



Ministry of Health

GUIDELINES FOR THE MANAGEMENT OF DIABETES MELLITUS IN PRIMARY AND SECONDARY CARE FACILITIES IN GHANA

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FOREWORD

Diabetes is a priority NCD for Ghana. Ghana's NCD Policy and Strategic Plan outline action points to be undertaken to address diabetes in Ghana. Among these is the development of a diabetes management guideline that aims to streamline prevention and control of diabetes across all levels of health care.

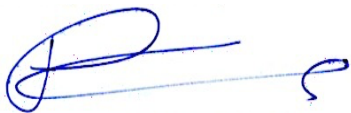
This guideline targets four main focal points namely:

- Primary prevention of diabetes through healthy diet, physical activity, reduction of alcohol and cessation of tobacco use.
- Early detection through screening
- Appropriate management of diabetes and prevention of complications
- Prompt referral where necessary

This document is intended for use mainly at the primary and secondary levels of healthcare delivery. Thus all health facilities including Polyclinics/Family Medicine Departments in Teaching Hospitals are expected to use this document to guide the screening, diagnosis and clinical management of persons living with diabetes. It also includes non-pharmacologic management of diabetes to ensure a holistic effect. Although intended for primary and secondary levels of health care, expertise was drawn from the various specialties in the management of diabetes including clinicians and other specialists from tertiary level facilities in the development of this guideline due to the need for a holistic approach to care for persons living with diabetes.

This management guideline for diabetes recognizes the need for clients and their social support systems to be fully engaged in the delivery of healthcare. Thus, self care recommendations are made to guide health workers on simple strategies to teach clients to ensure that quality of life is maintained or improved, despite the diagnosis of diabetes.

Diabetes is a preventable disease. It is therefore crucial that health workers across all levels of care and stakeholders are engaged to deliver standard, world-class services not only to persons with diabetes, but also to their families, persons at risk of diabetes and the general population. This will ensure that the burden of diabetes is reduced to the barest minimum in Ghana. I will therefore encourage all healthcare workers to make this document an important operational and reference manual for diabetes in all primary and secondary level health facilities in Ghana.



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ACRONYMS

ASCVD	Atherosclerotic Cardiovascular Disease
CVD	Cardiovascular Diseases
CHAG	Christian Health Association of Ghana
CHPS	Community-based Health Planning Services
CKD	Chronic Kidney Disease
DHMT	District Health Management Teams
DM	Diabetes Mellitus
DPP- 4	Dipeptidyl peptidase IV Inhibitor
EGFR	Estimated Glomerular Filtration Rate
FBS	Fasting Blood Sugar
FDA	Food and Drug Authority
GDA	Ghana Diabetes Association
GHS	Ghana Health Service
GLD	Glucose Lowering Drug
GLP1 RA	Glucagon-like Peptide-1 Receptor Agonist
HbA1c	Glycated Haemoglobin A1c
HDL	High Density Lipoprotein
HF	Heart Failure
IDF	International Diabetes Federation
NASH	Non-Alcoholic Steatohepatitis
NPH	Neutral Protamine Hagedorn
OPD	Out-Patient Department
OGTT	Oral Glucose Tolerance Test
PCOS	Polycystic Ovarian Syndrome
PHC	Primary Health Care
PLD	People living with diabetes

RBS	Random Blood Sugar
TZDs	Thiazolidinediones
SGLT – 2	Sodium glucose transporter – 2 Inhibitor
SMASH	Salmon, Mackerel, Anchovies, Sardines and Herrings
SMBG	Self-monitoring of Blood Glucose
SQ	Subcutaneous
SSA	Sub Saharan Africa
SU	Sulphonylureas
T2DM	Type II Diabetes

CLIP ART



Risk factors



Contraindications

EXECUTIVE SUMMARY

Diabetes mellitus is a leading reason for visits to healthcare facilities in Ghana. The cost associated with management of diabetes is high and escalate when complications set in. Type II Diabetes (T2DM) is the commonest form of diabetes which is largely asymptomatic in the early stages and preventable. Screening is a key aspect of the diabetes control. Prevalence of diabetes is directly linked to multiple factors such as urbanisation, family history, obesity, and physical inactivity. The gradual rise in prevalence of gestational diabetes and adolescent type 2 diabetes also contribute to the increasing burden of T2DM. Women who develop gestational diabetes as well as the offspring of the index pregnancy, have increased risk for developing diabetes later in life. Children also develop diabetes and should be screened when suspected.

Currently there is no cure for any form of diabetes however it is sometimes possible to drive T2DM into remission with lifestyle modification. Diabetes is often a progressive disease and must be managed aggressively early. It is crucial that both non-pharmacologic and pharmacologic treatments be initiated at the same time for all people who meet diagnostic criteria. People living with diabetes must be monitored regularly and treatment intensified to ensure that set targets are met. These targets include not only blood glucose targets but importantly targets for body weight, waist circumference, blood pressure, and lipids.

The principles of patient centredness must be embraced when formulating these targets. Patient centred clinical methods optimise the probability of achieving set targets. Diabetes self-management education and support provides people living with diabetes with the knowledge, skills and support they need to make decisions daily. Self-management education may be lifesaving; therefore, structured educational programs must be institutionalised in every diabetes care service. These programs must ideally be evidence based, quality assured and culturally sensitive to the needs of the community. It is not uncommon for people with diabetes to have other chronic conditions such as hypertension, chronic kidney disease or stroke. Patients needing higher levels of care must be referred without delay. Health care providers must be trained to coordinate the care of people living with multi-morbidity.

People living with diabetes in Ghana often must deal with a complex socio-cultural believe system and alternative medicine. To optimise self-care behaviours and long-term outcomes these issues must be addressed as part of comprehensive diabetes care.

1.0 INTRODUCTION

1.1 Global Burden of Diabetes Mellitus

Worldwide, the numbers of people who live with or have been diagnosed of diabetes mellitus (DM) have been increasing over the years. The International Diabetes Federation (IDF) estimated in 2019 that 1 in 11 persons (approximately 463 million) of the adult world population (20-79 years) were living with diabetes; a figure, which will rise to 700 million by 2045, representing a projected increase of 51% if current trends continue. These projections are likely to be worse in developing countries including Ghana where detection rates are low. The IDF projects the prevalence of diabetes in SSA to increase by 47 million representing 143% by 2045. There is long pre-symptomatic phase before diagnosis of Type 2 diabetes. Fifty percent (50%) of type 2 diabetes remain undiagnosed (and untreated) for a variable length of time and may develop complications, hence the recommendation for screening by most guidelines.

1.2 Diabetes in Ghana

DM is a common reason for OPD attendance and an important cause of mortality in Ghana as evidenced by GHS annual reports 2017-2019. The Ghana Diabetes Association (GDA) reported in 2016 that there were about 4 million people living with diabetes in Ghana. Non-population-based studies estimate the prevalence of diabetes to be between 6-9% of the adult population. The World Bank in 2019 reported the prevalence of DM in Ghana to be 2.5% in the adult population 20-79 years of age. DM is an important contributor to cardiovascular diseases including CKD, stroke, heart attack, peripheral vascular diseases, and amputations.

1.3 Levels of Care targeted by this Document

The health system in Ghana comprises Primary, Secondary and Tertiary levels of care. The focus of this document is the Primary and Secondary levels of care. An understanding of the health system is required to facilitate referrals between different levels. The levels of care within the health system and the targeted workforce are presented in the Table 1 and Figure 1.

Table 4: Level of Healthcare and targeted workforce for the use of Diabetes Guidelines for Primary and Secondary Care

Level of care	Facilities	Targeted Health Workforce
Primary	CHPS, Health centres, Polyclinics in Teaching Hospitals	Community Health Officers, Nurse Prescribers, Physician Assistants, Doctors (e.g., Medical Officers, Family Physicians, Physician Specialists)
Secondary	Districts hospitals, Regional Hospitals	Physician Assistants, Doctors (e.g., Medical Officers, Family Physicians, Physician Specialists, Paediatricians)
Others	Other health facilities	All other health workers interested in management of diabetes

The Community level provides primary care (point of entry), and service delivery is through the CHPS strategy. This strategy involves the demarcation of districts into CHPS zones and compounds aligned with the lowest units of election management (electoral areas). Community Health Teams, comprising health workers and community volunteers, deliver integrated primary care services with community health committees playing an oversight and supportive role.

Specifically for this document in relation to the management of DM, primary care facilities are health facilities without doctors or health facilities with non-specialist doctors in internal or family medicine. Such primary care facilities include CHPS compounds, Health Centres, hospitals without specialists including district hospitals. For secondary care facilities, these are facilities which have available specialists in internal or family medicine and paediatrics. Such facilities include hospitals with specialists including district hospitals and regional hospitals, Polyclinics of Teaching Hospitals etc.

