My Diabetes Advice factsheets.

Nobles Hospital Children's Diabetes Service, Isle of Man.

Isle of Man Government
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DEPARTMENT OF HEALTH
Rheynn Slaynt

Paediatric Diabetes Team

The Paediatric Diabetes Team predominantly works Monday-Friday 9am to 5pm, and occasionally provide additional out of hours cover to either newly diagnosed patients and families or those starting on insulin pump therapy.

Out of hours telephone support is provided by the Children's Ward. Tel: 650023.

If you think your child may have Diabetic Ketoacidosis (DKA) please take them urgently to the Emergency Department (ED) at Noble's Hospital.

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Hypoglycaemia (hypo)

What is a ‘hypo’

The full name for a hypo is hypoglycaemia. It’s when your blood glucose level (also called blood sugar) is too low, usually **below 4mmol/l** in people that have Diabetes. A hypo can happen quickly, so it’s important you know what the signs are and what to do if your child has a hypo.

What causes a hypo?

• too much insulin has been taken

• unplanned or strenuous exercise

• a delayed or missed meal or snack

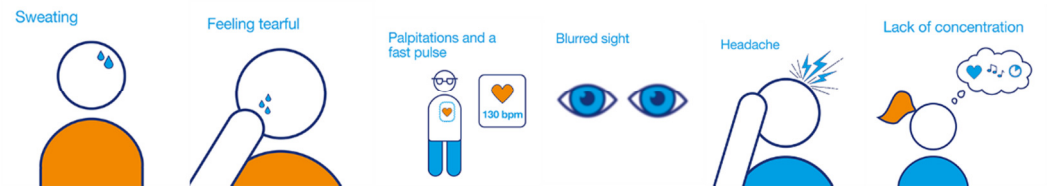
• not enough carbohydrate food

• sometimes no obvious cause.

Signs and symptoms of a hypo

Everyone has different symptoms, but the most common symptoms of a hypo are:

- trembling and feeling shaky
- sweating
- being anxious or irritable
- going pale
- palpitations and a fast pulse
- lips feeling tingly
- blurred sight
- being hungry
- feeling tearful
- tiredness
- having a headache
- lack of concentration.



You must do something as soon as you notice symptoms of a hypo, or if a blood test has shown your blood glucose (also called blood sugar) levels are too low.

Treating a hypo

Treat the hypo immediately. You can do this by eating or drinking a fast-acting carbohydrate:

Children up to 5 years = 5g

Children 5-10 years 5-10g

Children over 10 years 10-15g

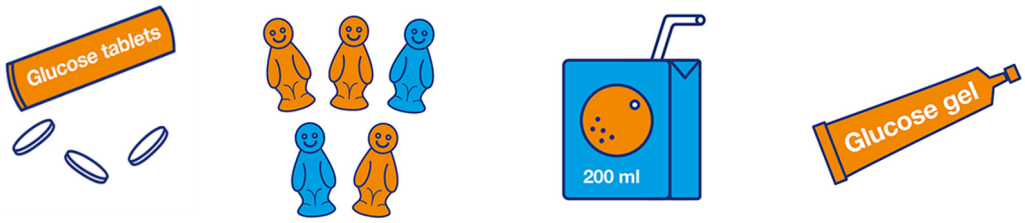
If you're feeling too drowsy or confused to eat or drink, ask someone to help you. If you don't act quickly, it could get much worse and you could also become unconscious or have a fit. This is called a severe hypo, and you would need somebody to help to treat it (see 'what to do when someone is having a severe hypo').

Examples of hypo treatments:

- glucose or dextrose tablets (4 - 5g per tablet)
- jelly babies (4 - 5g per jelly baby)
- a small glass of a sugary (non-diet) drink = 15g
- a small carton 150mls of pure fruit juice = 15g
- 1 tube of a glucose gel such as GlucoGel® (10g per tube)

Which hypo treatment you choose is up to you? The type and amount depends on what works best for you. It might depend on your taste, or how easy it is to store or carry around. You can get things like glucose gel, glucose tablets and dextrose tablets on prescription. Talk to your diabetes team about this. They can give you advice about how much to take and which treatment to choose.

If you’re not sure how much carbohydrate is in a product, check the food label. It's important to check this often, as ingredients can change.



Re-test your blood glucose level after 15 minutes. If the level is still below 4mmol/l then you will need to treat the hypo again with a further 5g to 15g of a fast-acting carbohydrate and re-test after a further 10 - 15 minutes.

