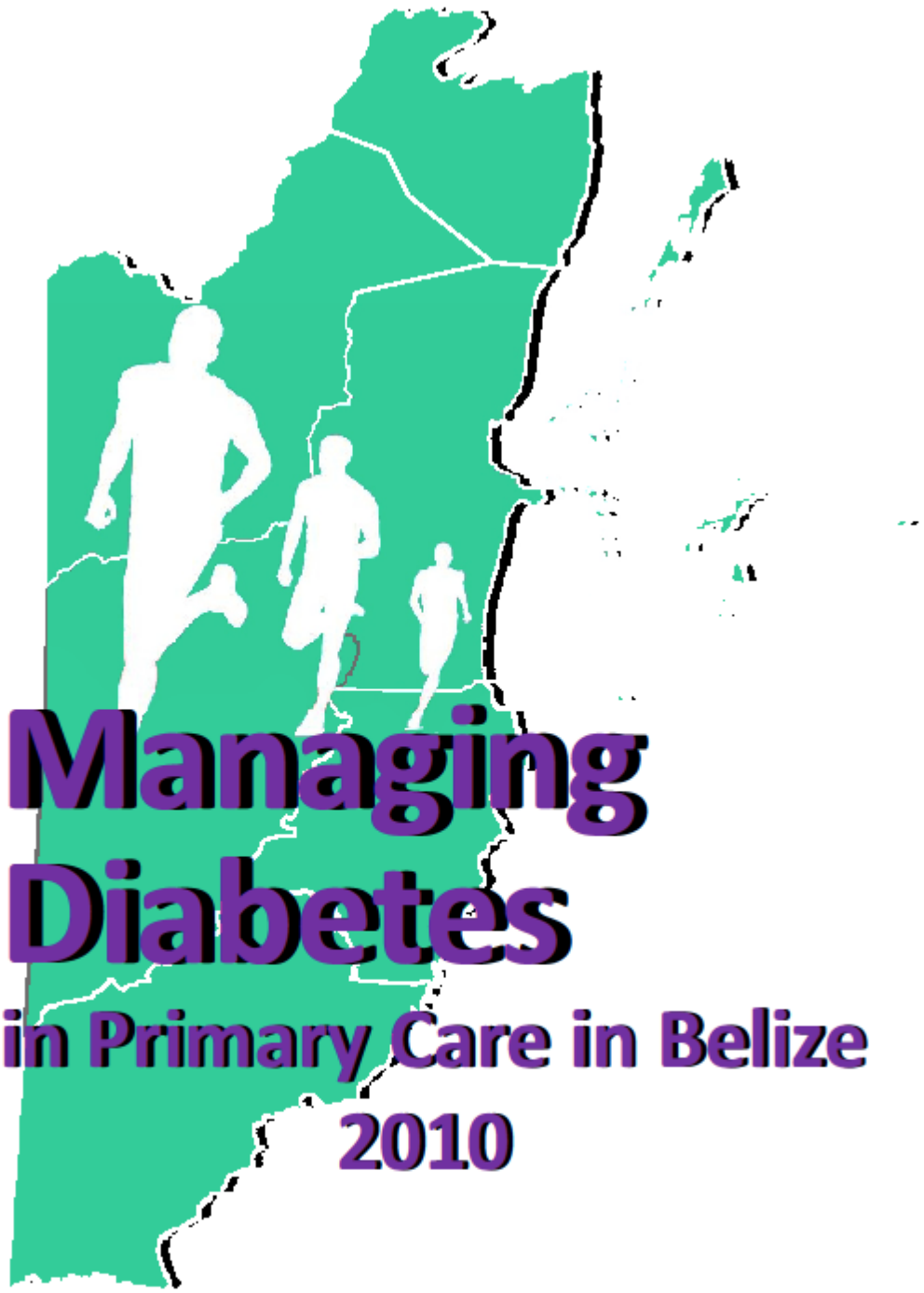

Managing Diabetes

in Primary Care in Belize

2010

Pan American Health Organization

National Health Insurance

Managing Diabetes in Primary Care in Belize

2010

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PREFACE

This protocol developed for the Management of Diabetes in Belize is adapted from the manual "Managing Diabetes in Primary Health Care in the Caribbean" as well as from the previous Ministry of Health Diabetes Outpatient Management Protocol.

The need for uniform guidelines for healthcare providers has become critical in Belize as morbidity and mortality related to this disease has shown significant increase over the past decade. Parallel to this epidemiological transition are concurrent efforts of reform in the health sector. This includes the amplification of the National Health Insurance which was instituted in Belize in 2001, underwent piloting in the south side of Belize City, and rolled out to the southern districts of the country in 2006.

This much-needed update to the protocol for diabetes is a part of the strategy to institute a national disease management programme consisting of other supporting mechanisms such as the promotion of healthy lifestyles, improved quality of care, surveillance, monitoring and evaluation. This text reflects the current body of knowledge on this disease and responds to the economic and social conditions which currently prevail in Belize.

The protocol is intended for use at the primary health care level countrywide. In the short term it is anticipated that its use will translate into improved quality of care in settings where diabetes is managed and in the medium and longer term to a reduction in disability and mortality related to the disease.

Hon. Pablo Marin	Dr. Peter Allen	Dr. Michael Pitts
Minister of Health	Chief Executive Officer	Director of Health Services

March 2011

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Managing Diabetes in Primary Care in Belize

INTRODUCTION

Diabetes is a metabolic disorder characterized by the presence of hyperglycemia due to defective insulin secretion, insulin action, or both. It can lead to complications such as nephropathy, retinopathy, neuropathy and vascular disease, all of which can lead to significant morbidity, mortality, and significant costs of tertiary care and rehabilitation. Diabetes mellitus is increasingly prevalent in middle income countries, particularly where there has been rapid economic development and where there are ethnic groups which are susceptible to the development of the disease.

The World Health Organization (WHO) estimated in 2002 that 173 million adults had diabetes worldwide, and predicted that there will be at least 350 million people with diabetes type 2 by 2030. At present, about two- thirds of persons with diabetes live in developing countries and the majority of the predicted cases will originate from these areas. In the Americas, the number of people with diabetes mellitus was estimated at 35 million in 2000 and is expected to increase to 64 million by 2025. Currently, 52% of these people from the Americas live in Latin America and the Caribbean. The global increase in the incidence of diabetes is related to high levels of obesity associated with change from traditional diets, diminishing levels of physical activity, population aging and increased urbanization.

The Central American Initiative (CAMBI) Diabetes and Hypertension Risk Factor Survey conducted in Belize in 2006 showed that the overall prevalence of diabetes mellitus was found to be 13.1%-15.6% among newly diagnosed and 7.7% in known cases of diabetes. In Belize, diabetes was reported as the second leading contributor to mortality for 2003 and 2004 and the leading contributor to mortality in 2005 and 2006, and remained the leading cause of death among women since 2005. The trend is also evidenced by the quality of care received by patients suffering from one or more chronic conditions. To promote proper management, standards for care and clinical practice guidelines targeting primary care providers have been published by professional organizations such as the Canadian Diabetes Association, the American Diabetes Association, and the World Health Organization.

Managing Diabetes in Primary Care in Belize

A study conducted by RJ Wilks et. al. “Management of diabetes mellitus in three settings in Jamaica”, states that there is good evidence that the complications of diabetes can be reduced with control of hyperglycemia and that good practice guidelines are essential to reducing complications of diabetes.

This manual provides a practical approach to the diagnosis and management of diabetes mellitus at the Primary Care Level, with the goal of providing management guidelines based on current knowledge and best practice. The importance of non-drug or lifestyle management and the need to educate patients, families, communities and health care workers must be stressed. This manual targets health care workers and it is anticipated that these guidelines will be systematically applied toward the outcome of improved quality patient care delivery and positive outcomes in persons living with diabetes in Belize.

AIM & OBJECTIVES

AIM:

To produce a unified, evidence-based approach to the management of diabetes in Belize

OBJECTIVES:

- To prevent or delay the onset of diabetes mellitus and co-morbid
- conditions of obesity, hypertension and dyslipidemia
- To promote earlier diagnosis of diabetes mellitus
- To improve the quality of care of persons with diabetes mellitus
- To prevent and treat acute and long-term complications of diabetes Mellitus
- To promote education and empowerment of the patient, family, community and health care worker

OVERVIEW OF DIABETES MELLITUS

Diabetes mellitus (DM) is defined by the World Health Organization as a metabolic disorder characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both.

The symptoms of marked hyperglycemia include:

- Polyuria
- Polydipsia
- Weight loss, which may sometimes be associated with polyphagia
- Blurred vision

There are several types of diabetes mellitus, which may be classified as follows:

1. Type 1 Diabetes Mellitus

Type 1 diabetes results from a cell-mediated autoimmune destruction of the β cells of the pancreas.

- The rates of destruction are rapid in some individuals, mainly infants and children, and slow in others (mainly adults, known as late onset autoimmune diabetes [LADA]).

- This form of diabetes is characterized by severe insulin deficiency. Exogenous insulin is required to control glucose, prevent diabetic ketoacidosis, and preserve life. The onset of illness is usually abrupt and associated with ketoacidosis. These patients require insulin and must be referred urgently to a diabetes specialist or emergency department when acutely ill.
- A transient period of insulin independence (“honeymoon phase”) or reduced insulin requirement may occur early in the course of type I DM.

2. Type 2 Diabetes Mellitus

- Type 2 DM initially characterized by insulin resistance followed by failure of β cells to compensate for increased insulin requirements.

- Type 2 diabetes occurs mainly in persons 40 years and older, however, type 2 DM is being increasingly diagnosed in younger age groups and is associated with overweight and lack of physical activity. There may be a marked family history in persons with this disease or a history of gestational diabetes; race and ethnicity may play a role. Type 2 diabetes is associated with the metabolic syndrome which is characterized by a group of metabolic risk factors occurring in an individual.

- Insulin secretion is usually sufficient to prevent ketosis under basal conditions but Diabetic Keto Acidosis (DKA) can develop during severe stress.

3. Gestational Diabetes

Gestational diabetes refers to glucose intolerance developing during pregnancy. Persons with this condition must be referred for specialist care. This condition is a recognized risk factor for the subsequent development of diabetes mellitus.

4. Other types of Diabetes Mellitus

Specific genetic defects or diseases of the exocrine pancreas such as complications of pancreatitis, endocrinopathies, or exposure to specific drugs or chemicals can lead to other types of diabetes mellitus.

Table 1
Presentation of Types 1 and 2 diabetes Mellitus

Features	Type 1 (Formerly referred to as insulin-dependent diabetes- IDDM)	Type 2 (Formerly referred to as non-insulin-dependent diabetes- NIDDM)
Occurrence	Accounts for about 5% of cases	Accounts for about 95% of cases
Pathogenesis	Auto-immune pancreatic beta cell destruction	Relative insulin deficiency and insulin resistance
Age of onset	Usually before age 30 years	45 years and above (but diagnosis at an earlier age appears to be increasing)
Onset	Abrupt	Gradual
Insulin requirement	Insulin therapy required for survival	May initially be managed by lifestyle changes and oral glucose-lowering agents, but eventually may require insulin for control
Ketosis	Ketosis prone	Ketosis resistant except with severe stress
Family history	Minor	Marked

Section I:

Screening and the Diagnosis of Diabetes Mellitus

RISK FACTORS FOR TYPE 2 DIABETES MELLITUS

- Overweight (Body Mass Index ≥25 kg/m^2)
- Age 45 years and older
- Physical inactivity
- Diabetes in a first-degree relative
- Prior gestational diabetes or history of delivering a baby >4 kg (9 lb)
- Polycystic ovary syndrome
- History of Impaired Glucose Tolerance (IGT) or Impaired Fasting Glucose (IFG)
- HDL-C level ≤ 35 mg/dL (≤ 0.90 mmol/L) and/or Triglyceride level ≥250 mg/dL (≥2.82 mmol/L)
- Race/ethnicity (e.g. persons of Asian and African descent)
- Presence of coronary artery disease and/or hypertension (blood pressure ≥140/90 mm Hg)
- Presence of other vascular complications

SCREENING FOR TYPE 2 DIABETES MELLITUS

Screening involves the testing of individuals who are at risk of having the disease. Population-based screening is expensive and therefore priority should be given to persons with identifiable risk factors. However, where possible and affordable, population-based screening should be encouraged.

