



## GGC Children's Diabetes Service

Supporting Children and Young People with  
Diabetes in Education

*Delivering better health*

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## Introduction

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Diabetes is a life-long but treatable condition that needs to be managed 24 hours a day and 7 days a week. As a significant amount of time is spent in nurseries and schools, staff play a vital role in the care of children and young people with diabetes. It is important that staff and the diabetes team work together to help young people with diabetes achieve their full learning and health potential.

There are Education Acts in Scotland, which place requirements on the education authorities. The Education (Additional support for learning) (Scotland) Act (2004) requires schools to identify, meet and keep under review the additional support needs of pupils, including those with diabetes. The Education (Disability Strategies and Pupils' Educational Records) (Scotland) Act (2003) also places duties on bodies responsible for schools to prepare an accessibility strategy which sets out their plans to ensure access to the curriculum, physical environment of schools and school information.

### Aims

- A safe learning environment
- Well managed diabetes

It is well documented that if a child's diabetes is not looked after this will adversely affect their learning ability and health.

This is a practical guide for staff involved with young people with diabetes. Its purpose is to educate nursery and school staff about managing diabetes effectively.

## What is Diabetes?

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It is not yet known why children get diabetes. What is known is that the number of children developing diabetes is increasing and most children have type 1 diabetes. It is not caused by poor diet or eating too many sweets but by a process where the cells in the pancreas that make insulin are destroyed by the immune system.

Food gives us energy to live. There are three main food groups; protein, fat and carbohydrate. When food is digested carbohydrate is broken down to a sugar called glucose, which moves into the blood stream. The blood glucose level is regulated by a hormone called insulin which is necessary to allow the movement of glucose into the cells of the body where it is stored or used as energy. Diabetes occurs when the body cannot make enough insulin and if untreated causes the glucose levels to become dangerously high.

Insulin is essential for life. It cannot be taken as a tablet and must be given by injection or an insulin pump. The majority of children receive their insulin by injection using a pen device; however, over a third of children with diabetes in Scotland use an insulin pump device, meaning that the number of children using insulin pumps at school is commonplace.

Diabetes cannot be cured, however it can be well managed by balancing insulin, carbohydrate and exercise. Testing the blood glucose level is necessary to assess and look after the condition. It is important to manage diabetes properly to minimise the risks of short and long term complications.

## Managing Diabetes Successfully

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### Blood glucose control

The aim is to control diabetes by keeping the blood glucose levels within the **target range** of 3.9-6.9mmol/l, most of the time. Optimal blood glucose control helps to promote growth, development, concentration and to prevent the immediate dangers of glucose levels that are too high or too low. It also can help prevent or delay the long-term complications of diabetes such as heart disease, stroke, blindness, kidney failure, nerve disease, and amputations.

#### Target Blood Glucose

- 3.9-6.9 mmol/l

The key to getting the best possible blood glucose results is to balance carefully insulin, food intake and exercise. As a general rule carbohydrate from food makes the blood glucose rise and exercise and insulin make the blood glucose fall.

Many young people will be able to manage most or all of their diabetes care themselves whilst others will need help from school staff because of age, developmental stage, lack of experience or confidence. Over and above routine care a diabetes emergency may happen at any time to anyone with the condition. School staff need to know about diabetes and be prepared to provide diabetes care at school.

#### What is successful diabetes management at school?

- Maintaining best possible blood glucose control
- Assisting the young person with performing diabetes care tasks
- Identifying key staff who know about diabetes

### Identifying staff

It is important for the member of staff who coordinates the care of children with medical health needs to identify a group of staff for training. Staff trained in supporting pupils may be teachers, including PE teachers and Guidance teachers, school nurses, and pupil support assistants. The Guidance Teacher has an important part to play in secondary schools where the pupils have many teachers.

## Care tasks may include supervising or carrying out:

- Blood glucose testing and recording results
- Insulin injections or giving doses via a pump
- Recognising and treating a low blood glucose level (hypoglycaemia)
- Recognising and dealing with high blood glucose levels (hyperglycaemia)
- Urine or blood ketone testing
- Counting carbohydrate and promoting healthy eating
- Dealing with exercise

## Location for testing and injecting

Young people requiring supervision or support should have a mutual arrangement with the nursery or school about the location for testing and injecting. Some schools have a medical room and others a room set aside for this purpose. Many others, especially older children, will be able to perform diabetes tasks independently and will carry their own equipment.

With proper safety procedures in place for the disposal of used equipment there is no danger to other young people or staff.

## Supplies

The child's parents or guardians are responsible for providing the necessary equipment and supplies needed to look after diabetes, however, it is helpful for the nursery or school staff to inform them when supplies are running low or need to be replaced.

