



AIDA from Senegal-
Aida has Type 2 diabetes

Type 2 diabetes in brief

Diagnosed with type 2 diabetes

Type 2 diabetes can be managed. With the right treatment and support, you can live the life you desire.

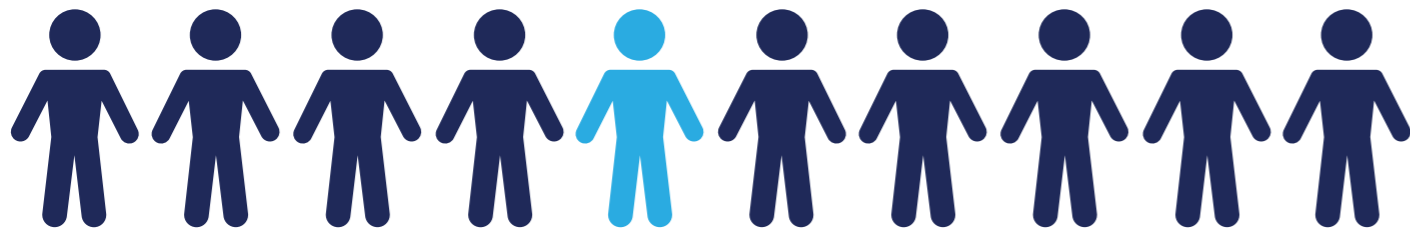
Millions of adults of all ages, from all walks of life, are living with type 2 diabetes. There are many things you can do to reach your treatment targets and enjoy a high quality of life.

This leaflet will help you to better understand diabetes and equip you to manage your type 2 diabetes effectively.

If you have questions, ask your doctor or diabetes care team.

The information in this leaflet is not intended to replace your doctor's advice or medical consultation.

1 IN 10 ADULTS
HAS DAIBETES¹



What is diabetes?

- Diabetes is a condition in which the body cannot control the level of sugar in the blood, resulting in high blood glucose levels.²
- The body's supply of energy comes from digested foods such as: bread, maize, pap, potatoes, rice, milk, honey, sugar, fruits, vegetables and others.³
- These foods are broken down into glucose. The glucose is taken by blood to the different parts/cells of the body and provides the necessary energy for these cells.²
- Insulin, a hormone produced by the beta cells in the pancreas, helps lower the level of glucose in the blood, and thus keeps the blood glucose levels within the normal range.²
- In people with diabetes the beta cells either produce too little or no insulin, or the insulin produced cannot be used effectively (commonly referred to as insulin resistance), resulting in high blood glucose levels i.e. diabetes.²

Types of diabetes

There are two main types of diabetes:

Type 1 Diabetes Mellitus: ^{4,5}

- Type 1 Diabetes Mellitus is most commonly diagnosed in people under the age of 30.
- The beta cells in the pancreas no longer produce any insulin and therefore these individuals must inject insulin every day to maintain a blood glucose level within the acceptable range.
- This is referred to as an 'absolute' insulin deficiency. Insulin is a protein and therefore must be injected. It cannot be taken orally because it is destroyed by the digestive juices in the stomach before it can be used.

Type 2 Diabetes Mellitus: ^{2,4,5}

- Usually occurs in older patients but is increasing in children, adolescents and young adults.
- People who are overweight, relatively inactive or have a relative with type 2 diabetes mellitus are more susceptible to type 2 diabetes.
- As type 2 diabetes is a progressive condition, treatment usually begins with exercise and changes to diet. At time of diagnosis tablets are started with diabetes disease education. After a while, insulin therapy may be needed to achieve and maintain good blood sugar control.
- Excessive weight inhibits the proper utilisation of glucose in the peripheral tissues and often these people need to lose weight and increase their activity levels.