"Overall, at least 50% of those with diabetes do not know that they have the condition. In developing countries the proportion with undiagnosed diabetes is considerably higher. At the time of diagnosis, every second person with diabetes has already developed one or more micro- or macrovascular complications"[1]

[1] Diabetes Voice, Dec. 2003

Screening and the Diagnosis of Diabetes Mellitus

Reasons for screening include:

- There is a rising prevalence in Belize.
- There is a long, latent asymptomatic period in which the condition can be detected
- At diagnosis, significant numbers of individuals already have evidence of the micro-vascular complications of diabetes and may also have macrovascular disease.
- Early treatment improves long-term outcome.

THE SCREENING TEST

The fasting plasma glucose (FPG) is the recommended screening test. The 75 gm Oral Glucose Tolerance Test (OGTT) is more sensitive for detecting glucose intolerance but is not recommended for screening as it is more expensive and less practical.

Glucometers may play a role in initial screening but cannot be used for diagnosis. Any abnormal results must be confirmed by measurement of fasting plasma glucose. Testing of glucose in the urine is not recommended for screening.

If the test result is normal but the client is 45 years or older (particularly if overweight) re-screening would be appropriate at 3-yearly intervals. If the person is overweight and has additional risk factors such as a positive family history or co-morbid disorders, re-screening should be done annually.

Screening and the Diagnosis of Diabetes Mellitus

DIAGNOSTIC CRITERIA AND CLASSIFICATION OF DIABETES MELLITUS

The diagnosis of diabetes mellitus must be based on laboratory venous blood test results.

We recommend that the diagnosis of diabetes mellitus be made using the criteria of the American Diabetes Association (ADA).

Table 2
Criteria for the Diagnosis of Diabetes Mellitus

1). Symptoms of diabetes plus casual random plasma glucose concentration ≥200 mg/dL (≥11.1 mmol/L). Casual is defined as any time of day without regard to time since last meal. Or 2) FPG ≥126 mg/dL (≥7.0 mmol/L). Fasting is defined as no caloric intake for at least 8 h. Or 3). 2-h post-load glucose ≥200 mg/dL (≥11.1 mmol/L) during an OGTT. The test should be performed as described by the WHO, using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water.

In the absence of unequivocal hyperglycemia, these criteria should be confirmed by repeat testing on a different day. The third measure (OGTT) is not recommended for routine clinical use.

Glycosuria and finger-prick glucose measurements using a glucometer should not be used for the diagnosis of diabetes.

At this moment the HbA1c test is not recommended for diagnostic purposes.

DIAGNOSTIC CRITERIA FOR IMPAIRED FASTING GLUCOSE AND IMPAIRED GLUCOSE TOLERANCE

Table 3

Criteria for the Diagnosis of Impaired Fasting Glucose and Impaired Glucose Tolerance[2]

	Fasting Plasma Glucose		2h Plasma Glucose
Normal	≤100 mg/dL (≤5.6 mmol/L)	and	<140 mg/dL (<7.8 mmol/L)
Impaired Fasting Glucose (IFG)	100–125 mg/dL (5.6-6.9 mmol/L)		
Impaired Glucose Tolerance (IGT)			140–199 mg/dL (7.8-11.1 mmol/L)

Impaired Glucose Tolerance (IGT) and Impaired Fasting Glucose (IFG) refer to intermediate states between normal glucose tolerance and DM type 2. IFG and IGT are risk factors for DM type 2 and micro- and macrovascular complications. Lifestyle modifications are recommended for persons with IGT or IFG, but the rationale for drug therapy has not been established.

If the IFG ranges from 100–125 mg/dL (5.6-6.9 mmol/L) or the blood sugar 2 hours after a 75 gm glucose load is between 140-199 mg/dL (7.8-11.1 mmol/L), an individual is considered to have impaired fasting glucose (IFG) or impaired glucose tolerance (IGT) respectively, and is classified as 'pre-diabetes'.

Such persons are at high risk of developing diabetes and cardiovascular (CVD) disease. Indeed, impaired fasting glucose and impaired glucose tolerance frequently co-exist with other cardiovascular risk factors giving rise to the Metabolic Syndrome.

[2] Source: Adapted from the American Diabetes Association 2005

Table 4

Criteria for Identification of the Metabolic Syndrome[3]

	Feature	Criterion
1	Abdominal obesity (waist circumference)	
	- Men	>102 cm (40 in)
	- Women	> 88 cm (35 in)
2	Fasting Plasma Lipids Triglycerides	
	HDL Cholesterol	≥150 mg/dL (≥1.69 mmol/L)
	- Men	<40 mg/dL <1.03 mmol/L)
	- Women	<50 mg/dL (<1.29 mmol/L)
3	Blood Pressure	≥130/85 mm Hg
4	Fasting Blood Glucose	≥110 mg/dL (≥6.1 mmol/L)

The Metabolic Syndrome

The metabolic syndrome is characterized by the co-occurrence of obesity (especially central obesity), dyslipidemia (especially high levels of triglycerides and low levels of high density lipoprotein cholesterol), hyperglycemia and hypertension. The diagnosis of metabolic syndrome is made if an individual has three or more of the characteristics shown in Table 4.

There is a large overlap between the Metabolic Syndrome and pre-diabetes. Persons with the metabolic syndrome are at increased risk of developing diabetes.

[3] Source: Executive summary of the third report of the 2001 National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel {ATP})

Table 5

Classification of Overweight and Obesity by BMI, Waist Circumference, and Associated Disease Risks[4]

			Disease Risk* Relative to Normal Weight and Waist Circumference	
	BMI (kg/m^2)	**Obesity Class**	**Men 102 cm (40 in) or less Women 88 cm (35 in) or less**	**Men > 102 cm (40 in) Women > 88 cm (35 in)**
Underweight	< 18.5		-	-
Normal	18.5 - 24.9		-	-
Overweight	25.0 - 29.9		Increased	High
Obesity	30.0 - 34.9	I	High	Very High
	35.0 - 39.9	II	Very High	Very High
Extreme Obesity	40.0 +	III	Extremely High	Extremely High

* Disease risk for type 2 diabetes, hypertension, and CVD.
\+ Increased waist circumference can also be a marker for increased risk even in persons of normal weight.

[4] Reference: NHLBI Obesity Education Initiative

Section II:
Effective Delivery of Care

Requirements for the Effective Delivery of Care

Some of the requirements for the effective delivery of care are adequate personnel, facilities, equipment and supplies. Good information and a clearly defined referral system are also essential elements.

Personnel

The management of diabetes depends on the functioning of a multidisciplinary team. The composition of the team will depend on the country's resources but should include:

- Medical Doctor
- Nurse
- Diabetes Educator
- Nutritionist/Dietitian
- Pharmacist
- Social Worker

There should be access to other health professionals such as an endocrinologist or diabetes specialist, physiotherapist, psychologist, ophthalmologist and nephrologist. The staff should be trained to ensure that the services are patient-centered **and to accept the patient as an important member of the team who should be fully involved in his/her care**.

"The establishment of a practice which puts the person at the centre of care will require a change in the attitudes and beliefs of health professionals and people with diabetes".[5]

[5] Diabetes Voice, May 2003

Effective Delivery of Care

Facilities

The facilities should be easily accessible to persons with disabilities e.g., ramps, rails and wheelchair assistance.

Adequate space should be provided for:

- Registration of the patient
- Education and counseling
- Physical examination

There should be access to laboratory services.

Equipment and Supplies

Equipment related to the management of diabetes should be available.

These include:

- Glucose monitors
- Testing materials such as glucometers, strips, lancets, etc
- Beam balance scale and stadiometer
- Measuring tape (non-stretch), tuning fork, ophthalmoscope, 10G monofilament
- Audiovisual equipment and printed material for patient and staff education

Information System

The information system plays an important role. The system should include:

- medical records for collection of client information
- mechanisms for client recall and annual record reviews
- system for evaluating quality of care

Effective Delivery of Care

Patient Visits

The person with diabetes should have regular contact with the health system. The following is a suggested schedule of visits and activities.

THE INITIAL VISIT

Medical History

A comprehensive medical history should be elicited to determine the client's baseline information. This includes:

- Symptoms
- History of other medical conditions
- Medications being used
- Risk factor assessment
    - o Smoking
    - o Alcohol intake
    - o Exercise patterns
    - o Nutrition
    - o Family history of diabetes, hypertension, vascular disease
    - o Psychosocial assessment
- Identification of factors that may affect management of diabetes
    - o Cultural
    - o Educational
    - o Socio-economic

If patient is already being treated:

- review of results of previous tests
- details of information on previous treatments

Physical Examination

A thorough physical examination should be done, paying special attention to:

- Height and weight to determine BMI

• Waist circumference

See "Protocol for the Prevention and Management of Obesity, Diabetes, and Hypertension in Belize", for further details.

• Blood pressure (including checks for orthostatic hypotension)

• Skin for evidence of infections, ischemia, ulcers and state of insulin injection sites

• Eyes for evidence of diabetic retinopathy (such as microaneurysms, hemorrhages and exudates), visual acuity

• Mouth for gingivitis, periodontitis

• Heart for cardiomegaly and murmurs

• Abdomen for hepatomegaly

• Feet for evidence of peripheral artery disease and neuropathy

- o Appearance- color, evidence of atrophy, state of nails, presence of ulcers
- o Sensation, reflexes, vibration
- o Pulses- dorsalis pedis, posterior tibial

• Neurological system for evidence of cranial and peripheral neuropathy

Laboratory Tests

The following laboratory tests should be conducted:

• Blood

- o Hemoglobin
- o Fasting plasma glucose
- o HbA1c
- o Fasting lipid profile- low density lipoprotein cholesterol (LDL-C), high density lipoprotein cholesterol (HDL-C), Triglycerides (TG)
- o Serum creatinine

If clinically indicated

- o Thyroid function tests
- o Liver function tests

- Urine
  - o Ketones, Protein
  - o Tests for microalbumin
- Other tests
  - o Electrocardiogram—this should be done routinely as a baseline in older patients
  - o Echocardiogram (this should be done if indicated)
  - o Doppler (this should be done if indicated)

Referrals

Where available the client should be referred to the following personnel:

- Nutritionist/Dietitian
- Chiropodist/Podiatrist
- Diabetes Educator
- Medical Social Worker
- Ophthalmologist
- Other specialists as indicated

FOLLOW-UP VISITS

Please see Appendix IV for the Diabetes Management Flow Sheet.

