

Children's and Young People's Diabetes Service

How to adjust insulin doses on Multiple Daily Injections

Introduction

This information is a guide to adjusting insulin doses. To achieve good diabetes control your blood glucose levels need to be:

- Between 4.0 to 6.0 mmol/L at breakfast
- Between 5.0 to 9.0 mmol/L two- three hours after a meal
- Between 4.0 to 7.0 mmol/L at bedtime
- Between 4.0 to 7.0 mmol/L during the night.

You should aim to perform at least five blood glucose tests per day, check before each mealtime, whether food is to be eaten or not, before bed and one extra test. Once a week check the blood glucose level between midnight and 3 am. If there is a pattern of high or low blood glucose levels over 2-3 days at the same time of day should adjust the insulin doses. A high blood glucose level is a reading of 7mmol/L or above before a meal or 9mmol/L or above 2 -3 hours after a meal.

Use a blood glucose record book to note your results every day or upload your meter to Diasend. This helps to spot patterns in blood glucose levels and make changes.

What causes high or low blood glucose levels?

You will see high or low blood glucose levels from time to time as it is impossible to avoid these in everyday life. Reasons for this include;

- ❖ Illness
- ❖ Stress
- ❖ Exercise and physical activity
- ❖ Missed insulin
- ❖ Incorrect insulin doses (too much or too little insulin taken)
- ❖ Lumpy injection sites

During illness you may need to increase your insulin doses - see 'Managing high blood glucose levels with ketones' advice sheet for Sick Day Information.

When you are exercising you may need to adjust your insulin before, during or after your exercise - see Exercise Information for advice.

High blood glucose levels mean you need more insulin, lower blood glucose levels mean you need less insulin.

If you have a pattern of high or low blood glucose levels over 2-3 days at a similar time you need to adjust your insulin doses as follows:

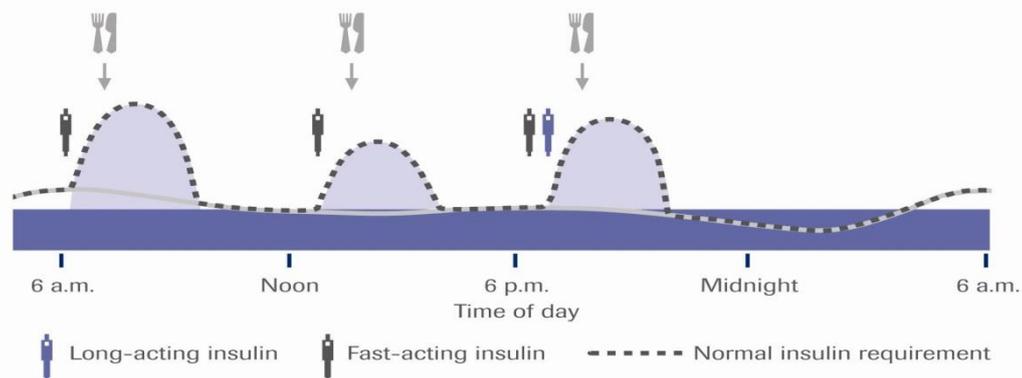
Which insulin to adjust?

If blood glucose is high/low at breakfast adjust your long acting background insulin at night

If blood glucose is high/low before midday meal adjust your breakfast insulin to carbohydrate ratio

If blood glucose is high/low before evening meal adjust your midday insulin to carbohydrate ratio

If blood glucose is high/low before bedtime adjust your evening insulin to carbohydrate ratio



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Adjusting background insulin

Long acting background insulin Lantus or Levemir is adjusted to keep blood glucose levels steady overnight and between meals. Increase or decrease background insulin to keep blood glucose levels steady. If background insulin is working properly a meal can be skipped without the blood glucose level dropping or rising more than 2-3mmol/L. This means the background insulin is working well.

Adjust your background insulin by;

- ❖ 0.5 unit if your dose is less than 10units
- ❖ 1 unit if your dose is between 10 and 19units
- ❖ 2 units if your dose is between 20 and 29units
- ❖ 3 units if your dose is 30units
- ❖ By 10% of the dose for doses above 30 units, e.g. if your dose is 45units increase by 4.5units

Adjust your background insulin every 2-3 days until your blood glucose levels are in target.

