	15.7	17.5	19.4
8: 1	97	13.4	14.4	15.8	17.5	19.4
8: 2	98	13.5	14.4	15.8	17.6	19.5
8: 3	99	13.5	14.4	15.8	17.6	19.5
8: 4	100	13.5	14.4	15.8	17.7	19.6
8: 5	101	13.5	14.4	15.9	17.7	19.7
8: 6	102	13.5	14.5	15.9	17.7	19.7
8: 7	103	13.5	14.5	15.9	17.8	19.8
8: 8	104	13.5	14.5	15.9	17.8	19.9
8: 9	105	13.6	14.5	16.0	17.9	19.9
8: 10	106	13.6	14.5	16.0	17.9	20.0
8: 11	107	13.6	14.6	16.0	17.9	20.0
9: 0	108	13.6	14.6	16.0	18.0	20.1
9: 1	109	13.6	14.6	16.1	18.0	20.2
9: 2	110	13.7	14.6	16.1	18.1	20.2
9: 3	111	13.7	14.6	16.1	18.1	20.3
9: 4	112	13.7	14.7	16.2	18.2	20.4
9: 5	113	13.7	14.7	16.2	18.2	20.5
9: 6	114	13.7	14.7	16.2	18.3	20.5
9: 7	115	13.8	14.7	16.3	18.3	20.6
9: 8	116	13.8	14.8	16.3	18.4	20.7
9: 9	117	13.8	14.8	16.3	18.4	20.8
9: 10	118	13.8	14.8	16.4	18.5	20.8
9: 11	119	13.8	14.8	16.4	18.5	20.9
10: 0	120	13.9	14.9	16.4	18.6	21.0

Appendix 10. Body Mass Index for Age Chart for Boys *continued*

BMI-for-age BOYS
5 to 19 years (percentiles)

World Health Organization

Year: Month	Months	3rd	15th	Median	85th	97th
10: 1	121	13.9	14.9	16.5	18.6	21.1
10: 2	122	13.9	14.9	16.5	18.7	21.1
10: 3	123	13.9	15.0	16.6	18.7	21.2
10: 4	124	14.0	15.0	16.6	18.8	21.3
10: 5	125	14.0	15.0	16.6	18.8	21.4
10: 6	126	14.0	15.1	16.7	18.9	21.5
10: 7	127	14.0	15.1	16.7	19.0	21.6
10: 8	128	14.1	15.1	16.8	19.0	21.6
10: 9	129	14.1	15.2	16.8	19.1	21.7
10: 10	130	14.1	15.2	16.9	19.1	21.8
10: 11	131	14.2	15.2	16.9	19.2	21.9
11: 0	132	14.2	15.3	16.9	19.3	22.0
11: 1	133	14.2	15.3	17.0	19.3	22.1
11: 2	134	14.3	15.3	17.0	19.4	22.2
11: 3	135	14.3	15.4	17.1	19.4	22.2
11: 4	136	14.3	15.4	17.1	19.5	22.3
11: 5	137	14.4	15.4	17.2	19.6	22.4
11: 6	138	14.4	15.5	17.2	19.6	22.5
11: 7	139	14.4	15.5	17.3	19.7	22.6
11: 8	140	14.5	15.6	17.3	19.8	22.7
11: 9	141	14.5	15.6	17.4	19.8	22.8
11: 10	142	14.5	15.6	17.4	19.9	22.9
11: 11	143	14.6	15.7	17.5	20.0	23.0
12: 0	144	14.6	15.7	17.5	20.1	23.1
12: 1	145	14.6	15.8	17.6	20.1	23.1
12: 2	146	14.7	15.8	17.6	20.2	23.2
12: 3	147	14.7	15.9	17.7	20.3	23.3
12: 4	148	14.8	15.9	17.8	20.3	23.4
12: 5	149	14.8	16.0	17.8	20.4	23.5
12: 6	150	14.8	16.0	17.9	20.5	23.6
12: 7	151	14.9	16.1	17.9	20.6	23.7
12: 8	152	14.9	16.1	18.0	20.6	23.8
12: 9	153	15.0	16.2	18.0	20.7	23.9
12: 10	154	15.0	16.2	18.1	20.8	24.0
12: 11	155	15.0	16.3	18.2	20.9	24.1
13: 0	156	15.1	16.3	18.2	20.9	24.2
13: 1	157	15.1	16.4	18.3	21.0	24.3
13: 2	158	15.2	16.4	18.4	21.1	24.4
13: 3	159	15.2	16.5	18.4	21.2	24.5
13: 4	160	15.3	16.5	18.5	21.3	24.6
13: 5	161	15.3	16.6	18.6	21.3	24.7
13: 6	162	15.4	16.6	18.6	21.4	24.8
13: 7	163	15.4	16.7	18.7	21.5	24.9
13: 8	164	15.5	16.7	18.7	21.6	24.9
13: 9	165	15.5	16.8	18.8	21.7	25.0
13: 10	166	15.5	16.8	18.9	21.7	25.1
13: 11	167	15.6	16.9	18.9	21.8	25.2
14: 0	168	15.6	16.9	19.0	21.9	25.3
14: 1	169	15.7	17.0	19.1	22.0	25.4
14: 2	170	15.7	17.0	19.1	22.0	25.5
14: 3	171	15.8	17.1	19.2	22.1	25.6
14: 4	172	15.8	17.2	19.3	22.2	25.7
14: 5	173	15.9	17.2	19.3	22.3	25.8
14: 6	174	15.9	17.3	19.4	22.4	25.8
14: 7	175	16.0	17.3	19.5	22.4	25.9
14: 8	176	16.0	17.4	19.5	22.5	26.0
14: 9	177	16.1	17.4	19.6	22.6	26.1
14: 10	178	16.1	17.5	19.6	22.7	26.2
14: 11	179	16.1	17.5	19.7	22.7	26.3
15: 0	180	16.2	17.6	19.8	22.8	26.4