EVERY VISIT

All patients:

- Measure weight
- Determine BMI (using initial height)
- Measure blood pressure
- Review self-monitoring of blood glucose results and reinforce its importance
- Elicit information on adherence to treatment
- Ask about symptoms, including those of hypoglycemia
- Conduct visual inspection of feet (*see Appendix #5*)
- **Give advice on nutrition and physical activity**

Effective Delivery of Care

Insulin treated patients

- Inspect injection sites
- Ask about occurrence of hypoglycemic attacks
- Test urine for ketones, if ill

EVERY 3-6 MONTHS

- Measure HbA1c

ANNUAL REVIEW FOR ALL PATIENTS

General

- Measure weight
- Determine BMI
- Measure waist circumference
- Measure blood pressure
- Ask about frequency of smoking and alcohol use
- Review diet - especially if overweight or plasma glucose and/or HbA1c are unacceptable
- Ask about mental health (especially depression)

Physical Examination

Pay special attention to:

- Feet
- Eyes
- Mouth

Laboratory Investigations

Blood

- HbA1c
- Lipids
- Creatinine

Urine

- Microalbumin

Other Test

- Electrocardiogram for persons over 40

Section III:

Control of Blood Glucose, Blood Pressure and Blood Lipids

Control of Blood Glucose, Blood Pressure and Blood Lipids

Table 6
Metabolic, Blood Pressure and Nutritional Targets
for Control in Diabetes Mellitus and Associated Conditions

Measurement	Good
Blood glucose:	
- Preprandial	90-130 mg/dL (5.0-7.2 mmol/L)
- Postprandial	<180 mg/dL (<10.0 mmol/L)
HbA1c	<6.5%
Total cholesterol	<200 mg/dL (< 5.2 mmol/L)
HDL cholesterol	>40 mg/dL (>1.0 mmol/L)
LDL cholesterol	<70 mg/dL (<1.8 mmol/L)
Fasting triglycerides	<150 mg/dL (<1.7 mmol/L)
Blood Pressure	≤120/70 mmHg
Body Mass Index	18.5 - 25 kg/m2
Waist circumference :	
Women	<80 cm (<32”)
Men	<94 cm (<37”)

Control of Blood Glucose, Blood Pressure and Blood Lipids

ACHIEVING GLYCEMIC CONTROL

Glycemic control is fundamental to the management of diabetes. Optimal glycemic control can substantially reduce the risk and progression of many of the associated complications of diabetes.

Key concepts in setting glycemic goals:

- Goals should be individualized
- Certain populations (children, pregnant women, and elderly) require special considerations
- Less intensive glycemic goals may be indicated in patients with severe or frequent hypoglycemia
- More intensive glycemic goals may further reduce microvascular complications at the cost of increasing hypoglycemia
- Postprandial glucose may be targeted if HbA1c goals are not met despite reaching target preprandial glucose goals
- Goals for adult patients
    - HbA1c <6.50%
    - Preprandial plasma glucose 90–130 mg/dl (5.0–7.2 mmol/l)
    - Peak postprandial plasma glucose <180 mg/dl (<10.0 mmol/l)

NON PHARMACOLOGICAL MANAGEMENT OF HYPERGLYCEMIA

Weight management, proper nutrition, and physical exercise should be the first line of treatment for diabetes mellitus and should be maintained throughout the course of the disease. In addition to improving glycemic control, these interventions also slow progression of impaired glucose tolerance to overt diabetes.

NUTRITIONAL MANAGEMENT

People with diabetes should receive individualized Nutritional Management (NM) as needed to achieve treatment goals. Achieving nutrition-related goals requires a coordinated team effort that includes the person with diabetes. Medical Nutrition Therapy (MNT) involves a nutrition assessment to evaluate the patient's food intake, metabolic status, lifestyle, and readiness to make changes, goal setting, dietary instruction, and evaluation. To facilitate adherence, the plan should be individualized and take into account cultural, lifestyle, and financial considerations.

Control of Blood Glucose, Blood Pressure and Blood Lipids

Goals of NM that apply to all persons with diabetes are as follows:

- Attain and maintain recommended metabolic outcomes, including glucose and A1C levels; LDL cholesterol, HDL cholesterol, and triglyceride levels; blood pressure; and body weight.

- Prevent and treat the chronic complications and comorbidities of diabetes. Modify nutrient intake and lifestyle as appropriate for the prevention and treatment of obesity, dyslipidemia, CVD, hypertension, and nephropathy.

- Improve health through healthy food choices and physical activity.

- Address individual nutritional needs, taking into consideration personal and cultural preferences and lifestyle, while respecting the individual's wishes and willingness to change.

Assess

Nutritional status using BMI or waist circumference.

- *Body mass index* (BMI) has been the traditional index of obesity and usefully identifies the risk of diabetes and cardiovascular disease in a given population.

- *Waist Circumference*
  The waist circumference is a marker of visceral adiposity and a strong predictor of diabetes and cardiovascular disease risk.

Control of Blood Glucose, Blood Pressure and Blood Lipids

Elicit

Information on dietary practices. A food diary is one way of doing so.

Advise

- Overweight patients should reduce calorie intake i.e. eat smaller portions and increase physical activity.
- Intake of fats and oils and fried foods should be limited.
- The intake of saturated fat, margarine and hydrogenated oils should be reduced.
- Consumption of red meat should be limited and increased intake of fish, white meat and legumes encouraged.
- Increased intake of complex carbohydrates and high fiber foods should be encouraged.
- The intake of refined carbohydrates (sugars) should be reduced.
- The intake of salt and high sodium foods should be reduced.
- A variety of foods and fresh fruits and vegetables should be included as part of the regular nutrition.
- Meals should be evenly distributed throughout the day. Breakfast, lunch and dinner should be taken at fairly regular times with mid morning, mid afternoon and bedtime snacks. This is especially important for patients treated with insulin.

Refer

To nutritionist/dietitian where available, especially for new patients or if dietary indiscretion is recognized.

See **"Protocol for the Prevention and Management of Obesity, Diabetes, and Hypertension in Belize"**

"Lifestyle measures, principally changes in nutritional habits and physical activity, may reverse some of the glucose, lipid and blood pressure disorders of diabetes."[6]

[6] Diabetes Voice, Dec.2003

PHYSICAL ACTIVITY

Physical inactivity and over-nutrition leading to obesity are major contributors to the increasing levels of Type 2 diabetes worldwide. Physical activity is therefore a key factor both in the prevention and management of Type 2 diabetes.

Assess

Physical activity levels.

Advise clients about the benefits of regular physical activity which include:

- Improvement in glycemic control
- Prevention of cardiovascular disease
- Reduction in hypertension
- Reduction in levels of VLDL and increase in HDL cholesterol levels
- Enhancement of weight loss or maintenance of weight
- Improvement in mental health (helps counter anxiety and depression)

Meeting the requirements for physical activity does not require a formal exercise regimen. Physical activity can be incorporated into the activities of daily living. See Table #6, Ibid.

Regular aerobic activity should be sustained for 30-60 minutes at least 5 times weekly. The level and intensity of physical activity should be guided by the age and capacity of the patient.

Table 7
Guide to Physical Activity Levels

Level of Activity	Examples
Light	Office work, cleaning house, playing softball, basketball, or walking
Moderate	Walking briskly, gardening, cycling, tennis, dancing, swimming, light weight training, climbing stairs
Strenuous	Jogging, competitive swimming and tennis, aerobic workout, vigorous dancing
Very Strenuous	Running, intense aerobic workout, intense weight training, football

Note: These are simply a few examples. Physical activity levels will be determined by the degree of exertion. Before commencing physical activity program, persons with diabetes should be assessed by a medical doctor.

Control of Blood Glucose, Blood Pressure and Blood Lipids

Elicit

Medical history including:

Present status of disease including symptoms, treatment, complications

- Cardiac history
- Family history

Conduct

Physical examination including:

- Measurement of BMI, waist circumference
- Cardiac assessment
- Identification of complications of diabetes
- Foot examination

The history and physical examination should reveal any precautions that must be taken.

Contraindications to exercise

- Uncontrolled hyperglycemia
- Unstable angina
- BP >200/100 mmHg
- Acute heart failure
- Febrile illness

Patient advice about exercising

- Warm up before and cool down after exercise
- Wear proper footwear
- Monitor feet closely for blisters or any other damage
- If exercising away from home, wear identification
- Ensure adequate intake of fluids
- Eat appropriately and modify insulin as necessary

Control of Blood Glucose, Blood Pressure and Blood Lipids

Smoking cessation

Studies of individuals with diabetes consistently found a heightened risk of morbidity and premature death associated with the development of macrovascular complications among smokers. Smoking is also related to the premature development of microvascular complications of diabetes and may have a role in the development of type 2 diabetes.

The routine and thorough assessment of tobacco use is important as a means of preventing smoking or encouraging cessation. Special considerations should include assessment of level of nicotine dependence, which is associated with difficulty in quitting and relapse. Management of persons with diabetes who smoke should include:

- advice to abstain from the use of tobacco and alcohol
- counseling and other forms of treatment as a routine component of diabetes care

Pharmacological Management of Hyperglycemia

Currently, the main therapeutic options for the treatment of Type 2 diabetes are:

Medications

The use of medications for a person newly diagnosed with diabetes or a patient with GDM should be reviewed with a specialist. The following is a list of medications currently available in the drug formulary and recommended regimen for the treatment of diabetes.

INSULIN

The indications for insulin treatment are:

- All Type 1 patients
- Patients with Type 2 diabetes whose metabolic control is chronically inadequate, evidenced by an HbA1c >6.5% despite adequate diet, weight reduction, exercise and maximum dosages of oral hypoglycemic agents
- To cover acute illness, surgery or pregnancy
- Treatment of diabetic ketoacidosis or hyperglycemic/hyperosmolar non-ketotic diabetic states
- Post–myocardial infarction

Patients with Type 2 diabetes who are failing or have failed oral therapy can be safely and effectively started on insulin in the outpatient setting, with proper advice and training by the health care team.

Table 8
Types of Insulin Available

Type of Insulin	Examples
Rapid-acting	Insulin lispro
	Insulin aspart
Short-acting	Regular
	Humalog
Intermediate	NPH, Lente
	Ultralente
Long-acting	Glargine
	Detamir
Pre-mixed	70% Lente: 30% Regular
	80% Lente: 20% Regular

Note: • Regular insulin should be injected subcutaneously 15-30 minutes before a meal for the onset of action to coincide with food absorption.
• Humalog (an analogue insulin) can be given at the start of the meal.

• Glargine is given once daily, preferably on mornings, either alone or in combination with short-acting insulin or oral agents.

Mixing of Insulins:

- ✓ If Lente or Ultralente is mixed with Regular insulin in a syringe, it should be injected immediately, or the action of the Regular insulin becomes impaired.
- ✓ Glargine should not be mixed in the syringe with other insulins or injected at the same site as other insulins.
- ✓ If it is necessary to mix short and long acting insulin, then NPH is preferable to Lente in mixing with Regular insulin.
- ✓ When insulins are mixed, the Regular insulin should be drawn up first before the Lente or Ultralente.

Possible Insulin Regimens in Type 2 diabetes Mellitus

1) Combined oral agents and insulin:
   - Morning: Oral agents e.g. Metformin or Sulphonylureas or Thiazolidinediones
   - Bedtime: Glargine or NPH insulin: Start with 10 - 15 units and adjust to achieve target fasting values.

2) Twice Daily Regimen of Both 'Regular' and 'NPH' Insulin
   - Use the 'Rule of Thirds'
   - 1/3 short-acting insulin and 2/3 long-acting insulin
   - 2/3 of daily dose in morning and 1/3 in evening

Example
Assuming a total dose of 45 units of insulin is required per day for control

	Regular	NPH
A.M: 2/3 of total daily dose (30 units)	10	20
P.M: 1/3 of total daily dose (15 units)	5	10

3) Multiple Dosing Regimen:

Short-acting analogue e.g., Regular analogue immediately before each main meal together with long-acting analogue insulin at bedtime e.g. Glargine.

This regimen is useful in patients with little control or those who desire flexibility due to their lifestyles. High levels of motivation, frequent testing and adjustment of dosages are necessary for good control on this regimen.

Whenever possible, it may be useful to get input from a diabetes specialist.

