PRIMARY HEALTH CARE PROJECT

Guideline for Diabetes Mellitus and Metabolic Syndrome Management

Iraq

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1. Introduction

Diabetes with its devastating complications is considered one of the leading causes of morbidity and mortality globally. It is estimated that as many as three out of every four people with diabetes are diagnosed while the remaining one is missed. Diabetes is a chronic disease that requires continuous medical care and education to prevent acute complications and to reduce the risk of long term complication. People with diabetes should receive treatment and care from a physician-coordinated team of health professionals including nurses, nutritionists, and social workers. Iraq is one of the forefronts of the Type II Diabetes Mellitus epidemic and should not be forgotten or neglected. According to the national survey conducted in 2006, it is estimated that 10.4% of the adult Iraqi population (25-26 years of age), have hyperglycemia. In addition, over 40% of the adult Iraqi population has an elevated blood pressure, and many will be found to have various lipid abnormalities.

1.1 Definition

Diabetes mellitus is a metabolic disorder of multiple etiology characterized by chronic hyperglycemia with disturbances of carbohydrates, fat and protein metabolism resulting from a defect in insulin secretion, insulin resistance, or both. (WHO, 1999). It is almost always associated with multiple other metabolic abnormalities, such as hypertension, dyslipidemia, and a pro-thrombotic state, which in combination form the Metabolic Syndrome, and greatly increase the morbidity and mortality of the disease.

1.2 Progression of Diabetes and the Metabolic Syndrome

The potential long-term complications of diabetes can be roughly divided into two categories, the microvascular and the macrovascular.

- The microvascular complications: are primarily caused by decreased circulation through the smallest arterioles of the body's organs, and are directly associated with prolonged hyperglycemia resulting in retinopathy (leading to blindness), nephropathy (leading to renal failure), and neuropathy (leading to Charcot foot and peripheral infections). Various studies have shown that the development of these microvascular complications can be significantly delayed by strict and consistent control of the blood glucose, most commonly by maintaining glucose at less than 126 mg/dl.

- The macrovascular complications of diabetes – are caused by the progressive development of atherosclerosis in the major arteries of the body (aorta, carotid, and illiac vessels) leading to myocardial infarction, heart failure, stroke, and peripheral vascular disease –These complications appear to be more related to the other metabolic abnormalities that most commonly accompany diabetes, primarily hypertension, lipid abnormalities, and increased thrombogenesis rather than the actual hyperglycemia.

- This combination of metabolic abnormalities has been termed the Metabolic Syndrome. Most studies have found that it is one or more of these macrovascular complications which is the primary cause of death in 75-80% of all diabetics.

1.3 Classification of Diabetes

Diabetes can be classified into four clinical categories, which include:

1. Type I – this is found most commonly in children and young people, although with good care is found increasingly in older individuals. It is characterized primarily by destruction of the β islet cells of the pancreas, and almost total deficiency of insulin. Approximately 10% of all diabetics have Type I diabetes.

2. Type II – this is characterized by relative resistance of cells to insulin, and is strongly associated with obesity, especially abdominal obesity. It is found primarily in older adults, but increasingly found even in obese young adults. Approximately 80% of all diabetics have type II diabetes, and most of these will also develop the metabolic syndrome as they age.
3. Gestational Diabetes – This is characterized by a relative glucose intolerance with hyperglycemia during pregnancy, and can lead to significant complications of the pregnancy, such as macrosomia and increased incidence of certain congenital defects. Although it may improve following delivery, it is also associated with an increased risk of frank diabetes later in life.
4. Other causes of diabetes – these are relatively uncommon, but include various disorders of the pancreas (cystic fibrosis, chronic pancreatitis), genetic defects in pancreatic β-cell function or of insulin action, or diabetes induced by various medications (corticosteroids, anti-neoplastic drugs, anti-retroviral drugs).

2. Diagnosis of Diabetes Mellitus

- Diabetes should be suspected with any of the following symptoms:
  - Polyuria (frequent urination)
  - Polydipsia (thirst and frequent drinking of water or other fluids)
  - Weight loss
  - Intermittent blurring of the vision
- Diagnosis is established with one of four possible tests, as follows:
  - fasting plasma glucose ≥ 126 mg/dl (7.0 Mmol/L), which is confirmed with a second elevated reading on a separate day. Fasting should be for minimum of 8 hours.
  - 2 hour postprandial (ideally 75 mg. glucose in water) plasma glucose ≥ 200 mg/dl (11.1 Mmol/L)
  - Casual (without regard to the time since the last meal) plasma glucose ≥ 200 mg/dl (11.1 Mmol/L), together with any of the above suspicious symptoms
  - HbA1c measurement ≥ 6.5% using a standardized method of testing

Pre-diabetes (Impaired fasting glucose and impaired glucose tolerance)

Hyperglycemia that is not sufficient to meet the diagnostic criteria for diabetes is categorized as either impaired fasting glucose or impaired glucose tolerance. (Table 1).

Table 1**:** Impaired Glucose Tolerance by Type of Test.

Test	**Pre-Diabetes Values (Impaired glucose tolerance)**
Fasting Plasma Glucose	100- <126 mg/dl (5.6-7 Mmol/L)
Oral Glucose Tolerance Test (2hr PP)	140 - <200 mg/dl (7.8-11.1 Mmol/L)
HbA1c	5.5% – 6.4%

2.1 Clinical Evaluation of Diabetes and Metabolic Syndrome

Targeted History

- Symptoms of diabetes (urination, thirst, weight loss, vision change)
- Current medications
- Past medical history
- Family history with a focus on:
  - Diabetes
  - Hypertension
  - Heart and vascular problems, especially early death from cardiac causes
  - Kidney failure
- Evidence of current diabetic complications
  - Vision loss or blurring
  - Peripheral edema
  - Vascular problems in feet
  - Foot ulcers
  - Paresthesias or numbness of feet or hands
- Other risk factors associated with the Metabolic Syndrome
  - Hypertension
  - Smoking

  - Hyperlipidemia or Dyslipidemia
  - Age > 40 years
  - Obesity with BMI > 25 or increased waist circumference (> 102 cm for men or >88 cm for women)
  - History of gestational diabetes or delivery of large babies > 4kg.
  - Alcohol or drug abuse
- Life style factors
  - Occupation
  - Level and type of daily exercise
  - Eating patterns
  - Socio-economic level
- Complete dietary history
  - Normal daily diet
  - "Binge" foods or eating
  - Relative composition of protein, carbohydrates, fat
  - Type of fat taken (saturated fats of animal origin, unsaturated fats of vegetable origin, dairy products)

Targeted Physical Examination

- Height and weight
  - Calculate the Body Mass Index (BMI) as below:
    BMI = Weight (kg) /Height (m^2)
    Normal BMI Value – – 18.5 - <25
- Waist circumference
  - Normal for men < 102 cm
  - Normal for women < 88cm
- Blood pressure
- Ophthalmoscopic exam
  - Visual acuity
  - Fundoscopic exam – refer to ophthalmologist for complete exam
- Mouth and dental condition
  - Dental infections
  - Moniliasis or other mucosal abnormalities
- Thyroid abnormalities
  - Enlarged or nodular thyroid
- Cardiac exam
  - apical heave, (LVH)
  - loud S2 or S4, JVD (evidence of heart failure)
  - arterial disease (carotid, peripheral, renal)
  - Edema
- Pulmonary Exam
  - Basal crackles
  - Evidence of fluid or effusion
- Abdominal exam
  - Palpable kidney (polycystic kidney)
  - Other masses(abdominal aortic aneurysm)
  - Bruit (renal artery stenosis)
- Peripheral pulses and distal microvascular circulation
  - Dorsalis pedis and posterior tibial pulses

  - Capillary circulation in fingers and toes
- Skin condition and edema, especially legs
  - Ischemic skin changes
- Neurological exam with a focus on:
  - Extremity deep tendon reflexes
  - Pin, vibration, position sensation of the feet
  - Light pressure sensation of the feet using 10 gm. Monofilament fiber
- Condition of feet and toes
  - Warmth and circulation
  - Presence of cracks or ulcers
  - Deformities

2.2 Initial Laboratory Evaluation

- Fasting plasma glucose
  - Should be confirmed with 2 elevated levels>126 mg/dl (7.0 mmol/L), or elevated 2 hr. postprandial glucose of >200 mg/dl (11.1 mmol/L)
- Hemoglobin A1C
- Lipid profile (Fasting cholesterol, LDL, HDL, Triglycerides)
- Serum Creatinine
- Urine albumin, ketones, and glucose (dipstick)
- Urine specimen for quantitative albumin – may calculate Albumin/Creatinine ratio
- ECG in adults> 40 years of age

3. Management of Diabetes Mellitus

3.1 Management of TYPE 1 Diabetes Mellitus

Type I diabetes is most often seen initially in children and adolescents, but with excellent medical care and counseling can result in a productive adult life. It is diagnosed in less than 10% of all patients with diabetes, and is associated with a genetically determined predisposition, the presence of autoimmune markers, aggressive beta-cell destruction, severe insulin deficiency, and the urgent need for insulin replacement therapy because of the risk of ketoacidosis. Type I diabetes is a serious condition and management should be initiated at a specialized level. Once stabilized, some of the follow-up can be done at the PHC level.