After having a hypo

After a hypo, you may need to eat or drink a bit more especially if you are going to be very active. This is to stop your blood glucose levels going down again.

Try to eat 5g to 10g of a slower-acting carbohydrate. This could be a:

- Cereal bar
- piece of fruit
- biscuit
- Or it could be your next meal, if it’s due.

If you are on an insulin pump you may not need to have this additional snack.

What to do when someone is having a severe hypo

It’s important that your family and friends know what to do if you have a severe hypo and become unconscious. They shouldn’t try to give you any food or drink because you won’t be able to swallow. They will need to help you very quickly.

They need to:

- put you into the recovery position (on your side, with your head tilted back and knees bent)
- give you a glucagon injection – if there is one available and someone knows how to use it

- call an ambulance (999).

It can be a good idea to record your hypos, to see if there are any trends or patterns. Knowing this may help your healthcare team find the best diabetes treatment for you.

Hypos at night

Low blood glucose levels can happen at night, and some people don't always notice the symptoms and wake up straight away. This means that your blood glucose levels may drop further and the hypo may get more severe. If the hypo doesn't wake you up, you may only realise that you've had one if you feel very tired, have wet the bed or have a headache the next morning.

If you think you might be having hypos at night, check your blood glucose levels at bedtime (22:00 – 23:00hrs) then test again at 03:00 - 04:00hrs. If your blood glucose levels are dropping during this time then you may need to change your basal insulin dose. If you are using a Libre or Dexcom CGM then looking at the daily information or Ambulatory Glucose Profile (AGP) will highlight any episodes of hypoglycaemia.

Speak to the Diabetes team for any support with changing insulin doses or managing hypos.

Adapted from Diabetes UK 'Having a Hypo'

Catherine Wallinger & Grant McCallum. 11/2019

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Adjusting Insulin Doses to Maintain Good Control

In order to keep Blood Glucose (BG) levels within target while your child grows, you may need to change insulin doses in-between clinic visits. These tips will help you to know what to do and when:

1. Ideal BG levels are 4-7mmols/L before meals and 5-9mmols/L 2 hours after.
2. Keep a record book (BG diary) and try to fill it in at least twice a week with all the BG levels from your child's meter. If using Continuous Glucose Monitoring (CGM) or Libre (Flash GM) aim to review your child's data at least weekly.
3. Look at the BG readings in the record book or computer data every week with your child and compare their BG's to their target range. Discuss any adjustments that may be required that way your child will learn with you about how to change doses.
4. Always give your child's usual correction dose if levels are more than 7.0mmol/L before a meal. A correction may also be needed with a snack (follow advice from your Insulin pump or Bolus advisor BG meter).
5. **Adjusting your Insulin to carbohydrate Ratios (ICR's)** - Look for patterns of high BG levels and increase insulin doses if BG levels are high (more than 7.0 mmol/L before meals) 4 days or more a week. If your child has high BG levels before a particular meal which is not related to snacking between meals, increase the insulin dose for the meal eaten **BEFORE** the levels became high.
   This also applies If your child has high BG levels before bed (target before bed 6 - 7mmol/L) by increasing the insulin to carb ratio for their evening meal in the same way.

   e.g if your child's level is high at lunchtime increase their breakfast Insulin to Carbohydrate Ratio (ICR) by 1g if 1:10g or less and by 2g if more than 1:10g
   i.e : If your child's breakfast ICR is 1:10g, then consider changing to 1:9g
   if 1:15g change to 1:13g

6. If your child has **high BG levels on waking in the mornings (more than 6 mmol/L for 4 days or more in a week)** and these are not because of high levels before bed, increase the Tresiba or pump basal rates by 10% (see guide on next page)

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How to increase basal rates if on a pump or long acting insulin

On a pump

- If not using CGM or FGM Check BG levels late pm, around 0300 and before breakfast.
- If your BG rises overnight and is higher on waking than at bedtime without evidence of overnight hypo consider a basal rate increase 2 hours before the point where your BG starts to rise (Contact your Diabetes nurse if unsure how to do this)

How to increase Tresiba, Levemir or Lantus

- Check BG levels late pm, around 0300 and before breakfast.

