

# Hypoglycaemia

Looking after diabetes relies on balancing the blood glucose *rise* from food with the blood glucose *fall* due to insulin. The body usually makes just enough insulin to match the blood glucose, keeping this in a narrow range. Someone *with* diabetes needs to match the doses of injected insulin with the amount of food (carbohydrate) eaten. The amount of exercise we take is also important.

Blood glucose moves below 4 and above 8 mmol/l when the careful balance of food, insulin and exercise is upset. A low blood glucose (“hypo”) might occur when:

- Not eating enough carbohydrate
- Being late for, or missing, a meal or snack
- Taking too much insulin
- Taking insulin at the wrong time
- Taking the wrong type of insulin
- Taking extra exercise and too little food
- Food not absorbed (e.g. vomiting, diarrhoea)

A “hypo” is defined as a **blood glucose less than 4 mmol/l** and should **always** be treated

**Hypoglycaemia** - *What’s in a name?*

- *Hypo* - low
  - *Glyc* - glucose
  - *Aemia* - blood
- “ low  
= blood  
glucose ”

A reason can usually be found, but sometimes a hypo may occur without obvious cause. The severity of a hypo is graded by seeing what happens when the low blood glucose takes place. Generally, the lower the blood glucose concentration, the more serious the symptoms will be, and by definition the higher the “grade” of hypo.

Once recovery has started to improve, starchy food such as a sandwich or digestive biscuit should always be given. This helps prevent a further fall in blood glucose. While tempting, chocolate is *not* recommended, as its fat slows glucose absorption.

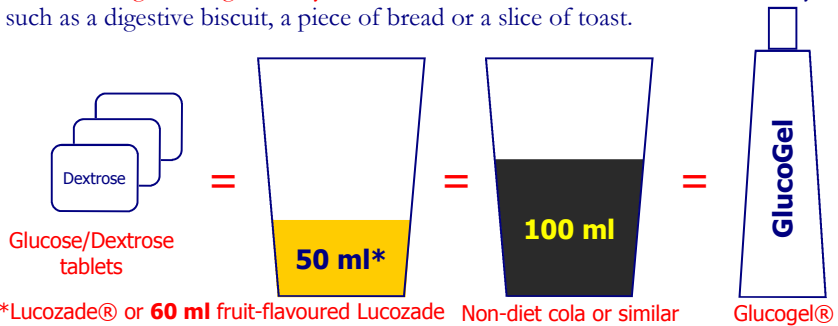
Severity	Symptoms	Treatment
Mild	<ul style="list-style-type: none"> <li>• Shaky</li> <li>• Hungry</li> <li>• Pale</li> <li>• Headache</li> <li>• Stomach Ache</li> <li>• Mood Swings</li> <li>• “Jelly”/Tired Legs</li> <li>• Lack of Concentration</li> </ul>	<ul style="list-style-type: none"> <li>• Give fast-acting carbohydrate                             <ul style="list-style-type: none"> <li>• 3 <b>GLUCOSE TABLETS</b> <i>OR</i></li> <li>• 50 ml <b>LUCOZADE® ORIGINAL</b> <i>OR</i></li> <li>• 100 ml <b>NON-DIET COLA</b> or similar</li> </ul> </li> <li>• Wait 10 minutes and then retest blood glucose</li> <li>• If blood glucose still under 4 mmol/l: repeat above fast-acting carbohydrate &amp; retest blood glucose after another 10 minutes passes</li> <li>• If blood glucose risen to 4 mmol/l or higher: give <b>STARCHY CARBOHYDRATE</b> such as                             <ul style="list-style-type: none"> <li>• Digestive biscuit</li> <li>• Small sandwich</li> <li>• Snack or meal (if due)</li> </ul> </li> </ul>
Moderate	<ul style="list-style-type: none"> <li>• Same as above, <i>however</i></li> <li>• Slightly more confused</li> <li>• Dizziness</li> <li>• Unable to treat self</li> <li>• Too confused to eat/drink</li> <li>• Slurred speech</li> <li>• Unsteady on feet</li> </ul>	<ul style="list-style-type: none"> <li>• Treat as for Mild hypoglycaemia</li> <li>• Consider using <b>GLUCOGEL</b> as fast-acting carbohydrate, instead of Glucose tablets, Lucozade® Original or non-diet drink</li> </ul>
Severe	<ul style="list-style-type: none"> <li>• Not able to take food/drink</li> <li>• Sleepy/Unconscious</li> <li>• May be fitting</li> </ul>	<ul style="list-style-type: none"> <li>• <b>GLUCAGEN GLUCAGON</b> injection</li> <li>• Call 999 if no or slow response to treatment</li> <li>• <b>See Treatment Section on Page G 11</b></li> </ul>