Appendix 10. Body Mass Index for Age Chart for Boys *continued*

BMI-for-age BOYS
5 to 19 years (percentiles)

World Health Organization

Year: Month	Months	3rd	15th	Median	85th	97th
15: 1	181	16.2	17.6	19.8	22.9	26.4
15: 2	182	16.3	17.7	19.9	23.0	26.5
15: 3	183	16.3	17.7	20.0	23.0	26.6
15: 4	184	16.4	17.8	20.0	23.1	26.7
15: 5	185	16.4	17.8	20.1	23.2	26.7
15: 6	186	16.4	17.9	20.1	23.2	26.8
15: 7	187	16.5	17.9	20.2	23.3	26.9
15: 8	188	16.5	18.0	20.3	23.4	27.0
15: 9	189	16.6	18.0	20.3	23.5	27.0
15: 10	190	16.6	18.1	20.4	23.5	27.1
15: 11	191	16.7	18.1	20.4	23.6	27.2
16: 0	192	16.7	18.2	20.5	23.7	27.3
16: 1	193	16.7	18.2	20.6	23.7	27.3
16: 2	194	16.8	18.3	20.6	23.8	27.4
16: 3	195	16.8	18.3	20.7	23.9	27.5
16: 4	196	16.8	18.4	20.7	23.9	27.5
16: 5	197	16.9	18.4	20.8	24.0	27.6
16: 6	198	16.9	18.5	20.8	24.0	27.7
16: 7	199	17.0	18.5	20.9	24.1	27.7
16: 8	200	17.0	18.5	20.9	24.2	27.8
16: 9	201	17.0	18.6	21.0	24.2	27.8
16: 10	202	17.1	18.6	21.0	24.3	27.9
16: 11	203	17.1	18.7	21.1	24.3	28.0
17: 0	204	17.1	18.7	21.1	24.4	28.0
17: 1	205	17.2	18.7	21.2	24.5	28.1
17: 2	206	17.2	18.8	21.2	24.5	28.1
17: 3	207	17.2	18.8	21.3	24.6	28.2
17: 4	208	17.3	18.9	21.3	24.6	28.2
17: 5	209	17.3	18.9	21.4	24.7	28.3
17: 6	210	17.3	18.9	21.4	24.7	28.4
17: 7	211	17.4	19.0	21.5	24.8	28.4
17: 8	212	17.4	19.0	21.5	24.8	28.5
17: 9	213	17.4	19.1	21.6	24.9	28.5
17: 10	214	17.4	19.1	21.6	24.9	28.6
17: 11	215	17.5	19.1	21.7	25.0	28.6
18: 0	216	17.5	19.2	21.7	25.0	28.6
18: 1	217	17.5	19.2	21.8	25.1	28.7
18: 2	218	17.5	19.2	21.8	25.1	28.7
18: 3	219	17.6	19.3	21.8	25.2	28.8
18: 4	220	17.6	19.3	21.9	25.2	28.8
18: 5	221	17.6	19.3	21.9	25.3	28.9
18: 6	222	17.6	19.4	22.0	25.3	28.9
18: 7	223	17.7	19.4	22.0	25.4	29.0
18: 8	224	17.7	19.4	22.0	25.4	29.0
18: 9	225	17.7	19.5	22.1	25.5	29.0
18: 10	226	17.7	19.5	22.1	25.5	29.1
18: 11	227	17.8	19.5	22.2	25.5	29.1
19: 0	228	17.8	19.5	22.2	25.6	29.1

