MEDECINS SANS FRONTIERES

My Diabetes Companion

FOREWORD

Diabetes is a chronic Non Communicable Disease (NCD) and sustained efforts are needed from patients, their families and health care providers to deal with it successfully. With the COVID-19 pandemic ravaging all corners of the globe, more than ever, diabetes needs to be at the center of our attention.

Following the quote "The diabetic who knows the most, lives the longest" by Elliott P. Joslin (1869-1962), doctor and pioneer in diabetes management and patient education, we set out to develop this comprehensive context-adapted booklet to empower all stakeholders that include patients (including expert patients), relatives and Health care workers.

The booklet is based on existing evidence about diabetes, and real time experience in diagnosing and managing diabetes in the Manicaland NCD pilot project, Zimbabwe. Patients and health care workers from Victoria Chitepo Provincial Hospital, Chipinge District Hospital, St Peter's Mission Hospital, and nine primary health care sites in Chipinge District contributed to its content with support of MSF mentors. Valuable guidance was also provided by Sister P. Rwizi, diabetes educator at Harare Central Hospital.

The booklet is intended for patients to read step-wise and discuss each section with their health care worker, on and off-site. Family members and caretakers are also encouraged to study the booklet as part of the learning process and management of diabetes as a team.

We would like to thank and recognize the expert patients and health care workers from Ministry of Health and Child Care (MoHCC) in Zimbabwe, and from Médecins Sans Frontières.

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CONTENTS

1. AN INTRODUCTION TO DIABETES MELLITUS

- The body cells need sugar to work normally. Sugar gets into the cells with the help of a chemical produced in our body called insulin. In a healthy person, insulin helps turn sugar into energy. Through its actions, insulin lowers blood sugar levels.

- If there is not enough insulin, or if the body stops responding to insulin, sugar builds up in the blood.

- Normal Blood sugar levels are from 4-11mmol/litre

- **Therefore, Diabetes is a condition that results in too much sugar in your body.**

- The main types of Diabetes are:
  Type 1 – characterized by insufficient insulin production and commonly diagnosed in children and young adults.
  Type 2 – The body cells do not respond to insulin well, commonly diagnosed in adults.

WHAT ARE THE SIGNS AND SYMPTOMS OF DIABETES?

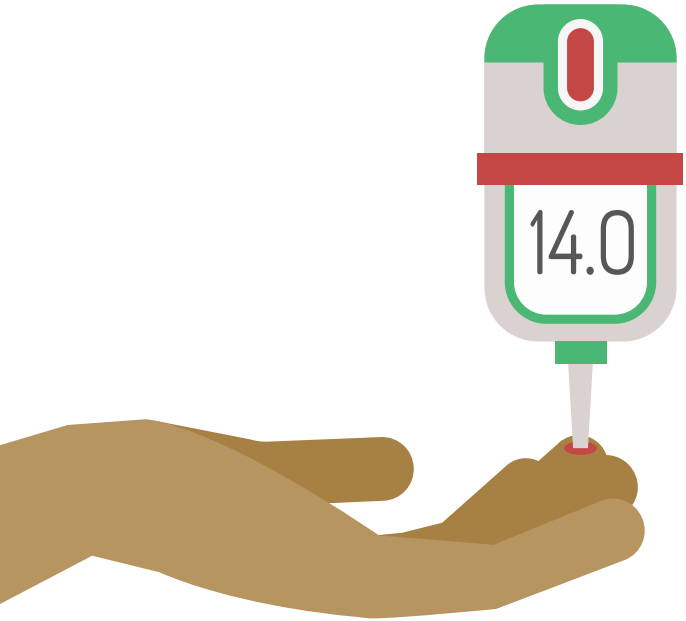
- Excess thirst
- Passing urine frequently, even at night
- Feeling hungry frequently
- Unintended weight loss
- Tiredness
- Blurred vision
- Irritability
- Slowly healing sores
- Dry and itchy skin
- Losing feeling in your feet or feeling a tingling sensation

TESTS TO CONFIRM DIABETES

1. Fasting Blood Sugar (FBS): a blood test to check the level of your sugar in the blood before you have eaten anything in the morning. the last thing you should have eaten is last nights supper.
2. Random Blood Sugar (RBS): a blood sugar test taken at anytime of the day, whether you have eaten or not.
3. HbA1c or simply A1c is a blood test that gives the average blood sugar over a period of 3 months.

Table 1: Diabetic tests

Diabetes test	Normal/Target range
Fasting Blood Sugar	4-7mmol/L
Random Blood Sugar	4-11mmol/L
HbA1c	Less than 7%



WHAT CAN BE COMPLICATIONS IN DIABETES?

- Blindness
- Foot ulcer, which may lead to amputation
- Coma
- Kidney damage
- Nerve damage
- Sexual problems (impotence)
- Hypertension/heart attack
- Stroke.

WHAT ARE THE RISK FACTORS FOR DIABETES?

- Family history of Diabetes Mellitus
- The likelihood of developing diabetes is much higher if you:
  - » overweight or obese
  - » suffer from heart disease
  - » live a sedentary lifestyle i.e.
    - not exercising, eating junk
    - food or are pregnant
  - » are 40 years or older
  - » are Black or Indian
  - » have high blood pressure (above 140/90)
  - » Have had diabetes during pregnancy or have delivered a large baby (4kg or more).

DIABETES TREATMENT

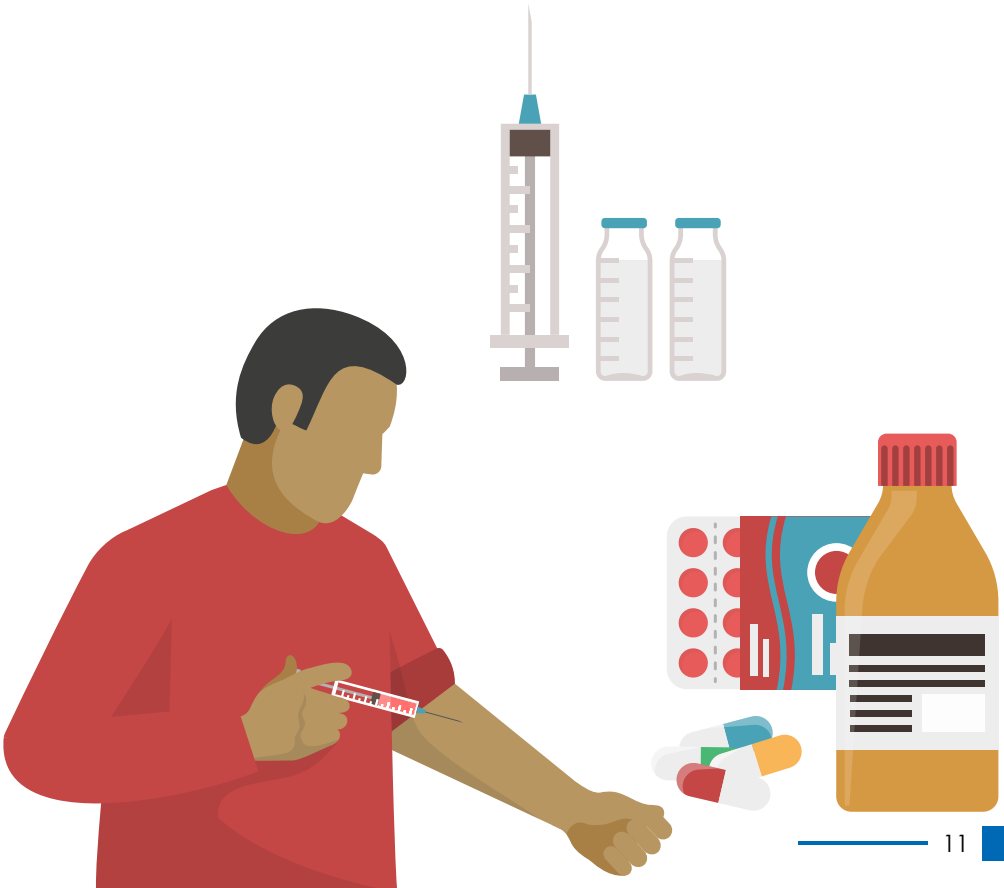
Diabetes can be treated by

1. Adhering to a particular lifestyle.
2. Taking medications as prescribed

The medications may be oral tablets or insulin injections depending on the type of Diabetes.