ORAL HYPOGLYCEMIC MEDICATIONS

Therapy with oral agents should be introduced when the blood sugar is not controlled by diet and exercise after 4-6 weeks.

The majority of persons with diabetes, even if initially controlled on non-pharmacological measures, will eventually require drug therapy.

Sulfonylureas

(Chlorpropamide[Diabinese], Glibenclamide [Glyburide])

- Contraindicated in pregnancy and lactation and in severe hepatic and renal disease.
- The drugs stimulate insulin production and may cause hypoglycemia especially in patients with renal impairment. In the second generation sulfonylureas, Glyburide has the highest rate of hypoglycemia.
- There are rare cross sensitivities for patients with sulfa allergies.
- HbA1c lowering commonly achieved is 1.5-2.0 %
- There are no major differences among sulfonylureas on effectiveness, and switching from one to another is rarely beneficial in improving hyperglycemia

Control of Blood Glucose, Blood Pressure and Blood Lipids

Biguanides
(Metformin[Glucophage])

- Contraindicated in pregnancy, lactation, and in patients allergic to biguanides.
- Contraindicated in patients with renal disease (creatinine ≥1.5 mg/dl in men, or ≥1.4 mg/dl in women) because of risk of lactic acidosis. In patients ≥80 years of age, a creatinine clearance should be checked prior to initiation to therapy. Temporary reductions in renal function (e.g. pyelography or angiography) can cause lactic acidosis. Metformin should be suspended 48 hours prior to a procedure in which radio-contrast material would be used and it should not be resumed until renal function is tested and confirmed to be normal.
- Do not use in patients with COPD, Congestive Heart Failure, severe hepatic disease or alcoholism or in any state at risk for intravascular volume depletion.
- HbA1c lowering effect commonly achieved is 1.5-2.0%.
- More effective in obese patients because it counteracts insulin resistance and weight gain is less common, it may also promote weight loss.
- It can be used in combination with sulfonylurea or insulin.
- Major effect may be by reducing hepatic glucose production and enhancing insulin action.
- It does not cause hypoglycemia because it does not stimulate insulin secretion
- It may have unpleasant side effects such as metallic taste, diarrhea, nausea, and anorexia, but these may be transient.

Combinations of these classes of drugs are frequently required for optimum control.

Low dose combination therapy could be considered early in the disease, as it improves the efficacy of therapy and minimizes side effects.

Monotherapy

- One of the above oral agents should be initiated, considering the contraindications and indications outlined above. Always start low and slow. The dose should be increased to the maximum clinically effective dose as long as it is tolerated.

Oral Combination Therapy

- If glycemic control goals are not achieved on monotherapy, then a second agent should be added to the maximum clinically effective dose of the first drug.

TABLE 9
Profile of Principal Oral Glucose-Lowering Agents

Class	Action	Advantages	Contraindications	Side effects	Dosing
Biguanides e.g. Metformin	Reduce hepatic glucose output and delay glucose absorption from the gut	Do not cause weight gain Lower LDL cholesterol Do not cause hypoglycemia	Renal insufficiency Hepatic insufficiency Severe heart failure	Lactic acidosis Gastrointestinal problems	Start with 500 mg once or twice daily with meals
Sulphonylureas e.g Gliclazide, Glimepiride, Glipizide, Glyburide, (short acting)	Stimulate insulin release	Low cost Effective	Pregnancy Lactation	Hypoglycemia	Short acting drugs preferable for use in the elderly Start with a low dose and increase as necessary
Meglitanides Repaglinide	Increase insulin release	Rapid on-off effect due to short half life	Pregnancy Lactation	Gastrointestinal upset Hypoglycemia	Multiple dosing regimen is necessary
Alpha glucosidase inhibitors e.g.Acarbose	Reduce intestinal absorption of carbohydrates	Do not cause hypoglycemia	Pregnancy Kidney disease Cirrhosis	Gastrointestinal symptoms	Start with low dose 25 mg 2-3 times daily (Take with the first bite of each main meal) Increase to maximally tolerated dose
Thiazolidinediones e.g.Rosiglitazone Pioglitazone	Beneficial effects on lipids and blood pressure	Increase insulin sensitivity	Cardiac failure Liver disease Caution when used with insulin	Water retention Weight gain	Can be used as monotherapy or in combination with other oral agents or insulin

Note:

1) The current cost of thiazolinediones and meglitanides prohibits their ready use in Primary Care. However they can be used as first line drugs where indicated.
2) Chlorpropamide, a long-acting sulphonylurea, is not recommended. Where still available, it should be used with extreme caution in the elderly and should be avoided in those with renal disease.

Insulin + Oral Agent

- If treatment goals are not met on oral agents or if oral agents are contraindicated, then it is necessary add insulin as an adjunctive therapy or begin insulin alone.

Insulin as an adjunct to oral therapy

- A bedtime dose of NPH insulin is added to metformin. The starting dose of NPH insulin is often 0.1 U/kg based on ideal body weight. If the patient is also on sulfonylurea, this may be discontinued when insulin is added.

Insulin alone

- See insulin regimens outlined above.

MONITORING OF BLOOD GLUCOSE

Self Monitoring of Blood Glucose

Self-monitoring of blood glucose (SMBG) is a major component in the achievement of good glycemic control. SMBG is particularly useful in persons with Type 1 diabetes but may also play a critical role in the management of persons with Type 2 diabetes.

The main functions of SMBG are to:

- provide persons with diabetes with information about their response to therapy. This information can be used to make adjustments to diet, medication and physical activity
- foster the partnership between the patient and the health care team as results obtained by the patient may be used to modify treatment regimens
- detect hypoglycemia, especially in those who may be ill or unaware of relevant symptoms
- allow persons with diabetes to be aware of the status of their blood glucose control without being solely dependent on health care professionals
- empower persons with diabetes.

An **individualized home monitoring** plan is required and must be culturally sensitive to the patient and health care workers. The plan should include the timing and frequency of tests. Frequency will vary according to the type of diabetes, the medication prescribed and the level of glycemic control.

Testing should be done in the fasting state as well as before and after meals. For persons with Type 1 diabetes and pregnant women on insulin, SMBG should be done at least three times per day. Recorded results should be presented to health care professionals at clinic visits. The person's ability to adjust treatment, food and physical activity according to the results should also be monitored.

SMBG may not be suitable for everyone with diabetes. The patient should be able to perform the test accurately, following the manufacturer's instructions, and must know what results to expect and what action to take if the results are outside the desired range.

Major limitations of SMBG are:

- the cost of the testing strips, and
- difficulties experienced by some persons in pricking themselves (needle phobia).

BLOOD GLUCOSE MONITORS

There is usually a reasonable correlation between glucose concentrations measured in capillary blood by glucose meters and those from serum or plasma glucose measured by clinical laboratory procedures.

BLOOD GLUCOSE TESTING

The technique of testing should be taught by members of the health care team who should ensure that the test is being done accurately.

It is important to ensure that strips match the machine.

Strips must be stored according to recommendations of the manufacturers.

HbA1c

This test is used in combination with self monitoring of blood glucose to assess long term control. This test should be done every 3- 6 months.

Control of Blood Glucose, Blood Pressure and Blood Lipids

URINE TESTING

- Urine testing for glucose is not recommended for evaluating control. In settings where this may be the only available option for monitoring glycemic control, persistent glycosuria highlights the need for the patient to seek further medical attention.
- Urine testing for ketones is important during sick days especially for Type 1 diabetes. (See Appendix X).

HYPOGLYCEMIA

Hypoglycemia/Hypo is used to describe blood sugar levels < 4 mmol/L or <70mg/dl.

Possible causes:

- More exercise than normal
- Too little food; too much insulin/tablets
- Alcohol consumption
- Menses
- Hot weather

Signs and symptoms include:

- Sweating
- Hunger
- Shaking
- Blurred vision
- Missed or late meals
- Dizziness
- Headaches
- Tiredness
- Tingling lips/finger tips

May also notice:

- Glazed eyes
- Mood changes
- Unusually aggressive behavior

THE THREE STAGES OF HYPOGLYCEMIA

1. MILD HYPOGLYCEMIA

Hypoglycemia characterized by shaking, sweating, hunger, weakness, and anxiety.

Treatment

Self-treatment with 10 to 15 grams (2-3 teaspoons) of pure glucose. Wait 10 minutes and follow with a protein such as 8 oz. of milk or cheese and crackers or bread. If untreated, it progresses to moderate hypoglycemia.

2. MODERATE HYPOGLYCEMIA

Hypoglycemia characterized by confusion, slurred speech, glassy eyes, poor coordination, and lack of concentration.

Treatment

Assistance may be required. Take a 20 to 30 gram (4-6 teaspoons) dose of pure glucose, wait 10 minutes then follow with a protein such as 8 oz. milk or cheese and crackers or bread. If untreated, it progresses to severe hypoglycemia.

3. SEVERE HYPOGLYCEMIA

Hypoglycemia characterized by unresponsiveness, combativeness, agitation, convulsions and unconsciousness.

Treatment:

This is an acute medical emergency. Seek medical assistance.

Severe hypoglycemia can be life threatening if not treated promptly and thoroughly. Emergency measures are required, including injection of glucagon or intravenous dextrose, followed by oral glucose or sweetened drinks.

Hospital admission is indicated for severe or prolonged hypoglycemia, co-existing renal disease or illness associated with use of long-acting oral glucose lowering agents. The usual dose of insulin/diabetic medication may need to be modified, once the hypo episode has been treated.

Encourage patients to carry glucose and snacks at all times.

CONDITIONS IN DIABETES MELLITUS REQUIRING HOSPITAL ADMISSION

- Newly diagnosed diabetes in children and adolescents or in pregnancy
- Uncontrolled diabetes
    - Chronic refractory hyperglycemia associated with metabolic deterioration
    - Inability to obtain glycemic control with outpatient therapy
    - Recurrent hypoglycemia
    - Metabolic instability characterized by frequent swings between hypoglycemia and hyperglycemia
    - Recurrent diabetic ketoacidosis in the absence of trauma and infection
    - Uncontrolled diabetes in pregnancy
- Institution of intensive insulin regimes including insulin-pump therapy
- Potentially life-threatening acute complications of diabetes
    - Diabetic ketoacidosis characterized by hyperglycemia, acidosis and ketones in the urine and/or blood.
    - Hyperglycemic hyperosmolar state characterized by severe hyperglycemia and elevated serum osmolality, often with concomitant alterations in mental status.
    - Hypoglycemia with neuroglycopenia characterized by altered consciousness, seizures, coma, or disturbances of motor or language function, where there has not been prompt full recovery following glucose therapy, a sulfonylurea drug has been implicated, or there is concern about patient supervision or monitoring.

Control of Blood Glucose, Blood Pressure and Blood Lipids

Treatment of Associated Co-morbid conditions

Diabetes increases the risk of coronary events twofold in men and fourfold in women. Part of this increase is due to the frequency of associated cardiovascular risk factors such as hypertension. There is a strong epidemiological connection between hypertension in diabetes and adverse outcomes of diabetes. Clinical trials demonstrate the efficacy of drug therapy versus placebo in reducing these outcomes and in setting an aggressive blood pressure–lowering target of <120/80 mmHg. It is very clear that many people will require three or more drugs to achieve the recommended target. Achievement of the target blood pressure goal with a regimen that does not produce burdensome side effects and is at reasonable cost to the patient is probably more important than the specific drug strategy.

Recommended Interventions based on Blood Pressure Measurements:

- <120/80
  This is the target blood pressure. Patient should continue being evaluated on a regular basis and reinforce life style modifications.

- 120-129/80-89
  Patients with a systolic blood pressure of 120–129 mmHg or a diastolic blood pressure of 80–89 mmHg should be given lifestyle and behavioral therapy (sodium restriction, weight loss, and increase physical activity) alone for a maximum of 3 months and then, if targets are not achieved, in addition, should be treated pharmacologically.