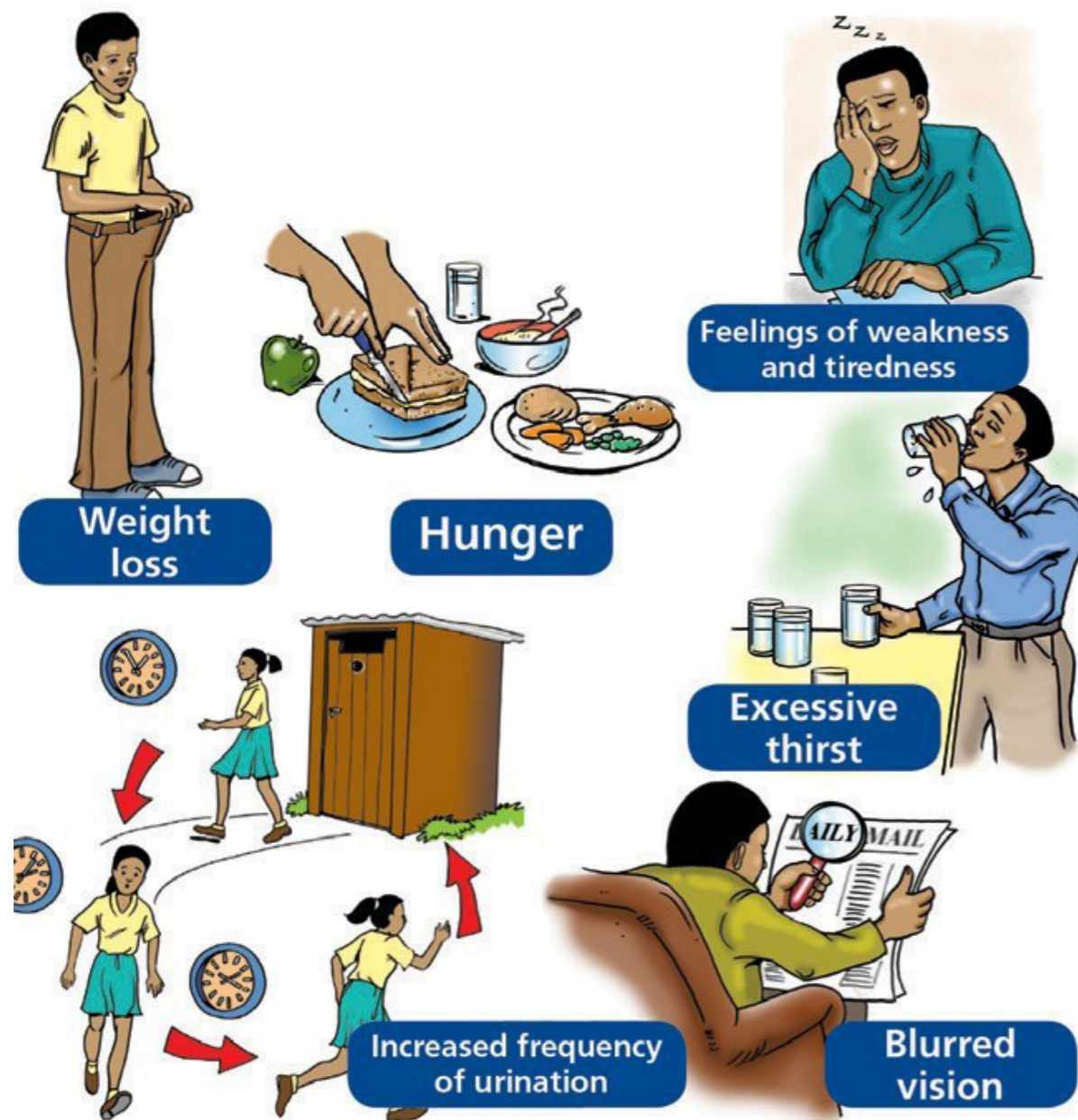
The main symptoms of diabetes (i.e. an elevated blood glucose level) are: ^{2,6}

- Increased frequency of urination
- Excessive thirst
- Unexplained feelings of weakness and exhaustion • Weight loss
- Nausea and vomiting
- Blurred vision

Before you were diagnosed and treated for diabetes, you may have experienced the following symptoms: ^{2,6}

- Excessive thirst
- Increased frequency and the amount of urine passed • Excessive hunger
- Weight loss
- Extreme fatigue
- Slow healing of cuts and wounds
- Frequent infections
- Blurred vision
- Numbness or tingling in the feet and hands.

Some symptoms of diabetes^{2,6}



Remember

Now that you have been diagnosed with diabetes, your aim should be to bring your blood glucose back to an acceptable level. This will alleviate your symptoms.

