



InDependent Diabetes Trust

Hypoglycaemia and Children

Updated December 2008



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Hypoglycaemia is not caused by diabetes but by the treatment of it.

What is hypoglycaemia?

In people without diabetes the level of glucose in the blood is controlled by insulin produced by the beta cells in the pancreas. This prevents the level of glucose in the blood from rising too high. In people with Type 1 diabetes, the body does not produce its own insulin and the blood glucose levels rise too high [called hyperglycaemia] and so injections of insulin are given to prevent this.

People with diabetes are advised to keep their blood glucose levels as near to the normal blood glucose levels as possible. If the blood glucose levels drop below normal, whatever the cause, then this is called hypoglycaemia [a hypo].

‘Good’ control of diabetes is avoidance of both high and low blood

glucose levels.

Definitions

Normal blood glucose levels in non-diabetic people range between 4 and 7mmols/l. Hypoglycaemia is usually said to occur at 3.8mmols/l and so the recommended lower level is 4mmols/l – hence the recommendation to people with diabetes that “4 is the Floor”.

Note: Some publications say that hypoglycaemia does not occur until blood glucose levels are below 3.5 or even 3.0mmols/l. However, there is research that shows that the ability to function may be impaired by blood glucose levels of 3.8mmols/l and lower.

Useful definitions of hypoglycaemia

It is important that even mild hypos, or ‘lows’, are recognised as being hypoglycaemia and treated. This is also important so that all hypos can be reported to your doctor to provide a true picture of your diabetic control.

Hypos are generally defined as follows:

Mild: a hypo that is easily treated by the patient by the intake of a sugary drink or food, often referred to as ‘being low’.

Moderate: one where someone else, spouse, friend or parent, has to intervene and give the sugary food/drink because the person with diabetes is confused or even losing consciousness.

Severe: one that usually means unconsciousness and maybe accompanied by a convulsion/seizure.

Parent comment: I am sure that I under-reported my daughter’s hypos at our clinic visits because I was never sure how to answer the question about how many hypos she had since the last visit. I didn’t know whether to class the lows before meals as a hypo or not.

The causes of hypoglycaemia

The simplistic explanation is that hypoglycaemia is caused by too much insulin hence the statement that hypoglycaemia is not caused by diabetes but by the treatment of it. The other way of looking at this is that there is not enough food for the exercise taken.

Information packs and leaflets describe the causes of hypoglycaemia as follows:

- Missing or postponing a meal or eating less than the correct allowance of carbohydrate.
- Taking more exercise than usual.
- Injecting the wrong dose of insulin.
- Keeping tight control of blood glucose levels ie near normal, increases the risk of severe hypoglycaemia.
- Emotional upset or stress.
- Alcohol consumption.
- No apparent reason.

From a patient/carer perspective this may seem like an underestimate of the complexities of hypoglycaemia in everyday life. Many leaflets for patients list these causes of hypos in a way that seems to place responsibility and blame on the patient and/or the family carer. All too often this can add to their feelings of guilt and failure for ‘not having managed their diabetes properly’! This is especially the case for parents of children with diabetes.

Treatment of hypoglycaemia

- Hypoglycaemia in its early stages [mild hypo] is treated with a sugary drink or sugary food. This should then be followed with some longer-acting carbohydrate to prevent another hypo.
- If the hypo is not treated at this stage then there may be confusion, behavioural changes, helplessness and an inability to function

- properly occurs [moderate hypo].
- If not treated at this stage with glucose or GlucoGel, then coma occurs and this may or may not be accompanied by seizures [severe hypo]. Severe hypos need treating with glucagon or intravenous glucose and this may mean admission to hospital.

Note: GlucoGel is a sugary gel that can be squeezed into the mouth around the cheeks and gums. It **MUST NOT** be given if the person is unconscious or unable to swallow because they could choke. It is available on a doctor's prescription in the UK.

