D: Low and High Glucose Levels

D1: Hypoglycaemia

A hypo occurs when the blood glucose falls to **3.9mmol/l or below.** Hypoglycaemia is the result of a mismatch between insulin dose, food consumed, and recent exercise and is rarely, if ever, a spontaneous event.

Hypos occur more frequently:

- when the treatment regime is altered (eg increased insulin dose, increased activity levels or reduced carbohydrate intake)
- in younger children
- when there are frequent low blood glucose levels
- if Lipo's are present
- during stress
- in hot weather
- during sleep
- after alcohol

The warning signs can be:

- Shakiness or dizziness
- Tiredness
- Sweating or clammy
- Headache
- Feeling hungry or tummy feels "funny"

Or you may notice:

- Pale with glazed eyes
- More moody or quiet than usual
- More badly behaved or irritable than usual
- Confused or unable to speak properly

MILD/MODERATE HYPOS are quite common in people with diabetes. A mild, easily treated hypo can be a good sign that the blood glucose level is within target most of the time.

SEVERE HYPOS occur as blood glucose levels become even lower and cause your child to lose consciousness or have a seizure (fit). Severe hypos are uncommon, but you should know what to do if this were to occur.

Treating mild/moderate hypos

The first step is to take some sugar (usually 5-15g carbohydrate) which will work quickly to raise the blood glucose level by approximately 3-4mmol/l.

As a guide, approximately 5g of glucose is needed for a 10kg child

10g of glucose is needed for a 30kg child

15g of glucose is needed for a 50kg child

(Approximately 0.3g/kg)

The amount of carbohydrate required will depend on the size of the child, type of insulin therapy, closeness to recent insulin dose as well as the intensity of any planned or recently undertaken exercise.

The following items are good examples:

Food	Lucozade Energy Original	Fresh fruit juice	Full sugar cola	Glucotabs™	Glucose tablets	Jelly babies	Fruit pastilles	Honey	Jam
5g carb	25ml	100ml	50ml	1 tablet	1 ½ tablets	1	2	1 level teaspoon	1 level teaspoon
10g carb	50ml	200ml	100ml	2 tablets	3 tablets	2	3	1 ½ level teaspoons	2 level teaspoons
15g carb	75ml	300ml	150ml	4 tablets	4 ½ tablets	3	5	2 level teaspoons	3 level teaspoons

*1x25g tube of Glucogel = 10g carbohydrate

Chocolate is NOT recommended as an effective treatment for hypos as the body takes longer to break down the lactose found in milk than it does glucose. The presence of fat further slows the rate of absorption.

Double the carbohydrate is needed with fruit juice to get the same effect as the other treatments due to the way the sugar acts in fruit juice. Fruit juices contain fructose (fruit sugar), this also takes longer to be absorbed than glucose.

Treating severe hypos

Very low blood glucose levels can lead to unconsciousness or a seizure. Severe hypos are uncommon, but it is important to know what to do if they do occur.

You must not place anything in the mouth if they are unconscious.

Place the person in the recovery position (lying on their side with the head tilted back).

If you have been trained to administer intramuscular Glucagon this can be given immediately, if not dial 999 and wait for medical assistance.

When alcohol causes or contributes to severe hypoglycaemia, glucagon may be ineffective in treating the hypoglycaemia and intravenous glucose in hospital may be required.

Longer acting carbohydrate

This is no longer routinely recommended in order to avoid overtreatment.

But a maximum of 20g may be considered in the following circumstances:-

Pre and post exercise

Initially lower BG levels

Insulin overdose

Post alcohol

Or if unsure

See Hypo flowchart for more detail on management

Things to consider

- Prompt treatment can prevent severe hypos.
- Make sure there is always a supply of dextrose tablets or sugary drinks.
- Monitoring blood glucose levels regularly to avoid hypos.
- Encourage children and young people to let their friends know that they have diabetes and make sure that they know what to do in the event of a hypo.
- Children and young people with diabetes should wear some form of identification.
- Is this a one off event or is there a pattern of low blood glucose levels?
- Try to work out the cause so you can try and prevent hypos in the future.
- Monitor more frequently during the next 24 hours to prevent further hypos.
- Monitor blood glucose and ketone levels 2-4 hourly if hypo and ill.