2007 WHO Reference

Appendix 11. Oral Hypoglycemic Agents General Information

CLASS	Primary Action	Site of Action	Adverse Effects	Contra-indications
Sulfonylurea	↑ insulin secretion (insulin secretagogue)	Sulfonylurea receptors in pancreatic beta islet cells	Hypoglycemia (++1st gen & + 2nd gen) Weight Gain	Renal Insufficiency Liver Diseases Known Hypersensitivity
Meglitinides	↑ insulin secretion (insulin secretagogue)	Receptors in pancreatic beta islet cells	Hypoglycemia Weight Gain	Liver Diseases Known Hypersensitivity
a-Glucosidase Inhibitors	↓ carbohydrate absorption	Small Intestine	Gastrointestinal Symptoms	Renal Insufficiency Liver Diseases Inflammatory Bowel Dis-ease Known Hypersensitivity
Biguanides	↓ Hepatic Glucose production	Unknown	Gastrointestinal Symptoms Lactic Acidosis	Renal Insufficiency Liver diseases Alcoholism Congestive Heart Failure Known Hypersensitivity
Thiazolidinediones	↑ Insulin sensitivity ↑ Peripheralglucose uptake	PPARg receptors in insulin-sensitive tissues	Weight Gain Edema Congestive Heart Failure	Liver Disease Alcoholism Congestive Heart Failure Known Hypersensitivity

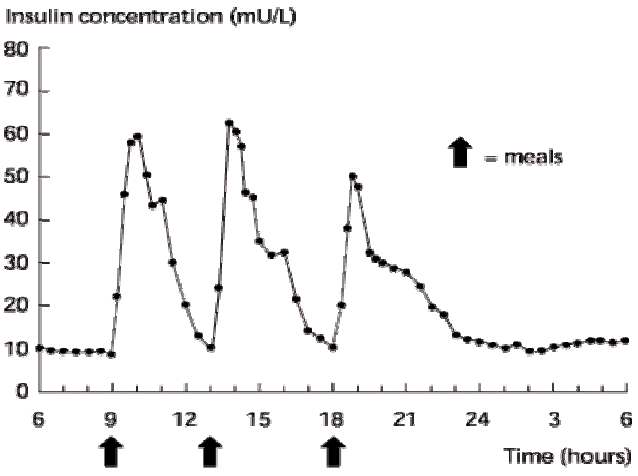
CLASS	Types	Indications	Time-Action Profile (hours)		
			Onset	Peak Level	Duration
Sulfonylurea	**1st Generation**				
	Chlorpropramide	Difficult to control diabetes or with poor compliance		**4**	**60**
	Tolbutamide				
	Acetohexamide				
	2nd Generation				
	Glipizide	Older Diabetics	**0.5**	**1-3**	**12-24**
	Gliclazide	Older Diabetics	**4-5**	**6-12**	**24**
	Glyburide or Glibenclamide	Younger Diabetics	**1**	**2-6**	**12- 24**
	Glimepiride		**2-4**	**2-3**	**16-24**
Meglitinides	Repaglinide	Postprandial Hyperglycemia	**0.25-0.5**	**1**	**4-6**
	Nateglinide		**0.3**	**1**	**1-4**
a-Glucosidase Inhibitors	Acarbose	Postprandial Hyperglycemia	**1**	**1-2**	**4**
	Voglibose		**0.25**	**1-1.5**	
Biguanides	Metformin	Overweight patients with insulin resistance		**2-3**	**7-12**
Thiazolidinediones	Rosiglitazone	Insulin Resistance	**2-4**	**1-2**	**24-30**
	Pioglitazone		**1**	**1-2**	

Note: *For drug preparations, daily doses and maximum dose of different types of drugs please consult product inserts, the Philippine Drug Formulary, PPD or PIMS.*