Insulin therapy^{4,5,7}

Healthy eating and exercise are two of the three fundamental components in the treatment of diabetes. However:

- In type 2 diabetes, insulin and/or tablets often need to be added to the diabetes treatment for optimal blood glucose control.
- Patients who are not well controlled on oral anti diabetic medication will need to be initiated on insulin therapy.
- Insulin therapy, a substitute for your natural insulin needs to be injected because if given in a tablet form, the insulin would be destroyed in the stomach.

Type 1 diabetes

People with type 1 diabetes need to inject insulin every day, as their pancreas no longer produces any insulin.

Type 2 diabetes

Over a period of time the pancreas may produce progressively less insulin, regardless of what medication the person has taken. In this case, the initiation of insulin therapy should ensure good blood glucose control, and is often accompanied by a noticeable feeling of improved well being.

Normal insulin release in people without diabetes⁷

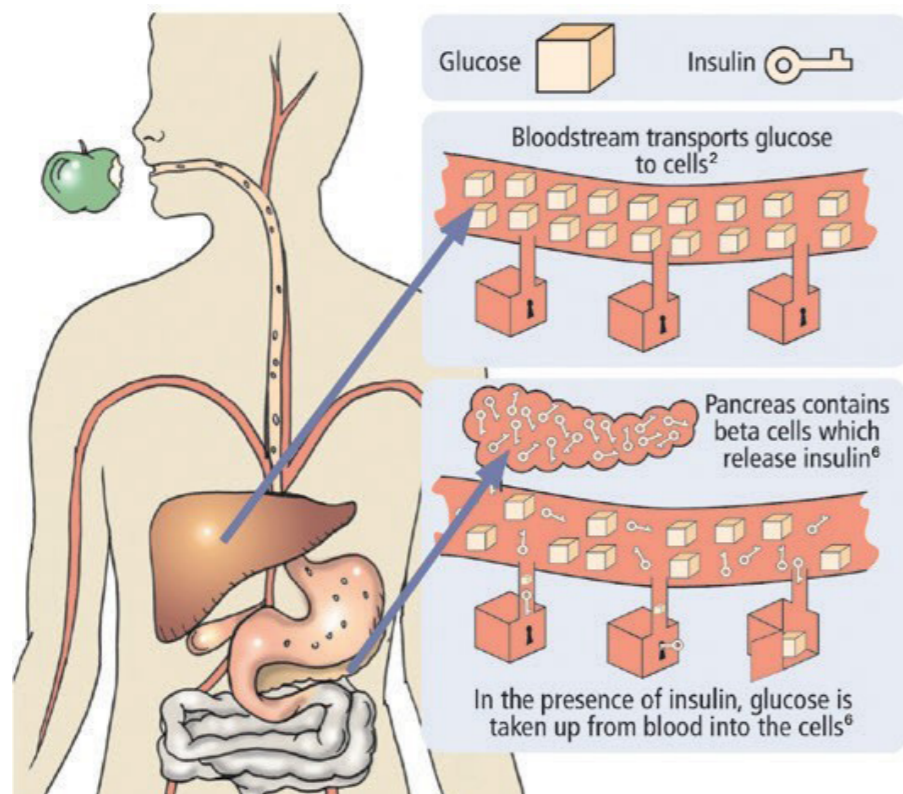
The pancreas releases insulin in varying quantities throughout the day and night according to the natural body rhythm and foods eaten. The slow and small release of insulin over a 24-hour period is known as the basal insulin requirement. Conversely, at mealtimes, the pancreas quickly releases shorter acting insulin; the amount released depends on the amount and type of foods eaten. In a person with diabetes, insulin therapy attempts to mimic the normal release of insulin from the pancreas.

What does insulin do? ⁸

The glucose in the blood cannot get into the body's cells without the aid of insulin. Insulin helps with the uptake of glucose from blood into the cells and facilitates the storage of fat. Normally, the glucose in the blood (the blood sugar) stays within a narrow range (3,9 - 7,8 mmol/L) because insulin is secreted automatically by the body, in the correct amount and at the correct time, as food is being converted into glucose.