- ≥140/≥90
  Patients with hypertension (systolic blood pressure ≥140 or diastolic blood pressure ≥90 mmHg) should receive drug therapy in addition to lifestyle and behavioral therapy.

HYPERTENSION MANAGEMENT IN ADULTS WITH DIABETES

There is a higher prevalence of hypertension among persons with diabetes compared with non-diabetics. In the Caribbean diabetes is present in about one-third of hypertensive patients. This co-existence is often a result of:

- The high prevalence of both conditions in the Region
- The relationship between insulin resistance and hypertension
- The higher prevalence of chronic renal disease among diabetic patients

Hypertension increases the risk of strokes, ischemic heart disease, retinopathy and nephropathy in persons with diabetes.

Non-drug Treatment

- Weight management must be recommended for all persons with diabetes. Caloric restriction and any degree of weight loss are beneficial for the overweight or obese patient.
- The intake of potassium and calcium must be adequate and sodium intake limited. Increased consumption of fruits and vegetables is to be encouraged as well as the use of low fat-dairy products. A balanced diet will provide all the essential nutrients and vitamins without the need for supplementation.
- Smoking cessation is critical for reducing the risk of vascular complications of hypertension and diabetes.
- Alcohol intake should be limited as it compromises the control of both diabetes and hypertension.
- Physical activity should be continued unless specifically contraindicated.

Drug Treatment

Most persons with hypertension and diabetes will need 2 or more drugs for control, in addition to lifestyle changes.

- Low-dose Thiazides e.g. Hydrochlorthiazide, can be used safely in the majority of diabetics. Thiazides, used in low doses, rarely affect glucose, lipids, or electrolyte balance and should be the antihypertensive of first choice.

- Diuretics, ACE inhibitors, Angiotensin Receptor Blockers (ARBs), and Calcium Channel Blockers (CCBs) have all been shown to reduce the risk of cardiovascular complications.
- ACE inhibitors or ARBs are the drugs of choice for renal protection in diabetics with proteinuria. ACE inhibitors have been shown to improve cardiovascular outcomes in high-risk patients with or without hypertension and there is compelling evidence for early use in persons with diabetes.
- In persons who are allergic to ACE/ARBs, the use of the calcium channel blocker Diltiazem has provided similar benefits.
- Beta-blockers have a place in the management of persons with diabetes, but should be used with caution in persons with peripheral vascular disease. Water soluble forms, e.g. Atenolol, are preferable.
- In elderly hypertensive patients, blood pressure should be lowered gradually to avoid complications.
- Patients not achieving target blood pressure on three drugs, including a diuretic, and/or patients with significant renal disease, should be referred to a specialist experienced in the care of patients with hypertension.

LIPID MANAGEMENT IN ADULTS WITH DIABETES

Type 2 diabetes mellitus is associated with increased prevalence of lipid abnormalities (viz. increased low density liproproteins (↑LDL-C), decreased high density lipoproteins (↓HDL-C) and increased triglycerides (↑TG), which contribute to macrovascular disease (heart attacks and strokes).

Lipid management aimed at lowering LDL cholesterol, raising HDL cholesterol, and lowering triglycerides has been shown to reduce macrovascular disease and mortality in patients with type 2 diabetes, particularly those who have had prior cardiovascular events.

Lowering LDL cholesterol and triglycerides and raising HDL cholesterol have been shown to reduce macrovascular disease events as well as mortality.

General Points

- Diet and exercise remains the cornerstone of treatment of dyslipidemia.
- Pharmacological therapy is often required to achieve targets and should be implemented in conjunction with lifestyle changes.
- Routine screening of all diabetes patients for dyslipidemia is to be encouraged through annual testing.

Control of Blood Glucose, Blood Pressure and Blood Lipids

Goal of therapy:

- Total Cholesterol < 200 mg/dl
- LDL <100 mg/dl (<2.6 mmol/l)
- Triglycerides <150 mg/dl (<1.7 mmol/l)
- HDL men >45 mg/dl (>1.1 mmol/l) women > 55mg/dl

HDL-cholesterol

- Aim for >40 mg/dL (>1.0 mmol/L)
- Nicotinic acid (Niacin) is the most effective drug for raising HDL-C, but has limited usage in clinical practice, as a result of an unpleasant flushing reaction. When used, doses should be restricted (e.g. 500–1000 mg per day) to reduce the likelihood of hyperglycemia.

LDL-cholesterol

- Aim for LDL-cholesterol <70 mg/dL (<1.8 mmol/L). Statins are the drug of choice, if drug therapy is needed.

Hypertriglyceridemia

- Aim for <150mg/dL (<1.7 mmol/L).
- This derangement frequently responds to calorie and alcohol restriction. Adequate glycemic control also contributes to reductions in triglyceride levels.
- Fibrate therapy (e.g. Gemfibrozil) may be necessary if these measures fail with statin therapy.
- Patients with diabetes who have other cardiovascular risk factors (such as hypertension, smoking or microalbuminuria), may benefit from the addition of a statin irrespective of initial LDL-cholesterol levels.
- All diabetic patients with cardiovascular disease (angina, myocardial infarction, transient ischemic attack, stroke, and claudication) should be on cholesterol-lowering medication.
- Combination therapy with a statin and fibrates may be used for mixed lipid disorders but the risk of rhabdomyolysis is increased.
- Note that liver function should be evaluated before commencement of statin therapy.

OTHER THERAPEUTIC INTERVENTIONS

The following therapies may be considered in the management of diabetes and associated conditions.

Antiplatelet Therapy

Aspirin blocks thromboxane synthesis by acetylating platelet cyclo-oxygenase and has been used as a primary and secondary therapy to prevent cardiovascular events in diabetic and nondiabetic individuals.

- Use aspirin therapy (75–325 mg/day) in all adult patients with diabetes and macrovascular disease.
- Consider beginning aspirin therapy (75–325 mg/day) for primary prevention in patients ≥30 years of age with diabetes and one or more cardiovascular risk factors.
    - Family history of coronary heart disease
    - Cigarette smoking
    - Hypertension
    - Obesity (>120% desirable weight); BMI >27.3kg/m_2 in women,
    - >27.8kg/m_2 in men
    - Albuminuria (micro or macro)
    - Lipids: cholesterol >200mgdl, LDL >100mdl, HDL <45mg/dl in men and <55mgdl in women
- Do not use aspirin in patients:
    - <21 years of age because of the increased risk of Reye's syndrome
    - with aspirin allergy
    - with bleeding tendency
    - on anticoagulant therapy
    - with recent gastrointestinal bleeding
    - with clinically active hepatic disease

Section IV:
Prevention and Reduction of Complications

Prevention and Reduction of Complications

NEPHROPATHY

The microvascular complications of diabetes mellitus i.e. nephropathy, neuropathy and retinopathy are directly related to the duration and degree of glycemic control. This is a major cause of end-stage renal disease (ESRD). Improving glycemic control, aggressive antihypertensive treatment, and the use of ACE inhibitors (for the treatment of both micro and macroproteinuria) will slow the rate of progression of nephropathy.

In patients with type 1 diabetes, with or without hypertension, with any degree of albuminuria, ACE inhibitors have been shown to delay the progression of nephropathy. In patients with type 2 diabetes, hypertension and microalbuminuria, ACE inhibitors have been shown to delay the progression to macroalbuminuria. In patients over age 55 years, with or without hypertension but with another cardiovascular risk factor (history of cardiovascular disease, dyslipidemia, microalbuminuria, smoking), an ACE inhibitor (if not contraindicated) should be considered to reduce the risk of cardiovascular events.

If ACE inhibitors are used, monitor BUN and creatinine levels and serum potassium levels. The use of DCCBs (Nifedipine) is less effective in slowing nephropathy progression compared with ACE inhibitor therapy in those with diabetes, nephropathy and macroalbuminuria.

In short-term studies, non-DCCBs (Verapamil, Diltiazem) have reduced albumin excretion. Other treatment modalities such as protein restriction may have benefits in selected patients. In addition, Angiotensin Receptor Blockers (ARB), also known as Angiotensin II Receptor Antagonists, block the action of Angiotensin II. They relax blood vessels and cause decreased peripheral vascular resistance, which will slow the progression of nephropathy. An example is Losartan (Cozaar).

Prevention and Reduction of Complications

CONTRIBUTING FACTORS

- Duration of diabetes (usually >10 years)
- Poor glycemic control
- Poor blood pressure control
- Genetics- family history of hypertension or renal failure
- High protein intake

SCREENING FOR NEPHROPATHY

Micro albuminuria is the earliest manifestation of nephropathy

Main methods for screening

- Measurement of urinary albumin/creatinine ratio (ACR)
- 24 hour collection of urine for proteinuria
- Timed collection of urine for microalbumin

Table 10
Definition of Abnormalities in Renal Albumin Excretion

Category	Spot collection µg/mg creatinine	24-hr collection mg/24 h	Timed collection µg/min
Normal	<30	<30	<20
Microalbuminuria	30-299	30-299	20-199
Clinical albuminuria	≥300	≥300	≥200

Source: American Diabetes Association, Clinical Guidelines of Care, 2005

Prevention and Reduction of Complications

"People with poorly controlled diabetes have a markedly increased risk for and incidence of heart attack, stroke, blindness, kidney failure, leg amputation and early death. Not only is their productive life span shortened, but the quality of life of people with diabetes and their families is severely impacted."[7]

RECOMMENDATIONS TO REDUCE THE RISK OF NEPHROPATHY

- Screen for microalbuminuria at diagnosis and then annually in all persons with Type 2 diabetes mellitus.
- Once microalbuminuria or proteinuria has been confirmed:
  Include an ACE-inhibitor or ARB in the therapeutic regimen.
- Aim for tight blood pressure control with combination therapy if necessary so that BP $\leq$ 120/80 mmHg.
- Aim for tight glycemic control.
- Advise on a protein restricted diet and refer to a nutritionist/dietitian for specialized management.
- Refer for specialist care.

NB. Care must be taken when performing procedures requiring the use of contrast material as radiocontrast media are particularly nephrotoxic in patients with diabetic nephropathy; azotemic patients should be carefully hydrated before such procedures.

[7] Declaration of the Americas on Diabetes , August 1996

Prevention and Reduction of Complications

RETINOPATHY

Diabetic retinopathy is an important cause of blindness.

Contributing factors

- Duration of the disease (usually >10 years)
- Poor glycemic control
- Poor blood pressure control

Screening

Refer all persons with Type 2 diabetes mellitus to an ophthalmologist as soon as possible after initial diagnosis and then annually for dilated fundoscopy. Patients with Type 1 diabetes should have an initial eye examination 3-5 years after the onset of the disease. When planning pregnancy, women with preexisting diabetes should have a comprehensive eye examination and should be counseled on the risk of development and/or progression of diabetic retinopathy. Women with diabetes who become pregnant should have a comprehensive eye examination in the first trimester and close follow-up throughout pregnancy and for 1 year postpartum.

NB. This guideline does not apply to women who develop GDM because such individuals are not at increased risk for diabetic retinopathy.

Recommendations to reduce risk of retinopathy

- Aim for tight metabolic and blood pressure control
- Refer for specialty care

NB. Aspirin therapy does not prevent retinopathy or increase the risk of hemorrhage.

Prevention and Reduction of Complications

NEUROPATHY

Diabetic neuropathy occurs mainly in persons with poor glycemic control. The symptoms are:

- Tingling
- Numbness
- Weakness
- Burning sensations

Symptoms usually start at the periphery (fingers and toes) and move up the limbs. If the autonomic nervous system is affected, abnormalities of bladder and bowel function and penile erectile dysfunction (ED) may also occur.