Appendix 12. OHA Preparations and Dosages

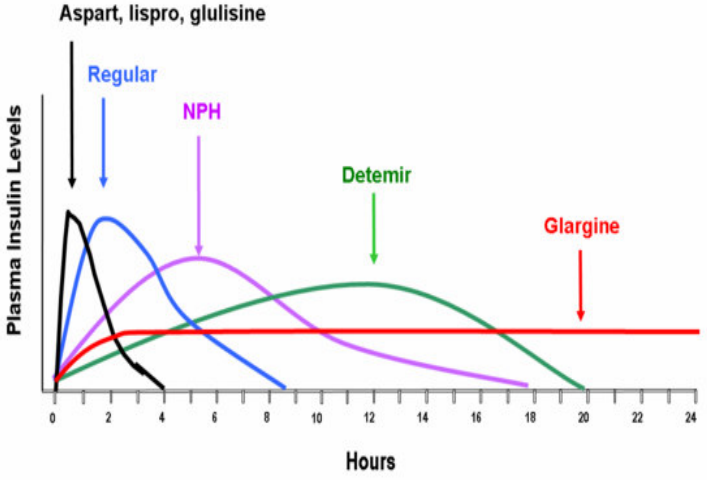
CLASS	Types	Preparation (tablets)	Initial Daily Dose	Maximum Dose (mg/day)
Sulfonylurea	**1st Generation** Chlorpropramide Tolbutamide Acetohexamide **2nd Generation** Glipizide Gliclazide Glyburide or Glibenclamide Glimepiride	 250 mg 500 mg 2.5,5,10 mg 80 mg 1,2,3 mg	 250 mg OD a.m. 2.5mg OD for elderly 30 mins AC 80 mg BID-TID 30 mins AC 1.5-5 mg OD 1-2 mg OD	 100-500 mg 40 mg 40-320 mg 20mg 8 mg OD
Meglitinides	Repaglinide Nateglinide	0.5,1,2 mg	0.5 – 2 mg tab BID-QID 15 minutes before meals 120 mg TID, 60 mg TID in elderly 15 minutes before meals	0.5-16 mg 120 mg TID
a-Glucosidase Inhibitors	Acarbose Voglibose	50 & 100 mg 200 , 300 mcg	25 mg tab TID after first mouthful of food 200-300 mcg tab TID after first mouthful of food 25 mg tab TID afetr first mouthful of food	100 mg TID 600-900 mcg 100 mg TID
Biguanides	Metformin	500 & 850 mg	500 mg BID or 850 mg OD Taken AC	Maximum 3 grams
Thiazolidinediones	Rosiglitazone Pioglitazone	4 & 8 mg 15 & 30 mg	4mg OD or 2mg BID 15 mg tab OD-BID 30 mg tab OD	4-8 mg 45 mg OD
Abbreviations: OD – once a day, **BID**- twice a day, **TID**- Three times a day, **QID**- four times a day, **AC**- before meals				
Note: *For drug preparations, daily doses and maximum dose of different types of drugs please consult product inserts, PPD or PIMS.*				

Appendix 13. Insulin Action Profiles



Normal 24-hour Action Profile of Insulin Secretion

Source: http://www.australianprescriber.com/upload/issue_files/2502_Fig1Phillips.gif