Remember ^{2,6}

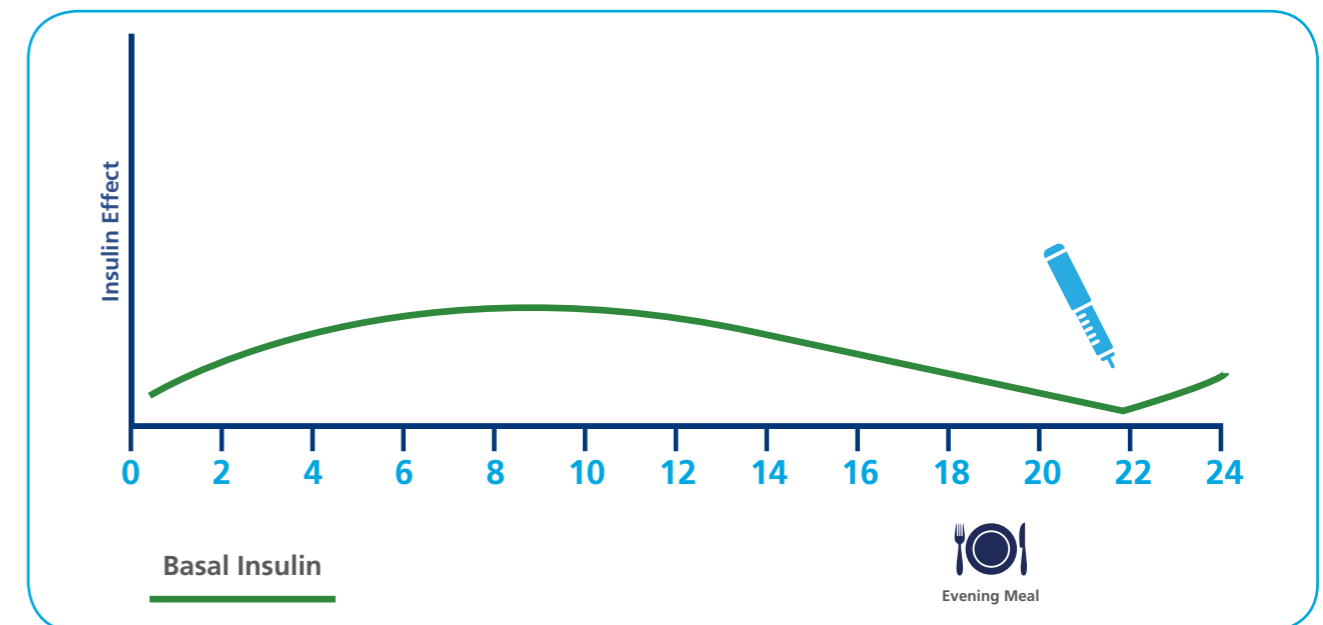
- A person with diabetes has no, or relatively little insulin and therefore their glucose cannot get into their cells to be used.
- This leads to a build-up of glucose in the blood.
- A continuously elevated blood glucose level will initially cause symptoms like: weakness, thirst, weight loss, increased frequency of urination and a general feeling of being unwell. ^{2,6}
- If left untreated, it can lead to more serious complications involving the nerves, blood vessels, eyes and kidneys. ^{2,6}



Types of insulins ⁷

Basal insulin (intermediate or long acting)

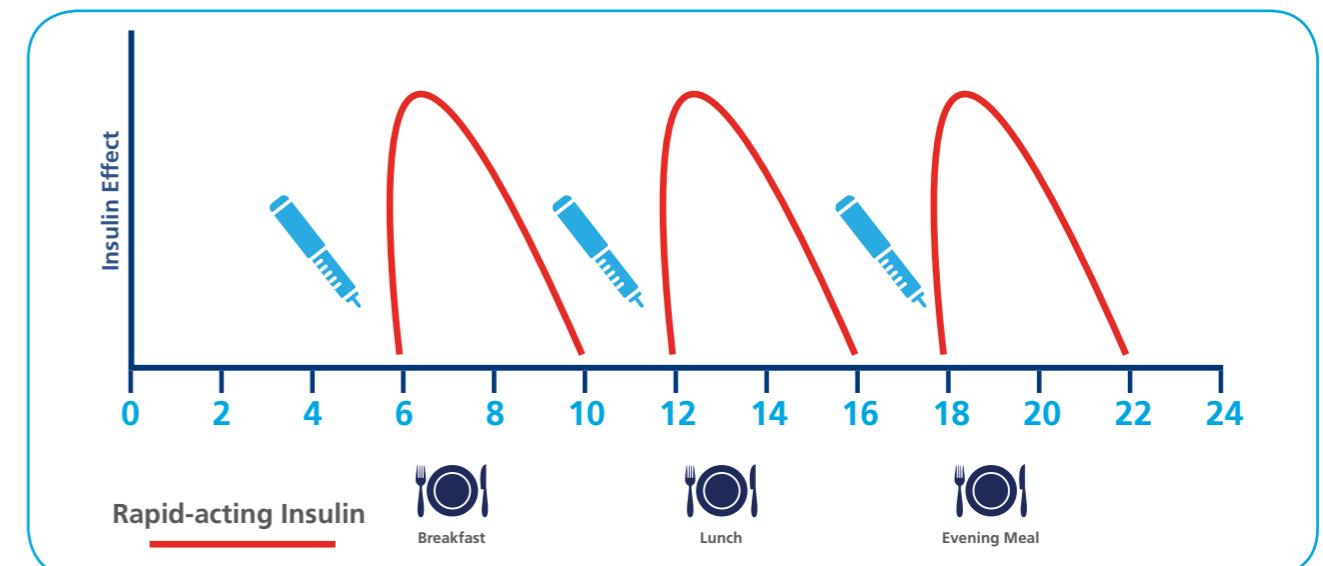
A basal insulin is long acting and provides background insulin for up to 24 hours depending on the dose injected. Basal insulin is normally injected in the evening (at dinner or at bedtime).



