Hypoglycaemia

Looking after diabetes relies on balancing blood glucose *increase* from food with blood glucose *fall* from insulin's action. The body usually adjusts the insulin produced to match the blood glucose concentration, keeping blood glucose within a narrow range. For someone *with* diabetes, this same balance must be achieved by matching injected insulin doses to both the food we plan to eat, and the exercise we expect to take.

Blood glucose moves out of the target range of 4-8 mmol/l when the 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 observing the person's reaction at the time of the low blood glucose. Generally, the lower the blood glucose concentration, the more serious the symptoms seen, and by definition the higher the "grade" of hypo.

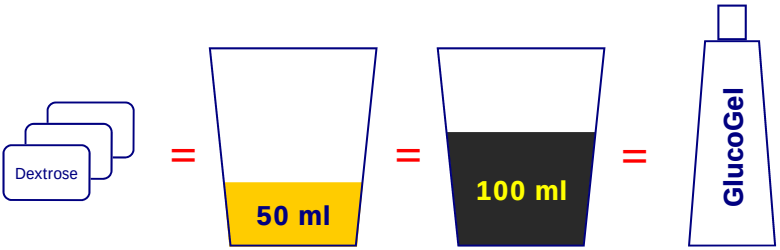
Hypo Severity	Symptoms	Treatment
Mild	• Shaky • Hungry • Pale • Headache • Stomach Ache • Mood Swings • "Jelly"/Tired Legs • Lack of Concentration	• 3 Glucose tablets *OR* • 50 ml Lucozade® Original *OR* • 100 ml non-diet Coca cola™ or similar then give STARCHY CARBOHYDRATE after a few minutes, such as • Digestive biscuit • Small sandwich • Snack or meal (if due)
Moderate	• Same as above, *however* • Slightly more confused • Dizziness • Unable to treat self • Too confused to eat/drink • Slurred speech • Unsteady on feet	• 3 Glucose tablets *OR* • 50 ml Lucozade® Original *OR* • 100 ml non-diet Coca cola™ or similar • Glucogel then give STARCHY CARBOHYDRATE (as above)
Severe	• Not able to take food/drink • Sleepy/Unconscious • May be fitting	• GlucaGen glucagon injection **SEE TREATMENT SECTION OVERLEAF**

Once someone has responded to initial treatment, solid food such as a small sandwich or a digestive biscuit should always be given to help prevent a further fall in blood glucose. While tempting, chocolate is *not* recommended, as the fat in chocolate slows glucose absorption into the blood.

Mild Hypos

Everyone, whether they have diabetes or not, will experience a mild hypo from time to time. For someone without diabetes, when blood glucose falls below 4 mmol/l, usual insulin production is temporarily stopped. This helps prevent the person's blood glucose from falling even further.

People *with* diabetes inject their insulin, and this injected insulin continues to lower blood glucose, whether it is high or not. This means a mild hypo needs to be treated quickly with any of the suggested remedies from the table on the previous page, or from the illustration below. Reassuringly, most people have no problem noticing their blood glucose has fallen below 4 mmol/l, as early symptoms of hypoglycaemia tend to be physical. Always follow this immediate boost in blood glucose with something more substantial, such as a digestive biscuit or a piece of bread or toast.



Mild hypos are part of having diabetes, and anyone taking insulin should have at least one or two mild hypos weekly. Any more often suggests insulin dose may be too great for the amount of carbohydrate eaten, while less often suggests insulin dose may be too small. A proper balance between insulin, food, and exercise is vital.

Moderate Hypos

Someone suffering from a moderate hypo may not recognise their own symptoms, and need to rely on someone else doing so. The brain *only* uses glucose for energy , and a moderate fall in blood glucose may temporarily affect its function. A moderate hypo does not result in physical symptoms alone, but also causes brain-related features such as tiredness, confusion, unsteadiness and slurred speech to occur. Any of the hypo remedies from the previous page, or from the illustration above, should treat a moderate hypo adequately.

While the causes of most moderate or severe hypos are known, it may also occur for no obvious reason. This can cause alarm for all concerned. The diabetes team would always advise the person/family to look over the blood glucose results over the last week to see if there have been an increased amount of mild hypos. This situation can unfortunately diminish the signs and symptoms of mild hypos as the brain gets used to running at a lower blood glucose level and this in turn increases the risk of a more moderate/severe hypo occurring. Also, it would be a good idea to look back over the last couple of days at their daily routine and in particular around food intake and activity levels to see if there is either a specific reason or in most cases an accumulation of ciircumstances that have cause the more moderate or severe hypo episode.