Your health care provider will work together with you to come up with a medicines and lifestyle prescription that best suits your situation.

It is important to note that ultimately, most Diabetes patients will need to take daily insulin injections in order to control the disease.



HOW DO I KNOW IF MY MEDICATION IS EFFECTIVE?

Your sugar levels will be within the normal range.

Diabetes test	Normal/Target range
Fasting Blood Sugar	4-7mmol/L
Random Blood Sugar	4-11mmol/L
HbA1c	Less than 7%

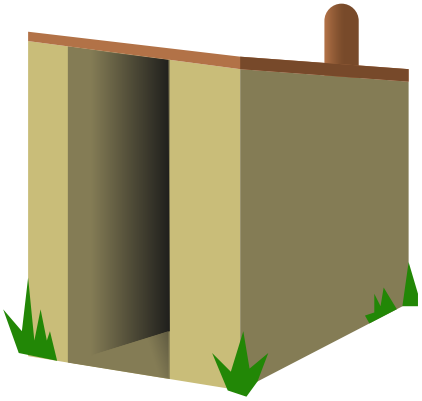
Your health care provider will advise you on the frequency of blood sugar testing to determine whether you are doing well.

HOW ABOUT SIDE EFFECTS?

Different medicines have different side effects. Report to your clinic if you think you have side effects, which may include:

- Allergic reactions
- Upset stomach
- Diarrhoea or muscle pain

If you have any of these, seek immediate medical attention. However, many diseases can cause similar discomforts.



MYTHS AND FACTS ON DIABETES

Myth	True/false	Explanation
Diabetes is not a serious condition	False	If untreated, many people with diabetes are likely to become sick or even die from complications
Diabetes is caused by evil spirits	False	The body does not produce enough insulin, or no insulin at all, so sugar builds up in the blood and cannot be used for energy production
Diabetes can be cured	False	Diabetes Mellitus is a lifelong condition which can only be controlled through lifestyle changes and medications. It is not curable.
Diabetes is a death sentence	False	With appropriate treatment and lifestyle changes, people with diabetes can lead a near normal life
If someone in your family has diabetes, you will also develop it	False	It is true that being born in a family with a history of diabetes (first degree relatives) increases the chance of developing the condition. But by avoiding risky behaviours such as smoking, harmful use of alcohol, obesity, poor diet (how much people eat, what they eat) and a sedentary lifestyle one can prevent or delay the onset of diabetes

Myth	True/false	Explanation
If no one in your family has diabetes, do not worry about diabetes!	False	Even if no one in your family is suffering from diabetes, you still may get it. Excess body weight for example puts you at risk for diabetes.
You cannot exercise much or play sport if you are diabetic	False	Exercise for a minimum of 30 min a day for at least 3-5 times a week is encouraged. All forms of sports are also encouraged.
You will get diabetes if you are overweight	False	Being over-weight or obese increases the chance of developing diabetes; it is encouraged to have a normal body weight, ask your clinician about a health body mass index.
Type 1 diabetes is caused by eating too much sugar	False	Sugar in itself does not cause type 1 Diabetes Mellitus. But too much sugar in your diet does contribute to obesity which is a risk factor to development of the type 2 diabetes.
Diabetics should avoid eating sweets and other types of sugary foods	True	Diabetic people should avoid free sugars such as table sugars, sugary drinks, fruit juice, sweets as well as foods made with sugar such as cakes and biscuits. People with diabetes should also limit the quantities of starchy meals such as sadza, which are made up of complex sugars.

Myth	True/ false	Explanation
I can use herbs to treat diabetes	False	Herbs have not been proved to treat diabetes therefore you are not advised to use them.
Type 2 diabetics go on insulin because they would have failed to adhere to health care advice.	False	During the early stages of the disease, insulin levels can be controlled adequately through healthy eating, exercise and oral medications. However, as disease progresses, an increasing number of people will need insulin to make up for the increasing lack of insulin production by the body. If insulin treatment is recommended by your health care provider, it is likely to have a positive impact on your diabetes and your health.
Diabetes medications interfere with ARVs	False	You should continue with both treatments at the same time. Inform your health care worker about any other condition you are being treated.
I can pass Diabetes to my family and friends	False	Diabetes Mellitus is not infectious; it cannot be passed from one person to the other.
I can have children	True	Diabetic patients can have children, but it is important to tell your health service provider about your diabetes.

Myth	True/false	Explanation
I can eat the same foods as my family	True	Yes, you and your family can eat the same healthy foods. You can show the way forward to the whole family on how to eat healthy. Share with them the concept of the "Healthy Plate" see page.
You do not need to eat special foods if you have diabetes.	False	During the early stages of the disease, insulin levels can be controlled adequately through healthy eating, exercise and oral medications. However, as disease progresses, an increasing number of people will need insulin to make up for the increasing lack of insulin production by the body. If insulin treatment is recommended by your health care provider, it is likely to have a positive impact on your diabetes and your health.

NOTES

Reflection

Are you now able to explain to your relatives what is diabetes?

2. DIABETES LIFESTYLE: EATING AND EXERCISE

WHAT IS HEALTHY EATING?

Healthy eating involves eating planned, regular, nutritious foods.

Eating a healthy diet is part of diabetes treatment. Many people need to change **what** they eat and **how much** they eat to help treat their diabetes. This will help keep the sugar at or near normal level and prevent long-term problems. Changing the diet can also help to treat obesity and high blood pressure

PLAN YOUR MEALS

- Eating raises blood sugar, while being active lowers it, so you need to plan your meals and your activity levels.
- Aim to eat meals at the same time each day, especially if you are on insulin or tablets that increase insulin levels such as Glibenclamide.
- Plan to eat breakfast, lunch and supper and small snacks in between, daily.
- Avoid getting hungry or becoming too full. This helps to prevent low or high blood sugars.

BASIC FOOD GROUPS AND NUTRITION

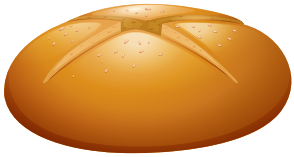
Carbohydrates

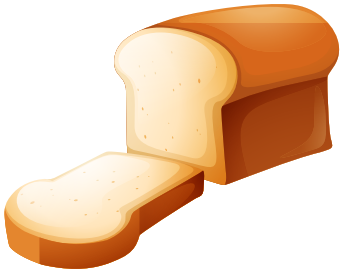
They are rich in energy and constitute the fuel of our body. They are needed in moderation. Examples of carbohydrates

- Starchy food: Bread, maize, rice, sadza/isitshwala, sorghum, rapoko, potatoes, sweet potatoes, cassava, yams, porridge, oats, breakfast cereals, macaroni/spaghetti
- Table sugar and added sugars (from processed foods and sweetened beverages): free sugar, sweets, fizzy drinks and other sugar sweetened drinks, chocolate, biscuits, cakes, canned fruits
- Natural sugar coming from honey and sugar cane : this type of sugar is quickly absorbed
- Natural sugar coming from fruits, vegetables and milk: they contain different amounts of natural sugars. They are not

counted as added sugars. But fruit juice should be avoided as it tends to have lots of energy without the added benefit of fibre, which is found in the whole fruit.