graphical representation only

Bolus Insulin (Rapid-acting or mealtime insulin)

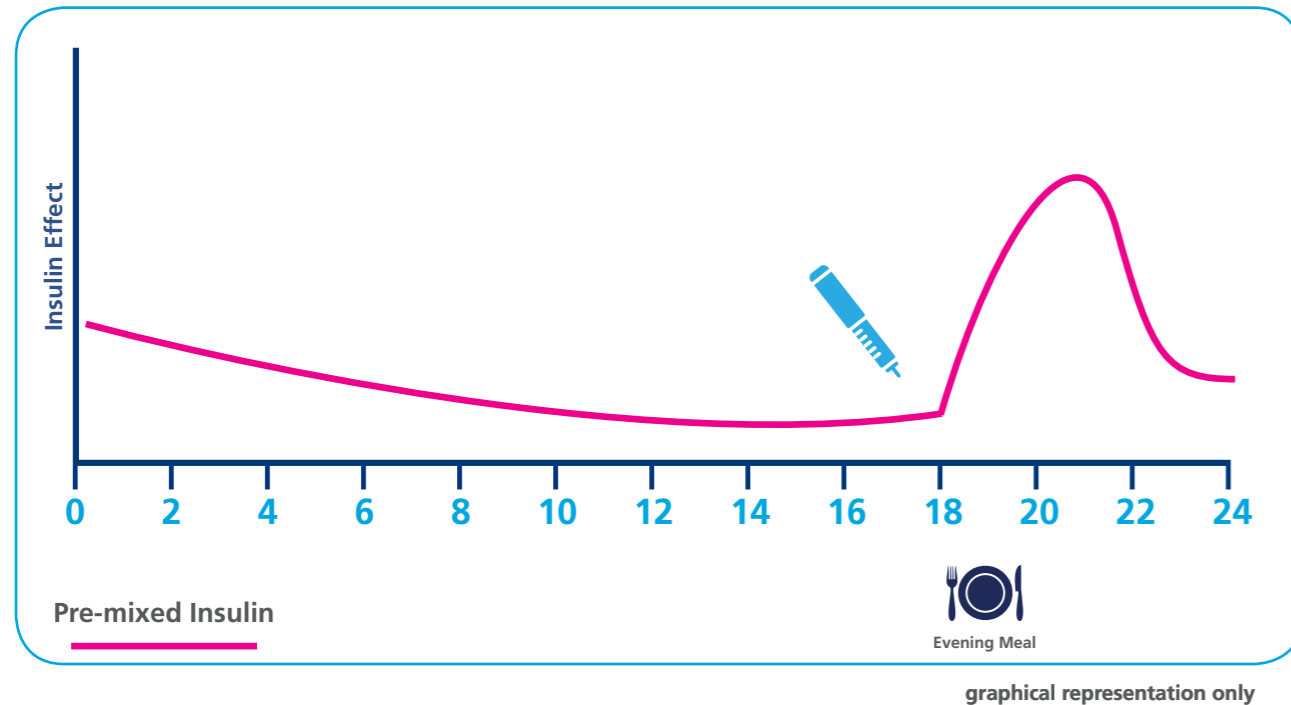
This is the insulin that you would inject immediately before eating, to help with the glucose absorbed from that particular meal and which stays in the blood stream for 3 - 5 hours.