Severe hypos

About a third of all people with diabetes will have a severe hypo at some time in their lives. This can be a very alarming experience, but if you are prepared and know what to do you will cope well, and the person concerned will recover quickly. It is also important to realise that even without any help the body recovers from most hypos by releasing glucose from stores in the liver and the muscles.

The brain uses glucose for fuel, and severe hypos occur when the blood glucose level (or "blood glucose concentration") falls so low that the brain no longer functions properly. When this occurs varies from person to person. Agitation, aggression and loss of consciousness may occur. Sometimes blood glucose falls so low that a fit, or convulsion, occurs. This is often very frightening , but permanent problems are very unlikely. Complete recovery is to be expected, but even so severe hypos should be avoided whenever possible.

Glucagon works by making the liver release its stores of glucose

Carbohydrate is stored by the liver, for times when energy needs cannot be provided by food (such as overnight, when asleep). When the blood glucose concentration has fallen very low, the body responds by making hormones that restore the glucose levels. One such hormone is glucagon – the same substance that can be injected in times of emergency. Glucagon works by releasing the liver's stores of glucose into the blood stream, so increasing the blood glucose available.

To help speed the recovery process, you should have a glucagon kit at home. The glucagon you have at home, in an orange box, is called "GlucaGen®".

Why do Severe Hypos occur?

Occasionally severe hypos happen for no apparent reason, but usually they are due to one or more of the following situations:

- A missed snack or meal, especially if blood glucose results are already low.
- Insulin given incorrectly at the wrong time – for example, the morning insulin dose given at tea-time (consult the insulin errors guideline for further advice).
- Prolonged activity following too little carbohydrate and/or too much insulin. Strenuous exercise can lower blood glucose for up to 18 hours, so exercise periods should be planned. Frequent, regular blood glucose testing is always helpful – reducing insulin doses before and after exercise may be necessary.
- Illness such as diarrhoea and vomiting may result in food not being absorbed properly. Extra blood glucose testing during illness is therefore essential.
- Alcohol lowers blood glucose by slowing the release of glucose from liver stores. Extra eating before, during and after drinking alcohol is therefore recommended. Extra testing is sensible, along with carrying some means of diabetes identification

When to give a GlucaGen® Injection

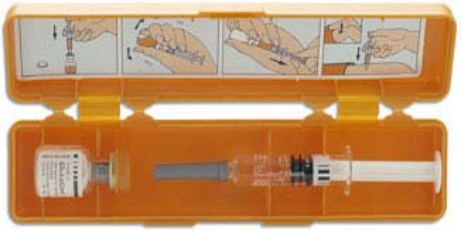
- If the child is being extremely difficult and refusing sugar by mouth.
- If the child is unconscious.

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

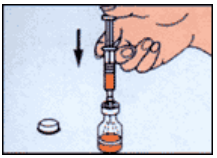
Along with insulin, the pancreas also produces glucagon. While insulin stores glucose in cells and causes blood glucose to fall, glucagon releases glucose from the body's stores, and so increases blood glucose. It can be given to treat severe "hypos".

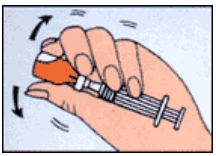
"GlucaGen®" is the name of the glucagon you should have at home, supplied in a kit form, and stored in the refrigerator (shown below). Check the expiry date every so often, and make sure you have an in-date kit available at all times.

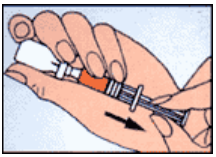


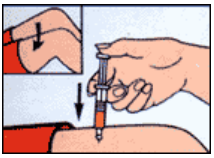
Treatment of a Severe "Hypo"

1. Place child in the recovery position (Page G 08 overleaf) 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 the child becomes conscious and cooperative (opens eyes, speaks).
8. Talk to and reassure the child, which will help them to rouse.
9. When child is sitting, give them half a cup of Lucozade®.
10. Check blood glucose.
11. Vomiting may occur; if sick, wait a few minutes and continue.
12. Solid food (e.g. 2 plain biscuits or a sandwich) should be given, but delayed a few minutes to allow Lucozade® to be absorbed, and so hopefully avoiding further fall in blood glucose.
13. The child may be unwell afterwards, complaining of a headache or nausea.
14. It is common for the child to want sleep. Continue checking blood glucose half hourly for 2-3 hours after recovery.

How to place someone in the Recovery Position

1. Position person's legs

- Kneel beside person
- Straighten person's legs
- Lift nearer leg at knee so it is bent fully upwards

2. Position person's arms

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

3. Roll person into position

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

4. Stabilise person in position

- Make any necessary adjustments to prevent the person from rolling
- Ensure 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 on tongue or inhale vomit

Guidelines

This procedure should only to 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).