## Mild Hypos

Everyone, whether they have diabetes or not, will have had a **mild hypo** at some time - perhaps their dinner was delayed, or they were exercising for a while. For someone *without* diabetes, a blood glucose under 4 mmol/l reduces insulin release for a short time, and this helps to keep the blood glucose from falling any lower.

**Treat mild or moderate hypos with fast-acting glucose, & check blood glucose in 10 minutes. If still low, treat again, but if 4 mmol/l or higher, give longer-acting carbohydrate.**

People *with* diabetes inject insulin, and from then on this insulin keeps on working, whether the blood glucose was high or not. They should **first take glucose that is quickly-absorbed**, such as glucose/dextrose tablets, Lucozade®, sugary soft-drink, or Glucogel®. 10 minutes later, once the fast-acting glucose has had a chance to be taken in, **longer-acting carbohydrate should follow**. This includes more starchy food such as a digestive biscuit, a piece of bread or a slice of toast.



## Moderate Hypos

Those on insulin should probably have at least **one or two mild hypos a week**. More often than this suggests too much insulin is being taken, while too few hypos means insulin doses are too low. A balance between insulin, food, and exercise is the key.

Someone having a **moderate hypo** may not notice their own symptoms, and so might need to rely on someone else. Glucose is the brain's main source of energy, and a fall in blood glucose can affect it. This is why a moderate hypo often directly alters brain function, causing tiredness, confusion, unsteadiness and slurred speech. Any **quickly-absorbed glucose**, like glucose/dextrose tablets, Lucozade®, sugary drinks, or Glucogel® should be enough to treat a moderate hypo. Again, **slower-acting starchy foods** should follow 10 minutes later.

**Regular daily review of blood glucose results helps highlight early (problems)**

Occasionally, a moderate hypo may seem to happen for no obvious reason. This can be alarming for all concerned. Regular daily review of blood glucose results, insulin doses, food intake and exercise patterns all help to highlight patterns of repeated low readings. The brain can get used to frequent low blood glucose amounts, and typical warning signs may not occur. Instead of being able to stop the blood glucose falling even lower, in this case a severe hypo may happen unexpectedly, without the usual early warning signs mentioned above.

# Severe hypos

About a third of all people with diabetes have a severe hypo at some time in their life. This can cause great concern, but generally all recover rapidly and with no long-term harm. The body releases its own glucose from its stores in the liver and muscle.

The brain uses glucose for energy. **Severe hypos** occur when blood glucose falls so low that the brain starts acting erratically. Agitation, irritability, aggression and loss of consciousness may follow. Sometimes blood glucose falls so low that a **convulsion**, or fit, occurs. This can be very frightening to anyone present, but fortunately long-lasting problems are extremely rare. Complete recovery is expected, but even so, a severe hypo can be very alarming, and should of course be avoided whenever possible.

Carbohydrate is stored by the liver, for times when energy needs cannot be provided by food (such as when sleeping overnight). If blood glucose falls very low, the body makes chemical “messengers”, known as **hormones**, to try to once again increase the blood glucose. Insulin is a hormone, but works to *reduce* the amount of glucose in the blood. **Glucagon**, however, is another hormone made in the pancreas, and works in the opposite way – releasing the body’s glucose stores. Just like insulin, glucagon is made in the islets of the pancreas (in “alpha cells”, and not insulin’s “beta cells”).

Glucagon works mainly by making the liver release its stores of glucose

Glucagon can be injected in times of emergency. Everyone with diabetes should have glucagon at home. It comes in an orange box, called a “**GlucaGen®**” kit.