graphical representation only

Pre-mixed (dual-acting insulin) ⁹

This is insulin with both rapid-acting and intermediate-acting effect. The rapid-acting component helps control the rise in blood sugar after meals and the intermediate-acting component provides a constant level of background insulin



Insulin Regimens

Your doctor will advise you which insulin regimen to follow and how many units of each insulin to inject at different times of the day. The most commonly recommended regimens are:

- Basal insulin once a day (type 2 diabetes)
- Basal-bolus insulin: basal insulin in the evening and rapid insulin at meal times – type 1 and type 2 diabetes
- Pre-mixed (biphasic or dual-acting) insulin once, twice and when necessary, three times a day – typically in type 2 diabetes

How to store insulin ^{9,10}

- Cold insulin injected into the body causes a burning sensation, so insulin currently in use can be kept out of the refrigerator for up to one month (at room temperature – maximum 30 °C).
- Do not expose insulin to extreme temperatures, bright light or direct sunlight.
- Spare, unused insulin must be stored in the fridge at 2 – 8 °C (see package insert for product specific information).
- If no refrigerator is available, store in a cool dark place (do not place insulin next to ice).
- Do not freeze or expose to ice.
- Do not use after expiry date.

If stored correctly, the insulin will remain fully effective up until the final expiry date marked on the label.

What should my blood glucose level be?¹⁵

For most people, the general target for glucose control in type 2 diabetes is HBA_{1c} of less than 7%. The HBA_{1c} test gives an indication of your blood glucose control over the previous 3 months

Your doctor or diabetes Nurse will teach you how and when to measure your blood glucose and if you need to change your insulin dose depending on the results

In general, people with type 2 diabetes should aim to keep their fasting/premeal blood glucose levels between 4.4 -7.2 mmol/L and post meal blood glucose levels between 4.4 -10.0 mmol/L

Note:¹⁵

Initially, after you have been diagnosed as having diabetes, you may need to test your blood glucose more frequently until your blood glucose level stabilizes.

Keeping a record

You will be asked by your diabetes care team to keep a record of your blood glucose levels so that they can analyse your readings and advise you of any changes that need to be made.

It is important to take your meter/diary with you every time you visit your doctor or diabetes nurse educator.

- It is important to test your blood glucose level regardless of whether you are a person with type 1 or type 2 diabetes.
- It is recommended that you test your blood glucose levels as instructed by your healthcare professional.

Please take note of the following:

- Blood glucose levels may be elevated for no obvious reason, therefore a doctor must be consulted.
- Influenza or an infection could be a possible reason for the reactions.
- Urine should be checked for ketones if blood sugar level is high.

WORK WITH YOUR DIABETES CARE TEAM TO CREATE A TREATMENT PLAN THAT'S RIGHT FOR YOU

Monitoring your HbA_{1c}

This test is done at a laboratory to see what your average blood glucose level has been over the previous 3 months.

What is the HbA_{1c} (Glycosylated Haemoglobin)?¹²

- The oxygen-carrying component of the red blood cells – the haemoglobin, is affected by the amount of glucose carried by the red cells in the blood.
- The HIGHER the level of glucose in the blood, the more the haemoglobin cells 'stick' together.
- The LOWER the blood glucose level, the less 'stuck' together the haemoglobin will be.
- The HbA is given as a percentage, i.e. a percentage of 'stuck togetherness'.

Translating HbA_{1c} into estimated average glucose levels¹¹

HbA _{1c} %	6	7	8	9	10	11	12
Average Plasma Glucose mmol/l	7	8.6	10.2	11.8	13.4	14.9	16.5

Note:¹¹

- If during the 3 months prior to your HbA_{1c} test you have had a high level of glucose in your blood, your HbA_{1c} level will reflect this.
- If your blood glucose level has been generally well controlled, the test will also display this.
- Everyone who has diabetes should have their HbA_{1c} done at least every six months to check their overall level of control.
- Make a point of consulting with your diabetes care team to interpret the results of your HbA_{1c} test.