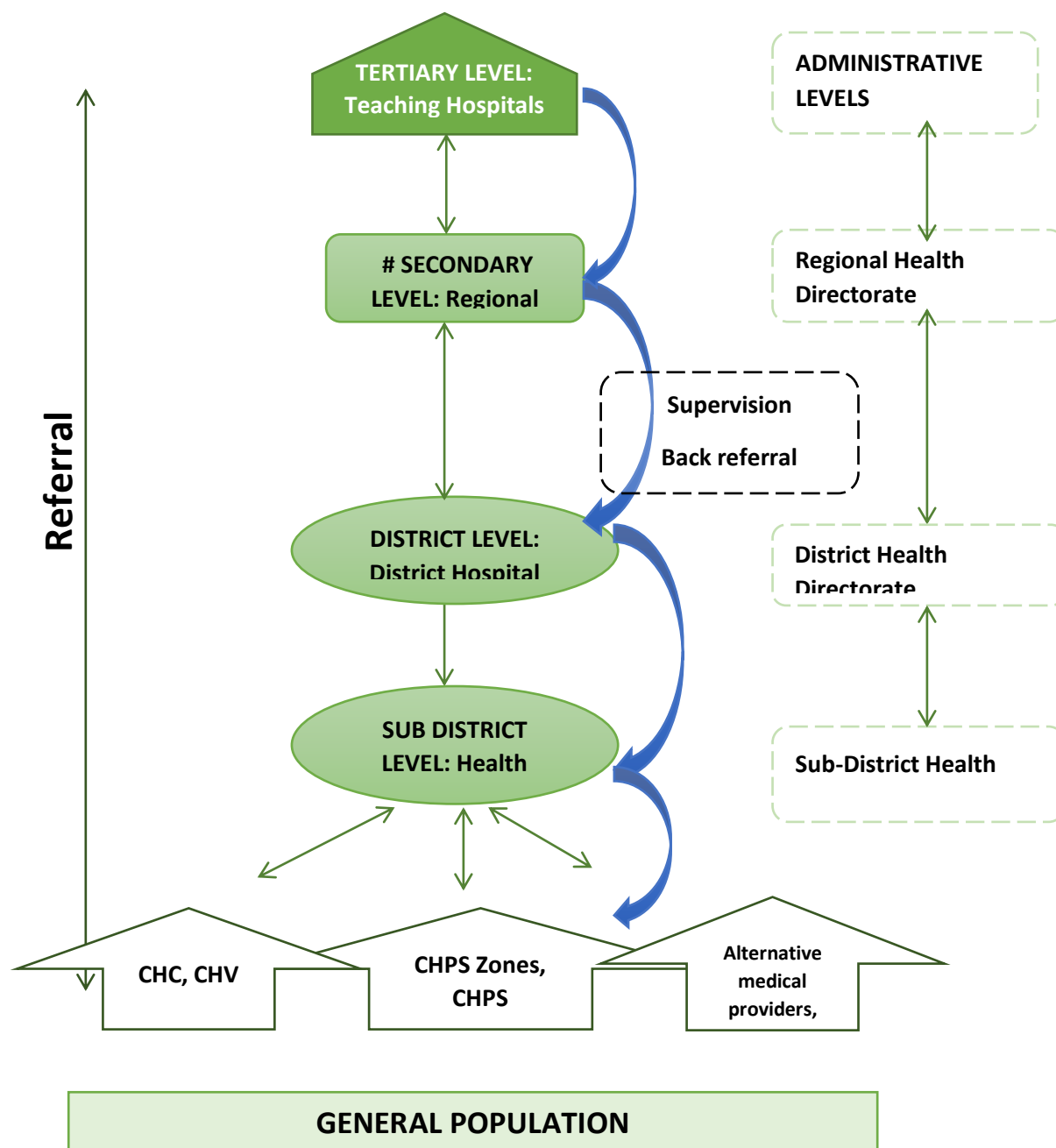
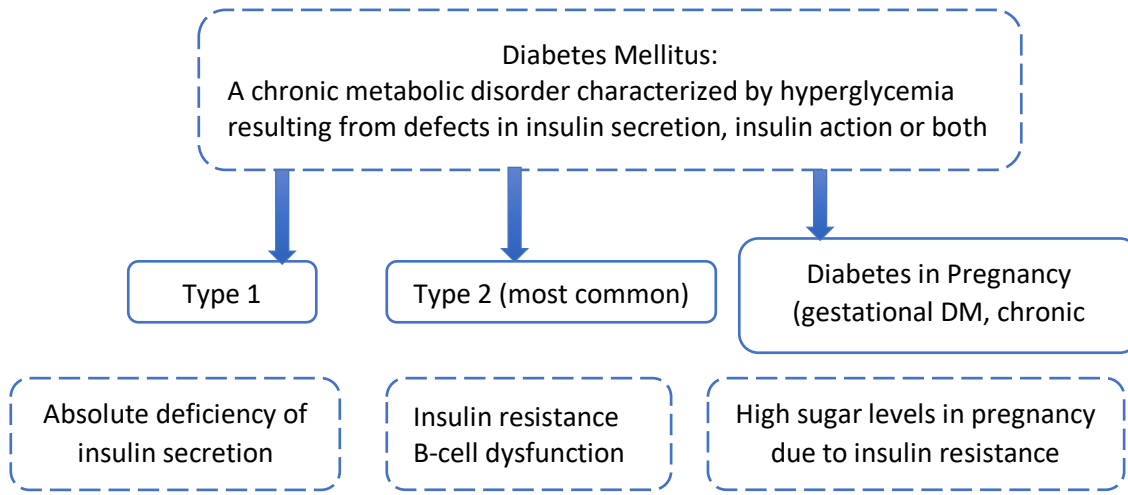


Figure 3: Main components of the health system in Ghana

This includes quasi government institutions, private facilities and CHAG

1.4 Types of diabetes and clinical features



1.4.1 Type 1 Diabetes

This condition develops primarily due to the destruction (autoimmune induced) of beta cells (β -cells) of the pancreas resulting in insulin deficiency. Therefore, these people require insulin for their management. The rate of destruction of the β -cells varies – it could be rapid or slow thus the clinical onset of type 1-Diabetes could be acute or sub-acute. Type 1 diabetes can develop at any age but tends to develop in younger age groups with a peak age 11-14 years. Most of these persons are diagnosed before the age of 35 years.

Persons with type 1-Diabetes are usually of normal weight or may be underweight.



Risk Factors for Type 1 Diabetes include:

- Family history of diabetes (first degree relative- parent, siblings)
- Age (type 1 is more likely in a child, teen or young adult)

Classical symptoms of patients with type 1 Diabetes include

- Excessive urinating (polyuria)
- Excessive thirst and drinking of water (polydipsia)
- Excessive eating (polyphagia)
- Weight loss

Others may present with lack of energy/fatigue, blurred vision, repeated infections and bedwetting (enuresis). These symptoms tend to develop early on in the disease.

Undiagnosed persons, particularly children and adolescents, may present with ketoacidosis and/or coma.

1.4.2 Type 2 Diabetes

Type 2 diabetes usually develops in people older than 40 years – but it is now also being seen more commonly in younger people. Although impaired, the β - cells still produce some insulin, but they may also experience insulin resistance. These persons do not necessarily require insulin for their management.



Risk Factors for Type 2 Diabetes include:

- Age 40 years and above
- Family history of diabetes (first degree relative- parent, siblings)
- Physical inactivity
- Obesity
- Personal history of
 - High Blood Pressure (140/90mmHg or more)
 - Low HDL cholesterol (good cholesterol), (0.9mmol/l) or lower)
 - High triglycerides (2.82mmol/l) or higher)
 - History of gestational diabetes
 - Delivered a baby weighing more than kg.
- Excessive alcohol consumption
- Woman with Polycystic Ovarian Syndrome (PCOS)
- Drugs
 - Prolonged use of steroids such as prednisolone, hydrocortisone etc.
 - Atypical antipsychotics
- Tobacco use including cigarette smoking

Approximately 50% of patients present with classic diabetes symptoms as stated for Type 1 above. The other half remains asymptomatic and is only diagnosed on routine screening. The blood sugar may remain significantly elevated (hyperglycaemia) on average for about 5-7 years before being diagnosed (e.g., by routine screening, at medical examinations or because of the presence of recurrent infections e.g., vaginal candidiasis or present with diabetes complication of the eye, feet etc.). Obesity is a major predisposing factor and is often present at the time of diagnosis

1.5 Prevention of Diabetes

Diabetes is a chronic condition and has a major impact on the lives of the people with diabetes and their caregivers (families and significant others). Family functioning is likely to be affected at the time of making a diagnosis of diabetes or its complications. People living with diabetes (PLD) have to practice self-care daily, live a fulfilling and normal life, while facing the other responsibilities and stresses of life. These daily self-care routines can be taking a psychological toll on the PLD and become burdensome. Managing diabetes goes beyond blood glucose control and must never be reduced to that. Health promotion should be an integral part of diabetes prevention (primary, secondary, tertiary) and management in health care facilities.