Some Golden Rules for hypoglycaemia:

- Always have some form of quickly absorbed glucose with you.
- If it is difficult to make the person eat or drink, then GlucoGel can be used, which is easier than the more old-fashioned method of rubbing jam around the cheeks and gums!
- Adults and children with diabetes are renowned for denying that they are hypo when they actually are. If you are suspicious that they are hypo, always treat with sugary food or drink.
- If you are a parent or carer and are unable to treat an unconscious hypo, call emergency services or your GP.
- If the hypo is accompanied by vomiting, drowsiness and difficulty breathing, then a doctor is needed and admittance to hospital.



Warning symptoms of hypoglycemia

When the blood glucose levels start to drop at the stage of mild hypoglycaemia, then there are warnings signs/symptoms of the impending hypo. These are usually:

- Sweating
- Trembling
- Pallor

- Weakness
- Hunger

These are called the **adrenergic effects of hypoglycaemia** because the body reacts to the low blood glucose level by the production of counter-regulatory hormones, mainly adrenalin and glucagon. These hormones are the 'fight and flight' hormones that the body releases when there is any danger. Hypoglycaemia is a danger and these hormones give the warning symptoms of an impending hypo and trigger the release glucose from the liver.

If the mild hypo is not treated for any reason, then the blood glucose drops further and the symptoms of this are less obvious to the person with diabetes when the signs are usually:

- Confusion
- Irritability
- Behavioural changes such as aggression, excitement or violence
- Sensory changes such as blurred vision

These symptoms are much harder to recognise and can be missed and so remain untreated. This can lead to a severe hypo and unconsciousness.

These are the neuroglycopenic effects of hypoglycaemia because the blood glucose level has dropped to lower levels and the brain is starved of glucose. This results in reduced cognitive function with confusion and behavioural changes. The person who is hypo may well say that they are "definitely not hypo" but in reality this may be part of the confusion caused by the neuroglycopenia. Research has shown that brain function can be impaired when the blood glucose falls below 3.5mmols.

Important to remember:

- The warning symptoms vary from person to person and can vary in the same person at different times. Many people have found

that the warnings seem to vary with the rates at which the blood sugars fall. For example after exercise they drop quickly but at other times it may be a gradual, slow drop over a longer period with less obvious warning signs.

- Often the family carer or friend notices the signs of a hypo before the person with diabetes, especially the behavioural changes which can be difficult to handle, especially aggressive and/or violent hypos.
- It is very common for the person with diabetes to deny that they are hypo even though they are. Carers get used to this as one of the signs that their partner or child is actually hypo!
- If the person who is hypo carries out a blood test while hypo the results are not necessarily reliable because of their confused state while doing the blood test.
- The warning symptoms are the body's mechanism for WARNING of an impending DANGER and that danger is hypoglycaemia.

Loss of hypo warnings [or hypoglycaemia unawareness]

Hypoglycaemia itself, or the avoidance of it, is an acute daily problem for people with diabetes but when accompanied by loss or partial loss of warnings, it can have a dramatic effect on the lives of both the person with diabetes and their families. There can be a marked reduction in the quality of life for all concerned.

- **Total loss of warnings** - is a condition where the warning symptoms of an impending hypo are not present and so when the blood glucose levels drop there are no warning signs that the person must eat. This makes the likelihood of severe hypos much greater. People with loss of warnings have to rely on the help of others.
- **Partial loss of hypo warnings** - this means that warning symptoms are present sometimes and not at other times. In some ways this

is more difficult than total loss of warnings because the person may not even be aware that they have some loss of warnings and so have unexpected and unheralded moderate or severe hypos. This is particularly dangerous when driving.

- **Reduced warning symptoms** – is where the early warning signs of hypoglycaemia are reduced or missing [sweating, trembling etc] and the blood glucose drops to the stage where the symptoms are less obvious [confusion, behavioural changes etc]. This means that the person often then requires the help of others to treat the hypo.

The effects of loss of warnings

Information gathered from the experiences of people with diabetes, their carers and parents says that loss of warnings may result in the following:

- A feeling of insecurity and loss of independence.
- Embarrassment.
- A fear of leaving the home.
- Being a danger to oneself and others.
- Aggressive or violent behaviour.
- Family conflict, breakdown of relationships.
- Loss of driving licence – it is illegal to drive with reduced or total loss of warnings.
- Loss of job
- A deliberate raising of blood glucose levels to avoid such situations.