Action Profiles of Different Types of Insulin Formulations

Source : http://www.endotext.org/diabetes/diabetes20/figures/figure7.png

Appendix 14. Various Insulin Formulations

Classification	Description / Recommendations	Type	Action Profile		
			Onset (hrs)	Peak (hrs)	Duration (hrs)
Rapid Acting Analogues	• Can be given immediately before meals because there is evidence that the rapid action not only reduces postprandial hyperglycemis but that postprandial and nocturnal hypoglycemia may also be reduced. • Offer the useful option of being given after food to toddlers who are reluctant to eat. • Give a quicker effect than regular insulin when treating hyperglycemia, with or without ketosis, including sick days. • Most often used as prandial or snack boluses in combination with longer acting insulins given twice or more times daily. • Most often used in insulin pumps. • ALL CHILDREN SHOULD HAVE SOLUBLE OR RAPID ACTING INSULIN AVAILABLE FOR CRISIS MANAGEMENT.	Lispro Aspart Glulisine	**0.15-0.35**	**1-3**	**3-5**
Short Acting	• Used as an essential component of most daily replacement regimens either: in combination with intermediate acting insulin in a twice-daily regimen as pre-meal bolus injections in basal-bolus regimens (20-30 min before meals) together with intermediate acting insulin twice daily or a basal analogue given once or twice a day. • Regular insulins are best suited for intravenous therapy. Rapid-acting insulins can also be given IV. However the effect is not superior to that of regular insulin and it is more expensive. • Soluble insulin is used in the following crisis situations: diabetic ketoacidosis control of diabetes during surgical procedures hyperglycemic episodes at home (eg. During intercurrent illness)	Regular/ Soluble	**0.5 -1**	**2-4**	**5-8**
Intermediate Acting	• Suitable for twice-daily regimens and for pre-bed dosage in basal-bolus regimens • Isophane insulins are extensively used in children, mainly because of their suitability for mixing with soluble or rapid-acting insulins in the same syringe, vial or cartridge without interaction • WHEN REGULAR INSULIN IS MIXED WITH LENTE PREPARATIONS IT REACTS WITH EXCESS ZINC, BLUNTING ITS SHORT-ACTING PROPERTIES.	Isophane NPH	**2-4**	**4-12**	**12-24**
		IZS/lente	**3-4**	**6-15**	**18-24**
		Semilente	**1-2**	**4-10**	**8-16**
Long Acting	• Designed to have a duration of action of more than 24 hours to meet basal insulin requirements and therefore could be used in basal-bolus injection regimens. Their action profile in children appears to be extremely variable and they may have to be injected twice daily to meet basal insulin requirements.	Ultralente Ultratard	**4-8**	**12-24**	**20-30**
Basal Analogues	• Show a more predictable insulin effect with less day-to-day variation compared with NPH insulin • More expensive • Have not been formally approved for children younger than 6 years old	Glargine	**2-4**	**none**	**24**
		Detemir	**1-2**	**6-12**	**20-24**
Pre-mixed	Fixed ratio mixtures of premeal and basal insulins. Although they remove potential errors in drawing up insulin, they remove the flexibility offered by separate adjustment of the two types	50% NPH + 50% regular, 70% NPA + 30% aspart 70% NPH + 30% regular, 75% NPL + 25% lispro			

Source: International Society for Pediatric and Adolescent Diabetes, "ISPAD Clinical Practice Consensus Guidelines 2006-2007." Pediatric Diabetes Vol. 72006-2007 28 Nov 2007 <www.ispad.org>.

Appendix 15. Insulin Regimen

Regimen	Indications	Recommendations
Basal Insulin + oral agents	When oral agents fail to achieve the target glycemic control	Continue oral agents at same dose Add single, evening insulin dose **10 U or 0.15-0.2 u/kg/day** NPH (bedtime) 70/30 (evening meal) Glargine (bedtime or with evening meal) Titrate dose weekly according to fasting SMBG* (FPG) Increase by **4U** if **FPG> 140 mg/dl** Increase by **2U** if **FPG = 120 -140 mg/dl** Treat to target (usually <120 mg/dl) Reduce morning oral agent dosage if daytime hypoglycemia occurs
Two Insulin injections + Oral agents	When FPG is acceptable but HbA1c is 7% or if evening NPH or 70/30 dose is large (>50 u) and targets are still not achieved	**Oral agent options:** Stop Sulfonylurea Continue Metformin for weight control Continue glitazone for glycemic stability **Insulin options:** NPH bedtime + morning NPH + regular/aspart/lispro with evening meal 70/30 (evening meal) + 70/30 morning Glargine + regular/aspart/lispro to main meal
Basal-Bolus	When HbA1c is >7% on 2 injections	**Oral agent options:** Continue Metformin for weight control Continue glitazone for glycemic stability **Insulin options:** Bedtime NPH and morning NPH + regular/aspart/lispro with each meal Glargine + regular/aspart/lispro with each significant meal
Monotherapy		Start at **0.5 – 1.0 unit/kg/day** May start at low, fixed dose of intermediate acting insulin (15-20 in AM and 5-10 at HS) Options: NPH or Premixed twice a day Single morning or bedtime NPH Increase by 10-20% once or twice a week If dose reaches >40-50 units give 2/3 total in AM and 1/3 total in PM. When requirement reaches 1-1.5 u/kg may do any of the following: Shift to multiple injections when necessary Add insulin sensitizers (Met, TZD) Increase dose to break state of insulin resistance
Mixed split		Conventional insulin therapy PREBREAKFAST with HN, H70/30 or R/N PRESUPPER with HN, H70/30 or R/N
Premixed		Convenient method for taking 2 types of insulin. Eliminated errors inherent in the multi-step procedure of self-mixing
Multiple components		Conventional insulin therapy Multiple doses of short acting insulin + 1-2 doses of intermediate or long acting insulin