- Refined or whole grain products:
  - » Refined products are lower in fibres. They are broken down fast and increase blood sugar to a greater degree. Examples of refined products include: flour, white bread or bread rolls, muffins, white rice, refined sadza/isitshwala).





  - » Whole grain products are rich in fibres and are slowly broken down and absorbed. Examples are rapoko, brown rice, whole-grain cereal, oatmeal.

Proteins

These are building blocks for the body.

Examples of foods rich in Proteins

- Meat, fish, milk products, beans, peas, soya chunks, eggs, nuts.
- Eat a variety of healthy protein-rich foods but avoid protein sources with unhealthy fats.
- Opt for lean meat such as chicken without the skin, fish, eggs, beans, peas, soy beans or soya chunks, round-nuts (niymo/indhlubu), low fat dairy, peanuts and other nuts, sunflower or pumpkin seeds.
- Avoid read meat and processed meat such as, sausages, polony, corned beef. Opt for low fat dairy products.
- Have two to three daily servings of protein-rich foods, and 1-2 servings of fish per week (matemba, makrel, bream).

Fats

Fats are essential in the body to give your body energy. Fats also support cell growth and help to keep the body warm and help in the absorption of nutrients.

- There are different types of fats. Some are better for your body than others. It's good to reduce the intake of total fat.
- Limit fat from animal products such as fatty meat and dairy fat (whole milk, butter, fatty cheese and ice cream).
- Limit cooking oil; a bottle of 2litre cooking oil should last a month when used by a family of six people.

Fruits, vegetables, vitamins, fibre

Vegetables are high in fibres, vitamins and minerals. They also contain various amounts of carbohydrates (starch and sugar)

- Eat starchy fruits and vegetables in moderation (maize, potatoes, sweet potatoes, pumpkins, green peas, arrowroots, yams, butternut, bananas)
- Prefer non-starchy vegetables that are very low in carbohydrates and do not affect your blood sugar levels significantly (tomatoes, cucumbers, mushrooms, spinach, cabbage, Broccoli, covo, rape, tsunga, black jack, okra, cucumber, green beans, leafy salad greens, lettuce).
- Include a variety of different coloured vegetables.
  - » Dark green vegetables: Broccoli, covo, rape, tsunga, black jack, okra, cucumber, green beans, leafy salad greens, Lettuce,
  - » Red and Orange vegetable : Carrots, Pumpkin, Red peppers, Tomato
- Some fruits are high in natural sugar and should be eaten in moderation: watermelon, pineapple, mango. It's better to eat apples, oranges, naartjes, wild fruits…
- Eat a portion of fruits and/ or vegetables at each meal

Drinks/beverages

- Water is the healthiest option. Aim to drink 6 – 8 glasses per day.
- Avoid sugary drinks (e.g. sugar-containing fizzy drinks).
- Avoid fruit juice.
- You may include tea and coffee in your diet but avoid putting sugar. Avoid hot chocolate that contains sugar.
- Use artificially sweetened beverages in moderation.
- Opt for low fat milk
- Alcohol consumption should be in moderation (two pints per day).
- If you do not drink alcohol, don't start
- Avoid commercially prepared maheu: it contains lots of sugar and starch
- Opt for traditional maheu without added sugar. Drink maheu in moderation (it contains starch)

Salt

- Avoid foods that contain a lot of salt especially if you have high blood pressure.
- Don't add salt to your plate.

What can I do if I need to lose weight?

- Basic principle to lose weight: burn more energy (calories) than you consume!
- Avoid drastic diet plans that don't last
- Avoid eating your biggest meal of the day at night. Eat more for breakfast and less for supper
- Eat healthy, nutritious food, and make it a lasting lifestyle
- Increase your routine daily physical activities : avoid sitting too much, get up and move, move, move whenever you can : walk, even when phoning, spend energy in doing household chores, gardening or other physical activities, take breaks from "siting"
- Add some exercises that make you break into a sweat and make your heart beat faster
- Avoid liquids with added sugar
- Eat more whole foods, and avoid refined foods with added sugars
- Fill your stomach with fruits and vegetables
- **In need of a snack? Go for it with a handful of unsalted nuts, a carrot, some maputi (the healthy version is the unsalted version)**
- Seek help from a nutritionist if you need help to manage your weight.

Courtesy of David Brazier

ZIMBABWE HAND JIVE FOR MEASURING APPROPRIATE FOOD PORTIONS

Carbohydrates: *(Starch and fruit): Choose an amount the size of your two fists,*

Protein: *Choose an amount the size of the palm of your hand and the thickness of your little finger.*

Vegetables: *Choose as much as you can hold in both hands. Choose low-carbohydrate vegetables (e.g. green or yellow beans, broccoli, lettuce)*

Fat: *Limit fat to an amount the size of the tip of your thumb.*

Drink no more than 250ml (8 oz) of low-fat milk with a meal

EXAMPLE OF LUNCH/SUPPER

POSSIBLE BREAKFAST OPTIONS

Bread with peanut butter

Yams (madhumbe)

Milet porridge (zviyo)

Poridge with peanut butter (dovi)

Examples of healthy snacks

Roasted nuts, pack of maputi/popcorn,
Fruits : banana, apple, mango, orange, avocado
One slice of brown bread with butter,
One hard boiled egg
Green garden salad

Courtesy of David Brazier

Carbohydrates: • Avoid too much of starches • Avoid added sugars • Prefer whole grains • Opt for the traditional sadza/isitshwala • Prefer unrefined grains	**Fats:** • Reduce fat, prefer low fat dairy • Limit fat from animal products • Prefer vegetable fat • Avoid commercially prepared fast foods and fatty snacks
Proteins: • Eat a variety of proteins throughout the week • Opt for lean meat • Avoid processed meat • Enjoy fish, eggs, beans, peas, soya chunks, round-nuts, nuts and seeds	**Fruits and vegetables:** • A portion of fruits or vegetables per meal • Eat starchy vegetables/ fruit in moderation • Eat a variety of fruits and vegetables • Eating food with a lot of fibre gives you a filling effect and is good for your bowel movements
Drinks/beverages: • Drink lots of water • Avoid sugar sweetened drinks • Avoid fruit juices • Avoid adding sugar in your tea or coffee • If you do not drink alcohol, don't start	**Salt:** • Avoid foods that contain a lot of salt • Don't add salt to your plate

PHYSICAL EXERCISE

Brainstorming on physical exercise

- What is the level of physical activity your job allows you i.e. sit a lot, walk a lot?
- Do you think gardening, farming, household chores constitute exercise?
- What is your preferred physical activity/sport? At which time of the day?
- What stops you from doing physical exercise?
- What could enable you?
- Do you have any medical limitations to do sports?