CARE OF THE FOOT

Foot lesions are common in persons with diabetes. See Appendix V.

Factors that contribute to foot lesions

- Neuropathy
- Ischemia
- Injury/Infection
- Incorrect foot wear

Recommendations to reduce the risk of foot problems

- Aim for tight metabolic and blood pressure control
- Encourage smoking cessation
- Encourage routine daily self-examination of feet
- Encourage use of correct foot wear. Where available, a chiropodist or podiatrist should be consulted when necessary
- Examine peripheral pulses for peripheral vascular disease
- Test feet routinely for peripheral neuropathy
- Refer for specialty care as appropriate

Prevention and Reduction of Complications

CARDIOVASCULAR DISEASE

Persons with diabetes are at significantly increased risk of developing cardiovascular disease, which is the major cause of mortality and chronic morbidity.

Cardiovascular disease includes:

- Coronary heart disease, which can lead to angina and myocardial infarction
- Cerebrovascular disease leading to transient ischemic attacks and strokes
- Peripheral vascular disease

In terms of risk stratification, persons with diabetes should be treated in an identical manner to persons without diabetes who have previously had a heart attack.

In addition to glycemic and blood pressure control and correction of dyslipidemias, the following are strongly advised:

• Smoking Cessation

  o Successful smoking cessation is the most effective intervention for both primary and secondary prevention of cardiovascular disease.

• Use of Anti-Platelet Agents

  o Primary prevention with an anti-platelet agent should be given in all patients over the age of 40 years who have no contraindications, especially those with multiple risk factors.

  o Aspirin use is beneficial for secondary prevention following myocardial infarction, stroke, peripheral vascular disease, angina or following surgery for any of these conditions.

Prevention and Reduction of Complications

Miscellaneous Complications

Illness

The stress of illness frequently aggravates glycemic control and necessitates more frequent monitoring of blood glucose and urine or blood ketones. A vomiting illness accompanied by ketosis may indicate diabetic ketoacidosis (DKA), a life-threatening condition that requires immediate medical care to prevent complications and death; the possibility of DKA should always be considered.

Marked hyperglycemia requires temporary adjustment of the treatment program, and, if accompanied by ketosis, frequent interaction with the diabetes care team. The patient treated with oral glucose-lowering agents or medical nutrition therapy (MNT) alone may temporarily require insulin. Adequate fluid and caloric intake must be assured.

Infection or dehydration is more likely to necessitate hospitalization of the person with diabetes than the person without diabetes. The hospitalized patient should be treated by a physician with expertise in the management of diabetes, and recent studies suggest that achieving very stringent glycemic control may reduce mortality in the immediate post–myocardial infarction period. Aggressive glycemic management with insulin may reduce morbidity in patients with severe acute illness.

Erectile Dysfunction

The prevalence varies depending on the duration of diabetes. In addition, to increasing age, ED is associated with smoking, poor glycemic control, low HDL, neuropathy and retinopathy.

It can result from nerve damage, impaired blood flow (vascular insufficiency), adverse drug effects, endocrinopathy, psychological factors, or a combination.

If endocrinologic evaluation is negative and other treatable diseases have been excluded, most diabetics respond to phosphodiesterase type 5 inhibitors (sildenafil, tadalafil, vardenafil). Typical doses include sildenafil 50-100 mg or vardenafil 10 mg 1 hour prior to sexual activity and taldalafil 10mg/d prior to sexual activity. Glycemic control should be intensified and could be a helpful adjuvant therapy; specialist referral should be considered if the problem persists. Cardiovascular status should be considered before starting these agents. **Sildenafil should not be used concurrently with nitrates in order** to prevent severe and potentially fatal hypotensive reactions.

Prevention and Reduction of Complications

Diabetic Foot Ulcers

Causative factors include neuropathy, excessive plantar pressure, and repetitive trauma; vascular insufficiency, poor healing, and polymicrobial infection are major contributors to ulcer formation.

Screening to identify patients at risk for ulcers include: detection of loss of protective sensation by monofilament and peripheral vascular disease.

Poorly managed foot ulcers may result in limb loss from amputation. Patient education should emphasize prevention, daily foot examinations, and application of moisturizing lotion, use of proper foot wear, and caution with self-pedicure.

The exposed feet should be inspected and palpated at every patient encounter: significant findings, such as calluses, hammer toes or other deformities, and soft tissue lesions should be evaluated.

Diabetic foot ulcers should be treated aggressively. Proper management includes a multidisciplinary approach that includes orthopedic surgeon, specialized nursing care, and close monitoring. Revascularization should be considered as an integral part of the management of foot ulcers. The presence of deep infection with abscess, cellulitis, gangrene or osteomyelitis is an indication for hospitalization and prompt surgical drainage.

Acute treatment of foot infections is dependent on severity, as outlined below.

Cellulitis

Rest, elevation of the affected foot, and relief of pressure are essential components of treatment that should be initiated at first presentation in localized cellulitis and new ulcers, *Staphylococcus aureus* and streptococci are the most frequent pathogens. Therapy with dicloxacillin, first generation cephalosporins, amoxicillin/clavulanate, or clindamycin is recommended.

Moderate to severe cellulites requires hospitalization and intravenous therapy, and may require surgical procedures such as debridement and even amputation.

Section V: Management of Gestational Diabetes Mellitus

GESTATIONAL DIABETES MELLITUS (GDM)

Gestational diabetes mellitus is defined as any degree of glucose intolerance with onset or first recognition during pregnancy. The definition applies regardless of whether insulin or only diet modification is used for treatment or whether the condition persists after pregnancy. It does not exclude the possibility that unrecognized glucose intolerance may have antedated or begun concomitantly with the pregnancy. Clinical recognition of GDM is important because therapy, including medical nutrition therapy, insulin when necessary, and antepartum fetal surveillance, can reduce the well-described GDM-associated perinatal morbidity and mortality. Maternal complications related to GDM also include an increased rate of cesarean delivery and chronic hypertension. Although many patients diagnosed with GDM will not develop diabetes later in life, others will be diagnosed many years postpartum as having type 1 diabetes, type 2 diabetes, IFG, or IGT.

The following categories of patients are at increased risk of GDM:

- > 25 years of age
- overweight
- first degree family history of diabetes
- previous history of abnormal glucose metabolism
- glycosuria
- previous poor obstetric history
- ethnicity associated with high prevalence of diabetes mellitus
- a previous large baby weighing more than 4.0 kg (9lbs)

"Diabetes in pregnancy may give rise to several adverse outcomes... Strict metabolic control may reduce these risks to the level of those of non-diabetic expectant mothers."[8]

[8] World Health Organization, Fact Sheet No 138, April 2002

Management of Gestational Diabetes Mellitus

Gestational diabetes poses a high-risk for both the woman and the child.
Complications of GDM include:

Fetus/Child

- Congenital malformations
- Increased birth weight
- Shoulder dystocia
- Elevated risk of perinatal mortality

Mother

- Hypertension in pregnancy and placental insufficiency which may occur more frequently
- Increased insulin resistance
- Development of diabetes-related complications
- Abortion

PROTOCOL FOR TESTING FOR GESTATIONAL DIABETES MELLITUS

1) Screen with questions related to risk factors as above
2) Test high-risk patients with the Oral Glucose Tolerance Test

If the first test is normal, retest high-risk patients at 24-28 weeks gestation.

DIAGNOSTIC CRITERIA

There are two main glucose tolerance tests used for diagnosing gestational diabetes, as described below. The test using 100 g glucose is also widely used for detection of 'at risk' infants and mothers.

Management of Gestational Diabetes Mellitus

Table 11
Glucose Tolerance Tests for Gestational Diabetes

100g glucose (Traditional Method)

Time	mg/dL	mmol/L
Fasting	> 95	> 5.3
1-h	>180	> 10.0
2-h	>155	> 8.6
3-h	>140	>7.8

75 g glucose

Time	mg/dL	mmol/L
Fasting	> 95	> 5.3
1-h	>180	> 10.0
2-h	>155	> 8.6

Note: Clinical practice includes the use of a screening 50g glucose load (fasting not required). If the one hour value is ≥140 mg/dL (≥ 7.8 mmol/L), proceed to a diagnostic OGTT.

The alternative is the single step approach using the diagnostic GTT.

Two or more venous plasma concentrations must be met or exceeded for a positive diagnosis.

REFERRAL

All cases of GDM should be referred to a specialist centre for care and delivery.

POST-PARTUM FOLLOW UP

Although most women with gestational diabetes mellitus revert to normal glucose levels after pregnancy, they are at significant risk of developing GDM in subsequent pregnancies as well as Type 2 diabetes later in life. Intense lifestyle modification should be encouraged with annual routine screening for diabetes starting at the 6-week post-partum visit.

Section VI:
Effective Self Care through Education

SELF-MANAGEMENT EDUCATION GOALS

The following goals are a guide for the entire health care team, which should work together to achieve them.

Always remember that the main member of the team is the PERSON LIVING WITH DIABETES and that he/she should be totally involved in goal and priority setting.

- **Describing the disease process and treatment options**
  - Identify diabetes as a disorder in which the body is unable to utilize food properly
  - Describe the actions of insulin and what happens in the body when insulin is not available or does not work properly
  - Explain how the prescribed meal and exercise plan and blood glucose monitoring are essential for management of the disease
  - List the risk factors for diabetes
  - State how the diagnosis of diabetes is established
  - State the importance and benefits of good diabetes control
  - Describe the effects of oral hypoglycemic agents

- **Incorporating appropriate nutritional management**
  - State that nutrition therapy and meal planning are essential components in the control of blood glucose
  - List the goals:
    - Identifying appropriate body weight (explain BMI)
    - Reaching and maintaining appropriate body weight
    - Controlling blood glucose and lipids
    - Practicing good nutrition

"Helping people with diabetes to acquire the knowledge and skills to manage their own condition is central to their leading a full and healthy life."[9]

[9] Diabetes Action Now, 2002

- o Discuss meal-planning strategies to meet the goals
- o Demonstrate the correct portion sizes for the meal plan
- o Identify times for snacks
- o Demonstrate how to evaluate food products using food labels
- o Discuss use of non-caloric sweeteners
- o Explain importance of reducing total fat as well as saturated and hydrogenated fats
- o State the relationship of salt and hypertension, and discuss ways to reduce salt
- o State the effect of alcohol on blood glucose
- o Describe how to prevent and manage hypoglycemic attacks
- o State the relationship between obesity and diabetes and the benefits of achieving ideal weight

• **Incorporating physical activity into lifestyle**

- o State that exercise is recommended for diabetes management and good health in general
- o State that exercise can help lower blood glucose levels
- o Describe role of regular physical activity in achieving or maintaining the appropriate body weight
- o State the need to consult with the health care team before beginning an exercise program
- o List types of physical activity that the patient might agree to use
- o Describe the proper shoes and clothing for physical activity
- o State why and how to avoid dehydration
- o State that hypoglycemia can result from exercise if certain medications are used
- o State relationship of exercise to oral agent activity
- o Timing of meals and exercise
- o List factors that may increase the risk of exercise-induced hypoglycemia Alcohol and ß-blockers

Effective Self Care through Education

- **Using medications for therapeutic effectiveness**
    - State that in addition to diet and exercise some individuals may need either oral agents or insulin
    - State that the oral medication dosage is individualized
    - State the action of oral medication on blood glucose level
    - State the name of oral medication, its dosage and when it is to be taken
    - List the possible side effects of oral medication
    - State the possible interactions of diabetes medications with other medications taken

- **Monitoring**
    - Describe rationale for monitoring blood glucose
    - Demonstrate how to perform tests with appropriate materials
    - Demonstrate how to record results
    - Demonstrate proper disposal of lancets and other materials
    - State when and how to contact health care provider if results are consistently higher or lower than guidelines given