3.1.1 Diagnosis of Type I Diabetes

- In the majority of young people, the presenting symptoms are usually the following:
  - Unusual thirst
  - Excessive drinking of water and fluids
  - Frequent urination
  - Weight loss
  - Blurring of the vision
  - On occasion, the initial presentation may be a ketoacidotic coma
- The above symptoms should prompt immediate confirmatory tests for:
  - Heavy glycosuria>1.0 g/dl.(>55 mmol/l)
  - Possible ketonuria often >0.4 g/dl. acetoacetate (4 mmol/l)
  - Random plasma glucose ≥200 mg/dl (11.1 mmol/)
- Diagnostic criteria are the same for children as for adults

3.1.2 Diagnostic difficulties at onset

- Young infants with unexplained weight loss and hidden symptoms
- Hyperventilation of ketoacidosis misdiagnosed as pneumonia and asthma
- Abdominal pain or vomiting misdiagnosed as abdominal ‘migraine’ or appendicitis
- Enuresis or polyuria misdiagnosed as urinary infection
- Polydipsia misdiagnosed as habit or psychogenic drinking

3.1.3 Management at the Primary Health Care Center

All type 1 diabetic patients should be referred to the diabetes specialist. It is the specialized team's task to initiate treatment in newly diagnosed patients. The general aims of the diabetes care team should be to provide:

- Referral to specialized care
- Recognition of potential complications
- Expert practical guidance and skill training
- Consistent and repeated educational advice
- An understanding of, and support for, the psychosocial needs of the family
- Help the patient and the family to become independent in dealing with diabetes
- The importance of providing 'a good start' with confident, clear, positive messages, support and advice cannot be overemphasized.

3.1.4 Complications: Hypoglycemia

- Hypoglycemia is the most frequent acute complication in type 1 diabetes
- Clinically, hypoglycemia causes signs and symptoms of:
  - **Autonomic activation** (hunger, trembling of hands or legs, palpitations, anxiety, pallor, sweating)
  - **Neuroglycopenia** (impaired thinking, change of mood, irritability, dizziness, headache, tiredness, confusion and later convulsions and coma). This can occur without the alarming symptoms of sympathetic overactivity, which can result in hypoglycemia of which the patient is not aware.
- Mild hypoglycemia may cause a variety of reversible signs and symptoms characteristic of neurological dysfunction.
- Severe prolonged hypoglycemia with convulsions has the potential, particularly in young children, to cause permanent CNS impairment
- The blood glucose threshold for cognitive impairment is usually between 2.6 and 3.5 mmol/l (plasma glucose 3.1–4.0 mmol/l). Because of this, the level of blood glucose should be maintained above 3.5 mmol/l or 65 mg/dl.

Grading of severity of Hypoglycemia

1. Mild (grade 1): Child or adolescent is aware of, responds to and self-treats the hypoglycemia. Children aged below 5–6 years can rarely be classified as grade 1 hypoglycemia because they are usually unable to help themselves.
2. Moderate (grade 2): Child or adolescent cannot respond to hypoglycemia and requires help from someone else, but oral treatment is successful.
3. Severe (grade 3): Child or adolescent is semi-conscious or unconscious or in coma with or without convulsions and may require parenteral therapy (glucagon or IV glucose).

Treatment of Hypoglycemia

- Mild or moderate (grade 1 or 2)
  - Immediate oral rapidly absorbed simple carbohydrate e.g.
    - 5–15 g glucose or sucrose (tablets/sugar lumps)
    - 100 ml sweet drink (glucose/sucrose drinks, cola, etc)
  - Wait 10–15 min. If no response - Repeat oral intake as above
  - As symptoms improve or normoglycemia is restored, the next meal or oral complex carbohydrate should be ingested (e.g. fruit, bread, cereal, milk)
  - Note that blood glucose measurements are the only way to confirm hypoglycemia if the diagnosis is uncertain. Blood glucose measurements also confirm the return of the blood glucose towards normal after hypoglycemia
- Severe (grade 3)
  - Treatment is urgent, and a senior specialist/consultant physician at a hospital should be consulted for optimal management
  - Severe hypoglycemia with loss of consciousness with or without convulsions (particularly if there is vomiting) is most safely and rapidly reversed by injection of Glucagon, which is best given IM (or deep SC)
    - 0.5 mg for age <12 years
    - 1.0 mg for age 12+ years (or 0.1–0.2 mg/10 kg body weight)
  - If glucagon is unavailable or recovery is inadequate, IV glucose should be administered slowly by trained personnel over several minutes to reverse the hypoglycemia
    - glucose 10–30% at a dose of 200–500 mg/kg

- If the hypoglycemia is not associated with vomiting nor severe enough to remove the swallowing, spitting or gag reflexes, it is usually effective to give concentrated sugar as glucose gel/syrup/honey/jam carefully by mouth

Recovery phase after severe hypoglycemia
Close observation and blood glucose monitoring are essential because vomiting is common and recurrent hypoglycemia may occur .The child will then usually require, additional oral carbohydrate and/or IV infusion of glucose (glucose 10% at 1.2–3.0 ml/kg per hour)

Prevention of Hypoglycemia
The dangerous and damaging effects of hypoglycemic episodes can be prevented primarily by the education of the patients, their parents, and other care givers, with particular attention to:

- Early warning signs and symptoms of hypoglycemia, which may be unique to the individual
- The usefulness of regular blood glucose monitoring
- Effects of increased exercise on decrease in blood glucose, increasing the risk for hypoglycemia
- Preventative effects of higher fiber, higher carbohydrate foods and snacks
- The emergency management of hypoglycemic episodes
- Periodic review of individual insulin management
- Taking special care when routines are altered, such as holidays, travel or changes of season
- Repeated advice that a source of glucose or sucrose must always be immediately available
- Equipment for blood glucose measurement must be available to all young people with diabetes for immediate confirmation and safe management of hypoglycemia
- Glucagon should be readily accessible to all parents and care givers, especially when there is a high risk of severe hypoglycemia. Education on administration of glucagon is essential
- Children and adolescents with diabetes should wear some form of identification or warning of their diabetes
- Review of glycemic targets for those at high risk (e.g. young children and those with hypoglycemic unawareness)
- Assessment of hypoglycemic episodes with the goal of learning from each episode, particularly :
  - Food intake (daytime and bedtime snacks; pre- and post-exercise carbohydrate intake)
  - Insulin action profiles (e.g. rapid-acting insulin analog to reduce post-meal or nocturnal hypoglycemia; splitting evening short/rapid and bedtime intermediate-acting insulin doses)
  - Nocturnal (2.00–4.00 AM) blood glucose measurements

3.2 Management of Type II Diabetes and the Metabolic Syndrome

Patients with type II diabetes are generally obese, especially with central (abdominal) obesity and an increased waist size, which is strongly associated with a varying degree of resistance to the effects of insulin. This is usually associated (in at least 80% of all patients with diabetes) with other significant problems of the Metabolic Syndrome, including hypertension, dyslipidemias, a pro-thrombotic tendency, and a pro-inflammatory tendency. It is important to recognize that each of these associated problems must be aggressively and effectively treated simultaneously with the diabetes to reduce the morbidity and mortality of these combined metabolic abnormalities. It should be noted that the metabolic syndrome can be present even in non-obese individuals (with a BMI of < 25), and must be treated in a similar fashion.