Critical areas of focus in health promotion for diabetes include:

- Regular blood glucose monitoring
- Regular hospital attendance/ follow up
- Nutrition and dietary counseling
- Exercise and physical activity
- Medication monitoring and compliance
- Psychosocial support
- Prevention of complications
- Appropriate management of comorbidities

1.6 Screening for Diabetes

Screening for Diabetes should follow National guidelines on screening for NCDs. At the very least, screening should include the administration of the risk assessment tool for DM (Appendix 6) at all levels of the healthcare system. Random Blood sugar tests should be offered in line with guidelines and follow-up tests undertaken where indicated. Urine dipstick can be used as an additional screening tool but must not be the primary screening tool unless alternative methods are not available and there is a high index of suspicion of Diabetes Mellitus.

2.0 MANAGEMENT OF DIABETES

The prevention and management of diabetes and its complications hinge on lifestyle modifications: meal patterns, physical activity levels, smoking cessation, moderation of alcohol use and stress management. This section focuses on T2DM as it is the commonest form of diabetes. Additionally intensive lifestyle modification can result in remission of T2DM. Understandably behaviour modification can be the most challenging aspect of self-care for most people living with diabetes. It is however essential for people living with diabetes (PLD) to have a lifetime approach to lifestyle modification, preferably beginning prior to the diagnosis of diabetes and continuing throughout the lifetime.

Non-Pharmacological Management of Diabetes should cover:

1. Nutrition in diabetes- with emphasis on taking a good dietary history including timing of meals, local sources of carbohydrates, portion control and carbohydrate counting*, meal patterns
2. Timing of meals
3. Physical Activity
4. Mental health
5. Smoking cessation
6. Alcohol use

**Carbohydrate counting can be ascertained by reading food labels and using measuring devices.*



Figure 4: A weighing scale and a measuring cup for quantifying various food items

2.2 Non-Pharmacologic Management of Diabetes

2.2.1 Nutrition in Diabetes

Adequate blood glucose (glycaemic) control especially early in the disease process is associated with better outcomes. Hyperglycaemia may arise from a combination of factors namely:

- Fasting hyperglycaemia
- Post-prandial hyperglycaemia and
- Non-food related factors
 - Menstruation
 - Acute infections
 - Intercurrent illnesses (e.g., heart attacks, strokes, etc.)

A deliberate control of type and quantity of certain foods can ameliorate not only hyperglycaemia but also glucose variability. Although food choices and meal patterns have the highest impact on post-prandial hyperglycaemia, they can contribute to fasting hyperglycaemia as well. Hyperglycaemia may persist for up to nine hours following the evening meal. Both hyperglycaemia and hypoglycaemia can contribute to hyperglycaemia on waking up.

The emphasis of nutritional therapy in diabetes should be on portion control and not on eliminating food groups e.g., carbohydrates, fatty and oily foods. Portion control and timing of meals are major keys. Culturally, the portions of meals consumed are enormous. Patients therefore need to be taught about portion sizes and combinations of meal items to attain nutrient balance, satiety, control of blood sugar and prevention of complications. Increased intake of fatty and oily foods above recommended levels is often detrimental to overall health and well-being and, tend to lead to other complications.

There are two types of carbohydrates: Simple/ Refined and Complex. Refined carbohydrates have little or no fibre (naturally or removed during meal preparation). Complex carbohydrates have higher levels of fibre and provide between one to two (1-2g) grams of protein per serving to the diet. The presence of fibre with carbohydrate contributes other trace vitamins and minerals to the meal, help manage high body weight, prevent constipation and high blood cholesterol. Sources of carbohydrates may be classified into four main groups: starches, vegetables, fruits, and milk and milk products. Starches (which may contain fibre) and fruits all contribute more glucose to the body as compared to glucose from vegetable sources. All carbohydrates are broken down into glucose which is regulated by the hormone, insulin. Fluctuations in insulin release and sensitivity or insensitivity is because of mostly the type and quantity of glucose and partially by protein released into the blood stream. Therefore, it is very important to be able to identify carbohydrate sources in meals and be able to quantify the amount of glucose in a portion of carbohydrate meal considering factors like the activity level, current weight, and the medications one is on.



Figure 5: Examples of locally available foods

Proteins

Proteins are nutrients used by the body primarily for growth, repairing worn-out tissues, production of hormones and energy. Proteins have two types, essential and non-essential amino acids. The body cannot make the essential proteins while for non-essential, the body can make some to survive on. The two types of protein exist in two forms, plant, and animal proteins. Animal proteins contain all the essential proteins in different levels while plant proteins may not have all the essential proteins in the levels the body needs to survive. All animal proteins can contribute dietary cholesterol and saturated fat to the body while plant proteins contribute not only the protein but fibre and relatively some level of carbohydrates to the diet. Consistent high intake of protein in one's diet may lead to kidney injury and contribute to high blood sugar. Sources of animal protein include eggs, both oily and dry fish, snail, chicken, and meat. Plant proteins include all types of beans, legumes, and nuts. Plant proteins sources can be combined with grains and cereals to make their amino acid complete for better metabolism. All meat should be less in fat and eaten rarely, fish roe (eggs) should be avoided, and chicken should be deskinning before adding to meals. Protein requirements are based on factors like age, gender, medical condition, and activity level. A serving of protein is 21-28g (3-ounces).

Fats and oils

Carbohydrates rank first in terms of impact on post-prandial blood glucose levels followed by protein. Fats and oils have little if any effect on post-prandial blood glucose levels. Although fat is not associated with post-prandial glucose spikes, oily food can add significant amounts of calories and therefore result in increasing abdominal girth. Fats are solid at room temperature while oils are liquid. Fats and oils in the diet may come from animal or plant sources. The types of fats and oils include saturated fat, unsaturated (poly/mono) fat, and trans-fat.

Unsaturated fat: unsaturated fats are beneficial. Oily fish (e.g., salmon, mackerel, anchovies, sardines, and herrings - popularly called SMASH group of fishes), avocado, seeds and nuts are good sources of mono and poly-unsaturated fats, which is beneficial for heart and general well-being.

Saturated fats: For the average adult (including adults with diabetes), the daily intake of saturated fat should be less than 10g. 100 grams (equivalent to 100 mls) of coconut, palm and olive oil have 90g, 50g and 14g of saturated fat respectively. Sources of saturated fat include both animal and plant sources. Red meat, skin of poultry, coconut oil and palm oil are high in saturated fat. Trans-fat and saturated fat are detrimental to heart health. Trans-fat should be avoided, and saturated fat intake limited to less than 7% of total daily caloric intake. Sources of trans fat include margarine and commercially baked and fried products.

Vitamins and Minerals.

Vitamins and minerals are necessary for energy production, immunity and general well-being of the body. All the macro-nutrients (carbohydrates, proteins and fats and oils) contain different types of vitamins and minerals at varying levels. Vegetables and fruits contribute a lot of these nutrients to one's diet. However, in addition to these nutrients, fruits contribute more glucose to the body than vegetables. Increase intake of fruits can therefore increase one's blood glucose levels. Vegetables contribute more fibre to a meal (to prevent hyperglycaemia, constipation, weight gain and high blood cholesterol) in addition to the vitamins and minerals compared to pure carbohydrate sources. The body prefers using the vitamins and minerals from food than when food supplements are replaced with balanced meal. Some of the vitamins are fat-soluble so in the absence of oil in the meal, absorption of these nutrients is impeded; the reason for including all nutrients in a meal. Vegetables and fruits are mostly eaten raw therefore the need to wash and clean them well to rid them of pesticides, dirt, and other disease-causing organisms. Vegetables and fruits are to be washed under running water and last rinsed with vinegar or salt water. Try not to soak them in water since some of the vitamins and minerals are water soluble and can leach into the water; use the stock vegetable was cooked in to prepare soup or other meal since some of these nutrients

will be found in it. Some of these vitamins and minerals in the vegetables and fruits are heat-sensitive, therefore, cooking them for too long a time will destroy them all.