• Preventing, detecting and treating chronic complications

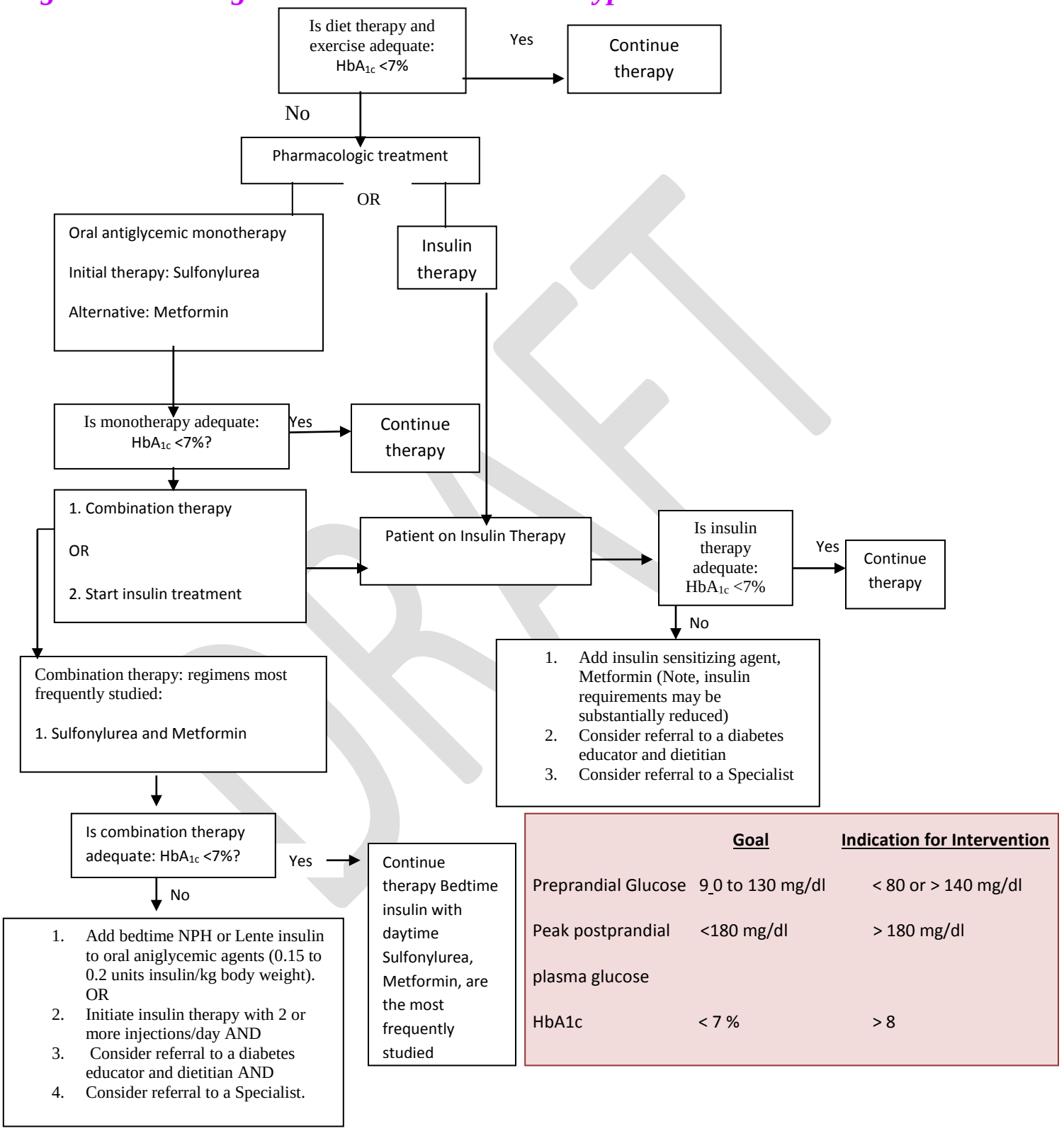
- Identify chronic complications associated with diabetes
- State that maintaining normal near-normal blood glucose may prevent or delay chronic complications
- State that smoking increases risk of complications
- State the need for an eye examination on a regular basis
- State that diabetes can affect the eyes without any symptoms being initially apparent
- State the need for daily foot inspection and for wearing well fitting shoes
- Demonstrate how to bathe feet and trim toenails safely
- Identify factors that may cause injury to the feet
- State the need to report early symptoms of potentially serious problems
- State the need for daily dental and mouth care
- Identify the organ systems particularly at risk from diabetes
- State that regular blood pressure monitoring is necessary
    - Need to control high blood pressure
- State that monitoring of cholesterol and triglycerides is necessary
    - identify differences between HDL-C and LDL-C
- state that diabetes may cause sexual dysfunction and identify resources for help

References

1. Meltzer S. MD; Leiter L. MD; Daneman D. MD; et al. 1998 *Clinical Practice guidelines for management of diabetes in Canada.* Canadian Medical Association. Oct. 20, 1998; 159 (8 Suppl)
2. Madelein A, Hamadeh G. *Quality of Diabetes Care in a university health Center in Lebanon*. International Journal for Quality in Health Care 1999; Vol.11, Number **6**: 517-521.
3. Gulliford M.C., Alert C.V., Mahabir D., Ariyanayagam-Baksh S.M., Fraser H.S. *Diabetes Care in Middle-income Countries: A Caribbean Case Study*. Diabetic Medicine, 1996; **13: 574-581**
4. Pan American Health Organisation. *Managing Diabetes in Primary Care in the Caribbean*. PAHO. Caribbean Health Research Council, 2006.
5. PAHO/WHO. Central America Diabetes Initiatives: Diabetes, Hypertension and Risk Factors Survey. Belize. Ministry of Health. 2008.
6. MOH. National Health Statistics. Epidemiology Unit, Ministry of Health. Belize 2006.
7. Faxon DP, MD; Schwamm LH, MD; Richards C. et al. *Improving quality of care through Disease Management Principles and Recommendations* from American Heart Association's Expert panel on Disease Management. Circulation 2004; **109: 2651-2654**.
8. Canadian Diabetes Association. *Clinical practice guidelines for diabetes mellitus in Canada*. Can Diabetes 1992; **5: 1-4**
9. American Diabetes Association. *Standards of medical care for patients with diabetes mellitus*. Diabetes Care 1989; **12: 365 -368**.
10. World Health Organization. *Management of diabetes mellitus. Standards of Care and clinical practice* guidelines. Geneva: World Health Organization
11. MOH /Cambridge Consulting Corporation. *Diabetes Outpatient Management Protocol.* Belize 2003

Appendices

APPENDIX I
Algorithm: Management Adult Patients with Type 2 Diabetes Mellitus



	Goal	Indication for Intervention
Preprandial Glucose	9_0 to 130 mg/dl	< 80 or > 140 mg/dl
Peak postprandial plasma glucose	<180 mg/dl	> 180 mg/dl
HbA1c	< 7 %	> 8

Appendix II

Quick Reference Card for Goals of Therapy

Cholesterol levels

- Total Cholesterol < 200 mg/dl
- LDL <100 mg/dl (<2.6 mmol/l)
- Triglycerides <150 mg/dl (<1.7 mmol/l)
- HDL men >45 mg/dl (>1.1 mmol/l) women > 55mg/dl

Glycemic Control

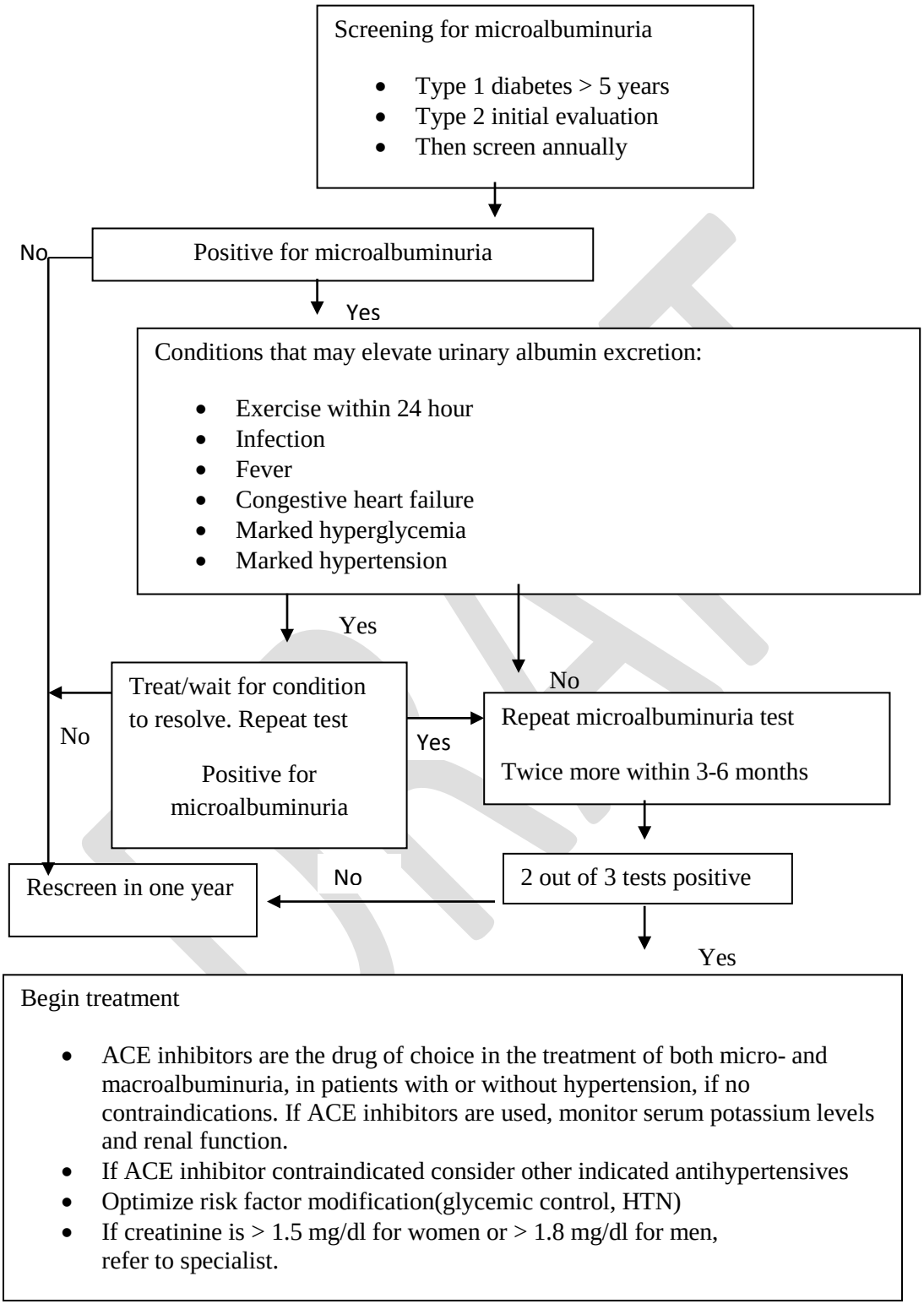
- Goals for adult patients
  - HbA1c <7.0%
  - Preprandial plasma glucose 90–130 mg/dl (5.0–7.2 mmol/l)
  - Peak postprandial plasma glucose (2hrs post meal) <180 mg/dl (<10.0 mmol/l)
  - Table below lists the correlation between HbA1c levels and mean plasma glucose levels

HbA1c (%)	mg/dl	mmol/l
6	135	7.5
7	170	9.5
8	205	11.5
9	240	13.5
10	275	15.5
11	310	17.5
12	345	19.5