## Blood Glucose Testing

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### When to test?

Blood glucose should be checked: -

- Routinely before lunch
- Routinely before snacks and lunch if using a insulin pump
- At other times: -
  - if there is concern that the blood glucose level is too low or too high
  - before, during or after sport / PE
  - when requested by the parents or diabetes team

### Target Blood Glucose

- 3.9-6.9 mmol/l

Many pupils will be able to check their own blood glucose. Younger children will need to be supervised or have someone else perform this task.

Parents will generally demonstrate blood glucose testing, however if necessary a member of the Diabetes Team will do so.

## Equipment needed

- Lancer (gadget used to prick the finger)
- Lancet (needle)
- Blood glucose meter
- Testing strip for meter
- Sharps bin (to dispose of used lancet)



## Method

Hands **must** be washed with soap and warm water before testing.

The method of testing is basically the same for each type of meter.

1. Prepare the lancet (finger pricking device). A new lancet should be used for each test.
  - a. Take off the device cap.
  - b. Insert the lancet (needle) and twist off the protective cover if necessary.
  - c. Replace device cap.
2. Check the lancet setting. This controls how deep the lancet will puncture the skin. Set this at 2 as this will usually provide a sufficient sample and be less painful than the higher settings, unless otherwise discussed with the family.
3. Carry out the test.



- a. Insert the test strip into the meter. This will automatically switch on the meter.
- b. The screen will indicate when the blood sample should be applied.
- c. Obtain blood sample by holding the lancet firmly against the **side of the fingertip** and press the release button. Gently squeeze the finger until a round drop of blood appears.
- d. Guide the test strip whilst in the meter to the blood drop. The sample will be drawn into the strip when it touches the blood.
- e. The meter counts down and the result will be displayed on the screen.



4. Write down the result in a blood glucose diary or jotter.
5. Remove the test strip and the lancet from the lancet.
6. Used test strips can be disposed of in the general rubbish and the lancet put into the sharps bin provided.

There are a variety of meters, lancers and test strips available (each with their own set of simple instructions).

## Insulin

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Advances in the development of different types of insulin and pumps have helped improve the management of diabetes. These options may require more frequent blood glucose monitoring and assistance for the young person with diabetes.

### Ways to give insulin

- Insulin pens
- Insulin pumps

Generally, people with type 1 diabetes use a **basal/bolus** insulin system. This method mimics the way a normally functioning pancreas produces insulin and requires injections during the school day.

**Basal** insulin is long acting insulin delivered once or twice a day out with school times. This type of insulin is used to control blood glucose levels overnight and between meals.

**Bolus** insulin refers to a dose of rapid-acting insulin that is given to cover the carbohydrate in a meal or snack and to lower blood glucose levels that are above target.

A combination of types of insulin is used to give flexibility at meals and snacks and helps to achieve target blood glucose levels.

### Lunch Routine

- Blood glucose testing
- Insulin injection
- Eat lunch

Many young people are able to give their own insulin, some will need supervision and there are others who will need somebody to do it for them.

Insulin comes in cartridges and should be stored carefully so that it continues working properly. The insulin cartridge will remain effective for 1 month at room temperature. Therefore, the cartridge should be changed every month even if using small doses of insulin. Spare cartridges are best stored in the fridge until their expiry date. Never freeze insulin.



Insulin Cartridge

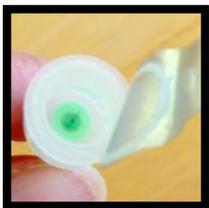
## Equipment for injection

- Pen device
- Insulin cartridge
- Pen needles
- Sharps bin (to dispose of used needle)



There are several different types of pens for different types of insulin and although each has minor differences the principles of use are the same. The doses are set by dialling up an amount with the body of the pen and can be in either half unit or single unit increments depending on the type of pen.

Insulin pens have a main body, containing the mechanism to dial up the particular dose of insulin, a barrel, which holds the cartridge, and a needle, which is covered by an inner sheath and an outer cap.



Needle



Outer Cap



Sheath



Needle

## Preparing and giving an injection



1. Screw the needle onto the pen. Remove plastic cap before use but retain to remove the needle after giving insulin dose.

2. Dial up a 2 unit dose by turning the dial at the bottom of the pen.

3. Hold the pen with the needle upwards, assisting any trapped air to rise. Tap the side of pen gently to allow air bubbles to rise to the top of the cartridge.



4. Remove inner sheath. Press plunger to expel air. Repeat steps 2 to 4 until insulin appears at tip of the needle. This removes air bubbles.