There is a wide spectrum in the degree of insulin resistance in patients with glucose intolerance or diabetes, which reflects the severity of the other elements of the metabolic syndrome as well.

These differences have resulted in a step-wise approach to the management of diabetes and the metabolic syndrome. In many cases, patients can be controlled with lifestyle changes and Step 2 management drugs. If these measures are not effective in reaching the target goals, referral to a specialist for consultation and/or management will be necessary.

One major study in the United Kingdom (United Kingdom Prospective Diabetes Study; *Br Med J. 1998*) found that aggressive control of the blood glucose alone did NOT significantly decrease the death rate in diabetics from heart attack or stroke, but simultaneous and rigorous control of the blood pressure in diabetic patients DID result in a 20-40% reduction in death from all causes, AND a 37% decrease in the associated microvascular problems.

Interestingly, it has also been found that the simultaneous treatment of co-existing hypertension and dyslipidemia also improves the control of diabetes. For example, the use of the ACE inhibitor antihypertensive ramipril for concomitant hypertension decreased the progression of Type 2 diabetes by 34%, and the addition of the statin drug simvastatin for co-existing dyslipidemia decreased the progression of diabetes by 30% (NIH Diabetes Prevention Study). These findings have significantly altered the management philosophy of diabetes, with attention now focused on simultaneous management of not only blood glucose and diet, but also blood pressure, cholesterol and lipid levels, body weight, activity level, and platelet function.

4. Diagnosis of Metabolic Syndrome

The metabolic syndrome is present if the following are present (International Diabetes Federation criteria):

1. Presence of central (abdominal) obesity, defined as a waist circumference of greater than 102 cm. for men, and 88 cm. for women
2. PLUS, ANY TWO OF THE FOLLOWING FACTORS or HISTORY OF PRIOR TREATMENT FOR THIS FACTOR:
    - Elevated fasting triglyceride level > 150 mg/dl. (1.7 mmol/L)
    - Reduced HDL cholesterol < 40 mg/dl. (1.0 mmol/L) for men, or < 50 mg/dl. (1.3 mmol/L) for women
    - Elevated blood pressure – systolic ≥130 mmHg and/or diastolic ≥ 80 mmHg.
    - Elevated fasting plasma glucose ≥ 100 mg/dl (5.6 mmol/L)

Note that these levels may not meet the criteria for diagnosis of diabetes or of hypertension in the normal individual, but are statistically correlated with glucose intolerance, relative insulin resistance, and a progressively higher risk of cardiovascular disease and early mortality, which has also been shown to be reduced if all of these factors are adequately controlled.

5. Goals of Diabetes and Metabolic Syndrome Management

The goals for chronic diabetes and the metabolic syndrome may be different from the goals of those who are normal or non-diabetic

Table 2 : Target Goals for Diabetes and Metabolic Syndrome

Parameter	Goal
Fasting blood sugar	80- < 126 mg/dl. (4.4 – <7.0 mmol/L)
HbA1C	<7.0%
Blood pressure	<130/80 mmHg
Serum total cholesterol	<200 mg/dl. (< 5.2 mmol/L)
LDL cholesterol	<100 mg/dl. (< 2.6 mmol/L)
HDL cholesterol	Men > 40 mg/dl (>1.0 mmol/L) Women > 50 mg/dl. (>1.3 mmol/L)
Triglycerides	< 150 mg/dl. (<1.7 mmol/L)
Stop smoking	No smoking
Decrease weight	BMI <25
Waist circumference	Men< 102 Cm. Women <88 cm.
Daily Exercise	Daily 30-60 min.

NOTE – MUST WORK SIMULTANEOUSLY TOWARD ACHIEVEMENT OF ALL TARGET GOALS

6. Overview of Integrated Management of Diabetes and Metabolic Syndrome

Step 1: Life style changes – to be continued alone for 2-6 month trial, and throughout ALL steps of management

- Weight loss
- Nutritional therapy
- Regular exercise program
- Stop smoking

Step 2: IF NOT reaching TARGET LEVELS WITH LIFESTYLE MANAGEMENT ALONE AFTER 2-6 MONTH TRIAL:

Diabetes management

- Add oral hypo-glycemic agents, beginning with one drug and adding others as needed

Hypertension management

- Confirm presence of persistent hypertension in spite of life-style and diet changes
- Classify degree of hypertension (with revised norms based on presence of diabetes)
- Exclude possible secondary causes of hypertension
- Begin management with ACE inhibitor medication

Dyslipidemia management

- Confirm lipid abnormalities in spite of life-style and diet changes
- Begin management with statin drug

Pro-thrombotic state management

- Begin Aspirin 80-160 mg/day

Step 3: IF NOT AT TARGET LEVELS WITH STAGE 2 MANAGEMENT – REFER FOR SPECIALIZED CONSULTATION AND/OR MANAGEMENT:

Diabetes management

- Add or change to insulin therapy

Hypertension management

- Add second anti-hypertensive appropriate for patient with diabetes (usually a thiazide diuretic, 12.5 – 25 mg/day)

Dyslipidemia management

- Adjust doses of statin drug to meet target levels for LDL
- If necessary, add fibrate drug or nicotinic acid to meet target levels for triglycerides and HDL

Pro-thrombotic state management

- Continue with Aspirin therapy 80-160 mg/day

Step 4: IF NOT AT TARGET LEVELS WITH STAGE 3 MANAGEMENT – TO BE MANAGED BY SPECIALISTS:

Diabetes management

- Intensive insulin program to reach glycemic target

Hypertension management

- Continue to adjust 2 medication dosages to reach blood pressure target (<130/80 mmHg)
- Consider adding a 3rd anti-hypertensive medication if necessary to reach target

Dyslipidemia management

- Continue to adjust medications to reach LDL, HDL, and triglyceride targets

Pro-thrombotic state management

- Continue with Aspirin therapy 80-160 mg/day

6.1 Lifestyle changes

- Weight loss is the cornerstone of management of Type II diabetes and the metabolic syndrome, and is shown to result in increasing insulin sensitivity with reduction of blood pressure and dyslipidemia
  - Calories restricted to 1600 – 1800 calories, with 50-60% in the form of complex, starchy carbohydrates, 20% fats, and 20% protein.
  - Weight loss should be gradual, not more than 1 kg/week
  - Weight loss should be prolonged until the goal BMI < 25 and target waist circumference is reached
- Nutritional therapy
  - Weight loss diet as above, with additional modifications to lower LDL cholesterol and triglycerides and reduce blood pressure
  - Incorporate low fat dairy products and lean meat into the diet, replacing most red meat with skinless chicken or with fish (rich in omega-3 fatty acids)
  - Mono-unsaturated fats (primarily vegetable oils) are preferred
  - Keep sodium level to 6 gm/day or less by adding no extra salt to cooking or at the table. Salt substitutes or other spices may be used in moderation
  - Add daily fiber in form of beans, oats or other whole grain foods or pasta, or fiber product such as psyllium seed – 10-15gms/day
  - Food items with high glycemic index (obviously sweet foods) should be avoided
- Regular exercise program
  - Regular aerobic exercise 30 minutes/day, 5 days per week is highly recommended and beneficial
  - Diabetics medications and diet should be adjusted according to exercise
  - Benefits of exercise in diabetes:
    - Improved insulin sensitivity.
    - Improved glycemic control (in type2 diabetes)
    - Improved lipid profile (reduced triglycerides and increased HDL cholesterol)
    - Lowered blood pressure
    - Improved fibrinolysis.
    - Potentiation of weight loss with proper diet
    - Improved quality of life and self-esteem
- Stop smoking
  - Message to stop smoking must be clear and direct – “cutting down” is not adequate to prevent the added complications of smoking
  - Usually requires a focused behavior modification approach
  - Assist patient to specify a “stop date”
  - Offer advice on how to cope with anxiety and cravings
    - Frequent small snacks
    - May benefit from nicotine patches or chewing gum (Nicorette)
    - Withdrawal symptoms will subside with time

6.2 Type II Diabetes Management

a. Step 1: Weight loss and lifestyle changes – initial trial of these alone for 2-6 months, and continue throughout management

b. Step 2: If not at target blood glucose after trial of lifestyle changes alone - BEGIN with metformin 500 mg/day, increase as needed to 2500 mg/day in two equally divided doses