Benefits of physical exercise

- increases fitness
- improves blood circulation.
- controls blood sugar
- maintains a good body weight
- prevents heart diseases
- Lowers blood pressure
- maintains a happy mood
- strengthens bones and muscles
- keeps your brain fit and agile

Examples of physical exercises include:

- Brisk walking or hiking
- Jogging
- Gardening
- Farming
- Some household chores
- Swimming
- Cycling
- Ball games
- Dancing
- Tennis

How much physical activity is needed?

- Frequency: The exercise should be performed regularly: aim to exercise for 30 min everyday
- If you sweat and your heart beat goes up you know that you are performing an effective exercise

NOTES

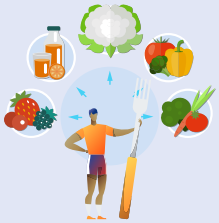
Reflection

1. Can you prepare a healthy plate for you and your family?
2. In your environment, what exercises are you going to do? What time will you do them.

3. LIVING WITH DIABETES

BEHAVIOURAL CHANGE AND COPING SKILLS

Diabetes is a chronic condition i.e. once diagnosed you must learn to live with it for the rest of your life. Its progression can be controlled through adopting necessary changes to your routine lifestyle and behaviours. It is important to remember that behaviour change is a process that will take time, commitment and support. Do not expect change overnight. Work with your healthcare provider, one step at a time. Remember diabetics can live a full life.

Lifestyle/behaviour	Advice/tips
Food and eating 	• Understand key principles to a nutritious meal and its impact on your sugar controls • Eat locally available foods • Adopt the healthy plate for the whole family and plan meals • If you have a garden, grow healthy plants and vegetables (carrots, cucumbers) • Practice healthy shopping by planning before you go shopping • Set realistic goals! it's better to eat sometimes a small amount than to abandon your diet completely due to setting unrealistic expectations for yourself

Lifestyle/behaviour	Advice/tips
Exercise 	• Exercise should be performed regularly: aim to exercise for 30 min everyday. • Plan for exercises a day before, • keep it simple and inexpensive • Turn regular activities into exercise e.g. brisk walking to work rather than driving, doing the chores at home • Involve family members in exercise and make it fun. They will motivate you and it's also healthy for them
Smoking and Alcohol consumption 	• Stop smoking. Smoking damages your blood vessels, which leads to worsening of the diabetes • Seek help on stopping from your health provider • Avoid excessive alcohol consumption • Consider joining Addiction Support Groups

Lifestyle/behaviour	Advice/tips
Social/cultural/ religious practices 	• Feel free to discuss with your health care provider, practices that you feel you cannot avoid but that may affect your Diabetes Mellitus desired lifestyle e.g. fasting at church, religious pilgrimage • If in school, let your teacher/ supervisor know about your condition and its requirements • Correct misconceptions, spread accurate facts from reputable sources: Stigma is heightened by insufficient knowledge • Avoid social gatherings where you may not be able to control your cravings or temptations to indulge • Connect and share your experiences and feelings with your colleagues and families

Lifestyle/behaviour	Advice/tips
Taking Medications 	• Take your medications as advised by your healthcare worker • Set alarms to remind you when to take your medications • Keep a medicines diary for the month and indicate by ticking as soon as you have taken your medication • Disclose to someone in the family about your medication needs • Always remember to keep a balance between taking medicines, exercise and eating • Check that you have adequate medicine supplies to last you the prescribed duration • Report adverse effects/side effects immediately to your health provider. Do not stop or adjust doses without their consent

Lifestyle/behaviour	Advice/tips
Travelling 	• Carry extra food/fruits in case of transport delays/ breakdowns. • Carry sugar/sweets with you • Carry fresh drinkable water • Take an extra supply of medication • Always carry with you, a copy of your medical records or a medical alert bracelet • If you have difficulties to recognize symptoms of low blood sugar, preferably travel with others who are aware of your condition • Continue using your normal treatment doses, and follow nutrition advice that you received • Wear appropriate footwear

NOTES

Reflection

list any changes in your life you are going to make in order to achieve a healthy lifestyle.

4. INSULIN MANAGEMENT

BRAIN STORMING: BASIC FACTS OF INSULIN TREATMENT

- How do you feel about injecting yourself insulin? Afraid? Not ready? Anxious?
- Have you ever been told that you may need insulin?
- What do you know about insulin?
- Do you know anybody who is using insulin?
- How do you inject insulin?
- What can stop you from accepting treatment with insulin?

WHAT IS INSULIN AND WHY DO I NEED IT?

- Insulin is a chemical produced naturally by the body. When this production is insufficient, there is a need to fill the gap with manufactured insulin (diabetes type 1).
- In people with type 2 diabetes, the body develops resistance to insulin. Initially tablets and life style changes help to control the blood sugars , but eventually it is necessary to compliment the natural insulin with manufactured insulin.
- Manufactured insulin is a liquid that needs to be injected into the body.
- You may be afraid or nervous about injecting yourself but you will see, you will quickly learn and develop a routine. There are tools available that make injections painless such as insulin pens.
- Insulin decreases blood sugar better than any other available diabetes medication.

WHEN DO I NEED INSULIN?

- Type 1 diabetes: insulin is needed as soon as the condition is diagnosed.
- Type 2 diabetes: when you are not able to control your blood sugar levels with medication alone, your health care provider will offer to add insulin to your treatment, and revise the oral medications.

ARE THERE DIFFERENT TYPES OF INSULIN?

- There are different types. Some types of insulin start working as soon as you inject yourself, others need about half an hour to get going. Some types last longer than others and therefore need less frequent injections. The aim is to ensure that you are covered with insulin throughout the day and at night. Insulin can be used on its own or in combination with other medicines
- Traditionally insulin comes in small vials or bottles, and one needs a needle and syringe to draw up the insulin.

- Nowadays, insulin comes also in **'pensets'**. They have prefilled insulin cartridges and a needle. These pensets are easier to use than the syringes and insulin bottles, and can also be used for people who have a deficient vision or in the dark. They may cost more than the syringes and needles.

HOW MUCH INSULIN DO I NEED?

- For each person we need to find the dose that lowers blood sugar as close to normal as possible, without causing low blood sugar (Hypoglycaemia).
- This is what we call the "target". It may differ from person to person. For medical and other reasons different patients might receive different instructions, everybody should know where they are aiming to be.
- The stronger the insulin resistance your body is, the more units of insulin will be required
- This can be done with one or more injections per day.

HOW SHOULD I STORE MY INSULIN SAFELY?

- Insulin is damaged by heat and light. Keep it in a cool, dark place but do not freeze it.
- **Best option:** store the insulin in the fridge (not in the freezer compartment, not in the back of the fridge).
- Once an insulin bottle has been opened, and refrigeration is not available: keep the insulin in a clay
- pot filled with water and stored in a cool, shady place inside the house. You may put the insulin in a plastic container/ bottle to protect it from getting wet or dirty, and then place it in the clay pot. This method allows insulin to retain its activity for 28 days.

Best option: *store the insulin in the fridge (not in the freezer compartment, not in the back of the fridge).*

STARTING INSULIN

- Starting insulin is a shared responsibility with your health care provider. Together you will make a plan on when to use insulin, what type of insulin to use and how much insulin you need.
- Some people need to inject themselves once a day only, others will need more frequent injections.
- You will start with a small dose that will be slowly increased until the dose that controls your blood sugar is found.
- This needs careful monitoring of your blood glucose to avoid putting you at risk of low blood sugar

SHOULD I INJECT MYSELF BEFORE OR AFTER MEALS?