Frequent Hypos and Hypo unawareness

NIGHT TIME HYPOS

Many families are worried about the possibility of the blood glucose level falling overnight. In fact, low blood glucose levels are fairly common overnight and may not even disturb a child's sleep pattern.

When the blood glucose level falls, the body responds by releasing other hormones, which allow the release of glucose from 'stores' in the liver. This in turn causes the blood glucose levels to remain high for a few hours. In this case, the only sign that the child has had a low blood glucose level overnight is that that they waken up with higher than expected blood glucose levels, and may have a headache.

It can sometimes be helpful to check blood glucose levels overnight (at about 2-3am) to find out if any changes to insulin doses are needed.

If you find that night time hypos are occurring please seek further advice from your healthcare team.

When to contact the team

Following a severe hypo

If there are more hypos than usual or they occur regularly with exercise

If there is hypo unawareness or night time hypos

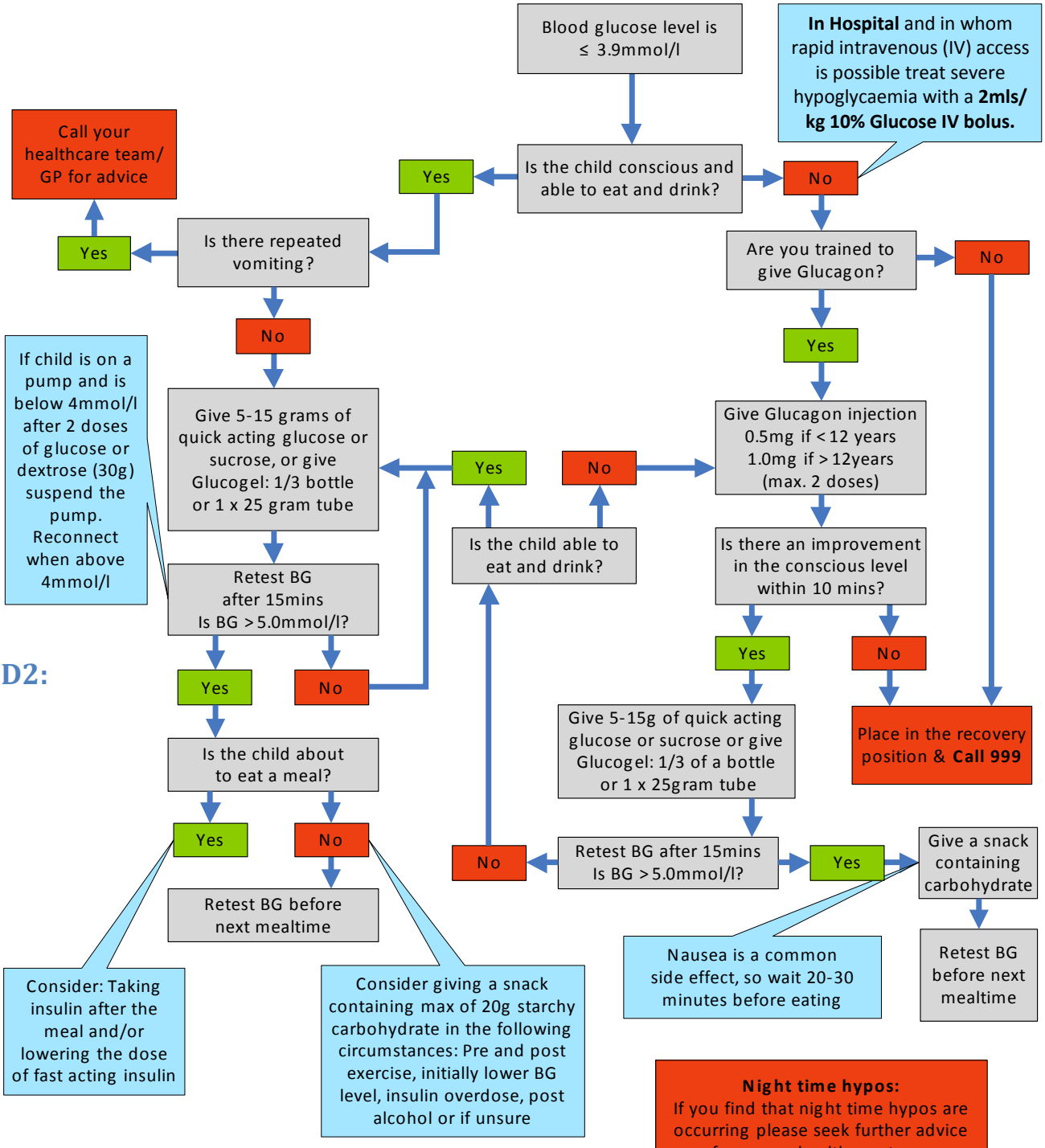
Always contact your team if you have any worries or questions