If not at target blood glucose in response to this:
Continue metformin and ADD glibenclamide - begin at 2.5 mg/day, increase as needed to 20 mg/day

If still not at target blood glucose in response to above: refer to specialist for consultation and initiation of therapy

c. Step 3: Begin insulin therapy, usually by discontinuing oral medications

6.3 Hypertension Management

Refer to MOH Guideline "HYPERTENSION – PREVENTION, DIAGNOSIS, AND TREATMENT - 2012" for complete description and protocol.

a. Step 1: Lifestyle changes trial for 2-6 months, and continue throughout management

If blood pressure > 130 systolic or > 80 diastolic on 2 or more separate occasions in spite of life-style and diet changes:

b. Step 2:
   - Classify degree of hypertension (with revised norms based on presence of diabetes)
   - Exclude possible secondary causes of hypertension
   - Begin management with ACE inhibitor medication

If not at target BP in response to this: Refer to specialist for consultation and further management

c. Step 3: Add second antihypertensive medication – most commonly thiazide diuretic – 12.5 – 25 mg/day

If not at target BP in response to this: Refer to specialist for management

d. Step 4: Maximize existing anti-hypertensive medications, consider adding a third medication (beta blocker or calcium channel blocker)

6.4 Dyslipidemia Management

Reference can be made to the following international guidelines:
USA – National Cholesterol Education Program, ATP III Guidelines (2004)
Europe – European Society of Cardiology, ESC/EAS Guidelines for the Management of Dyslipidemias

a. Step 1: Weight loss, diet changes, and other lifestyle changes trial for 2-6 months, and continue throughout management

If lipid levels not at target levels in spite of life-style changes and appropriate diet and exercise:

b. Step 2: Begin daily statin medication (with referral to and consultation with specialist)

If lipid levels still not at target levels, especially if triglyceride > 150 mg/dl.or HDL levels below target level:

c. Step 3: Adjust statin drug doses for maximal LDL control (referral to a specialist)
   - Add a daily fibrate or nicotinic acid medication for control of triglycerides and HDL
   - Note – the combination of statin and fibrate medications can increase the risk of significant myopathy; this should be done cautiously and only by a specialist

If lipid levels still not at target levels in spite of two lipid-lowering medications – refer to specialist for management:

d. Step 4: Maximize the doses of lipid-lowering medication
    - review diet, especially saturated fat content

6.5 Pro-Thrombotic State

a. Step 1: Weight loss and lifestyle changes – initial trial of these alone for 2-6 months, and continue throughout management

If not at target blood glucose and blood pressure levels after trial of lifestyle changes alone:

b. Step 2: Begin Aspirin 80-160 mg. daily

If not at target blood glucose and blood pressure levels:

c. Step 3 and 4: Continue Aspirin 80-160 mg. daily with other measures

6.6 Management of Special Diabetic Populations

- Elderly> 70 years
    - Show increased sensitivity to anti-diabetic medication - reduce initial dosage of most medications by 50%
    - Focus especially on control of systolic hypertension
- Renal disease
    - Monitor serum creatinine and Albumin/Creatinine ratio regularly
    - Consider adding an ACE inhibitor if Albumin/Creatinine ratio elevated,in consultation with nephrologist
- Pregnancy
    - Refer to Ob/Gyn for management during pregnancy. May require transfer to insulin therapy during pregnancy
- Coexisting heart or vascular disease
    - Refer to cardiologist for co-management.

7. Follow-up Management of Diabetes type II and Metabolic Syndrome

- All patients should be seen and evaluated on a regular basis, preferably monthly, and the following parameters should be evaluated:
- Monthly:
  - Blood pressure
  - Weight
  - Waist circumference
  - Fasting glucose
  - Foot exam for lacerations, superficial infections, ulcerations, etc.
  - Neurologic exam
    - especially lower extremities
    - Test for light touch, vibration or position sensation, pin prick sensation
    - May use a standardized monofilament for light touch sensation for reliability
  - Medication dose review
  - Patient education – may rotate topics discussed

- Every 6 months – refer to hospital for specialized tests and specialty consultation:
  - Hemoglobin A_1C
  - Lipid profile and management of dyslipidemia
  - Ophthalmologic evaluation
  - Quantitative albumin/creatinine ratio (request single **urine** specimen for quantitative albumin, and request **serum** creatinine)
    - Albumin/creatinine ratio calculated by dividing urine albumin (in mg/l by serum creatinine (in mg/100 ml.) Result is an empiric ratio that correlates with presence or absence of early nephropathy (normal <30, suspected nephropathy >30)
    - Refer to specialist if Albumin/Creatinine ratio >30 for followup. May consider starting daily dose of captopril or enalapril to preserve renal function, even if blood pressure normal or mildly elevated

- Every year (especially after 5 years duration of diabetes or age >40)
  - Monitor serum cholesterol, HDL, LDL, Triglycerides
  - ECG in adults > 40 years
  - Screen for stress, anxiety, and depression

8. Referral to Diabetes or other Specialist

- For persistent hyperglycemia or other parameters (blood pressure, lipids) uncontrolled with above treatment
- Pregnancy and diabetes (either gestional or pre-existing diabetes) – refer to Diabetic specialist and Obstetrician
- Initial presentation of Type I Diabetes
- Diabetic ketoacidosis
- Serious acute illness in addition to diabetes
- Switching from oral hypoglycemic medication to insulin
- Recognition and management of dyslipidemia
- Significant microalbuminuria - Albumin/Creatinine ratio (A/G ratio) > 30
- Problems such as:
  - Chest pain
  - Mental confusion
  - Painful neuropathy
  - Diabetic foot ulcerations or injury
  - Rapid weight change (increase or decrease)

9. **Prevention Messages**

- Screening for diabetes and metabolic syndrome
  - Screen all adults over 40 years of age with fasting blood sugar and blood pressure every 2-3 years
  - Begin screening at 35 years of age with any of the following:
    - Positive family history of cardiovascular disease
    - Obesity
    - Gestational diabetes or large babies
    - Symptoms of diabetes
  - Involve the community in diabetes and metabolic syndrome awareness and screening
- Nutrition – Encourage low saturated fat, low sodium, high fiber diet with calories restricted to promote weight loss
- Smoking cessation
- Obesity
    - Weight loss to keep BMI < 25
    - Waist circumference to less than target figures (see Table 2)

10. Health Education and Patient/Family Counseling

The aim of health education is to assist diabetics and those with the metabolic syndrome to become more knowledgeable about their disease and more proficient in self-management. Patient education should begin at the time of diagnosis, continue at every visit, and include:

- General education about diabetes and the metabolic syndrome
  - Diabetes is generally a permanent problem, and will require life-long management, if only diet
  - Diabetes can be controlled with effort, but requires daily attention
  - Control of blood sugar will prevent or delay microvascular symptoms:
    - Kidney disease and failure
    - Eye disease and blindness
    - Neurologic disease with impotence, foot ulcers, and digestive problems
  - Control of blood pressure and cholesterol will control and delay macrovascular symptoms:
    - Heart attack, heart failure, and strokes
    - Peripheral vascular disease with gangrene and amputation
    - Foot ulcers and infection
    - Skin changes of the lower extremity
  - Components of a proper diet to assist in control of blood sugar and lipids
    - Low saturated fat, moderate protein, complex carbohydrates instead of simple sugars
    - 10-15gms./day of fiber
    - Avoid or limit alcohol
    - Limit calories to 1500-1800/day, with goal of gradual weight loss to a BMI < 25, then maintenance at that level of weight
  - Critical importance of vigorous exercise for minimum of 30 minutes daily
  - Critical importance of stopping smoking completely and permanently
  - Importance of continuing with medication as prescribed and at regular hours, continuing with regular supply of medication to avoid running out
- Danger signs and risks to monitor and avoid:
  - Hypoglycemia symptoms – light-headedness, difficulty walking, confusion, disorientation
    - The treatment for hypoglycemia (15 grams of sugar)
    - Actions to take to prevent relapse of hypoglycemia
  - Possible vaginal yeast infections in women with diabetes
  - Postural dizziness with changes in position, especially for those with metabolic syndrome and several controlling medications
- Foot care monitoring and essentials of care:
  - Wash and dry feet daily
  - File (but do not cut) nails
  - Wear shoes that are soft and well-fitting
  - Notice and deal with small injuries or signs of pressure on feet
- Counseling in family planning if appropriate
- Encourage patients to consider purchasing their own glucometer and strips for self-monitoring, and if they are hypertensive, to purchase their own sphygmomanometer. Teach patients the correct use of these instruments and the proper recording of results in a log book. Advantages include:
  - Greater awareness of relationship between activity, exercise, diet, and medication
  - Greater collaboration in management of disease
  - Improved communication with health care providers