Appendix 16. Oral Antihypertensive Agents

Drug	Indications	Contraindications	Time Action Profile		
			Onset of Action (h)	Time of Peak (h)	Duration (h)
ACE Inhibitors					
Captopril	Hypertension Heart failure Acute and post-MI Left Ventricular Dysfunction Diabetic nephropathy	Idiopathic or hereditary angioedema Bilateral renal artery stenosis Pregnancy (2nd & 3rd trimester) Hypersensitivity	1-1.5	1-1.5	6-12
Enalapril			1	4-6	24
Lisinopril			1	7	24
Moexipril			1-2	3-6	24
Quinapril			1	2-6	18-24
Ramipril			1-2	3-6	24
Trandolapril			2-4	4-10	24
Angiotensin II Receptor Antagonist					
Losartan	Hypertension with or without concurrent use of thiazide diuretics Diabetic nephropathy	Hypersensitivity Primary hyperaldosteronism Bilateral renal artery stenosis Pregnancy (2nd & 3rd trimester)	6	6	24
Irbesartan					
Telmisartan					
Diuretics					
Hydrochlorothiazide	Edema, mild to moderate hypertension (hydrochlorothiazide) Edema, hypertension, congestive heart failure (furosemide) Edema and ascites associated with CHF, liver cirrhosis, or nephritic syndrome, essential hypertension, hypokalemia, primary aldosteronisn (K+ diuretics)	Anuria Hepatic coma Severe electrolyte depletion, imbalance Hypersensitivity Pregnancy, lactation Hypokalemia (furosemide) Hyperkalemia (spironolactone) Hyperuricemia/ Gout Severe or progressive renal insufficiency Clients receiving potassium supplements, amiloride, or triamterene (spironolactone)	2	4-6	6-12
Furosemide			1	1-2	6-8
Bumetanide			30-60 mins	1-2	4-6
Amiloride hcl			2	6-10	24
Triamterene			2-4	6-8	7-9
Spironolactone			1-2 days	2-3 days	
Beta Blockers					
Atenolol	Hypertension Angina pectoris Acute and post-MI Congestive heart failure Arrhythmias	Sinus bradycardia Peripheral arterial occlusive disease 2nd and 3rd degree heart block Cardiogenic shock Pulmonary edema Bronchial asthma	0.25	1-1.5	6-12
Metoprolol			1	2-4	24
Propranolol			0.5	1-1.5	3-5
Calcium Channel Blockers					
Amlodipine	Angina pectoris Mild to moderate hypertension Supraventricular tachyarrhythmias	Hypersensitivity Left ventricular dysfunction Hypotension Cardiogenic shock Sick sinus syndrome 2° & 3° AV block Atrial flutter or fibrillation Pregnancy Acute MI Pulmonary congestion			
Felodipine					
Verapamil				2	6-8
Diltiazem			0.5-1	2-3	6-11

Appendix 16. Oral Antihypertensive Agents *continuation*

Drug	Indications	Contraindications	Time Action Profile		
			Onset of Action (h)	Time of Peak (h)	Duration (h)
Alpha and Beta Blockers Carvedilol	Hypertension Angina Congestive heart failure Myocardial infarction (MI)	Bronchial asthma or COPD Cardiogenic shock Hypersensitivity Overt cardiac failure 2° & 3° AV block Sick sinus syndrome Severe hepatic dysfunction	1	4-7	24
Centrally-acting adrenergic blocker Methydopa	Moderate to severe hypertension Resistant cases of hypertension complicated by stroke, CAD, or nitrogen retention Hypertensive crisis Impaired renal function Renal hypertension	Hypersensitivity Mild hypertension Active hepatic disease	7-12	4-6	12-24
Direct Vasodilators Hydralazine	Essential hypertension Drug of choice for eclampsia Reduce afterload of CHF Severe aortic insufficiency after valve replacement	Coronary artery disease Angina pectoris Advanced renal disease Rheumatic heart disease Chronic glomerulonephritis	45 min	1-2	3-8