5. Dial up insulin dose.

6. Aim to inject 2-3 fingers' breadth from the site of the last injection. Gently lift a soft fold of skin, less than an inch wide. Do not squeeze tightly. Injection should be made into fat under the skin, and a larger pinch may cause pain by injecting into muscle. Change sites daily to avoid causing lumpy areas.



7. Insert needle straight into the skin, perpendicular to skin surface, and with a smooth steady action.

8. Press plunger down as far as it will go. Count 10-15 seconds before releasing the pinch and removing the needle.



9. Carefully replace the plastic outer needle cap and unscrew from pen. **Do not** use the sheath due to risk of needle-stick injury.

10. Immediately dispose of capped needle into sharps bin. Pen should be stored **without** needle attached for safety and to prevent leakage.



## Injection Sites

Injections are commonly given in the thighs, however are also given in the abdomen or arm. The insulin should be injected in different places within the chosen area to ensure that it works properly and the site remains healthy.

## Timing of Injections

The lunchtime insulin should **ideally** be given just before food unless other instructions have been given. There should not be a delay between the insulin injection and eating as the insulin will begin to lower the blood glucose within 10 minutes. The young person should eat directly after injecting and should have easy access to their meal and preferably eat with friends. Some schools arrange for the pupil to leave class a few minutes before the lunch bell rings to allow time to do the blood glucose test and insulin injection. These procedures do not take long and it is important not to take too much time out of a lesson.

## Doses

The amount of insulin required depends on the pupil's individual needs, the amount of carbohydrate eaten and the blood glucose reading.

Some children will eat set amounts of carbohydrate at snack times and lunchtime that do not change from day to day, whilst others will eat varying amounts and manage this with carbohydrate to insulin ratios (carb ratios).

If the blood glucose is higher than the target range extra rapid acting insulin can be given to bring it down. This additional insulin is called a Correction Dose.

## Pumps

An insulin pump is a small device that will continually deliver basal insulin. Boluses of insulin are also given for meals and snacks and when the blood glucose is high by pressing buttons instead of injecting. The pump calculates the bolus doses after the amount of carbohydrate eaten and blood glucose result is entered. The infusion set stays attached and insulin goes from the pump through tubing into the body. The infusion set only needs to be changed (at home) every 2-3 days.

## Hypoglycaemia (low blood glucose) - Recognition and Treatment

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A blood glucose result below 3.9mmol/l is too low and is called hypoglycaemia often referred to as 'hypo'.

Hypoglycaemia, which is not always preventable, is the greatest immediate danger to people with diabetes. Hypos can happen very suddenly and require immediate treatment.

### Hypoglycaemia

- Means **low** blood glucose

### Causes

- Underestimating or insufficient carbohydrate eaten at a meal or snack
- Delayed meal or snack
- Too much insulin or taking the wrong type
- No adjustment made for exercise (not eating extra carbohydrate and / or cutting insulin dose)
- Illness

There usually is a reason, but a hypo may happen without an obvious cause.

### Hypos: Signs and Symptoms

- Shaky or dizzy
- Looking pale
- Hunger
- Behaviour change
- Feeling sick
- Headache
- Poor concentration
- Stomach ache
- Tiredness
- Feeling 'wobbly'