Diabetes and Metabolic Syndrome Management

ANNEXES

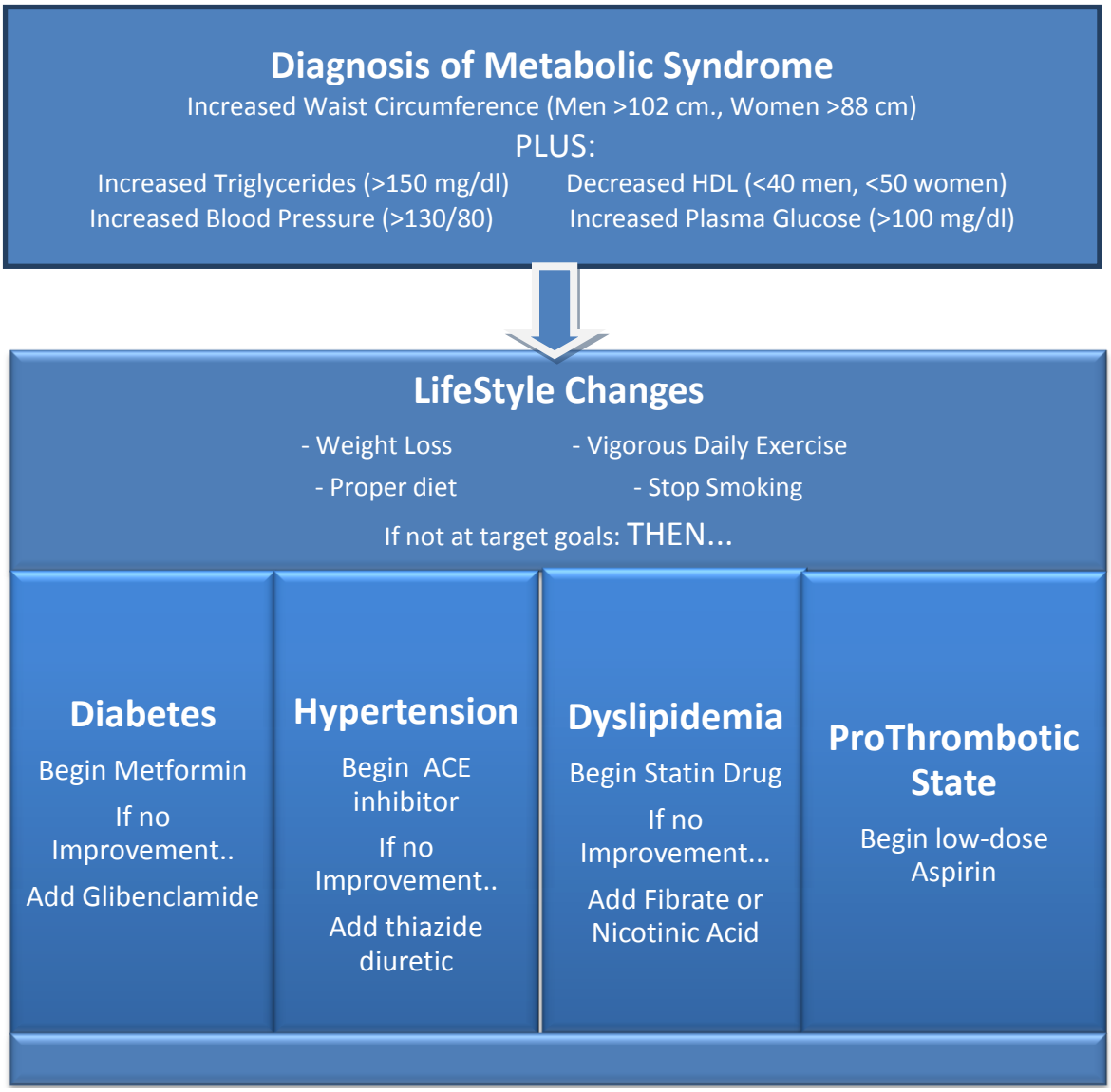
11.Annexes

11.1 Annex 1: Performance Checklist: Diabetes Mellitus type II and Metabolic Syndrome

Task	Achieved?		Comments
	Yes	No	
History: patient is asked about:			
Personal, family, and past history			
Symptoms related to diabetes			
Symptoms of coexisting illness(hypertension, liver disease, heart disease, high cholesterol)			
Frequency of acute complications (DKA – hypoglyceamia			
Full dietary history(times of meals, weight changes)			
Current medications used for coexisting diseases(steroids, thiazides)			
Methods of glucose monitoring			
Physical Examination			
Height & weight and waist circumference			
Heart rate, blood pressure			
Palpate peripheral pulses			
Examine feet for deformities, cracking, infection, ulcers			
Examine mouth, teeth, and gums			
Examine thyroid gland			
Examine skin(infection, site of insulin injection			
Chest & heart			
Abdomen (liver, spleen & loin)			
Neurological Examination (Vibration sense, peripheral numbness, ankle jerk)			
Patient Education			
Uses simple clear language			
Periodically checks to confirm if patient understands instructions			
Ask patient if he /she has any questions			
Educational messages			
Basic pathophysiology of diabetes and metabolic synd.			
Nutrition(caloric requirement, food types)			
Drugs: all drugs for diabetes/metabolic syndrome			

Task	Achieved?		Comments
	Yes	No	
Exercises: proper methods & timing			
Glucose and blood pressure monitoring			
Hypoglycemia: counsel about symptoms & prevention			
Management of other illnesses			
Long term complications and how can be prevented			
Personal hygiene			
Foot care			
Referral of patients to educational session (nutritionist, nurse specialist for diabetes)			
Monthly Diagnostic tests/procedures: Records the following tests/procedures on a monthly basis			
Fasting plasma glucose(FPG)&/or2H PPPG			
Urine glucose and ketones			
Quarterly Diagnostic tests/procedures: Orders/records following tests every 6 months			
Quantitative Albumin/Creatinine ratio			
Hb A1c			
Annual Diagnostic tests/procedures:			
Serum Cholesterol, HDL, LDL, Triglycerides			
Retinal examination (ophthalmologist referral)			
Serum creatinine			
ECG (patients > 40 years)			
Medication			
Appropriate drug prescription according to guidelines			
Referral			
Appropriate referral for consultation according to guidelines			

11.2 Annex 2: Algorithm for Management of Metabolic Syndrome



11.3 Annex 3: Foot Care – Patient Screening and Education for Diabetics

Screening symptoms of diabetic peripheral neuropathy

- Cold feet
- Intermittent cramping pain of calf or foot pain at rest, especially at night
- Burning, tingling, or crawling sensation in feet
- Pain and hypersensitivity of feet
- Weakness (foot drop)
- Skin color changes (redness, cyanosis)

Screening test for high risk of neuropathy

- Use 10 gm. Monofilament to test for light touch
- Apply Monofilament to sole of foot distally sufficient to bend monofilament – ask patient if and where pressure is felt
- Inability to feel 10 gm. pressure is high risk for future skin damage and ulceration

Patient education to prevent foot injury

- Shoes: Should be low heeled, made of soft leather or fabric, neither tight nor loose, with wide toes to avoid pressure, and the arch of shoe filling properly with the arch of the foot. Proper arch inserts should be used. Advise patient to look carefully to the inside of shoes before wearing to avoid pressure points from shoe

- New Shoes: Should be neither tight nor loose. Should be worn only for 2 hours on the first day, then increase daily use by one hour until shoes become comfortable

- Stockings and socks: Better made of cotton, thick, and warm with loose garters

- Bare foot walking: Absolutely prohibited whether indoors or outdoors

- Management of dry skin and cracks:
  - Dry skin without cracks: Soak feet daily in warm tap water for 10 – 15 minutes, dry gently, and rub with mineral oil or thick moisturizing cream to keep moisture.
  - Dry skin with cracks: Rub callus at edges of cracks with file or rough stone. Then soak feet in mild soap water for 10 – 15 minutes. Cover cracks with antiseptic such as neomycin ointment – and rub feet with mineral oil.