Appendix 17. Oral Lipid-Controlling Agents

Drug	Indications	Contraindications	Dosing Informaton		
			Initial Dose	Dosage Range	Regimen
HMG-CoA Reductase Inhibitors Atorvastatin	First line for ↑ **LDL** Maybe added to non-pharmacologic therapies for hyperlipidemia Coronary artery disease and concomitant hypercholesterolemia	Active liver disease Unexplained elevations of serum transaminases Hypersensitivity Pregnancy and lactation	10-20 mg	10-80	mg OD
Fluvastatin			20-40 mg	20-80	mg OD
Lovastatin			20 mg	10-80	mg OD
Pravastatin			40 mg	10-80	mg OD
Simvastatin			20-40 mg	5-80	mg OD
Fibric Acid Derivatives Gemfibrozil	↑ triglycerides Increases HDL cholesterol	Gallbladder disease Hepatic disease Hypersensitivity Primary biliary cirrhosis Renal disease Coadministration of genfibrozil and cerivastatin	1200 mg divided twice daily		
Fenofibrate			Starting doses: Hypocholesterolemia— 160 mg OD Hypertryglyceridemia– 54-160 mg/day With Rrenal impairment– 54 mg/day		
Fenofibrate, micronized			67-201 mg/day taken with food		
Nicotinic Acid Niacin	↑ triglycerides ↑ LDL ↓ HDL	Hypersensitivity Active liver disease Active peptic ulcer disease Arterial bleeding Uncontrolled hyperglycemia	100 mg	1-6	g TID
Niacin extended release			500 mg	1-2	g OD

Appendix 18. Formulas and Conversion Factors

Conversion of Plasma Glucose Values

From Conventional (mg/dl) to SI units (mmol/L) multiply by **0.05555**
eg. 200 mg/dl x 0.0555 = 11.1 mmol/L
From SI units (mmol/L) to conventional units multiply by **18.02**
eg. 7.0 mmol/L x 18.02 = 126 mg/dl

Conversion of Total Cholesterol, LDL and HDL Cholesterol Values

From Conventional (mg/dl) to SI units (mmol/L) multiply by **0.0259**
eg. 174 mg/dl x 0.0259 = 4.5 mmol/L
From SI units (mmol/L) to conventional units multiply by **38.61**
eg. 4.5 mmol/L x 38.61 = 174 mg/dl

Conversion of Triglyceride Values

From Conventional (mg/dl) to SI units (mmol/L) multiply by **0.0113**
eg. 133 mg/dl x 0.0113 = 1.5 mmol/L
From SI units (mmol/L) to conventional units multiply by **88.5**
eg. 1.5 mmol/L x 88.5 = 133 mg/dl

Conversion of kilocalories to grams

For Carbohydrates (CHO) divide by **4**
For Proteins (CHON) divide by **4**
For Fats divide by **9**

Determining the Body Mass Index

$$BMI = \frac{\text{Weight (kg)}}{\text{Height (m)}^2} \quad \text{or} \quad \frac{\text{Weight (kg)}}{\text{Height (m)} \times \text{Height (m)}}$$

Determining Significant Weight Loss

$$\%\ \text{weight loss} = \frac{\text{usual weight—actual weight}}{\text{Usual weight}} \times 100\ \%$$

Interpretation

Duration	Significant weight loss %	Severe Weight loss %
1 week	1-2	> 2
1 month	5	> 5
3 months	7.5	> 7.5
6 months	10	> 10

Determining Target Heart Rate (THR)

First, determine **maximum heart rate (HRmax)** by:

Short method: **HRmax= 220 — age in years**
Best-Fit Formula: **HRmax= 210 — 50% of age — 5% of body weight** *(lbs)* **+ 4** *(if male only)*

Then compute for the Target Heart Rate based on the intensity of exercise desired

Intensity	Target Heart Rate (THR)
Light / very light	**< 50%** of HRmax
Moderate	**50—70%** of HRmax
Vigorous	**>70%** of HRmax

Sources:

1. Asia-Pacific Type 2 Diabetes Policy Group and International Diabetes Federation Western Pacific Region, Type 2 Diabetes Practical Targets and Treatments. International Diabetes Institute:Melbourne, Australia, 2005.
2. Department of Health Philippines, University of the Philippines Manila., A Training Manual for Health Workers on Promoting Healthy Lifestyles. Manila Philippines: Publications Unit of WHO-WPRO, 2003.
3. Gibson, Rosalind S. Principles of Nutritional Assessment. Second Edition. New York: Oxford University Press, 2005.

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