Your healthcare provider will tell you exactly what times of the day you will inject yourself with insulin. In most cases you will start with 1 injection in the evening and increase doses and frequency as advised.

We advise that you inject yourself **BEFORE** your meals. See Self Monitoring of Blood Glucose section for full explanation.

HOW DO I PREPARE MY DOSE OF INSULIN?

If You Use Vials and Syringes

Step 1
Clean the top of the vial with an alcohol pad, then remove the cap from the syringe needle.

Step 2
Draw air into your syringe—an amount equal to the units of insulin you'll be injecting. To do so, pull back the syringe's plunger until its black stopper reaches your insulin dose amount on the syringe barrel. So if you will be taking 6 units of insulin, pull back the plunger until the stopper hits the 6 etched onto the barrel.

Step 3
Put the vial on a flat surface and hold it. Insert the syringe into the vial, and press down on the plunger to inject the air from Step 2 back into the vial.

Step 4
With the syringe still in the bottle, turn the vial and syringe upside down. The tip of the needle should be fully covered by insulin.

Step 5
Make air bubbles less likely by slowly pulling down on the plunger. Draw insulin past your dose. Tap the syringe a few times so any bubbles rise to the top.

Step 6
Without removing the syringe from the vial, slowly push the plunger until the edge of its black stopper reaches the number of units in your dose, as marked on the syringe. If you see any bubbles, push all that insulin back into the vial and repeat these steps until no bubbles are present.

Step 7
Identify an injection site. Pinch up a bit of skin (if necessary). Insert the needle at a 90-degree angle. Hold the needle in the skin for 5 seconds to ensure there is no leakage.

Step 8
Dispose of your syringe and needle in a sharps container.

illustrations by David Preiss: Diabetic Forecast, 2018 (ADA)

If You Use Insulin Pens

Step 1
Remove the pen cap and wipe the top of the pen with an alcohol swab to clean the area.

Step 2
Remove the paper tab from the pen needle, then screw the needle tightly onto the top of the pen.

Step 3
Prime your pen to remove air from the needle and insulin: Dial 2 units of insulin, hold the pen vertically with the tip facing the ceiling, and press the dose button. You should see a drop or stream of insulin at the tip of the pen needle. If you don't, which is common the first time you prime a pen, repeat the process until a drop appears.

Step 4
Set your dose. If you take 6 units of insulin, for instance, you'll dial to 6 in the dose window.

Step 5
Holding your pen at a 90-degree angle over your injection site, push the needle into the skin. Press the dose button.

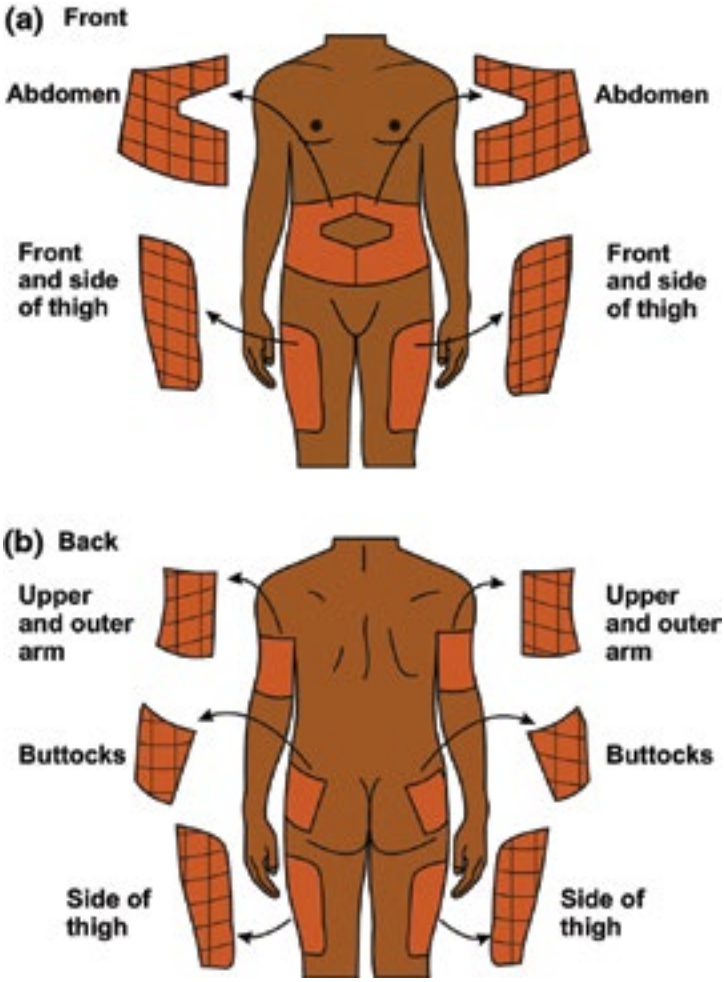
Step 6
Hold your pen still for about 10 seconds to make sure all the insulin is delivered. Remove the needle from your skin.

Step 7
Put the plastic cap on the end of the needle, unscrew the needle from the pen, and dispose of it in your sharps container. Recap your pen.

illustrations by David Preiss: Diabetic Forecast, 2018 (ADA)

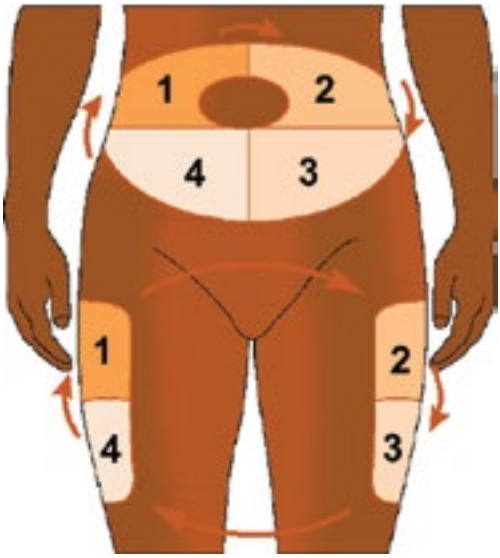
WHERE CAN I INJECT MY INSULIN?

- Use an area of the body in which approximately 2.5 cm of skin fat can be pinched between two fingers: thighs, lower abdomen, arms, and back.



Bahendeka et al 2019: doi.org/10.1007/s13300-019-0574-x

- Rotate the sites of injection, in order to give time for healing.



Bahendeka et al 2019: doi.org/10.1007/s13300-019-0574-x

CAN I REUSE SYRINGES AND NEEDLES?

Avoid reusing your syringes and needles. Although reusing syringes may help you cut costs, repeated use of needles causes them to become blunt (injections with blunt needles are painful and can cause scars). They also increase the risk of infections.

HOW DO I DISCARD SYRINGES AND NEEDLES

- Discard your used syringes and needles in a plastic bottle with a screw cap. Take the plastic bottle to hospital when you go for review and hospital staff will dispose of it correctly.
- You can discard the used syringes and needles in a Blair latrine/toilet
- Do not mix them with regular household waste.
- Never reuse the syringe of someone else

WHAT ARE THE COMPLICATIONS OF INSULIN TREATMENT?

It is important to minimize blood sugar fluctuations, as they are associated with risks and complications.