- Management of corns and calluses:
  - To remove excess corns or calluses ask patient to soak feet in warm tap water with mild soap for 10 minutes, then rub excess tissues by a file. If not effective consult podiatrist

- Nail care:
  - Clean around nails with a wood stick. If nails are long, file them. Filing should be straight and not shorter than the underlying soft tissues of the toes.
  - Soak brittle nails for 30 minutes each night in warm tap water

- Care of abrasions and minor trauma and infection
  - Patient should consult his physician, even in case of minor injuries. If a physician is not easily accessible at all times, patients should consult with a physician in case of redness, blistering or swelling

- Cover area with sterile gauze fitted by non-adhesive plaster. Advise patient not to use limb excessively and to elevate foot while sitting.
- Avoid irritant antiseptics
- Treat infections aggressively

11.4 Annex 4: Diet for Diabetes and Metabolic Syndrome

From the National Center of Diabetes \ Baghdad

A patient with diabetes or the metabolic syndrome should consider the following:

1. Proper care of nutrition and maintaining the blood sugar and lipid (fat) levels within the recommended levels will prevent the direct symptoms of the disease and complications in the future.
2. The patient should organize both the quality and quantity of the diet, so he\she will have three main meals (breakfast, lunch and dinner) plus snacks in between the meals. The snacks are especially important for children, pregnant women, and the elderly because of their limited food intake and increased needs for nutrition.
3. Avoid fasting for long times, and also taking too much food in one meal, because either extreme will negatively affect the level of blood sugar.
4. Work toward your ideal weight (in relation to sex, height and age). Losing 10-20 Kg will improve glucose and lipid control in over 50% of adult patients without the need for medication.
5. Enjoy at least 30 minutes every day of vigorous physical activity, such as sports activities, brisk walking, climbing stairs, or programmed aerobic exercises. Vigorous physical activity is of great help in controlling blood sugar, lipids, and blood pressure, and promotes a wonderful sense of well-being.
6. It is recommended to include high amounts of dietary fiber in the diet, as they improve digestion, food absorption, and blood sugar control. Dietary fiber is available in fresh and cooked vegetables, whole grain breads, and cereals.

Allowed foods (can be eaten anytime):

- Protein: primarily white meat and fish, and the white of eggs (without the egg yolk)
- Fresh vegetables (vegetables that are not cooked like tomato, cucumber, onion, Maduns, lettuce, garlic, celery etc.
- Cooked vegetables like: eggplant, pamia, cauliflower, chard, cabbage, turnip etc.
- Diary: low-fat (1% dairy fat) or skim dairy products like milk, yogurt, white cheese, etc.
- Drinks such as:
  - tea, coffee, green tea, Kujorat tea etc. - without sugar or with an artificial sweetener
  - sugar-free sodas such as diet soda

Restricted foods (can be taken in limited amounts and according to recommendations)

- Fruits, can take one of the below in each main meal:
  - Large size fruit (70-80 gm.) - one piece such as: apple, orange, banana, peach, grapefruit, pear etc.

- Small size fruit (10-20 gm.) - 3-4 pieces such as: small apple, grape, apricot, palm etc.
- Sliced fruits like melons (size of a piece is 50-60 gm.) can have 1-2 pieces in a meal.

Note: fruits are better eaten without peeling. Also, if making juice it should not be sweetened with sugar.

- Legumes: are allowed but in modest amounts. They are rich in starches and protein: Humus, Beans, Peas, lentils, mash etc. Legumes are better eaten green, fresh and not dried.
- Starches: can eat one type daily but in limited amounts, such as a piece of bread per meal, 3-4 spoons of rice, 1-2 medium size pieces of boiled potato.
- Pastries and non-sugar sweets: may take 2-3 pieces daily between meals or when feeling hungry, like: Cookies, biscuits, salty pastries, salty fingers.
- Dairy: can have the low-fat or skim dairy daily. Dairy butter or ghee are not recommended but It can be allowed once weekly in small amounts.
- Oils: modest amounts of specific oils such as olive oil or sunflower seed oil may be taken in food or as salad dressings

Forbidden Foods

Not recommended because of large amounts of sugar:

- Sugar: cane sugar, beet sugar and all other natural sugars
- Dried and canned fruits and fruits cooked with sugar solutions (jam)
- Alcoholic drinks
- Soda drinks and juices
- Ice cream and beverages
- Caster, jelly and trafel cake
- Honey, jam and dibis (date syrup)
- Macaroni and noodles in oil or sugar
- Desserts, candy, and sweet pastries like cake, baklava, crepes (*Iraqi desserts*) etc.
- Local cuisines which are full with sugar and fat like harisa, dolma, patcha

11.5 Annex 5: Insulin Therapy, for those PHC Centers with the expertise and availability of the drugs.

Principles of insulin therapy:

- To provide sufficient insulin throughout the 24 hours to cover basal requirements
- To deliver adequate boluses of insulin in an attempt to match the hyperglycemic effect of meals.

Insulin preparations:

- Short acting insulin (soluble, regular, human. Eg Actarpid, Humilin)
- Rapid acting insulin analogs (e.g. Insulin Lispro, insulin Aspart,gluelysin)
- Intermediate acting insulin (e.g. Isophane NPH, Lente)
- Long acting insulin (e.g. UltraJente®, untratard® insulin)
- Premixed human insulin (e.g. Mixtard in ratios of: 10:90, 15:85, 20:80, 25:75,30:70, 40:60, 50:50)
- Premixed biphasic Insulin (e.g. Biphasic insulin aspart)

Frequently used regimens

- Two injections daily of a mixture of short and intermediate-acting insulins (before breakfast and the main evening meal)
- Three injections daily using a mixture of short and intermediate acting insulins before breakfast; short-acting insulin alone before an afternoon snack or main evening meal; intermediate-acting insulin before bed; or variations of this.
- Basal-bolus regimen of short-acting insulin 20-30 min before main meals (e.g. breakfast, lunch and the main evening meal); intermediate or long-acting insulin at bedtime
- Basal-bolus regimen of rapid-acting insulin analog immediately before main meals (e.g. breakfast, lunch and main evening meal); with intermediate-or long-acting insulin at bedtime
- Insulin pump regimes are regaining popularity with a fixed or variable basal dose and bolus doses with meals
- None of these regimens can be optimized without frequent assessment by blood glucose monitoring

Daily dose:

- Daily insulin dosage varies greatly between individuals and changes over time. It therefore requires regular review and reassessment. Dosage depends on many factors such as:
  - Age
  - Weight
  - Stage of puberty
  - Duration and phase of diabetes
  - State of injection sites
  - Nutritional intake and distribution
  - Exercise patterns
  - Results of PG monitoring (and glycated hemoglobin)

- Intercurrent illness

Guideline on dosage

- During the partial remission phase (honey moon period) the daily insulin dose often gradually declines to <0.5 IU/kg per day
- Prepubertal children (outside the partial remission phase) usually require 0.7-1.0 IU/kg per day
- During puberty, requirements may rise substantially above 1 IU/kg per day

Distribution of insulin dose:

- The distribution of insulin dose across the day shows great individual variation:
- Children on twice daily regimens often require more (perhaps two thirds) of their total daily insulin in the morning, and less (perhaps one third) in the evening.
- On basal-bolus regimens, night time intermediate acting insulin may represent 30-50% of total daily insulin: 50-70% as rapid or short-acting insulin divided up between three to four pre-meal boluses, the proportion of basal insulin may be higher.