Short-term complications

Hypoglycaemia

- Hypoglycaemia occurs when your blood glucose level drops very low (below 3.9 mmol/l).¹¹ Some of the symptoms of hypoglycaemia are hunger, sweating, anxiety, faintness and headache.
- Hypoglycaemia may occur very quickly and if the first signs are not recognised and treated, it may lead to loss of consciousness or coma within minutes.

Causes of hypoglycaemic episodes (hypo's)¹¹

- Too much insulin is injected.
- Too little food is eaten, or a snack/meal is missed.
- Very strenuous exercise which burns up a lot of glucose, thereby lowering your reserves (glycogen). Unless you eat enough before and after exercising, you could experience a hypoglycaemic reaction – for up to 24 hours after the exercise.
- Drinking alcohol without eating – alcohol inhibits the recognition of hypoglycaemic symptoms.

Practical notes on hypoglycaemic episodes (hypo's)¹¹

- Symptoms of hypoglycaemia may occur at higher values than 3.9 mmol/l, for example patients with recent marked hyperglycaemia, can have symptoms at blood glucose levels in the normal range
- All diabetic patients must be educated on how to recognise hypo's and how to treat them
- Do a blood test, i.e. finger prick, when you feel the mild symptoms, so that you know at what blood sugar levels you may experience a 'hypo'.
- Your symptoms may vary from those listed and from those of other people with diabetes. They may also vary according to the time of day when they occur. Know your symptoms well.

Symptoms and treatment of hypoglycaemia ¹¹

SYMPTOMS	TREATMENT
	EARLY
<ul style="list-style-type: none"> • Sweating • Warmth • Anxiety • Tremor • Nausea • Palpitations • Fast heart rate • Hunger 	<p>Check blood glucose level at the onset of early hypo symptoms. Eat 15 - 20 g glucose if required in the form of:</p> <ul style="list-style-type: none"> • 15 - 20 g of glucose powder or tablets • 3 to 4 teaspoons of sugar /sucrose dissolved in a little water. • 1/2 a can (175 ml) of fruit juice or soft-drink • 2 - 3 Super-C sweets • 1 - 1½ tablespoons of honey <p>Repeat within 10-15 minutes if necessary. After this a light meal of carbohydrates (e.g. bread) and protein (e.g. peanut butter or chicken sandwich) must be taken</p>
	ADVANCED
<ul style="list-style-type: none"> • Poor concentration • Drowsiness / dizziness • Confusion • Weakness • Visual disturbances • Speech abnormalities • Headache • Seizures • Coma 	<p>Where available, Glucagon 1 mg injection to be administered by a trained family member.</p> <p>Patients with severe hypoglycaemia must be taken to an emergency room to receive immediate treatment and hospitalisation</p>

MILD

SEVERE

Treating a 'hypo' ¹¹

Check blood glucose level at the onset of early hypo symptoms.

Eat 15 - 20 g glucose if required in the form of:

- 15 - 20 g of glucose powder or tablets
- 3 to 4 teaspoons of sugar /sucrose dissolved in a little water. • 1/2 a can (175 ml) of fruit juice or soft-drink
- 2 - 3 Super-C sweets
- 1 - 1½ tablespoons of honey

Repeat within 10-15 minutes if necessary. After this a light meal of carbohydrates (e.g. bread) and protein (e.g. peanut butter or chicken sandwich) must be taken

If unable to swallow: ¹¹

- This will be in the case of a severe 'hypo', i.e.
 - Fainting
 - Convulsions / Seizures
 - Coma
- Immediately call for assistance.
- Treatment will be administered by another person, e.g. parent, friend, etc. So teach them about your condition and how to use a glucagon hypokit.
- Rub honey, syrup or sugar into the inside of the mouth.
- A glucagon hypokit should be used to treat any severe hypoglycaemic episode where the person cannot/will not swallow or is unconscious.
- Never give anything to eat or drink if the person is unable to swallow or is unconscious. If unconscious, turn the person on his/her side. Ensure that nothing is blocking the airway.
- An injection of glucagon increases blood glucose temporarily. It is important for others to know where the glucagon hypokit is kept and how it is used.
- Prepare the glucagon hypokit solution and inject (as shown in the instructions). As soon as the person is able to swallow, give a sweetened drink and something to eat to prevent a further 'hypo'.
- If within 10 minutes of injecting glucagon there is no obvious response, a second glucagon injection may be administered (if available), but call an ambulance (or doctor) or take the person to the nearest Hospital Casualty or Emergency Department.