Timing of meals

To prevent either hypoglycaemia or hyperglycaemia and have the goal of remission (type 2 diabetes), as much as possible meals should be taken at regular times. For most of the days, meals should be eaten from 8-9 am to 4-5 pm. If possible, avoid snacks and include all sources of food nutrients (carbohydrates, protein, fats and oils, vitamins, minerals) within the main meal. It is recommended that the last (main) meal should be taken at 3 – 4 pm with a healthy snack later in the evening if deemed necessary.

Variety of Meals.

Considering variety in meal choices contribute a lot of benefits to the body and mood of the individual. Variety prevents boredom and exposure to anti-nutritional properties present in food ingredients used in preparing meals. Ingredients used in meal preparation contain different types of nutrients at varied levels, therefore varying meal choices prevent nutrient deficiencies. It is therefore necessary for every individual to broaden their food choices.

Quantity of Meal.

Meal quantity prescription is based on factor like age, gender, activity level, medication, medical condition, and current weight. Since all nutrients are necessary for the body's optimal functioning, it is best to include them all in every meal to create balance. However, based on the factors mentioned above, the nutrients will be present in a meal in different proportions. As a rule, one can consider "My Plate" concept. Vegetables and fruits (4-6 servings and 1-2 servings respectively) take at least half (1/2) of the plate, protein (both plant and animal), a quarter (1/4) of the plate and carbohydrates (complex), a quarter of the plate.

Visit a nutrition professional to get specific quantities based on the factors mentioned above.

Serving sizes

A portion size is the amount of food one chooses to eat while serving size is a standardized amount of food.

- One cube of sugar has 5g of carbohydrates.
- Fruits, starchy carbohydrate, milk, or milk product have 15g of carbohydrate.
- A serving size of cooked rice (1 rounded stewing ladle /3/4 cup (240ml/ water glass)) has 15g of sugar and so does a portion of milk/milk products.
- The serving size of cooked pulses is 4-heaped tablespoons/ 1 stewing ladle.

- The serving size of cut fruit is 1 cup/ ½ cup juice.
- The serving size of uncooked vegetable and cooked vegetables is approximately 240mls (1 cup) and 120mls (1/2 cup) respectively. Contains 5g of carbohydrates.

The serving sizes of common foods are listed in the appendix.

2.2.2 Physical Activity

The benefits of physical activity include improved

- Mood
- Mobility
- Cardiac functioning
- Blood glucose control and
- Lipid profile.

These benefits depend on the type, duration, frequency, and intensity of the exercises. Aerobic exercises, strength training, and flexibility exercises are all important for PLD. Supervised exercise is more effective than unsupervised exercises and for some persons living with disability supervision is necessary to prevent injury. Supervision may be provided by a professional e.g., a physiotherapist or by a non-professional e.g., a friend or family member. The intensity of physical activity must be increased gradually rather than abruptly. It is advisable to have at the minimum a complete dilated eye exam, a foot exam and an assessment of cardiac function prior to initiating high intensity physical activity. Exercise routines must be consistently adhered to and should not depend on for example the weather or whether one feels like exercising or not.

2.2.3 Mental health

The idea of chronicity of a disease is difficult to accept and alien to certain Ghanaian tribes. Living with diabetes can take a toll on the mental health and diabetes is known to be associated with higher rates of depression. The self-care activities necessary for achieving good diabetes outcomes in the long-term, require daily dedication and focus. Periods that are particularly taxing include at the time of diagnosis and when a diagnosis of a new complication is made (critical times). Health care providers must routinely

- Screen for depression and especially at these critical times and refer to a mental health specialist as appropriate.
- Endeavour to use positive language when interacting with patients

- Be sensitive to the emotional demands of living with a chronic and largely symptomless condition like diabetes.
- Provide instant feedback on lifestyle choices as failure to do so can reduce the patient's motivation to continue to adhere to the recommended self-care routines.
- Avoid stigmatization of PLD

2.2.4 Smoking Cessation

There are no benefits of smoking. Passive and active smoking are detrimental to cardiovascular health. PLD must avoid smoking and seek professional assistance to quit smoking.

2.2.5 Alcohol use

Excessive alcohol can cause hypoglycaemia and hyperglycaemia. Alcohol contains carbohydrates and interferes with the body's ability to release glucose from liver stores.

2.2.6 General Recommendations

Specific lifestyle recommendations must be tailor-made to the individual's body weight, anti-diabetic medications and medical history. The following recommendations are not a substitute for professional medical advice/consultations:

1. It is best to avoid refined carbohydrates e.g., polished (white) rice, bread/pastry/spaghetti made with refined flour to limit post-prandial glucose spikes.
2. Water based cooking methods such as poaching, steaming, and boiling, are recommended over frying and grilling at high temperatures.
3. It is best to limit caloric intake after sunset and to finish all meals and snacks prior to sunset.
4. Individuals must endeavour to establish a physical activity routine. A minimum of 30 minutes of moderate to high intensity exercise on most days of the week is recommended, preferably supervised. Activities such as running, jogging, skipping, and cleaning louver blades are moderate to high intensity.
5. Products, which contain trans-fat, must be avoided and consumption of saturated fat restricted.
6. Screen for depression at the time of diagnosis and when new complications occur and manage appropriately.
7. Avoid cigarette smoking.
8. Avoid alcohol or use in moderation

2.2.7 Self-care for diabetes

The WHO has defined self-care as “the ability of individuals, families and communities to promote health, prevent disease, maintain health, and to cope with illness and disability with or without the support of a healthcare provider”. Self-care interventions have been shown to be both cost-saving and feasible in low- and middle-income countries.

Table 5: WHO recommendations for self-care of PLD

It is recommended that persons living with diabetes develop self-management plans with the support of their health provider to ensure that their blood sugar control is optimal, and clients are empowered to monitor, control and prevent complications and to self-report on time		
	Recommendation	Role of health workers
Type 1 and type 2 DM	People with type 1 and T2DM on insulin should be offered self-monitoring of blood glucose based on individual clinical need.	Discuss and educate patients on ○ Signs symptoms of hypo and or hyperglycaemia ○ Complications ○ Management of diabetes Teach patients (Refer to section on non-pharmacological management) ○ Self-monitoring/ how to check blood sugar ○ How to recognize danger signs and what to do when hypo or hyperglycaemic ○ Foot care ○ Healthy lifestyle ○ Blood pressure control: for patients who are capable, home monitoring of blood pressure is recommended
Type 1 DM	Management of diabetes: provide with urine ketone self- monitoring strips and ensure phone contact is established with a provider.	○ As above ○ Where patient is capable, teach urine ketone monitoring
Diabetes in Pregnancy	Self-monitoring of glucose as an additional option	○ As above

2.3 Pharmacological Management

Pharmacologic management of diabetes includes oral or injectable medications (e.g., soluble and long-acting insulin). Oral glucose lowering medications include

- Sulfonylureas e.g., gliclazide, glibenclamide, glimiperide
- Biguanides e.g., metformin
- Thiazolidinediones e.g., pioglitazone
- Dipeptidyl peptidase IV (DPP – 4) Inhibitor e.g., vildagliptin
- Sodium glucose transporter – 2 (SGLT - 2) Inhibitor e.g., empagliflozin

Drug therapy and glycaemic targets must be individualized based on factors such as

- Blood glucose levels (as assessed using FBS, RBS, HbA1c)
- Overall cardiovascular risk (as assessed using CVD risk scoring chart: see Appendix 7)
- Presence of diabetic complications e.g., CKD, Heart attack, CVA
- Patient specific circumstances such as
 - Ability to store insulin
 - Patient motivation e.g., willingness to take insulin injection
 - Social history and support system
 - Adverse events related to specific medication

A patient-centred approach should be used to guide the choice of pharmacologic agents. Considerations include efficacy, hypoglycaemia risk, impact on weight, potential side effects, cost, and patient preferences. Prescribers must be well versed with the indications, risks and benefits associated with each of these medications before prescribing.

The goals of therapy are to:

- i. Eliminate symptoms
- ii. Prevent, or slow the development of complications
- iii. Maintain HbA1c at or below the target value for individual patient
- iv. Improve the quality of life of the patient

When to initiate pharmacologic treatment

Initiate pharmacologic treatment based on any one or combination of the following:

- Patient above age 18 years
- Type of diabetes has been determined

For patients below 18 years of age, they must be referred to a District Hospital or to a Regional or Teaching Hospital to see a Medical Doctor or Specialist.

3.3.1 Initial Monotherapy

Criteria for initiating monotherapy

- Patient has $HbA1c \leq 7.5\%$
- For facilities unable to test for HbA1c, initiate monotherapy and refer to higher level for testing/care with feedback.