...the lighter side of diabetes

Leeds Children's Hospital

Children & Young People Diabetes Team

Managing Hypoglycaemia in Type 1 Diabetes



D2:

Hyperglycaemia and treatment plan

Created by Leeds Paediatric Diabetes Team April 2016.
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(see sick day rules **for sudden**

high blood glucose levels associated with illness)

Good diabetes care requires establishment of some degree of routine, particularly around meals. This does not mean you cannot go out or have a picnic or do everything other families do, but it does require a little more planning. Some families find it useful to draw up a chart(s) of days - think about weekends, sports days, holidays etc.

Remember to establish a routine of testing blood glucose, calculating dose of insulin and giving insulin dose before meal if at all possible. This does require some pre-planning of your meals. Overall it is better to aim for a slightly small meal which you know s/he will eat than a big meal which s/he cannot complete. You can always give more insulin.

It is important that carers who look after your children (e.g. grandparents, aunts etc) understand this. If parents are separated, it is essential that both parents follow similar rules and understand diabetes management.

It is also important to recognise when control is slipping over time and that adjustments need to be made to keep good control. This is often associated with coming out of the honeymoon period (1 year to 18 months after diagnosis) or associated with growing particularly at puberty.

It is important to seek advice when you see this is happening and not wait for the next clinic. Consider filling in 1 weeks' worth of glucose results on a glucose tracker or if you are able, downloading your meters/pumps and sending the results to your diabetes nurse (see example below and frequently asked questions for help).

Typical Day on basal bolus insulin					
	Breakfast	**Lunch**	**Snack**	**Evening meal**	**Bed**
Check glucose	**+**	**+**		**+**	**+**
Give insulin (bolus)	**+**	**+**	**+**	**+**	
Give insulin (basal)					**+**
Insulin to CHO ratio	**1:10**	**1:12**	**1:12**	**1:12**	
Review glucose levels	**8mmol/l**	**12mmol/l***	**7mmol/l**	**9mmol/l**	**15mmol/l****
***Make a note to see if this is regularly high and consider increasing insulin ratio at breakfast, gave correction dose at lunch. ** Remembered I had a piece of cake 3 hours earlier will need to give small dose of insulin in future.**					

You may find it helpful to fill in a page and review results (see page below) or use a **glucose tracker** and then email the results over a few days to your diabetes nurse.

Typical Day on basal bolus insulin					
	Breakfast	**Lunch**	**Snack**	**Evening meal**	**Bed**
Check glucose	+	+		+	+
Give insulin (bolus)	+	+	+	+	
Give insulin (basal)					+
Insulin to CHO ratio	1:	1:	1:	1:	
Review glucose levels					

Typical Day on basal bolus insulin					
	Breakfast	**Lunch**	**Snack**	**Evening meal**	**Bed**
Check glucose	+	+		+	+
Give insulin (bolus)	+	+	+	+	
Give insulin (basal)					+
Insulin to CHO ratio	1:	1:	1:	1:	
Review glucose levels					

Typical Day on basal bolus insulin					
	Breakfast	**Lunch**	**Snack**	**Evening meal**	**Bed**
Check glucose	+	+		+	+
Give insulin (bolus)	+	+	+	+	
Give insulin (basal)					+
Insulin to CHO ratio	1:	1:	1:	1:	
Review glucose levels					