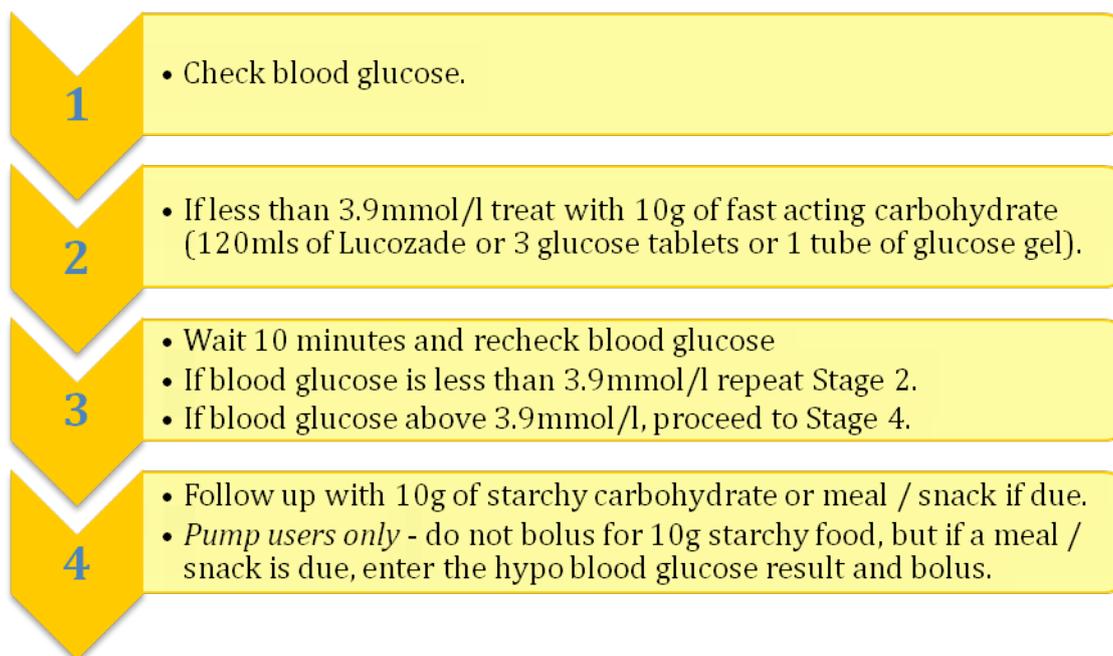
### Hypo

- Never leave anyone who is hypo alone or send them to another location on their own
- Hypo remedies must always be near at hand

Sometimes, its symptoms are mistaken for bad behaviour.

If the young person complains of any of these symptoms a blood glucose test should be done to confirm whether they are hypo or not. If in doubt and blood glucose testing is not possible TREAT. No harm will be done by treating even if it is not a hypo. Some people, especially young children, will not recognise hypoglycaemia symptoms with every episode and others have hypoglycaemia unawareness, therefore it is important that all staff can recognise and treat hypos.

If the blood glucose is less than 3.9mmol/l the hypo must be treated IMMEDIATELY as follows:



Mild hypos as described above are easily treated. Occasionally hypo symptoms can worsen. The pupil may require assistance if drowsy and confused. A tube of glucose gel e.g. DextroGel<sup>©</sup>, GlucoGel<sup>©</sup> or Rapilose<sup>©</sup> may be the best option to treat the hypo at this time.

Although rare, the hypo may become severe and the young person may faint, have a fit or appear unable to swallow:

- Do not put anything in their mouth
- Place them into the recovery position
- Telephone 999 for an ambulance

## ***Hyperglycaemia - Recognising and Dealing with High Blood Glucose***

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A blood glucose result over 6.9mmol/l is too high.

Day to day high blood glucose levels (especially if 14mmol/l or more) can result in the following:

- Thirst
- Passing urine more frequently (may need to go to the toilet during class time)
- Tiredness, lack of energy and eventual weight loss
- Lack of concentration

Hyperglycemia may be caused by too little insulin, food intake that has not been covered by insulin, or decreased physical activity. Other causes include illness, infection, injury, severe physical or emotional stress or the pump not working properly.

In the short term, hyperglycemia can badly affect cognitive abilities and academic performance. In the long term, moderately high blood glucose levels can increase risk for serious diabetes complications.

Although undesirable, there is no immediate danger unless the child has an insulin pump. The pump uses only rapid acting insulin and if the pump breaks down or is disconnected for long periods the wearer is at great danger of their diabetes becoming unstable. If left untreated they may develop a diabetes emergency called Diabetic Ketoacidosis or 'DKA'.

### Correction Doses

A correction dose is an amount of rapid acting insulin given to lower blood glucose levels that are above target. This dose can be added to the meal time bolus dose.

### Ketones

When there is not enough insulin the body cannot use glucose as the main energy source and must use fat as an alternative source of fuel. Using fat for energy produces ketones - acids that poison the body. Ketones can be extremely dangerous, and large amounts may even be life-threatening.

### Testing for Ketones

If the young person uses an insulin pump they must check for ketones when the blood glucose level is above 14mmol/l. The blood ketone test is done using a meter and a test strip, similar to blood glucose monitoring with a blood glucose meter. If the test indicates ketones are above 0.6 notify the parents/guardian in the first instance or the Diabetes Service for advice.

Occasionally those on basal bolus insulin will be asked to check for ketones at school if the blood glucose is over 14mmol/l. The ketone test may be a urine ketone or a blood ketone test. The urine test involves dipping a Ketostix<sup>©</sup> strip into the urine, waiting for 15 seconds and comparing the resulting colour to a colour chart. If the test indicates blood ketones are above 1.0 or urine ketones are moderate or large notify the parents/guardian in the first instance or the Diabetes Service for advice.

## Food and Diabetes

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Nutrition recommendations for young people with diabetes aim to provide maximum flexibility to meet each person's nutritional needs, appetite, eating habits, and lifestyle. When carbohydrate is eaten it is digested or broken down and goes into the blood stream in the form of the simplest sugar, glucose. It raises the blood glucose level.