- If your BG is higher on waking than at bedtime without evidence of overnight hypo consider increasing your child's Tresiba, Levemir or Lantus

- If your child is on less than 5units increase by 0.5 unit each time (you will need to be using a 0.5 unit pen)
- If your child has 5 – 10 units increase by 1 unit at a time
- If your child has 10 - 20 units increase by 2 units at a time
- If your child is on more than 20 units increase by 10% i.e 30 units add 3 units, 50 units add 5 units
- Wait 3 days before further increases

If you are unsure where to make changes please don't hesitate to call the Diabetes Nurses.

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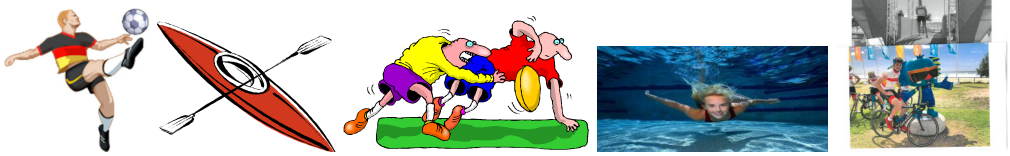
Recommendations for avoiding hypoglycemia in physically active young people with type 1 diabetes



- **Begin session with blood glucose levels within acceptable range (not very high or below 4mmols), and without high ketone levels. Measure glucose before start of exercise**
- **Always bring snacks**
- **Increase the intensity and/or the duration of the exercise progressively**
- **In the few hours before the exercise, take a slowly absorbing carbohydrate snack**
- **In the case of unplanned physical activity reduce the insulin dose during and after intense muscular activity**
- **Do not inject insulin at a site that will be heavily involved in muscular activity**
- **When physical activity is planned at a time of peak insulin action (following a bolus/extended bolus), a reduction of the insulin dose should be made (see chart)**
- **If the activity is prolonged (long distance cycling, long distance running/cross country), add glucose sweetened water or carbohydrates before, during and after the exercise**
- **Measure the blood glucose value before bedtime on the evening after major physical activity and make sure to add extra carbohydrates and/or reduce long-acting/basal dose to reduce the risk of nocturnal hypoglycemia**

ISPAD – guidelines 2018
Catherine Wallinger and Grant McCallum 11/2019
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- **Observe and record every change in insulin basal and bolus rate, and every change you have made to snacks/meals during and after sports to find out what works best for you**

- **Make the people accompanying you aware of the procedures and treatment of severe hypoglycemia**

- **If CGM: Check alert levels of decreasing values or low glucose limit and add a follower to increase safety**

Abbreviation: CGM, continuous glucose monitoring.

Bolus insulin adjustments for post meal exercise

Meal before exercise	Activities lasting 30-45 minutes	Activities lasting >45 minutes	Meal after exercise
Continuous, moderate to vigorous intensity aerobic activities e.g, jogging/running, moderate intensity swimming, bicycling, cross country, aerobic play	25%-50% bolus reduction	50%-75% bolus reduction	Up to 50% bolus reduction
Mixed aerobic and anaerobic burst activities e.g, hopping, skipping, dance, gymnastics, tag, dodgeball, field and team sports, individual racquet sports, etc.	25% bolus reduction	50% bolus reduction	Up to 50% bolus reduction

ssociation of Children's Diabetes Clinicians

Patient Advice for Management of Type 1 Diabetes Mellitus during illness in children and young people under 18 years (Sick Day Rules)

Note to parents and patients: This guideline should be discussed with your Paediatric Diabetes team before you use it as in some cases they may have to adapt it for your individual use

Sickness is an unavoidable part of everyday life. The body's natural response to illness results in higher blood glucose levels due to the release of stress hormones. During illness, you will need frequent blood glucose monitoring and often more insulin than usual.

What are ketones?

Ketones are acids which can make you feel very sick. They are produced when body is not getting enough food (glucose) or your body is not able to use glucose due to lack of insulin. If you do not get rid of ketones, you can become dehydrated and eventually develop Diabetic ketoacidosis. **Check for ketones whenever you are ill,** regardless of your glucose levels as you can have raised ketones with normal glucose levels i.e. starvation ketones with gastroenteritis