There are several causes of loss of warnings or hypo unawareness:

- Duration of diabetes – long term diabetes can result in loss of warnings.
- Frequent hypoglycaemia itself can cause loss of warnings and therefore the risk of more hypos. This then becomes a vicious circle of hypos leading to loss of warnings and more hypos!
- Intensive therapy with multi-daily insulin injections and aiming for near normal blood glucose levels, increases threefold the risk

of severe hypoglycaemia. This increased hypoglycaemia can therefore increase the risk of loss of warnings.

- Neuropathy – damage to the autonomic nervous system is a complication of diabetes and this can cause loss of warning symptoms.
- Changing insulin species can cause a loss or change in warning symptoms.
- ‘Human’ insulin can cause loss of warnings of hypos - from the early 1990s, Patient Information Leaflets in ‘human’ insulin packs have warned of this.

Living with the daily risk of hypos

Practical information from people with diabetes for people with diabetes

- One hypo can easily lead to another within the next 72 hours. The first hypo used up much of the body’s emergency store of glucose so leaving the body vulnerable to another hypo.
- Strenuous exercise can lead to low the blood sugars the next day.
- Exercise sufficient to lower blood sugars and cause a hypo is not always the strenuous sporty-type exercise. For example, for people with a sedentary job or the elderly, a trip around the busy supermarket is exercise and can be sufficient to cause a hypo.
- Good diabetic control means avoiding hypoglycaemia just as much as avoiding hyperglycaemia [high blood sugars].
- Being able to function and walk around with low blood sugars does not mean that you are not hypo – it probably means that you have missed or not had the early warning signs.
- Emotional upset, stress and excitement, which may not always be apparent, can cause hypos.
- With illness and especially vomiting, it is OK to eat or drink anything that will keep the blood sugars up to avoid hypoglycaemia.
- Many long and intermediate acting insulins contain crystals and

they settle to the bottom of the vial. They must be re-suspended before drawing up and injecting the insulin. Research has shown that the vial must be rolled or tipped 20 times to achieve a satisfactory mixture. Failure to do this can result in unexpected hypos because there will be less crystals in the insulin and it is the crystals that slow down the action of the insulin.

- A change of insulin type, species and even batch can affect diabetic control and cause hypos.
- Genetically produced synthetic ‘human’ insulin in some people causes more severe hypos, more frequent hypos and reduced or loss of warning symptoms.
- Hypos can occur for no apparent reason and in people who blood test frequently as well as those who don’t.

IDDT’s Parents’ and Teachers’ Information Packs

For many children with diabetes and their parents difficulties can arise at school and this is more often than not through lack of knowledge. The Parents’ Information Pack helps parents of children and adolescents with diabetes and includes a card to fill in about your child’s particular needs at school.

There is only limited information about diabetes in school libraries and so IDDT created a Pack especially for teachers. It contains a display poster about hypos and the various symptoms. We supply it to parents for them to take to their child’s teachers and we also supply directly to schools as we advertise the Pack in various teachers’ magazines.

Goodie Bags for children with diabetes and their brothers and sisters

IDDT believes that all children with diabetes and their brothers and sisters need a treat for coping so well with these difficult and life changing situations, so they are all entitled to a free ‘Goodie Bag’. We also want to acknowledge the achievements made by children with diabetes and their brothers and sisters by giving them certificates and we have opened a Hall of Fame on our website. A child can be nominated for their achievements, such as their first

injection, first blood test, dealing with their diagnosis, first day at a new school or for raising money for IDDT. We also don't want to forget brothers and sisters as well. They also have a lot to deal with so they deserve a 'goodie bag' and a shout out as well.

The Information Packs and the Goodie Bags are available free of charge by contacting IDDT on 01604 622837, enquiries@iddtinternational.org or write to IDDT, PO Box 294, Northampton NN1 4XS

InDependent Diabetes Trust

PO Box 294
Northampton
NN1 4XS

tel: 01604 622837

fax: 01604 622838

e-mail: enquiries@iddtinternational.org

website: www.iddtinternational.org