Carbohydrate foods include bread, potatoes, pasta, rice, cereals, milk, yogurt, fruit, pies, cake and sweets.

### Carbohydrate

- Causes the blood glucose to go up.
- Sugary and starchy foods and drinks contain carbohydrate.
- The body needs insulin to use carbohydrate as energy.

The eating plan recommended for people with diabetes is basically healthy eating. Sugary and high fat foods should only make up a small part of the diet while fruit and vegetables are encouraged. It is important also to ensure that the eating plan is designed to avoid high or low blood glucose levels. The main difference is that the timing and carbohydrate content of the food that the young person with diabetes eats are matched carefully to balance the way that the insulin works.

One method of balancing the food with insulin is to count carbohydrate and have a set amount of carbohydrate for snacks and meals and take a set dose of insulin.

Another, more commonly used, way to balance food and insulin for those on basal bolus insulin or a pump is that they count the amount of carbohydrate to be eaten at a meal time and give an amount of insulin to cover the food using an insulin to carbohydrate ratio (carb ratio). The amount of carbohydrate eaten at every meal can vary and the insulin dose is adjusted to cover the amount of carbohydrate eaten. The carb ratio is used to work out the number of units of insulin needed to cover the number of grams of carbohydrate eaten. For example, if the carb ratio is 5:1 that is 5g of carbohydrate will need to be covered by 1 unit of insulin and if 60g of carbohydrate is about to be eaten then the dose will be 12 units of rapid acting insulin. The pumps have a built in calculator and will work out how much insulin should be given when the amount of carbohydrate is entered.

## Exercise

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Exercise is an essential part of managing diabetes. Everyone is encouraged to exercise regularly. It usually has the effect of lowering the blood glucose so to keep the levels within the target range it is necessary to adjust the food intake and on occasion reduce the insulin dose.

Eating extra carbohydrate can prevent the blood glucose falling too low and can be taken in the form of a sugary or starch carbohydrate or as a sugary drink. The type and amount of carbohydrate can be discussed with the individual or their parents.

To prevent hypoglycemia, young people may need to test their blood glucose more frequently whilst being active.

Young people using a pump may disconnect it during contact or water sports. The pump should not be disconnected for more than 1 ½ hours.

#### Exercise is encouraged

- Young people with diabetes should take part in gym / PE and fully participate.
- Teachers need to know about hypos, how to treat them and where the remedy is kept.

### *Trips and Special Events*

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With proper advanced planning young people with diabetes can safely take part in any school activity. A visit from the Diabetes Team can be arranged to discuss this in detail if required.

### *Illness*

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The usual school or nursery procedure should be followed for young people with diabetes and the parents informed. Diabetes does not increase the chances of becoming unwell but illness does make the diabetes harder to manage and often causes high blood glucose levels.

### *Aim*

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The aim is that a young person with diabetes should be able to participate in all nursery or school activities in a safe learning environment with well managed diabetes. This is important psychologically and socially. This can be achieved by families, educational establishments and GGC Children's Diabetes Service working together. If there are any concerns please discuss them with the parents or guardian, in the first instance, but if they are not available call the Diabetes Service and a member of the team will be happy to help.

## Plan for Insulin Administration

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Name: \_\_\_\_\_

DoB: \_\_\_\_\_

### Normal daily insulin requirements at lunchtime

Type of insulin: \_\_\_\_\_

Dose of insulin: \_\_\_\_ units

### Correction dose

A correction dose is an *extra* dose of fast-acting insulin, either **NovoRapid** or **Humalog**, given when the blood glucose is above target and there are no or minimal ketones present.

Correction doses should not be given if the person has been hypo today (i.e. had a blood glucose under 3.9mmol/l). This correction dose should be given only at a mealtime unless advised otherwise by parent / guardian or medical staff.

1 unit of insulin should drop blood glucose by \_\_\_\_ mmol/l, e.g. when:

blood glucose is \_\_\_\_ mmol/l, give an extra ½ unit NovoRapid or Humalog

blood glucose is \_\_\_\_ mmol/l, give an extra 1 unit

blood glucose is \_\_\_\_ mmol/l, give an extra 2 units

blood glucose is \_\_\_\_ mmol/l, give an extra 3 units

blood glucose is \_\_\_\_ mmol/l, give an extra 4 units

The maximum correction dose for this young person is \_\_\_\_ units.

### Ketones

If the young person has ketones the parent / guardian should be contacted directly to deal with the situation.

Date Plan Completed: \_\_\_\_\_