Metformin

- Recommended initial treatment for persons with T2DM.
- It should be used in addition to diet therapy and physical activity.
- Dosage should be increased gradually from 500 mg to a maximum of 2000 mg per day administered in (two) divided doses.
- Metformin should be given during or after meals to reduce gastrointestinal side effects.
- Metformin dose should be reduced to 1000 mg per day when there is renal impairment. In severe renal disease **avoid metformin**.
- Metformin does not cause weight gain or hypoglycaemia



Metformin: Contraindicated in

- Chronic kidney disease (estimated glomerular filtration rate (eGFR) <30 mL/minute/1.73m²)
- Severe reduced liver function
- Acute cardiac insufficiency
- Respiratory insufficiency
- People who abuse alcohol
- People with history of lactic acidosis

Sulfonylurea

- Second-generation sulfonylurea (preferably glimepiride) can be used as initial (first line) treatment when metformin is contraindicated or not tolerated.
- Sulfonylureas may cause weight gain and or hypoglycaemia



Glibenclamide: Contraindicated in

- People aged 60 years or older
- People with severe liver disease
- Patients for whom hypoglycaemia is a concern (people who are at risk of falls, who have impaired awareness of hypoglycaemia, who live alone)
- People who drive or operate machinery as part of their job.
- People who abuse alcohol

Insulin as monotherapy

- Insulin is the drug of choice for Type 1 DM
- Some patients living with T2DM - Consider initiating insulin therapy (with or without additional agents) in patients with newly diagnosed T2D who are symptomatic and/or have HbA1c $\geq 10\%$, 86mmol/mol and/or random blood glucose levels ≥ 16.7 mmol/L).
- Insulin dose requirements vary from patient to patient irrespective of age and body weight.
- The total daily insulin requirement for most adults and pre-pubertal children is about 0.6-0.8 units/kg, which should be given in divided doses.
- It is prudent to begin with lower doses and build this up with time to prevent hypoglycaemia.
- Insulin requirements increase during infections, puberty, periods of stress, accidental or surgical trauma, pregnancy etc.
- The usual route for insulin injections for outpatient diabetes treatment is subcutaneous, administered 30 minutes before a meal for regular/soluble insulin, premix insulin, or NPH insulin and immediately before the meal for rapid acting analogue insulins (e.g. aspart, lispro)

**Refer also to the section on insulin below*

3.3.2 Combination Therapy

Combination therapies are medicines with two or more classes of ant diabetic agents with complimentary mechanisms of action, provides superior efficacy and allows patient to reach their glycaemic targets.

Initiate combination therapy if

- Baseline HbA1c threshold to start with the initial combination therapy varies from 7.5% to 9%.
- Patient fails to achieve and sustain glycaemic control, where HbA1c remains 1% to 2% points above the desired target, a combination of metformin and another glucose lowering drug (GLD) is recommended as initial treatment.

Combination therapies may include

- i. Metformin + Sulphonylureas (SU)
- ii. Metformin + TZDs
- iii. DPP-4 inhibitor + SGLT2 (with or without metformin)

The combination with an SU, a DPP-4 inhibitor, an SGLT2 inhibitor, or GLP1 RA may be the preferred option. In people with cardio-renal complications, strokes, heart failure, etc. GLP1RA or SGLT2 inhibitors are the preferred option

Criteria for combination therapy

- Intensification of treatment when metformin alone fails to control glycaemia to pre-determined HbA1c goals:
- Where cost is a limiting factor, add a second-generation sulphonylurea (preferably gliclazide) to metformin in patients with inadequately controlled glycaemia on metformin, along with diet therapy and physical activity.
- In hyperglycaemic patients with symptoms, refer as patients may need insulin therapy. Basal insulin may be used as a second line therapy
- Hypoglycaemia is a possible side effect of sulphonylurea, more frequent with glibenclamide than with gliclazide.
- Intensification of treatment when metformin and sulphonylurea fail to get the patient to target
- Refer for insulin treatment or add insulin to oral medication, Analogue insulins are preferable. Use of human insulin should be restricted to situations where cost is a barrier to access to insulin.
- Where Insulin is inaccessible to the patient for whatever reason (unacceptable, storage etc.), a DPP-4 inhibitor, SGLT-2 inhibitor, GLP1 receptor antagonists or a thiazolidinedione (TZD) may be considered. Prescribers must be well versed with the indications, risks and benefits associated with each of these medications before prescribing them.

Triple therapy: A third GLD should be added if a combination of a GLD with metformin is not sufficiently effective to reach or maintain the HbA1c target within 2-3 months. Triple therapy with three oral GLDs may be effective before adding an injectable.

The usual triple combinations are:

- Metformin + SU + pioglitazone OR
 - Metformin + SU + DPP4 inhibitor,
 - Recently SGLT2 inhibitors have been considered as an option to add to metformin + SU
- OR
- Metformin + DPP4 inhibitor.
 - Metformin + SGLT2 inhibitor + GLP1 receptor agonist may be a useful combination for those who have not lost sufficient weight)

Fear of injection should not be a reason to delay insulin; however, if the patient can remain on target without insulin, the health provider may spend less time on glucose monitoring and less education time explaining how to use insulin and how to recognize and manage hypoglycaemia.

3.3.3 Insulin Therapy

Insulin: is the drug of choice for Type 1 and some patients living with T2DM. Consider initiating insulin therapy (with or without additional agents) in patients with newly diagnosed T2D who are symptomatic and/or have HbA1c $\geq 10\%$ (86 mmol/mol) and/or random blood glucose levels ≥ 16.7 mmol/L).

If non-insulin monotherapy at maximum tolerated dose does not achieve or maintain the HbA1c target after three (3) months, add a second oral agent, a glucagon-like peptide 1 receptor agonist, or basal insulin.

Insulin

- Insulin injections should be taken at same time every day
- Insulin administered for day-to-day diabetes treatment is given subcutaneously usually 30 minutes before meals
- All insulin injections should preferably be administered in the abdomen, although they can also be given in the thigh, hip or buttock regions
- Insulin dosing can be safely reduced in patients with renal insufficiency

Combination injectable therapy for type 2 diabetes.

- Initiate basal Insulin. Usually with metformin, with or without another non-insulin agent
- Start 10iu /day or (dosage)iu/kg/day. Adjust: 10-15% or 2-4 units once or twice weekly to reach FBG target
 - For Hypoglycaemia: Determine and address cause; if no clear reason for hypoglycaemia,
 - Dose by 4 units or 10-20%
 - If HbA1c not controlled, consider combination injectable therapy
 - Add one rapid-acting insulin injection before largest meal
 - Start: 4 units, 0.1U/kg/day or 10% basal dose.
- If HbA1c <8%, consider basal insulin by same amount. Adjust: dose by 1-2 units or 10-15% once or twice weekly until self monitoring blood glucose SMBG target reached.
 - For Hypoglycaemia: Determine and address the cause; if no clear reason for hypoglycaemia,
 - Dose by 2-4 units or 10-20%
 - Change to premixed insulin twice (2X) daily (before breakfast and supper)
 - Add GLP-1A if not tolerated or HbA1C target not reached,
 - Change to 2 insulin injection regimen.

If goals are not met, consider changing to alternative insulin regimen.

If HbA1c is not controlled, advance to basal bolus.

If HbA1c is not controlled, advance to 3rd injection new inclusion Add ≥ 2 rapid-acting insulin injections before meals ('basal-bolus') Start: 4 units, 0.1 U/Kg/day or 10% basal dose.

- If HbA1c <8%, consider basal by same amount. Adjust: dose(s) by 1-2 units or 10-15% once or twice weekly to achieve SMBG target.
 - For Hypoglycaemia: Determine and address the cause; if no clear reason for hypoglycaemia,
 - Dose by 2-4 units or 10-20%
 - Change to premixed analogue insulin 3 times daily (breakfast, lunch, supper)
 - Start: Add additional injection before lunch
 - Adjust: dose(s) by 1-2 units or 10-15% once or twice weekly to achieve SMBG target.
 - For Hypo: Determine & address cause; if no clear reason for hypo, dose by 2-4 units or 10-20%
- If goals are not met, consider changing to alternative insulin regimen

- Refer for insulin treatment or add insulin to oral medication, Analogue insulins are preferable. Use of human insulin should be restricted to situations where cost is a barrier to access to insulin.
- If insulin is inaccessible to the patient for whatever reason (unacceptable, storage etc.), a DPP-4 inhibitor, SGLT-2 inhibitor, GLP1 receptor antagonists or a thiazolidinedione (TZD) may be considered.