## Why do Severe Hypos occur?

Severe hypos rarely happen for no clear reason. Here are some reasons they occur:

- A **missed snack or meal**, especially if blood glucose results are already low.
- **Insulin given at the wrong time** – for example, the morning insulin dose given at tea-time (consult the insulin errors guideline on Page G 03 for further advice).
- **Long periods of activity** after taking too little carbohydrate and/or too much insulin. Strenuous exercise can lower blood glucose for up to 24 hours, so exercise should be planned. Frequent, regular blood glucose testing is always helpful. Cutting insulin doses before and after exercise might also be useful.
- **Diarrhoea and vomiting** may cause food to not be absorbed properly. This is one of the reasons extra blood glucose testing during illness is so useful.
- Those old enough to drink **alcohol** legally should know that it lowers blood glucose by slowing glucose release from liver stores. Extra food before, during and after drinking alcohol is recommended. Extra testing is also sensible, along with a form of diabetes identification. Symptoms of low blood glucose may be mistaken for having had too much to drink, and this may delay hypoglycaemia treatment.

## When to give a GlucaGen® Injection

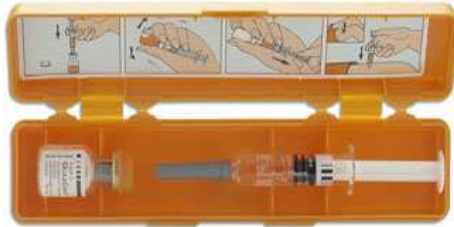
- If the child is being extremely **difficult** and **refusing sugar** by mouth.
- If the child is **unconscious**.
- If the child is **fitting**.

Please let the Diabetes Team know if you have had to deal with a severe hypo so we can provide you with support and advice, and hopefully prevent further episodes.

# Giving a GlucaGen® injection

Along with insulin, the pancreas also produces **glucagon**. While insulin stores glucose in cells and causes blood glucose to fall, glucagon releases glucose from the body's stores, and so **increases blood glucose**. It can be given to treat a severe "hypo".

"GlucaGen®" is the name of the glucagon stored at home for emergencies. It comes in a kit (shown below), and should be stored in the refrigerator. The expiry date should be checked every so often, to make sure an in-date kit is always available.



## Treatment of a Severe "Hypo"

1. Place person in the recovery position (Page G 21) and check time.
2. Prepare GlucaGen® Injection as shown below (illustrations courtesy of NovoNordisk):
3. Remove cap and inject water from syringe into bottle.
4. Gently mix water and powder in bottle.
5. Draw back cloudy liquid into syringe.
6. Remove air by holding syringe with needle upwards, tapping side gently, and slowly depressing plunger until a few drops appear at end of needle. This makes 1 ml of GlucaGen®.

**If child under 8 years old** inject 0.5 ml (0.5 mg) GlucaGen® into front of thigh.

**If child over 8 years old** inject 1 ml (1 mg) GlucaGen® into front of thigh.

**If there is no sign of recovery after 10 minutes,  
or if you are worried - call 999**

7. Give GlucoGel® (glucose gel) once consciousness and cooperation improves (eyes open, starts speaking).
8. Talking to and reassuring the person helps them to rouse.
9. Once sitting, give person half a cup of Lucozade®.
10. Check blood glucose.
11. If vomiting occurs, wait a few minutes and then continue.
12. After 5-10 minutes, give solid food (e.g. 2 plain biscuits or a sandwich). The delay allows the Lucozade® to be absorbed, and will hopefully avoid further fall in blood glucose.
13. Headache or nausea are common after a severe hypo has occurred.
14. It is common after a hypo to want to sleep. Blood glucose results should continue to be checked every half hourly for the next 2-3 hours.

**Please call Diabetes Team next working day to notify them of any severe hypos.**

# How to place someone in the Recovery Position



## 1. Position the legs

- Kneel beside the child
- Straighten their legs
- Lift nearer leg at knee so it is bent fully upwards

## 2. Position the arms

- Place nearer arm across chest
- Place farther arm at right angles to body



## 3. Roll into position

- Roll child away from you onto their side
- Keep leg at right angles, with knee touching ground to prevent them rolling onto their face



## 4. Stabilise in position

- Make any necessary adjustments to prevent the child from rolling
- Ensure the airway is open

## 5. Infant (under 1 year old)

- lay infant face down on an adult's forearm
- support head with hand
- check infant does not choke or inhale vomit

This procedure should only be used when there is no possibility of a head or neck injury. If this may have occurred, leave the patient where they are and call for help (999).

Guidelines