Hypoglycaemia

Patients on insulin treatment are at an increased risk of developing low blood sugar (hypoglycaemia)
(See complications of diabetes)

Infection

Infection usually starts from the site of injection, but may also spread to the rest of the body. Infection of the injection site is usually due to failure to observe hygiene (disinfecting injection site with spirit), and reusing needles and syringes.

Signs of infection

This depends on whether the infection is localized (still on the injection site only), or has spread to the rest of the body. An infected injection site is usually reddened, painful, swollen or may be have pus. Once infection has spread to the rest of the body, you may experience a fever.
Visit your clinic as soon as you have any signs of infection.

Scarring

This happens on the injection site and is usually due reuse of insulin needles. Blunt needles cause injury to your skin.
Check your injection technique: insulin needs to be injected vertically, not horizontally.
Scars can interfere with the slowdown absorption of insulin and your blood sugars may end up not being controlled.

MAY I EXERCISE IF I'M ON INSULIN?

Yes, you are encouraged to exercise. Exercise helps your body to use insulin efficiently and control body weight, contributing to overall improvement of blood glucose control. You are

encouraged to exercise for at least 30 minutes, three days every week as a minimum. Here are some tips:

- Check your blood sugar before you exercise. If it is below 3.9mmol/L, do not start exercises (including lifting, cycling, running, driving, operating machinery or engaging in any physical work) until you have eaten a meal or snack and rechecked your blood sugar level.
- If you feel weak in the middle of exercising or sporting, stop and check your blood sugar.

NOTES

Reflection

Can you now explain to someone else with diabetes how to safely inject insulin?

5. SELF MONITORING OF BLOOD GLUCOSE (SMBG)

WHAT IS SELF MONITORING OF BLOOD GLUCOSE

It is the process of testing one's sugars at prescribed time points and correcting insulin doses accordingly.

HOW DO I KNOW, IF MY BLOOD SUGAR IS WELL CONTROLLED WITH THE PRESCRIBED DOSE?

A health care worker will check, teach and equip you to test your blood at home. Once they are confident you have grasped the necessary skills, they will proceed stepwise, and invite you to test your blood sugar at home following specified testing intervals. You will be taught how to increase your insulin dose slowly but surely based on the sugar results

- It shows the effects of the eating plan, the food intake, the medication, the physical activity, and any type of stress on your blood sugar such as illness.
- It guides the adjustments in the eating plan, exercise program and medication to achieve targets for blood glucose.
- It is important to note down these results in a diary to help you and the health care team to keep track of progress towards achieving optimum control of the blood sugar levels.
- In order to perform Self Monitoring of Blood Glucose correctly, it is important for you to know your blood sugar target

OBJECTIVES FOR SELF MONITORING OF BLOOD GLUCOSE :

- To record a snapshot of blood sugar levels during the day and how they vary
- To achieve and maintain optimal levels of blood sugar
- To prevent, identify and manage low and high blood sugar levels.
- To adjust insulin doses, diet and exercise

HOW DO I KNOW MY BLOOD SUGAR LEVEL?

You will use a little machine called glucose-meter or

glucometer. You will need to prick your fingertip to get a drop of blood. This can be done several times daily or as advised by your health care worker.
Consistency is important: measure the blood glucose at the same time each day for each time point. We advise you to maintain stable/regular/predictable lifestyle conditions. This will facilitate the monitoring of your blood glucose, and dose adjustments by the clinician.
The blood sugar measurements should then be recorded in your booklet.
If you have impaired vision, ask your relatives for help with the reading to avoid errors.
Always keep your machine safe, away from the reach of children.
Always carry your machine with you to show the HCW on review days

TECHNIQUE OF CHECKING THE BLOOD GLUCOSE

1 Wash hands

5 Let the blood drop flow in the test strip

2 Prepare your supplies

6 After a few seconds, the machine will "beep" and display results. Record results as advised.

3 Insert strip into machine Make sure it displays same code as that on the bottle

7 Dispose the used needle and strip in a safe sharps container

4 Prick your finger

HOW DO I ACHIEVE MY TARGET BLOOD GLUCOSE VALUES?

Two important factors: lifestyle (diet and exercise) and insulin dose.

- If the diet and exercise do not match the insulin dose, your blood sugar level can get too low or too high. Blood sugar levels that are too low or too high can cause problems.

Lifestyle

- Aim to have a routine planned diet and exercise schedule
- It's you who defines what you eat according to the principles of healthy eating, and it's also you who defines what level of physical activity makes you feel good. Keep it stable and regular.

Insulin dose

- Administer the insulin dose that is safe and effective
- Your health care provider will choose the dose of insulin that you need using the results from the measurements you do at home
- They will adjust the insulin to fit into your lifestyle and may eventually teach you to do it by yourself

Always "TIE" your insulin injections with a meal ready to be served:

Test your blood sugar first (per instruction)

Inject the recommended insulin BEFORE you eat

Eat a healthy meal AFTER injecting insulin

Remember: Your safety is very important. The dose changes will be managed by medical staff in your clinic until you can do it yourself safely.

We would like you to learn to identify if your blood sugar is too low, or too high, and to take simple action to correct it.

Table 2: Your blood sugar at a glance: Low blood sugar

Blood sugar level	Decision
Less than 3.0 (severely low blood sugar)	Eat something sugary urgently! Get an escort and go the closest health facility. Do not take your next insulin dose
Between 3.0 and 3.9 (mildly low blood sugar)	Eat immediately something sugary and recheck in 15 minutes. Have a meal; if you feel good, you do not need to come to the hospital Check your blood sugar one hour after the meal. If it is normal, take your next insulin dose as scheduled.

Table 3: Your blood sugar at a glance: high blood sugar

Blood sugar level	Decision
Above 10 but less than 23 (mildly high blood sugar)	Use the decision tables (see below), and come for your planned review date
Above 23	visit diabetes clinic as soon as possible

WHY DID MY BLOOD SUGAR BECOME VERY LOW?

Contact your clinician by phone or visit, who will determine the reason. Ask yourself the questions below.

Table 4: Patient's for low blood sugar results

Reason for low blood sugar (hypoglycaemia)	Immediate action	Plan
Did I eat less than usual, or did I skip a meal?	Eat!	You need to plan your meals. Try to have your meals at the same time each day and to keep the quantities stable
Did I do a vigorous exercise without having had a snack?	Eat	Eat a snack before exercising
Did I make mistakes during the injection?	Eat	Ask your clinician to show you the correct technique
Could there be another reason?	Eat	Go to the nearest clinic

WHY IS MY BLOOD SUGAR HIGH?

It is possible that the right dose of insulin has not yet been found during the titration process.
Report your results to your clinician so that the doses can be adjusted if needed.
Ask yourself also the questions below!

Table 4: Patient's decision table for high blood sugar results

Reason for high blood sugar	Action
Did I eat sugary foods or were my meals irregular?	Revise the content and timing of your meals
Did I forget/or was I unable to inject my usual dose?	Inject yourself according to the usual plan. Do not change the usual dose without advice from your clinician
Did I make mistakes during the insulin injection?	Ask your clinician to show you the correct technique
Am I ill or feeling unwell?	Go to the nearest clinic
Could there be another reason?	Go to the nearest clinic

KEY MESSAGE FOR PATIENTS ON INSULIN:

- Have a routine planned diet and exercise
- Insulin is damaged by heat and light and should be kept in a cool, dark place, but must not be frozen
- Monitor your blood sugar as advised by the health care worker
- Record your results carefully in the booklet/sheet provided: this information is vital to your clinician to help them find the right insulin treatment for you

- Take simple action if your sugar is too low or too high and seek medical help if needed
- Know the symptoms of hypoglycaemia.