Check the blood glucose level between midnight and 3am when the background /overnight insulin dose has been changed.

If background insulin is given twice a day adjust the night time dose when waking blood glucose levels are high/low and the morning dose if daytime blood glucose levels are high/low.

Adjusting insulin to carbohydrate ratios

If blood glucose levels go up by more than 3-4mmol/L 2-4hours after a meal this may mean the insulin to carbohydrate ratio needs adjusting.

Insulin needs to be given at least 15minutes before eating, taking insulin after eating will cause high blood glucose levels 1-2 hours after eating and low blood glucose levels 4-5 hours later.

How to change your insulin to carbohydrate ratio

1. You can change the units of insulin and leave the carbohydrate at 10g - see Example A,
- OR
2. You can change carbohydrate and leave the 1 unit the same – see Example B.

Example A	To increase the dose	To decrease the dose
1 unit to 10g	Increase the units of insulin e.g. 1.5 units to 10g	Decrease the units of insulin e.g. 0.5 units to 10g
1.5 units to 10g	Increase the units of insulin e.g.2 units to 10g	Decrease the units of insulin e.g.1 unit to 10g
Example B		
1 unit to 10g	Decrease the carbohydrate e.g. 1unit to 7g	Increase the carbohydrate e.g. 1unit to 20g
1 unit to 7g	Decrease the carbohydrate e.g. 1 unit to 5g	Increase the carbohydrate e.g. 1 unit to 10g

Adjusting correction doses (insulin sensitivity factor)

If the total daily dose (Lantus/Levemir + all your fast acting insulin doses) changes then the insulin sensitivity or correction factor needs adjusting.

Add up all the insulin taken in a day.

Do this for the last 3-4 days and work out the average total daily dose (TDD).

For example, if the insulin doses are 38, 40, 42 units over 3 days, the average TDD will be: $38 + 40 + 42 = 120 / 3 = 40$ units.

Use the correction dose formula to calculate the insulin sensitivity $100 \div \text{your TDD} = \text{the amount 1 unit of insulin will lower your blood glucose levels.}$

Using the example above, where the TDD of insulin= 40units, $100 \div 40 = 2.5$. So 1 unit will lower the blood glucose level by 2.5mmol/L

Different correction doses may be needed at different times of day.

Getting help and advice with your insulin adjustment

- Have a go – you will learn from experience how to adjust insulin, you may find that your child goes a bit low or a bit high this can be managed by another adjustment.
- You need to know how to do this so you can teach your child/young person. All young people should be able to understand and adjust insulin by the time they are 17-18years old (but not before).
- Only change one thing at a time – or you won't know where you are.
- Make small changes.
- ALWAYS check in 3 days whether the change has worked. If it has, that's great. If it hasn't make another change.
- Make time to sit down & look at the blood glucose diary/meter download every week to discuss how you are making the changes with your child/young person.
- Try to not leave high blood glucose levels until the next clinic appointment as this may be too far in the future & your child's diabetes control might have suffered as a result.
- There is no maximum insulin dose; some teenagers might require a total daily dose of 2 units of insulin per kilogramme of bodyweight to achieve good diabetes control. (For example if you weigh 65kg you may need 130units insulin a day)
- Phone your Diabetes Nurse/Keyworker once you have tried a change if you are not sure what to do next.
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If you need help adjusting your insulin contact a member of the diabetes team either by phoning Monday to Friday between 8am and 6pm or email us diabetes@alderhey.nhs.uk

This information sheet has been written by

The Diabetes Team

Alder Hey

Eaton Road

Liverpool

L12 2AP

0151 228 4811

www.alderhey.nhs.uk

This information can be made available in other languages/formats on request.

<p>Leaflet code DIABMDI adjustment Date Produced: November 2013 Date Reviewed December 2015 Date of next Review: January 2017 © Alder Hey</p>