Table 6: Drug-specific and patient factors to consider when selecting antidiabetic treatment in adults with type 2 diabetes

Class of Medicine		Efficacy	Hypoglycaemia	Weight Change	CV effects		Cost	Route of admin Oral/SC	Renal Effects		Additional Consideration
					ASCVD	HF			Progression of DKD	Dosing/use consideration	
Metformin		High	No	Neutral (potential for modest loss)	Potential benefits	Neutral	low	Oral	Neutral	Contraindicated with EGFR <30ml/min/1.73m ²	1. Gastrointestinal side effects common (diarrhea, nausea) 2. Potential for B12 deficiency
Sulfonylurea (2 nd generation)		High	Yes	Gain	Neutral	Neutral	Low	Oral	Neutral	1. Glibenclamide: not recommended 2. Gliclazide and glimepiride: initiate conservatively to avoid hypoglycaemia.	FDA Special Warning on increased risk of cardiovascular mortality based on studies of an older sulfonylurea (tolbutamide)
Thiazolidinediones		High	No	Gain	Potential benefit: pioglitazone	Increased risk	Low	Oral	Neutral	1. No dose adjustment required 2. Generally not recommended in renal impairment due to potential for fluid retention.	1. FDA Black Box: Congestive heart failure (pioglitazone) 2. Fluid retention (oedema; heart failure) 3. Benefit in NASH. 4. Risk of bone fractures. 5. Bladder cancer (pioglitazones)
Insulin	Human Insulin	Highest	Yes	Gain	Neutral	Neutral	Low (SC)	SC	Neutral	Lower insulin doses required with a decrease in eGFR titrate per clinical response	1. Injection site reactions. 2. Higher risk of hypoglycaemia with human insulin (NPH or premixed formulations) vs analogues
	Analogues						High	SC			
DPP-4 inhibitors,		Intermediate	No	Neutral	Neutral	No	High	Oral	Neutral	1. Renal dose adjustment required (except linagliptin)	1. Pancreatitis has been reported in clinical trials. Discontinue if pancreatitis is suspected 2. Joint pain
SGLT-2 inhibitors		Intermediate	No	Loss	Benefit: empaglifloxin, canaglifloxin	Benefit empaglifloxin, dapaglifloxin & canaglifloxin	High	Oral	Benefits empaglifloxin, dapaglifloxin & canaglifloxin	Renal dose adjustment required (canaglifloxin, dapaglifloxin, empaglifloxin)	1. Mycotic Genitourinary infections 2. Bone Fractures 3. ↑LDL cholesterol 4. Risk of Fournier's gangrene 5. Amputations

3.0 MONITORING OF THE PLD IN PRIMARY HEALTH CARE

Diabetes is a life-long disease and patients must be monitored regularly and routinely. The monitoring is essential to assess the whole patient and not only the adequacy of blood glucose control so that problems can be detected early and resolved. The following require monitoring:

3.1 Blood glucose

Fasting blood glucose should be monitored or assessed during scheduled periodic clinic reviews. In addition, 2-hour post-prandial blood glucose levels if available in patients who are performing home monitoring should also be reviewed during scheduled clinic reviews. Patients should be encouraged to monitor their 2-hour post-prandial blood glucose levels.

- Post-prandial spikes are just as undesirable as hypoglycaemia.
- Glycated haemoglobin (HBA1c) should be performed at least twice in a year to monitor long-term blood glucose control. Where it is not available, efforts should be made to refer patients to higher level facilities

3.2 Urine dipstick

The urine dipstick should be performed at each clinic visit.

- Micro albuminuria is an early sign of diabetic kidney disease.
- The presence of protein in urine may be an indicator of diabetic kidney disease.
- High glucose levels in urine may help to identify persons with poor glucose control, non-compliant to therapy or those who require adjustment to treatment.
- Glucose in the urine must prompt further history taking on medication use and adherence.
- The urine dipstick result may also help identify urinary tract infection, which adversely impact blood glucose control.
- Urine dipstick can detect significant ketosis, which may be a pointer to either starvation ketosis as a result of prolonged fasting or diabetic ketoacidosis.

Micro albuminuria is an early sign of diabetic kidney disease. There are special dipsticks for detecting micro albuminuria, but these may not be available in all health facilities.

3.3 Kidney function tests

The kidney function test should be assessed at least yearly and more frequently for higher risk persons. Where it is not available, efforts should be made to refer patients to higher level facilities.

3.4 Side effects of medication

Providers should be aware of the side effects of commonly used medications for diabetes mellitus. Side effects of medicines lead to non-adherence to treatment. The health care professional should give appropriate counselling and reassurance.

3.5 Hypoglycaemia

For PLD, hypoglycaemia refers to blood glucose level below 4.0 mmol/l. It is more common in

- Elderly PLD
- Patients with impaired kidney function
- Patients on long-acting oral anti-hyperglycaemic medications or insulin.

Severe hypoglycaemia (Blood Glucose <2.2mmol/l) may result in

- Alteration of consciousness
- Fits
- Self-injury and
- Various degrees of brain damage.

These patients need immediate help (refer to management of hypoglycaemia).

After successful treatment and recovery of the patient from hypoglycaemia, the cause must be determined, and appropriate measures taken to prevent its recurrence.

Causes may include:

- i. Overdosing of medication e.g., insulin, sulphonylureas (such as glibenclamide)
- ii. Inappropriate anti-diabetic medication use in renal impairment and the elderly
- iii. Omitted or inadequate amount of food
- iv. Excessive physical activity
- v. Excessive alcohol intake
- vi. Insulinomas (insulin producing tumours)

Clinical features of hypoglycaemia vary from one patient to the other. The list below is not exhaustive but captures the commonest features associated with hypoglycaemia.

Symptoms of hypoglycemia

- Dizziness
- Blurred vision
- Headaches
- Palpitation
- Sweating
- Shaking of the hands and body
- Unconsciousness
- Convulsions
- Irritability and abnormal behaviour especially in children

Signs of hypoglycemia

- Sweating
- Tremors
- Tachycardia & bounding pulse
- Confusion
- Convulsions
- Unconsciousness
- Hypotension
- Coma
- Death

3.5.1 Management of hypoglycaemia

Mild or moderate cases of hypoglycaemia may be treated at home using non-pharmacologic means when identified by the individual patient or health worker to forestall development of severe hypoglycaemia.

i. Mild symptoms

- Give 2-3 teaspoons of granulated sugar **or**
- 3 cubes of sugar or
- Half a bottle (at least 150mls) of sugar-containing soft drink (not 'diet' drinks) to individuals who are conscious.

In the absence of the above, a glass of milk or fruit drink and a tablespoonful of honey are useful. The above measures should be followed immediately by a meal or snack

The rule of 15 (for managing hypoglycaemia)

- Recheck blood glucose 15 minutes after the above interventions
- If still hypoglycaemic, repeat the above interventions.
- After second interventions, recheck blood glucose after 15 minutes. If still hypoglycaemic **REFER**.

ii. Moderate hypoglycaemia

- Same as for mild hypoglycaemia but repeat after 10 minutes.
- If no improvement is observed, the patient should then be referred for in-hospital treatment for severe hypoglycaemia using intravenous dextrose protocols.

iii. Severe hypoglycaemia

Adults

- 50% solution 25-50 ml over 1-3 minutes through a large vein
- Then 5-10% solution 500 ml 4 hourly until the patient can eat normally

Children

- 10% solution 4 ml/kg body weight over 1-3 minutes through a large vein
- Then 5% solution according to total daily fluid requirement until blood glucose levels normalise

2nd Line Treatment

Glucagon IV, IM or SC

- Adults 1 mg stat.
- Children 8-18 years (bodyweight > 25 kg); 1 mg stat.
- 8-18 years (bodyweight < 25 kg); 500 micrograms stat.
- 1 month-8 years; 500 micrograms stat.
- Neonate; 20-microgram/kg stat.

Hypoglycaemia Unawareness

It refers to patients with sugars below 4.0 mmol/l but with no signs or symptoms of hypoglycaemia. It can occur in patients undergoing tight glucose control. When detected,

- The glucose control must be relaxed
- Discuss situation with patient

3.5.2 Management of Hyperglycaemia

For guidelines on management of hyperglycaemia move to Appendix 2.