Insulin dose adjustments:

- On twice-daily insulin regimens, insulin dosage adjustments are usually based on recognition of daily patterns of blood glucose levels over the whole day or a number of days, or in recognition of glycemic responses to food intake or energy expenditure, taking into consideration the frequency of hypoglycemic episodes occurrence.
- On basal-bolus regimens, flexible or dynamic adjustments of insulin are made before meals and in response to frequent blood glucose monitoring. The new analogues may require postprandial blood glucose tests to assess their efficacy and to safeguard against hypoglycemia.
- In case of elevated blood glucose level before breakfast: increases pre dinner or pre bed intermediate or long acting insulin (blood glucose tests during the night might ensure that this change does not result in nocturnal hypoglycemia)
- In case of rise in blood glucose level after breakfast increases pre breakfast short or rapid acting insulin or insulin analogue (aspartame or lispro).
- In case of elevated blood glucose level before evening meal increases pre breakfast intermediate acting insulin or increase dose pre lunch of short or rapid acting insulin analogue if on basal bolus regimen.
- In case of rise in blood glucose level after evening meal increase pre evening meal short or rapid acting insulin or insulin analogues.

Injection sites

- The usual injection sites are
  - Front of thigh/lateral thigh (the preferred site because of ease of access, administration and for slower absorption of longer acting insulins)
  - Abdomen (the preferred site when faster absorption is required, and it may be less affected by muscle activity on exercise)
  - Buttocks (upper outer quadrant - may be useful in small children)

- Lateral aspect of arm (in small children with little SC fat, IM injection is more likely and it may cause unsightly bruising)

Problems with injections

- Local hypersensitivity reactions to insulin injections are uncommon but when they do occur, formal identification of the insulin (or more rarely preservative) responsible may be possible with help from the manufacturer, or a trial of an alternative insulin preparation may solve the problem
- Lipohypertrophy with the accumulation of fat and fibrous tissue in lumps underneath the skin is common in children
- Lipoatrophy is now uncommon since the introduction of highly purified insulins
- Painful injections are common problems in children. Check angle and depth of injection to ensure injections are not being given IM
- Leakage of insulin is common and cannot be avoided. Encourage slower withdrawal of the needle from the skin, stretching of the skin after the needle is withdrawn, or pressure with a clean finger over the injection site
- Bruising and bleeding are more common after IM injection or tight squeezing of the skin
- Bubbles in insulin should be removed whenever possible.

11.6 Annex 6: Risk Classification of Metabolic Syndrome

Cardiovascular risk can be expressed as the percentage chance of an individual experiencing a cardiovascular event over a pre-defined period of time, usually the next 10 years. It mainly depends on the presence of CVD risk factors commonly seen with the Metabolic Syndrome such as smoking, average blood pressure, cholesterol levels, age, and presence or absence of diabetes. The below table can be used to estimate this cardiovascular disease risk over the next 10 years:

WHO Risk Prediction chart with Cholesterol Measurement

World Health Organization, “Prevention of Cardiovascular Disease”, 2007

11.7 Annex 7: Home Care of Diabetes and Metabolic Syndrome

Introduction

Diabetes, with or without the other elements of the Metabolic Syndrome, is a chronic, life-long, potentially deadly disease that continues to prematurely claim the well-being and the lives of multiple hundreds of thousands of people around the world. However, given the advances of scientific medicine over the past few decades it is now possible to reduce the risks of many of the serious complications of diabetes and to significantly extend the productive life span of many adults who suffer with this. However, the success of treatment depends primarily on an effective therapeutic partnership between the doctor and patient, in which the doctor applies the best scientific knowledge and skill to his recommended management, and the patient attempts to follow the management plan as completely as possible and provide the doctor with the information he/she needs to change the management as needed.

There are a variety of elements that have to be attended and monitored for the best control of the diabetes and prevention of the many potential complications. This means that the patient must learn as much as possible about the disease, the methods of control of diabetes, and how to monitor the daily changes in blood sugar and make necessary adjustments. Initially, it is expected that the patient will depend significantly on the doctor for advice and counsel, but as the patient gains experience with his disease, he or she should become more skilled at balancing the competing elements of diet, physical activity, and medication to maintain the blood sugar and other elements in good balance. The goal is that the patient is able to manage much of the normal fluctuations of life and his diabetes at home.

Home Care of Diabetes and Metabolic Syndrome

The important elements of the home care of diabetes and the metabolic syndrome are the following:

- Weight loss
  - Critical to the control of diabetes and all of the other metabolic abnormalities that accompany it, especially since excessive weight is one of the primary causes of Type II diabetes
  - Must be approached on a long-term basis; weight must be gradually reduced and remain at the lower level for life
- Nutritional therapy
  - A balanced, calorie restricted diet must be developed that is acceptable to the patient, and able to be maintained for the rest of life.
  - The diet must include critical elements of treatment of some of the other metabolic abnormalities seen with the metabolic syndrome, such as salt restriction to improve hypertension, and decreased saturated fat to improve lipid abnormalities
  - See the below section on Food Choices for Diabetes for more information
- Regular exercise
  - Regular vigorous exercise and physical activity is essential to any weight loss program

  - In addition, there are many added benefits to exercise, such as an improved sense of well-being, improved bone structure, fewer falls later in life, improved balance and coordination, lowered blood pressure, and improved cardiovascular function
  - To be maximally effective, the exercise must be vigorous aerobic activity for at least 30 minutes per day, 5 days per week
- Stop smoking
  - Any inhaled smoke has been shown to have multiple effects on the heart and circulation, including increased atherosclerosis, increased tendency toward a clotting disorder, lung damage, and decreased muscle function.
  - Any patient with diabetes must stop smoking completely and permanently, or risks shortening the life-span by at least 10 years
  - There are multiple behavioral and medication-based treatments available to assist in the difficult task of stopping smoking – ask your doctor about these if you are unable to stop without help.
- Know and be alert to danger signs of diabetes and the metabolic syndrome
  - Hypoglycemia symptoms – light-headedness, difficulty walking, confusion, disorientation
    - The treatment for hypoglycemia (15 grams of sugar), which should be carried with most diabetics
    - Actions to take to prevent relapse of hypoglycemia – regular scheduled eating 2-3 times daily, avoid fasting, balance food intake with exercise, confirm with doctor the dosages of medication
  - Possible vaginal yeast infections in women with diabetes
  - Postural dizziness with changes in position, especially for those with metabolic syndrome and several controlling medications
  - Any suggestion of a serious complication:
    - chest pain or pressure
    - weakness on one side of the body
    - vision changes
    - loss of consciousness, even if only for a few minutes
- Home blood glucose monitoring
  - Most patients visit the out-patient department, hospital, or physicians office for this monitoring; however it is expensive and impractical to do this with the frequency that is most helpful for good control of diet, exercise, and medications.
  - Patients should be encouraged to purchase a home glucose monitor, and taught how to use it effectively. Blood glucose results can then be recorded in a logbook with the date and any pertinent observations, for review by the monitoring physician
  - Home glucose monitoring is especially helpful for those patients who are unstable, whose diet is erratic, and who are on insulin
  - Since each glucose monitor requires a unique set of test strips, it is important that the patient purchase a monitor for which the test strips are easily and economically available in his/her region.

  - The doctor or nurse should review the use of the glucose monitor with the patient to be sure that the correct technique is followed for accurate results. The frequency of recommended use of the monitor will depend on the stability of the patient's diabetes, the age, the medications being used (especially if insulin is used), and whether or not the patient is susceptible to episodes of hypoglycemia
- Home blood pressure monitoring
  - Since the majority of those with adult onset diabetes also have increased blood pressure, it is very helpful for the patient to also purchase a blood pressure apparatus to self-monitor the blood pressure in varying stages of life. This will assist the doctor in deciding on the proper medications and dosage for best control of the blood pressure
  - Further information on this is available in the handout on "Home Care for Hypertension"
- Monitoring of blood lipids
  - Similarly, most adult patients with diabetes also have abnormal blood lipids (fats), which increase the risk of atherosclerosis and problems such as heart attacks and stroke. These should be monitored on a regular basis, at least once or twice each year, to help the doctor decide what treatments should be used to help control the lipids. This is one element of care that must be done by a physician or hospital laboratory.
  - The doctor will recommend various therapies to help reduce the lipids, including changes in the diet (see Annex 4 - "Diet for Diabetes and Metabolic Syndrome", and below section on "Food Choices…"), increased exercise, and if lipids are severely elevated, medication to reduce the lipids.
- Home monitoring and care of the feet
  - Uncontrolled diabetes and associated blood vessel changes can cause a progressive decrease in both the pain sensation of the foot and the circulation of the foot. These abnormalities increase the chances of injuries, which because of poor circulation may take much longer to heal.
  - Up to 20% of all patients with diabetes have a chronic foot problem noted on examination, and up to 15% of all diabetics will develop an ulceration on the foot during their lifetime, which can lead to an amputation if not promptly recognized and treated
  - It is important for each diabetic patient to develop a habit of visually inspecting both feet at least once weekly, or more often if the diabetes is advanced. The elements of this inspection should include the following:
    - Daily washing and inspection
    - Keeping walking areas clear of dangerous objects
    - Appropriate footwear (selection, fitting and use)
    - Using slippers indoors-no bare feet allowed at any time!
    - Proper nail and callous care – no bathroom surgery allowed on these areas!
    - Avoid extreme temperatures of either cold or heat on the feet
    - Avoid soaking of the feet for long periods of time, which can lead to burns and excessive softening of the skin
    - Report foot problems promptly to a physician (infections, ulcers, and cuts that do not heal)