Blood Pressure

	Systolic	Diastolic
Goal (mmHg)	<120	<80
Behavioral therapy alone (maximum 3 months) then add pharmacologic treatment	130–139	80–89
Behavioral therapy + pharmacologic treatment	≥140	≥90

Appendix III Algorithm: Screen for Microalbuminuria



Appendix IV: Diabetes Flow Chart

Patient name _____ ID# _____

Type of Diabetes ___ Type 1 ___ Type 2 ___ Gestational ___ Other

Date of Diagnosis ____/___/__ Home Glucose Monitoring ___ Yes ___No

Treatment: _____ Insulin _____ Oral Meds _____ Insulin & Oral Meds

ACE Inhibitor: ( ) Yes ( ) No If no, specify reason _____

Aspirin Use: ( ) Yes ( ) No If no, specify reason _____

CAD Status: ( ) Past MI ( ) HTN Smoking Status: ( ) Nonsmoker ( ) Smoker/PPD_____

Office Visit **Review Management Plan**	Date Result	Date Result	Date Result	Date Result	Date Result
Type 1 every 3 months Type 2 every 3–6 months					
Review each visit					
Height/Weight (BMI) < 25					
Blood Pressure < 130/80					
Glycemic Control					
HbA1c ≤ 7% Every 3-6 months					
Kidney Function					
Creatinine (annual)					
Crt Clearance calculated (annual)					
Microalbumin (if available) Type 1 dx >5 yrs then yearly Type 2 at dx then yearly					

Lipid Profile adults (annually)					
TC < 200 mg/dl					
LDL < 100 mg/dl					
TG < 150 mg/dl					
HDL men >45 women > 55 mg/dl					
Dilated Eye Exam					
Type I dx >5 yrs then yearly Type 2 at dx then yearly					
Foot Care					
Inspection self exam each visit					
Comprehensive exam yearly					
Self Management Training					
Nutritional Counseling					
SMBG Education					
Activity Counseling					
Smoking Cessation Counseling					
Oral Health Care					
Screening each visit					
Refer to Dentist every 6 months					

Appendix V: Annual Comprehensive Diabetes Foot Exam Form

Form: Annual Comprehensive Diabetes Foot Exam Form

Name:_____ Date:_____ ID#: _____

I. Presence of Diabetes Complications
1. Check all that apply.
☐ Peripheral Neuropathy
☐ Nephropathy
☐ Retinopathy
☐ Peripheral Vascular Disease
☐ Cardiovascular Disease
☐ Amputation *(Specify date, side, and level)*

Current ulcer or history of a foot ulcer?
Y____ N____

For Sections II & III, fill in the blanks with "Y" or "N" or with an "R", "L", or "B" for positive findings on the right, left, or both feet.

II. Current History
1. Is there pain in the calf muscles when walking that is relieved by rest?
Y____ N____
2. Any change in the foot since the last evaluation? Y____ N____
3. Any shoe problems? Y____ N____
4. Any blood or discharge on socks or hose? Y____ N____
5. Smoking history? Y____ N____
6. Most recent hemoglobin A1c result
_____% _____*date*

III. Foot Exam
1. Skin, Hair and Nail Condition
Is the skin thin, fragile, shiny and hairless? Y____ N____

Are the nails thick, too long, ingrown, or infected with fungal disease? Y____ N____

Measure, draw in, and label the patient's skin condition, using the key and the foot diagram below.
C=Callus U=Ulcer PU=Pre-Ulcer
F=Fissure M=Marceration R=Redness
S=Swelling W=Warmth D=Dryness

2. Note Musculoskeletal Deformities
☐ Toe deformities
☐ Bunions (Hallus Valgus)
☐ Charcot foot
☐ Foot drop
☐ Prominent Metatarsal Heads

3. Pedal Pulses Fill in the blanks with a "P" or an "A" to indicate present or absent.
Post. tibial Left____ Right____
Dorsalis pedis Left____ Right____

IV. Risk Categorization *Check appropriate box.*

☐ **Low Risk Patient**
All of the following:
☐ Intact protective sensation
☐ Pedal pulses present
☐ No deformity
☐ No prior foot ulcer
☐ No amputation

☐ **High Risk Patient**
One or more of the following:
☐ Loss of protective sensation
☐ Absent pedal pulses
☐ Foot deformity
☐ History of foot ulcer
☐ Prior amputation

V. Footwear Assessment *Indicate yes or no.*
1. Does the patient wear appropriate shoes? Y____ N____
2. Does the patient need inserts? Y____ N____
3. Should corrective footwear be prescribed? Y____ N____

VI. Education *Indicate yes or no.*
1. Has the patient had prior foot care education? Y____ N____
2. Can the patient demonstrate appropriate foot care? Y__ N__
3. Does the patient need smoking cessation counseling? Y____ N____
4. Does the patient need education about HbA1c or other diabetes self-care? Y____ N____

Provider Signature_____

VII. Management Plan *Check all that apply.*
1. Self-management education:
Provide patient education for preventive foot care. Date:_____
Provide or refer for smoking cessation counseling. Date:_____
Provide patient education about HbA1c or other aspect of self-care. Date_____

2. Diagnostic studies:
☐ Vascular Laboratory
☐ Hemoglobin A1c (at least twice per year)
☐ Other: _____

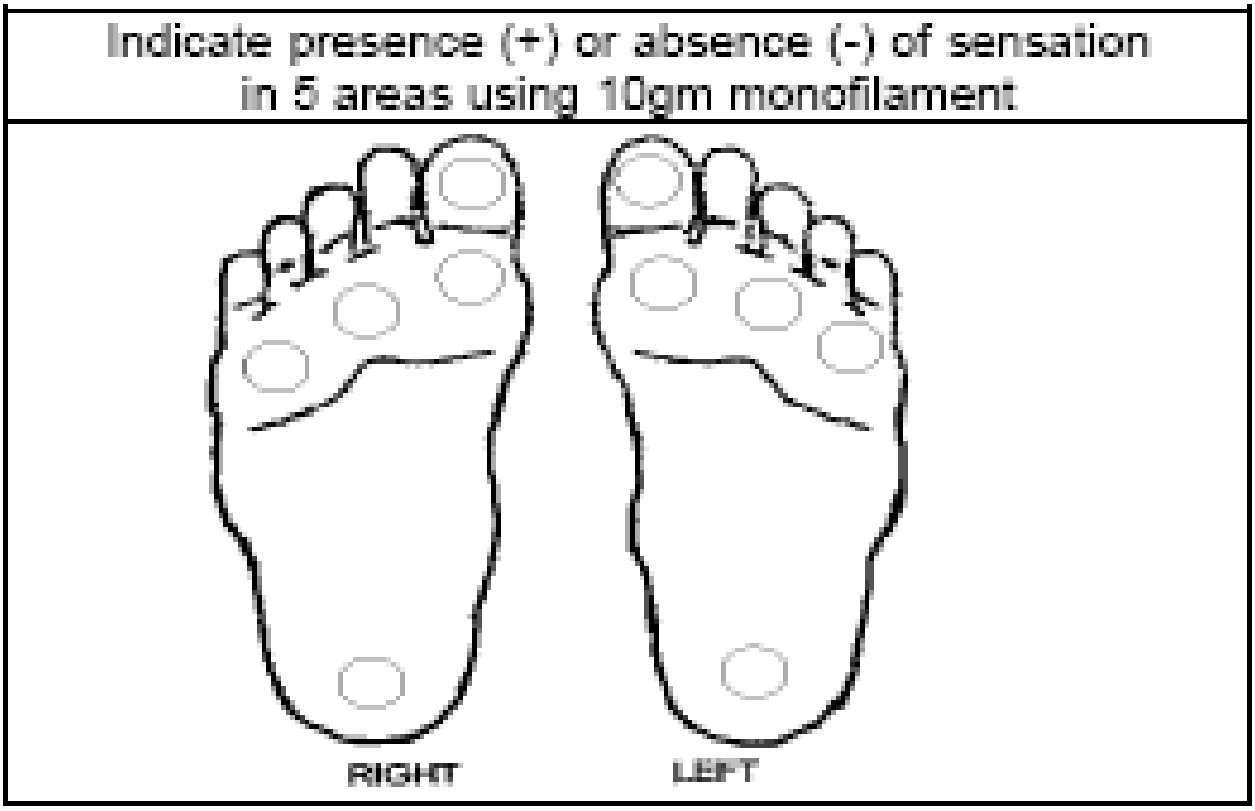
3. Footwear recommendations:
☐ None
☐ Athletic shoes
☐ Accommodative inserts
☐ Custom shoes
☐ Depth shoes

4. Refer to:
☐ Primary Care Provider
☐ Diabetes Educator
☐ Podiatrist
☐ RN Foot Specialist
☐ Pedorthist
☐ Orthotist
☐ Vascular Surgeon
☐ Foot Surgeon
☐ Rehab. Specialist
☐ Other:_____

5. Follow-up Care
Schedule follow-up visit. Date:_____

Appendix VI

Sensory Foot Exam *Label sensory level with a "+" in the five circled areas of the foot if the patient can feel the 5.07 (10-gram) Semmes-Weinstein nylon monofilament and "-" if the patient cannot feel the filament.*



Appendix VII

Shoes

And

Socks

Take ‘em off

If you have Diabetes

Have your doctor check your feet

Appendix VIII

Medias

y

Zapatos

Quitaselos

Si tiene Diabetes

Pidale a su medico que le vea los pies

Appendix IX

Diabetes Eye Exam Consultation Request and Report Form

Diabetes Eye Exam Consultation Request and Report Form

Date of Request _____

Dear Dr. _____:
Thank you for participating in the mutual care of this patient. As this patient's primary care provider, I am requesting a dilated retinal examination for the evaluation of diabetic retinopathy. The brief summary below will be included in this patient's medical chart. Thank you for your efforts.

PLEASE FAX OR MAIL TO PRIMARY CARE PROVIDER
Patient Name

_____
Last First MI

DOB _____ NHI # _____

Primary Care Provider_____

Address_____
_____

Phone_____

Fax_____

Dilated Retinal Exam Findings

Date of Exam _____

Findings:
No diabetic retinopathy R / L / Both

Diabetic retinopathy R / L / Both

Additional Comments:_____
_____
Recommended Follow-up: ( )12 months ( )6 months
Other_____
Education/education materials given ( )
Eye Care Provider_____
Address_____
Phone_____
Fax_____

Appendix X Sick Day Rules

When a person on insulin has a cold, flu, stomach upset, sore throat, urinary tract infection, chest infection, or other illness of short duration, the blood glucose might increase. The following rules should be followed to ensure that the blood glucose levels remain well controlled.

Continue SMBG

Illness or infection can result in an increase in the amount of insulin that the body needs and cause an increase in blood glucose. Home monitoring of blood glucose is recommended.

Test urine for ketones

Continue with insulin

Clients should be told never to stop taking insulin. They may require less insulin if their appetite is poor, but as illness usually increases the body's demand for insulin the regular dose is not stopped.

Review dietary needs

Since illness is often accompanied by decreased appetite, the diet and meal plan may need to be revisited and substitute foods be used which are more easily digested. More frequent, smaller meals may be better tolerated. The exchange lists should be used to determine appropriate food substitutes.

Maintain contact with the health care team

Clients should be made aware that they should contact the health care team if they:

1. are vomiting.
2. have ketones in their urine
3. note blood sugar levels consistently higher than usual
4. are unable to eat or drink
5. have a fever
6. have diarrhea or nausea persisting for more than 24 hours.
7. have abdominal pain
8. are not sure what to do.

Note: Those clients who are taking oral hypoglycemic agents should also communicate with the health care team if they have a fever, diarrhea, infection, or vomiting, as the oral agent they are using may not be appropriate in dose or type.