3.6 Other cardiovascular risk factors

It is essential to monitor diabetic patients to identify possible presence of additional cardiovascular risk factors. Diabetes is associated with excess CVD risk even with optimal blood glucose control. It is important that:

- Blood pressure is measured and documented at every clinic visit. Home BP monitoring provides useful information and should be encouraged especially monitoring of waking up BP.
- Lipid profile should also be measured annually and more frequently for those on lipid lowering medication.
- BMI
- Waist-to-hip ratio
- Abdominal circumference

3.7 Eye Care

Diabetes mellitus can result in diabetic eye disease especially in people with poor blood glucose control. Good control of blood glucose reduces the risk for developing diabetic eye disease.

Symptoms of diabetic eye disease include:

- Blurry or wavy vision
- Frequently changing vision—sometimes from day to day

- Dark areas or vision loss
- Poor colour vision
- Spots or dark strings (also called floaters)
- Flashes of light

Recommendation for DM eye care

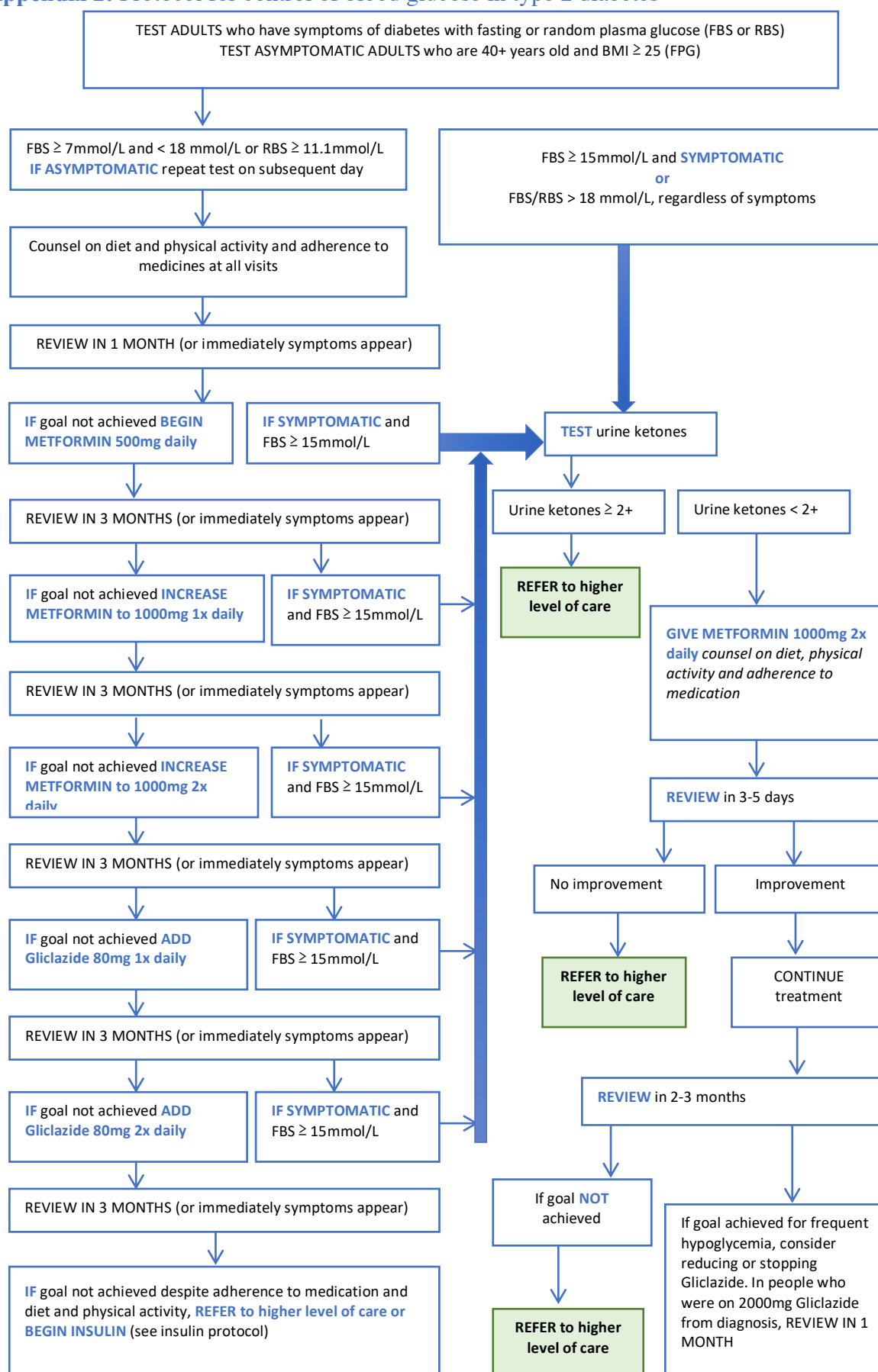
1. Yearly eye examination by an ophthalmologist. Patients at higher risk may be monitored more frequently.

APPENDICES

Appendix 1: Self-care strategies

SELF CARE STRATEGIES	HEALTH WORKER TO TEACH PATIENT	CARE AT HOME
Foot care	How to maintain foot hygiene by inspecting the feet; Look for sores, wounds and bites. If present client should report immediately to the health care provider to manage sores etc. Wear appropriate footwear Report immediately if • Sore or wound is not healing • Previously dry wound start ulcerating or becomes wet • Sore, wound or limb is painful	Assess feasibility of client to manage wound at home considering • Ability to dress sores • Ability of client to report if wounds worsen • Availability of logistics Appropriate footwear (refer to**) Regular examination of foot
Signs and symptoms of Hypoglycaemia	How to recognize hypoglycaemia: Client may have any of the following if the blood sugar is too low • Feel Dizzy • Experience Blurred vision • Headaches • Palpitation • Sweating • Shaking of the hands and body • Unconsciousness • Convulsions • Irritability and abnormal behaviour especially in children	All patients prescribed a glucose-lowering agent, which can cause hypoglycaemia, must be educated on • Prevention of hypoglycaemia and • Treatment of hypoglycaemia Where available, glucose preparations and or glucagon injections should be prescribed. Hypoglycaemia may occur even in people who have poor glycaemic control. Home remedies include banana, sugar, sugar-sweetened drinks, fruit juice
Signs and symptoms of hyperglycaemia	Hyperglycaemia tends to be asymptomatic and blood glucose levels maybe very high without any symptoms at all until DKA or HHS sets in.	

Appendix 2: Protocol for control of blood glucose in type 2 diabetes



Appendix 3: Complications of Diabetes

Acute complications of DM

Poor glucose control is associated with increased risk of the following:

Diabetic coma

* Including ketoacidosis and lactic acidosis
* 10-50 % mortality rate

Diabetic ketoacidosis

* 10-30 % mortality rate
* Initial manifestation 20-30% of time

Dehydration

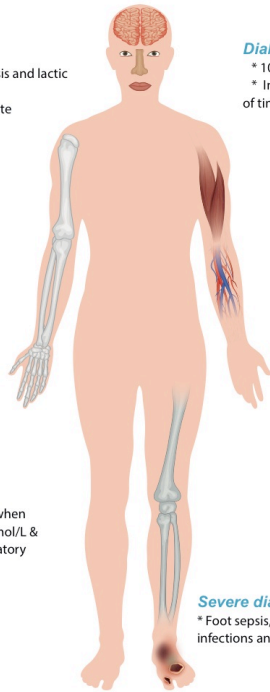
* Requiring hospitalization

Lactic acidosis

* > 50 % mortality when Lactic acidosis > 5mmol/L & septic shock or respiratory failure

Severe diabetes-related infections

* Foot sepsis, severe hand infections and mucormycosis



Chronic complications of DM

Poor glucose control is associated with increased risk

Microvascular

Eye disease(Retinopathy) and blindness

After 15 years:
* 40% develop retinopathy
* 2% become blind

Nerve damage (Nephropathy)

* Up to 50% of patients

Kidney disease (Nephropathy)