SICK DAY MANAGEMENT

These instructions are essential for patients with Type 1 Diabetes and are less important for patients with Type 2 Diabetes.

- An episode of illness or other stress factors, e.g. infection, injury, surgery, can lead to very high blood sugar even if you do not eat
- Go to your closest health facility as soon as possible to treat the underlying illness
- Continue monitoring you blood glucose
- Do NOT stop taking your insulin
- Drink a lot of fluids to prevent dehydration (see Table 1) These fluids should contain salt (sodium) and potassium so as to replace the loss of these electrolytes.

- If you are not able to follow a meal plan, use fluids with sugar to provide carbohydrate. Fluids can be oral rehydration salts, fruit juice, fizzy drinks (coca cola, ginger ale)
- Rest and avoid strenuous exercise/activity.

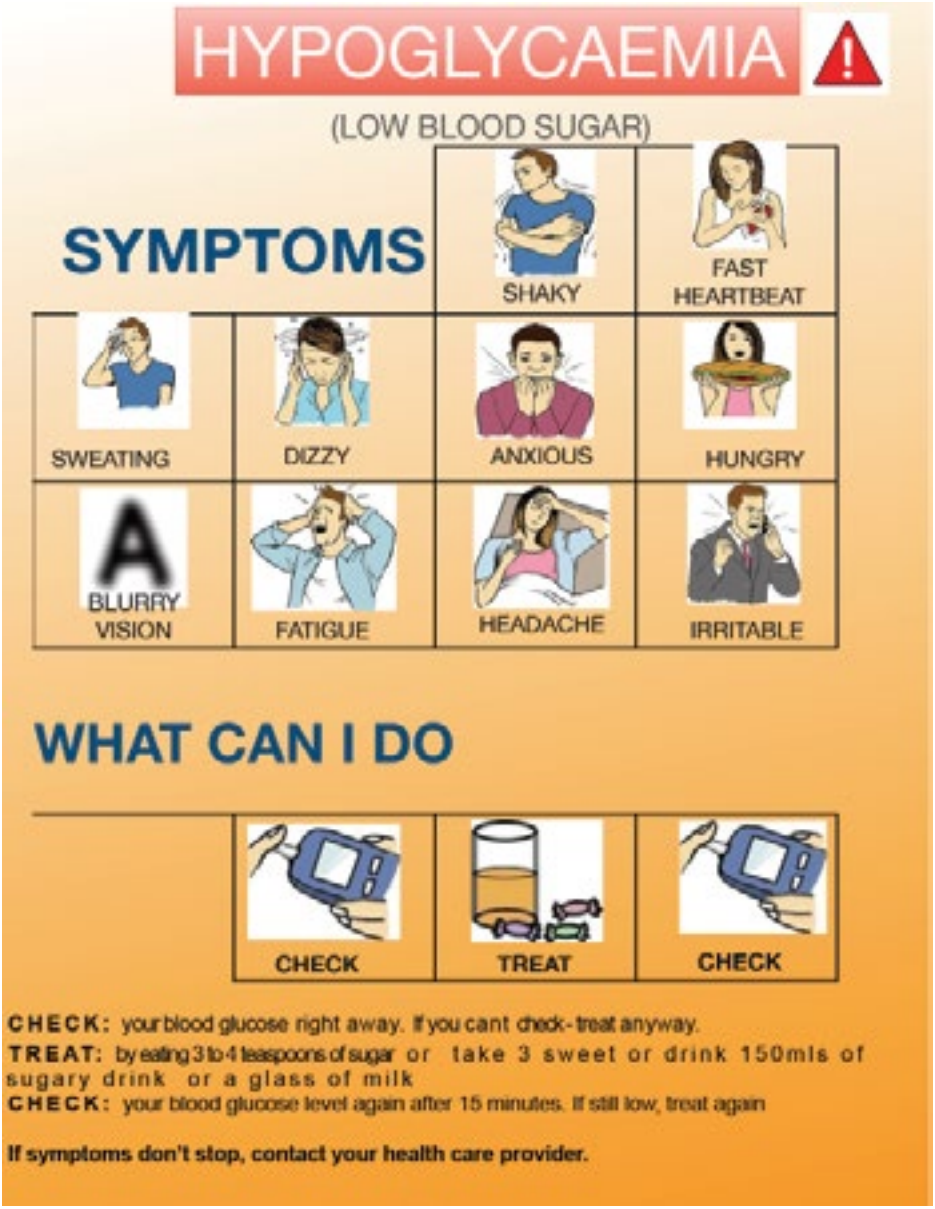
NOTES

Reflection

Do you now understand your blood sugars readings and how to correct abnormal values?

6. DIABETIC COMPLICATIONS AND COMORBIDITIES

HYPOGLYCAEMIA



WHAT IS HYPOGLYCAEMIA?

Diabetes Mellitus patients on treatment are at risk of developing low blood sugar (hypoglycaemia). The risk is particularly higher in patients on insulin and tablets such as Glibenclamide. All Diabetes Mellitus patients must be aware of signs and symptoms of hypoglycaemia (often referred to simply as "hypo") and how to manage it at home as an emergency. (see also section on insulin)

Signs of Hypoglycaemia:

- Feeling faint or weak
- Sweating
- Trembling/shaking
- Feeling irritable and/or confused
- Dizziness or light headedness
- Hunger

for common causes of hypoglycaemia, see table 4 in chapter 5.

WHAT SHOULD I DO WHEN I EXPERIENCE SIGNS OF LOW BLOOD SUGAR?

If you have a glucometer (blood sugar testing machine), test your blood sugar immediately. If the blood sugar is less than 3.9mmol/litre, take the following steps:

- Take 3 to 4 teaspoons of sugar immediately
- Repeat the blood sugar test after 15 to 20 minutes of taking sugar.
- If blood sugar has risen to above 3.9mmol/litre, take a protein meal for sustained energy requirements.
- If your blood sugar fails to rise above 3.9 after 20 minutes of taking sugar, go to the clinic or hospital immediately.

If you do not have a glucometer (blood sugar testing machine),

- take 3 to 4 teaspoons of sugar immediately and visit your clinic or hospital without delay.

DIABETIC FOOT

WHAT IS DIABETIC FOOT?

Over time, diabetes that is not carefully managed can lead to foot complications. You have an increased risk of developing foot problems if you:

- Have had a foot ulcer in the past
- Have nerve damage (numbness of feet)
- Have any foot deformities
- Have poor blood circulation to the feet

These foot problems if not promptly addressed may lead to severe disease requiring many days of admission. Diabetic foot complications also lead to amputations.
The risk of this can be reduced by observing foot care/ foot ware practices as illustrated below.

Foot Care Practices

Keep your feet clean and dry...

...especially in between your toes

Check the soles of your feet regularly or ask someone to do it for you

Never put your feet near open heat

Never use sharp objects on your feet

Get help from your clinic or doctor

Foot Ware Practices

Avoid wearing tight socks

Wear comfortable flat shoes with socks

Avoid wearing high heels

Never walk barefoot

Avoid wearing high boots without socks

CHRONIC KIDNEY DISEASE

WHAT IS CHRONIC KIDNEY DISEASE?

We all have two kidneys responsible for filtering our blood and removing waste and excess salt and water, which are are excreted as urine. Chronic kidney disease (CKD) is when the kidneys stop working well. This is usually a slow process but in time, the kidneys can stop working completely. While there are a number of other causes of chronic kidney disease, it is important to remember that diabetes can cause chronic kidney disease, as well as worsen existing chronic kidney disease.