Sick day rules

1. **Never stop the insulin**. Even if you are eating less than normal, your body needs insulin to use glucose and to get rid of ketones.
2. Check your blood glucoses more frequently eg every 2 hours including throughout the night.
3. Check for blood ketones. Give additional fast acting insulin every 2 hours if blood glucose is above target. **(See Table)**
4. If ketones are present when blood glucose is low, they are called 'starvation ketones and respond to drinking extra fluids containing sugar. Monitor blood glucose very closely and extra insulin may be required when blood glucose starts rising.
5. Keep well hydrated by drinking plenty of fluids.
   a. Water, or sugar-free fluids are probably most appropriate in the majority of cases where blood glucose levels are normal or high
   b. If blood glucose levels are low, drinks containing sugar are required, or eat carbohydrates if possible.
   c. Avoid carbonated drinks if possible
6. Inform the diabetes team early to seek advice

Using Sick day rules for pump patients

1. Same principles apply for pump patients with regards to glucose testing and fluid intake.

Version 4, Feb 2018
Review 2021

Authors: SM Ng, A Soni, JC Agwu, JA Edge, JH Drew, C Moudiotis, NP Wright, M Kershaw, MC Gardner, L Connellan, W Assam

2. In addition, even if unwell and blood glucoses are high, standard checks on the pump should be made for occlusions, disconnection and battery failures.
3. Give correction doses through the pump if blood ketone levels are less than 0.6mmol/l. If one correction dose given via the pump has no effect in 1 hour, repeat the correction dose with insulin pen.
4. If blood ketones are higher than 0.6mmol/l, give additional fast acting insulin using an insulin pen.
5. When blood glucose levels are rising in an unwell child needing frequent additional insulin doses, think about using higher temporary basal rates.

Negative ketones <0.6mmol.l (Blood)	**Small to moderate ketones** 0.6 – 1.5mmol.l (Blood)	**Moderate to large ketones** >1.5mmol.l (Blood)
Take a correction dose (CD) to correct high blood glucose (BG) in addition to normal bolus for carbohydrates eaten	Give • 10% of your total daily dose (TDD) of insulin as additional fast acting insulin OR • 0.1 units/kg body weight as additional fast acting insulin	Give • 20% of your total daily dose (TDD) of insulin as additional fast acting insulin. OR • 0.2 units/kg body weight as additional fast acting insulin
Then: • Re -check BG and ketones in two hours	Then: • Monitor fluid intake and ensure you are drinking enough fluids to keep well-hydrated • Re-check BG and ketones in two hours (See below)	Then: • Monitor fluid intake and ensure you are drinking enough fluids to keep well-hydrated • Re-check BG & ketones in two hours (see below)
If your BG is going down that is a good sign but monitor closely throughout the day. If BG is increasing but ketones less than 0.6 mmol/l: • Take another correction dose **using a pen** If ketones 0.5 – 1.5mmol/l, follow **orange** column advice If ketones >1.5mmol/l, follow the **red** column advice	If ketones negative follow **green** column advice If BG is increasing but ketones still 0.6 – 1.5mmol/l: • Continue to give 10% of TDD or 0.1 Units/kg as additional fast acting insulin every 2 hours **using a pen** • Give usual boluses for food • Re-check BG and ketones every 2 hours even through the night! If ketones increase to >1.5mmol.l, follow the **red** column advice	If ketones negative follow **green** column advice If BG is increasing but ketones have reduced to 0.6 – 1.5mmol/l, follow **orange** column advice If ketones are still >1.5mmol.l: • Give another 20% TDD or 0.2units/kg as additional fast acting insulin every 2 hours using a pen • Give usual boluses for food • Once vomiting with high ketones, go to Accident and Emergency

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Authors: SM Ng, A Soni, JC Agwu, JA Edge, JH Drew, C Moudiotis, NP Wright, M Kershaw, MC Gardner, L Connellan, W Assam

Checking basal rates on a pump

Basal rates should be checked every few months especially when seeing an increase in Blood Glucose (GB) levels, school holiday provide a good opportunity to do this.
This is required to ensure your child's programmed basal rates are meeting their body's requirement for the background supply of insulin. The basal insulin dose will need to be increased as they grow and develop. The teenage growth spurt is a particularly important time.