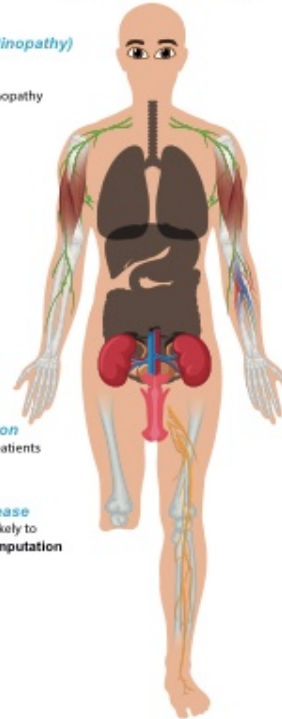
* Up to 1/3 of patients

Erectile dysfunction

* Up to 75% of male patients

Diabetic foot disease

* 15-40 times more likely to require lower limb amputation



Credit: Author's own construct

Appendix 4: Summary of WHO diagnostic criteria

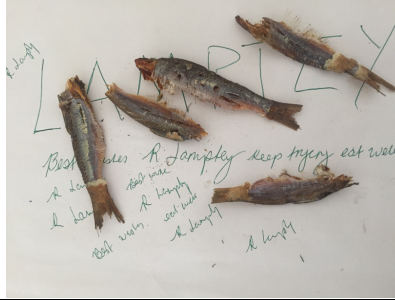
1	FBS $\geq$ 7.0 mmol/L. Fasting is defined as no caloric intake (food intake) for at least 8 hours OR
2	2-hour Postprandial glucose $\geq$ 11.0 mmol/L during OGTT ¹ . The test should be performed as described using a glucose load containing the equivalent of 75g anhydrous glucose dissolved in 250-300 ml water. OR
3	A random plasma glucose $\geq$ 11.1 mmol/L. Random is defines as any time of the day, without regard to the interval since the last meal OR
4	HbA1C $\geq$ 6.5% (48mmol/L). The test should be performed in the laboratory using a certified and standardized method

¹ OGTT: Oral Glucose Tolerance Test

Appendix 5: Examples of local foods appropriate for diabetics

Name of local food	PICTURE
Lima beans/ locally called in Ga -akpatramo	
A serving size for plantain. the serving size for plantain is about a 1/3 cup and this amount has 15g of carbs in it. - Any photographer can re-create the image on a GHS background.	
Fresh salad- just the vegetables with no dressing	
Leafy green vegetable specifically kale	
Avocado's: rich in monounsaturated fatty acids.	
Different types of herbs specifically from left to right mint-the peppermint variety, then parsley then cilantro	

Herrings are also high in polyunsaturated oils



Appendix 6: Risk Assessment for Diabetes²



Are you at risk for type 2 diabetes?

Diabetes Risk Test:

WRITE YOUR SCORE
IN THE BOX.

1. How old are you?

Less than 40 years (0 points)

40–49 years (1 point)

50–59 years (2 points)

60 years or older (3 points)

2. Are you a man or a woman?

Man (1 point)

Woman (0 points)

3. If you are a woman, have you ever been diagnosed with gestational diabetes?

Yes (1 point)

No (0 points)

4. Do you have a mother, father, sister or brother with diabetes?

Yes (1 point)

No (0 points)

5. Have you ever been diagnosed with high blood pressure?

Yes (1 point)

No (0 points)

6. Are you physically active?

Yes (0 points)

No (1 point)

7. What is your weight category?

See chart at right.

Height	Weight (Kg)		
4' 10"	54.00 – 64.00	65.00 – 86.00	87.00+
4' 11"	56.00 – 67.00	68.00 – 89.00	90.00+
5' 0"	58.00 – 69.00	70.00 – 92.00	93.00+
5' 1"	60.00 – 71.00	72.00 – 95.00	96.00+
5' 2"	62.00 – 74.00	75.00 – 98.00	99.00+
5' 3"	64.00 – 76.00	77.00 – 102.00	103.00+
5' 4"	66.00 – 78.00	79.00 – 105.00	106.00+
5' 5"	68.00 – 81.00	82.00 – 108.00	109.00+
5' 6"	70.00 – 84.00	85.00 – 112.00	113.00+
5' 7"	72.00 – 86.00	87.00 – 115.00	116.00+
5' 8"	74.00 – 89.00	90.00 – 118.00	119.00+
5' 9"	77.00 – 92.00	93.00 – 122.00	123.00+
5' 10"	79.00 – 94.00	95.00 – 126.00	127.00
5' 11"	81.00 – 97.00	98.00 – 129.00	130.00+
6' 0"	83.00 – 100.00	101.00 – 133.00	134.00+
6' 1"	86.00 – 103.00	104.00 – 137.00	137.00+
6' 2"	88.00 – 105.00	106.00 – 141.00	142.00+
6' 3"	91.00 – 108.00	109.00 – 144.00	145.00+
6' 4"	93.00 – 111.00	112.00 – 148.00	149.00+

1 point 2 points 3 points

If you weigh less than the amount in the left column: 0 points

Adapted from Bang et al., Ann Intern Med 151:775–783, 2009 • Original algorithm was validated without gestational diabetes as part of the model.

ADD UP
YOUR SCORE.

If you scored 5 or higher:

You are at increased risk for having type 2 diabetes. However, only your doctor can tell for sure if you do have type 2 diabetes or prediabetes, a condition in which blood glucose levels are higher than normal but not yet high enough to be diagnosed as diabetes. Talk to your doctor to see if additional testing is needed.

Type 2 diabetes is more common in African Americans, Hispanics/Latinos, Native Americans, Asian Americans, and Native Hawaiians and Pacific Islanders.

Higher body weight increases diabetes risk for everyone. Asian Americans are at increased diabetes risk at lower body weight than the rest of the general public (about 15 pounds lower).

Lower Your Risk

The good news is you can manage your risk for type 2 diabetes. Small steps make a big difference in helping you live a longer, healthier life.

If you are at high risk, your first step is to visit your doctor to see if additional testing is needed.

Visit diabetes.org or call 1-800-DIABETES (800-342-2383) for information, tips on getting started, and ideas for simple, small steps you can take to help lower your risk.

Learn more at diabetes.org/risktest | 1-800-DIABETES (800-342-2383)

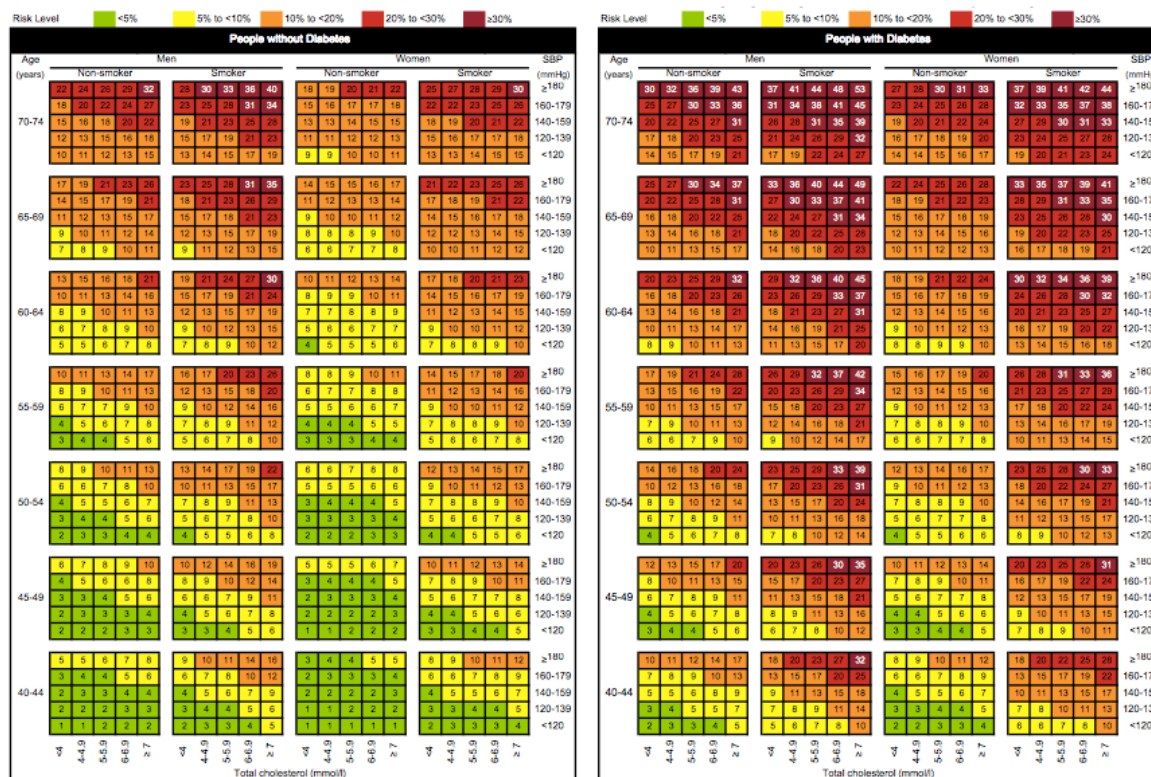
² Adapted from the American Diabetes Association

Appendix 7: CVD Risk Assessment³

WHO cardiovascular disease risk laboratory-based charts

Western Sub-Saharan Africa

Benin, Burkina Faso, Cabo Verde, Cameroon, Chad, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Sao Tome and Principe, Senegal, Sierra Leone, Togo



³ Adapted from the WHO Hearts: Technical Package for cardiovascular disease management in primary health care

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