Important notes on how to avoid hypo's ^{11,13}

General:

- Do not miss meals or snacks or have them late.
- Always carry glucose sweets with you.
- Always have a glucagon hypokit available:
 - At home
 - In your lunch box or drawer at work
- Wear a medic alert bracelet
- Make sure people close to you, e.g. family, friends, teachers, fellow workers all know:
 - What a 'hypo' is
 - What your symptoms are
 - Where you keep your glucose sweets and your glucagon hypokit – How to treat your 'hypo' and ensure that they are able to use the glucagon hypokit

Hyperglycaemia

This is when the blood glucose is very high, i.e. over 13.9 mmol/l. ¹¹

Causes of hyperglycaemia

- Infection
- Stopping insulin treatment or injecting too little
- Heart Attack
- Stroke
- Elderly: Decreased water intake
 - Diuretics (water tablet)

If your blood glucose is consistently more than 13.9 mmol/l or if you have any kind of infection and/or experience nausea /vomiting or feel abdominal pain, check for ketones in the blood or urine.¹¹ Contact your diabetes care team for advice.

Symptoms and treatment of hyperglycaemia ^{11,13,14}

Symptoms	Treatment
Excessive Thirst Frequent Urination Weight Loss Nausea Vomiting Abdominal Pain With ketones: Fruity smelling breath	<p>If no Ketones are present</p> <p>Drink lots of fluids – this will help to prevent ketones from forming. Check your blood sugar levels. Increase your insulin dosage as per your doctor's recommendation</p> <p>If Ketones are present</p> <p>Immediately contact your doctor for advice</p>

If you are vomiting: ¹³

- It is difficult to achieve rehydration through oral means then it must be done intravenously by a health care professional
- If ketones are found in the urine immediately contact your doctor for advice

Hypo (As in 'Low' blood glucose)	Hyper (As in 'High' blood glucose)
Fast onset Poor concentration Irritability Sweating Nausea Hunger	Slow onset Excessive Thirst Frequent Urination Tiredness Weakness Blurred vision

N.B.

- Always test the blood glucose level to confirm symptoms and if in doubt, give sugar.
- If you are uncertain of how to treat any of the above symptoms, contact your diabetes care team immediately for assistance.

Eat healthy ¹

Having diabetes doesn't mean that you have to give up all of the foods you like or buy special 'diabetic' foods. It just means that you should try to follow a balanced meal plan.

Eating healthy will give you more energy to do all the things you want and need to do in your daily life. Following a healthy meal plan helps you manage your blood sugar levels and your weight.

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APPROACH EVERY MEAL AS A CHANCE TO MAKE A HEALTHY FOOD CHOICE

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Healthy tips

- Eat a wide variety of healthy foods.
- Balance the number of calories with your activity level.
- Choose foods rich in whole grains, vegetables, fruits and fat-free/low-fat milk products.
- Eat lean meats, such as poultry and fish, and beans for protein.
- Limit the amount of saturated fat and salt.
- Cut down on added sugars.
- Keep to sensible amounts of alcohol.
- Have a proper breakfast every day to boost your body's ability to burn energy.
- Space your eating throughout the day and don't skip meals.

HEALTHY MEALS

Carbohydrate

Potato, pasta, rice ... **Lead to increase in blood sugar.** ^{1,3}



Vegetables

Broccoli, cabbage, lettuce, tomato, carrots, peas ... **Do not increase blood sugar.** ^{1,3}

Protein

Lean meat, chicken, fish, eggs ... **Do not increase blood sugar.** ^{1,11}

Stay active

Physical activity is a key part of managing diabetes. Regular activity can help you prevent health problems, lose weight or control your weight.⁶ It will also make your medication work better to lower your blood sugar levels and give you more energy.

Choose an activity that you enjoy. Just about anything that gets you moving is good. Take it slow at first, 5 or 10 minutes may be enough. Then gradually add on until you reach 30 minutes per day.

Maybe you would enjoy one of these activities: ¹¹

- Walking
- Jogging
- Bicycling
- Swimming
- Dancing



Charles from Kenya-
Charles has type 2 diabetes

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Novo Nordisk Kenya Ltd
3rd Floor Avenue 5 Building
Rose Avenue
Nairobi - Kenya



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