- See Annex 3 – "Foot Care – Patient Screening and Education for Diabetes" for more information on this

Food Choices for Diabetes and Metabolic Syndrome

A healthy diet for diabetes and the metabolic syndrome includes:

- Control calories to lose and maintain ideal weight
  - Most adults with diabetes and the metabolic syndrome are overweight, and can develop a significant level of control of their diabetes, blood pressure, and abnormal blood lipids by simply losing weight and keeping it off
- Choose primarily grains and cereals, vegetables, and fruits for the majority of meals. Use the following modified Dietary Approaches to Stop Hypertension (DASH) Eating Program as a guide to selection and quantity of foods:

DASH Eating Program

Food	Servings per day	Serving Size
Grains	5-6 daily servings	½ cup cooked rice or pasta; 1 slice whole grain bread
Vegetables	4-5 daily servings	1 cup raw vegetables or fruit ½ cup cooked vegetables or fruit
Fruits	2-3 daily servings	1 cup raw fruit 1 medium banana 1 orange, ½ grapefruit
Low-fat or fat-free dairy products	2-3 daily servings	1 cup of low-fat milk or yoghurt
Lean meat, poultry and fish	2 daily servings	90 grams cooked lean meat 90 grams cooked chicken
Nuts, seeds, and dry beans/lentils	1-2 servings per day	15 grams of nuts ¼ cup cooked beans, peas, or lentils, humus
Fats and oils	2-3 daily servings.	1 teaspoon olive oil
Sweets - limited	Less than 1 serving per day	1 small piece of pastry or sweet

Note: DASH diet adapted slightly for approximately 1600 Kcal/day, and to control simple sugars. See also Annex 4 – "Diet for Diabetes and Metabolic Syndrome" for general suggestions. http://www.nhlbi.nih.gov/health/public/heart/hbp/dash/new_dash.pdf

- Suggestions for starting the DASH eating program:
  - Add more vegetables, rice, pasta, and dry beans or lentils to your diet.
  - Use fruit with meals or as a snack. Canned and dried fruits are easy to use; choose fresh fruits in season.
  - Use whole grains such as brown rice, whole wheat bread, bulghur wheat, or oats as much as possible
  - Use only small amounts of butter, margarine, or salad dressing, and use low-fat or fat-free condiments and olive oil.
  - Use healthy oils for cooking and eating:
    - Use olive oil and other unsaturated fat oils such as sunflower oil

    - Eat foods rich in omega-3 fats such as fresh fish
  - Take low-fat or no-fat dairy products (yoghurt, cheese or milk) three times a day.
  - Use only low fat meats like chicken, fish or lean beef, and limit the quantity to no more than 180 gms/day.
  - Instead of typical high fat or sweet snacks (chips, candy, etc.), eat unsalted pretzels or nuts, raisins or dried apricots, plain crackers or biscuits, low-fat and fat-free yogurt and frozen yogurt; unsalted plain popcorn with no butter, fresh fruit or raw vegetables.
  - Read food labels carefully to choose products that are lower in sodium. Avoid the following high sodium (salt) items:
    - flavoring cubes (Maggi cubes) and soy sauce
    - canned and/or dried soup
    - canned vegetables
    - processed meats and luncheon meats
    - salted snacks like chips, pretzels, pickles
- Avoid fad (magazine-published) diets;
  - Eat a balanced diet instead
  - Eat small, frequent meals
  - Avoid large and heavy meals
- Check with your doctor about supplementing your diet with B vitamins
- Reduce salt in your diet
  - Avoid cooking with salt
  - Avoid fast food
  - Avoid salty food ,such as pickles, cured meals, salty snacks, and canned soup
  - Avoid seasonings that contain sodium , such sauces, ketchup and monosodium glutamate
  - Do not add salt to your food after it is prepared
  - Read food labels and buy foods that are low in sodium
  - When eating out ,ask that your food be prepared without salt
- Take foods rich in fiber every day
  - Dietary fiber is a plant material that humans cannot digest. Fiber increases the amount of stool in your intestine. The most well-known fiber is wheat bran.
  - In addition to lowering cholesterol and blood sugar levels, some studies have shown that people with hypertension who increase fiber in the diet for at least 8 weeks can significantly lower their blood pressure. As an added benefit, high fiber foods usually contain important vitamins and minerals.
  - Fiber comes in 2 forms, based on whether it will dissolve in water: soluble and insoluble. Most experts believe that most fiber intake should be in the form of **insoluble fiber**
    - Water Soluble Fiber sources: fresh fruits, dried fruits, vegetables, green leafy vegetables, oats, barley, legumes
    - Insoluble Fiber sources : vegetables, whole wheat, bran, whole grain brown bread
  - Raw foods tend to have more fiber than cooked, canned or pureed items. Even chopping and peeling skins removes some fiber

  - Fiber can also be taken in common fiber supplements like Metamucil, or whole wheat bran can be purchased very inexpensively from a miller. Use 2-3 teaspoons of bran in many cooked dishes
  - When taking high fiber foods, be sure to take at least 2 liters of water or other fluids every day. Fiber tends to bind water, which leads to softer stools and a more rapid transit of material through the intestines.
- Examples of a high – fiber diet:
  - **Breads and grains** : e.g. : Barley, whole grain breads , whole grain baked pastries and muffins
  - **Fruit :** Apple, orange, banana, dates, peach, pear
  - **Vegetables:** Carrots, spinach, tomato, potatoes, cabbage, zucchini
  - **Substitutes for meats**: Meat has no fiber and contains various amounts of cholesterol and saturated fats. There are many high-fiber foods that can help replace meat protein in the diet, such as almonds, kidney beans, peanuts, sesame seeds, sunflower seeds

Take Control of Your Diabetes

Many people believe they have no control over their health and wellness. Many ignore personal health decisions or simply leave them to doctors. Some patients have misconceptions about medication and the benefit of any treatments and any alternatives. You and your doctor must work together to jointly decide the best course of action to manage your health. This process is called “shared decision making”, in which your doctor becomes a guide and teacher and helps steer you toward the best treatment . Most doctors welcome this partnership, but you must learn about your illnesses for shared decision–making to work.

What is a treatment plan?

A treatment plan is what you and your doctor decide to do for management of your illness, and is very important to the success of long-term treatment of hypertension. Commitment to your doctor’s instruction is so essential to get to the treatment goals.

3 simple questions can help you get the most from your treatment plan:

- What is my main problem?
- What do I need to do?
- Why is it important for me to do these things?

Other important points to consider:

- Be sure to understand your treatment plan
- Stick with the treatment plan and allow time for improvements
- Don’t stop medicines when you feel better, check with your doctor
- Your doctor should tell you what to expect and when to follow –up or call. However, if your condition worsens between follow-up appointments, call your doctor.

What should you know about your medications?

Every year many people become ill because of problems with medications. This is especially true with the metabolic syndrome, where many patients will be taking a minimum of 4-5 different medications. Remember to ask:

- What side effects to expect
- What drug interactions are possible; both between two different medications, and with any foods, vitamins , nicotine and alcohol
- Find out if a new medicine reacts with those that you are taking now
- Many over-the-counter drugs and dietary supplements can also cause serious side effects and drug interactions; discuss these with the doctor before purchasing them
- Make sure you can drive or operate machines safely while taking a medicine; ask if the medication could cause sleepiness or decrease in reflexes
- Ask your doctor how much a prescription costs; Is there a less expensive option or generic version?

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