- Testing your child's basal rate involves fasting or having no Carbohydrates (CHO) for a period of time or, if this is not possible, delay eating for as long as possible.
- If their basal rate is right for them, their blood glucose level should be kept within their targets.
- It is important to consider when they last had a bolus (insulin for food or correction) and ate something, and what it was they ate, as these factors could still be affecting their blood glucose into the basal test period.
- It is not a good idea to check basal rates if your child is ill or has been doing a lot of exercise.
- Don't try to do the whole day at once. Getting the overnight period right first is usually a good idea, then breakfast until lunch, lunch until evening meal, and lastly evening meal till bedtime

General rules when checking your child's basal rate:

• Have your last meal at least two hours before starting to fast and avoid foods which take a long time to digest (meals high in fat and protein content) as they can continue to affect blood glucose levels for several hours after eating.
• Omit the next meal or delay it for as long as possible.
• Give a normal insulin bolus with the last meal before the fasting starts.
• Your child should not eat any snacks during fast period (they can drink water and if required can have a carb free snack).
• Check blood glucose level every one to two hours during the fast.
• If a hypo occurs (blood glucose under 4.0 mmol/L) treat and abandon test.
• If hyperglycaemia occurs (blood glucose over 14 mmol/L) treat and abandon test.
• Once complete, you can assess the results and change your child's basal rates if required.

Checking the overnight basal rate

- If blood glucose drops below 4.0 mmol/L or rises above 14 mmol/L during the fast, abandon the fast for that day and treat the low or high blood glucose.

Adapted from Leeds Insulin Pump Work Book for Children and Young People
By Grant McCallum and Catherine Wallinger 11/2019 review 11/2022

- If you see a rise or fall in BG you will need to change the basal rate. Look at the profile at the point where the BG started to go high or low, and go back two hours and increase or decrease the basal rate at that point.
- In general it is recommended to increase or decrease by approx. 0.025 – 0.1units per hour at a time depending on the child's age and sensitivity to insulin (Omnipod's smallest increment is 0.05units per hour).
- Always repeat the testing on another day to see if it is now correct.

Procedure

- No bedtime snack
- Test blood glucose every 2-3 hours, including overnight
- Miss breakfast and morning snack, or delay as long as possible
- Abandon test if under 4.0 mmol/l or over 14 mmol/l
- If blood glucose stays in target range: no change
- If blood glucose rises or falls more than 2 mmol/l, increase/decrease basal rate over the relevant time period
- Adjust the basal rate (0.025 - 0.1 units per hour depending on age and sensitivity beginning 2 hours before the effect is required)
- The effect of the adjustment should be re-checked over the next few days
- The use of continuous glucose monitoring may be considered
- In small children only 1 meal can be omitted at a time, so you may need to check the basal rates over more days to get all correct

*When the blood glucose does not remain stable within +/- 2 mmol/l, adjustments of the basal rate are recommended.

*Some young people need more insulin with breakfast due to the effects of the dawn phenomenon. This is a rise in BG which occurs in the hours before breakfast due to increased hormonal activity and is most noticeable during puberty.

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What to do in the Event of an Insulin Pump Failure

Insulin pumps are usually very reliable medical devices but there is always a possibility that you may experience a pump failure at some time. To avoid unnecessary stress we would advise that you make a plan for such an event.

- As back-up it is advisable to always have the items listed below -

a) an in date supply of Novorapid (Fast acting insulin) and Levemir (Long lasting/basal insulin)
b) 2 x Novopen insulin devices (if using insulin cartridges)

- Keep a note of your Insulin to Carbohydrate Ratios (ICR's) and Insulin Sensitivity Factor also known as your Correction Factor (ISF) from your pump and update these each time you make an adjustment
- In the event of a pump failure use your current Insulin to Carbohydrate Ratios and Insulin Sensitivity Factor to work out meal time and correction insulin doses which you can give using Novorapid insulin via an insulin pen

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- Keep a note of your total daily basal insulin dose from your pump and update this each time you make an adjustment.

For **Omnipod users** you can find this information by going into your pump menu via “settings” then “Basal Programs” then selecting whichever basal program you are using then “View”. The daily basal amount will be displayed at the bottom of the screen

For **Medtronic Users** this information can be found in your pump via the Menu then select “History” then “Summary” then select the 14 day option, the basal amount will be displayed below the TDD (total Daily Dose)

In the event of a pump failure if you are likely to be off your pump for more than 24 hours give the Total daily basal pump amount as your basal/long lasting insulin (Levemir) using an insulin pen

i.e. if you are using 22units of basal insulin via your pump give yourself 22units of Levemir insulin you have as backup

If you are likely to be off your pump for less than 24 hours you can give Novorapid every 4 hours to cover carbohydrate intake and to correct high blood glucose readings if required using your ICR’s and ISF from your pump

Contact your pump supplier for a replacement as soon as possible

Omnipod Pump users: 0800 011 6132

Medtronic Pump users: 01923 205167

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