WHAT ARE THE SYMPTOMS OF CHRONIC KIDNEY DISEASE?

At first, chronic kidney disease causes no symptoms. As the disease gets worse, it can:

- Make your feet, ankles, or legs swell (oedema)
- Give you high blood pressure
- Make you very tired
- Damage your bones

WHAT CAN I DO TO PREVENT OR KEEP MY KIDNEYS FROM GETTING WORSE IF I HAVE CHRONIC KIDNEY DISEASE?

You can protect your kidneys by:

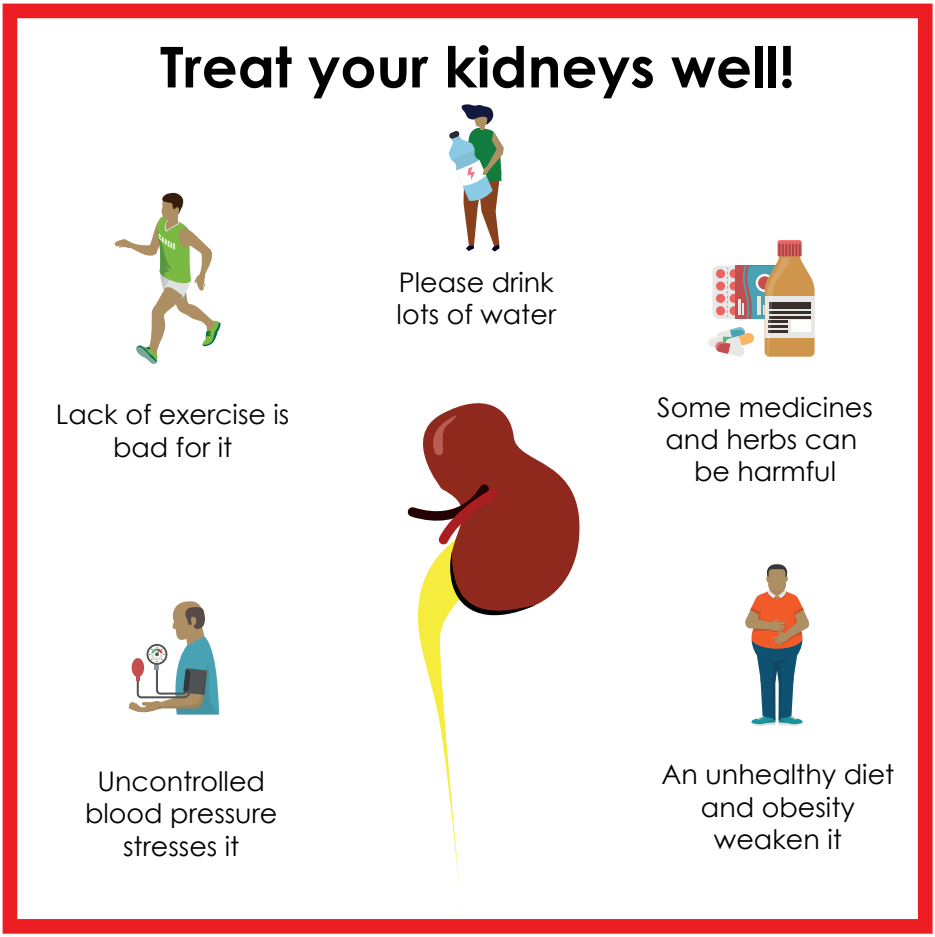
- Adhering to your medicines for chronic conditions (BP, Diabetes Mellitus, HIV, and Heart Disease) every day as prescribed
- Keeping your blood sugar in a healthy range as advised by your health care worker
- Eating a healthy diet
- Quitting smoking
- Losing weight, if overweight or obese
- Avoiding medicines known as "nonsteroidal anti-inflammatory drugs," or (NSAIDs) e.g. ibuprofen, diclofenac, indomethacin, celecoxib

WHAT ARE THE TREATMENTS FOR CHRONIC KIDNEY DISEASE?

Your health care provider will monitor your kidney function

annually by taking a blood sample known as a creatinine clearance test. They will use these results to advise you on how best to look after your kidneys. This may range from

- Adhere to your prescribed medications
- Eat a particular diet
- Take certain medications
- Dialysis
- Kidney transplant



DIABETIC RETINOPATHY

WHAT IS DIABETIC RETINOPATHY?

Diabetic retinopathy is an eye problem that can lead to vision loss and even blindness. It affects people with diabetes. It is most common in people who do not control their blood sugar well.

WHAT ARE THE SYMPTOMS OF DIABETIC RETINOPATHY?

Most people with diabetic retinopathy have no symptoms until the disease is very advanced. By then, it is usually too late to do anything about the vision loss. That's why it is important to get screened for the condition early. That way, doctors can take steps to protect your eyes before your vision is damaged.

WHEN SYMPTOMS START, THEY CAN INCLUDE:

- Blurry vision
- Dark or floating spots
- Trouble seeing things that are at the center of your focus when reading or driving
- Trouble distinguishing colours

SHOULD I SEE A DOCTOR OR NURSE?

- If you notice any vision loss (or dark spots in your vision), see an eye doctor as soon as possible

CAN DIABETIC RETINOPATHY BE PREVENTED?

Yes. If you have diabetes, you can reduce your chances of getting diabetic retinopathy by keeping your blood sugar and blood pressure levels as close to normal as possible. It might also be important to keep cholesterol levels in the normal range.

HYPERTENSION ("BP")

WHAT IS HYPERTENSION?

Hypertension is the medical term for high blood pressure.
Blood pressure is the force of blood against the walls of blood vessels
Blood pressure rises and falls throughout the day. When it stays elevated over time, it's called high blood pressure. A blood pressure level of 140/90 mmHg or higher is considered high.
Hypertension is a chronic condition such as HIV and diabetes and commonly occurs in patients with diabetes.

RISK FACTORS STRONGLY ASSOCIATED WITH HYPERTENSION

Living with Diabetes (6 out of 10 diabetes patients have hypertension)
Advancing age
Obesity and weight gain
Family history of hypertension
Race – common in black people
High-salt intake
Excessive alcohol consumption
Physical inactivity
HIV

SYMPTOMS OF HYPERTENSION

Most patients with HTN have no symptoms
Symptoms are defined by the extend of the target-organ damage (heart, kidney, brain, arterial blood-vessels

- Feeling short of breath
- Chest pain
- Palpitations
- Headache
- Dizziness
- Signs of stroke
- Blurred vision

LIVING WITH DIABETES AND HYPERTENSION.

Tips (see also section on living with Diabetes Mellitus)
Have your blood pressure checked at least once every three months/clinical visit AND acted upon.
Maintain your blood pressure controlled below 140/90
Adhere to all your prescribed medications even though they may be many
Adhere to appointment dates
Never default medicines
Avoid herbal medicines
When stressed, seek counseling services

COMPLICATIONS OF HYPERTENSION

High blood pressure usually has no symptoms, but is one of the biggest causes of stroke, heart attack heart failure, chronic kidney disease…Silent killer

MANAGEMENT

Hypertension is controlled through lifestyle changes (see living with diabetes) and specific hypertension medications. Your health care provider will advise accordingly.

NOTES

Reflection

list the possible complications of uncontrolled blood sugars

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