Perth Children's Hospital

Health Facts

Interpreting Insulin pump downloads

Parents' guide (Patients aged > 5 years)

Purpose of guide

This guideline is for use by parents of children over 5 years and provides step by step information on how to make insulin pump adjustments from a pump download.

While this guide will help you make adjustments, if you are not sure on the changes you should make it is recommended that you discuss this with your team at clinic or through the triage phone service.

Record keeping and uploading your pump

All insulin pumps have an upload system (Accuchek Connect for Roche, Diasend for Animas, and Carelink for Medtronic).

Carelink has a "personal version" and a "professional version". The professional version provides more detailed information. Both versions provide reports to the clinical team at PMH. Please ask your team if you want to use the professional version at home.

If you are having technical problems with the uploading of your insulin pump please contact your insulin pump rep to discuss. An accurate record book is essential to make changes if you have ongoing problems with uploading the pump.

Step by step guide

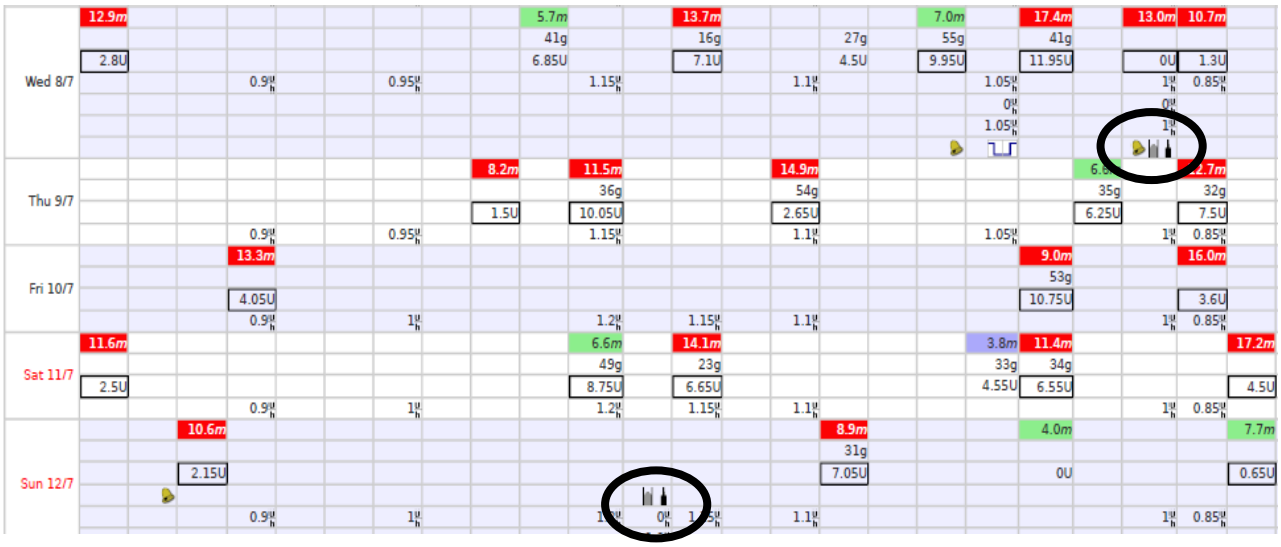
1. **General settings**
   a) Check the time and date are correct
   b) Check the target blood glucose value is 5.0 +/- 0.5mmol/L
   c) Active insulin time should be 3.

2. **General insulin pump requirements**
   a) **Blood glucose testing**: Aim for 4 - 6 per day. Pre-bed testing is really important to make sure your child goes to bed within target range and if not, to make a plan to get the glucose level into range
   b) **Site change frequency**: You need to change the infusion site every 3 days. If you have a teenager who is doing these themselves, you can check for a "cannula fill" every third day or "rewinds" (see example of Medtronic and Diasend below).
   c) **Regular Pump Uploads**: It is recommended that you upload your child's pump regularly (for example, every 2-4 weeks) in order to have a record of their current pump settings (in case the pump were to malfunction), and to see if any pump adjustments are

required. It is also important to ensure you have uploaded your pump prior to attending your clinic appointment.

Glucose Measurements		Bolus Events					Fill Events				
BG Readings	Sensor Duration (h:mm)	Manual Boluses	Bolus Wizard Events	With Food	With Correction	Overridden	Rewind	Cannula Fills	Cannula Amount (U)	Tubing Fills	Tubing Amount (U)
6			9	6	4	3	1	1	0.3	1	8.4
6			4	4	2						
1			4	3	1						
2			2	2			1	1	0.3	1	7.4
2			3	2	1						
2			3	1	2						
2			3	2	1		1	1	0.3	1	8.6
5			5	4	1						

Medtronic Cannula fill check is found on page 1 of the carelink profession report



Diasend Cannula fill check is found on the main compilation page.

d) **Bolusing:** Look to see that every meal has a bolus, and that there is an entered carbohydrate amount and blood glucose level. Check to see if there is a high blood glucose level entered and if so that a correction has been given.

3. Insulin amounts

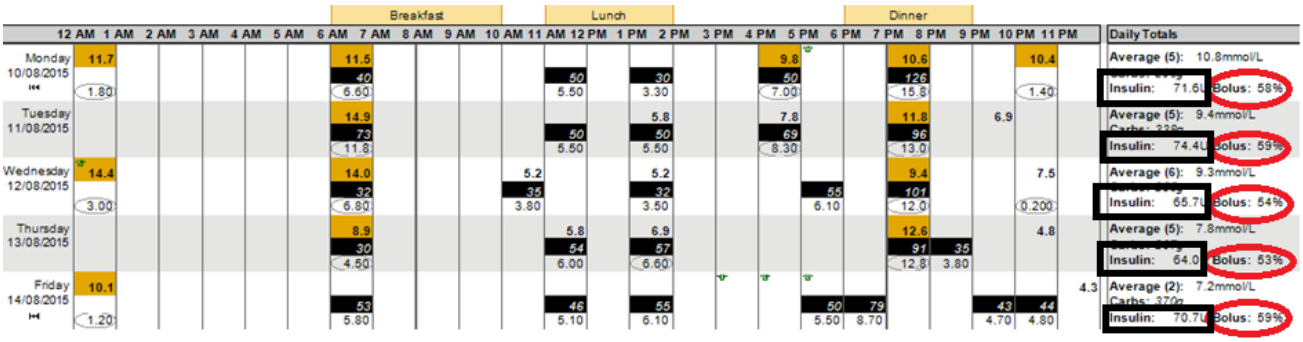
a) **How much daily insulin should there be?**
In general, most children before puberty need about 0.75 – to 1.0 units/kg/day once they are out of “honeymoon”. Teenagers often need 1.0 -1.3 units/kg/day. If your child has less than that, and has high blood glucose levels, it means that there isn’t enough insulin being given per day.

For example if your child has a weight of 40kg, and is on 30units per day you would calculate this as follows:

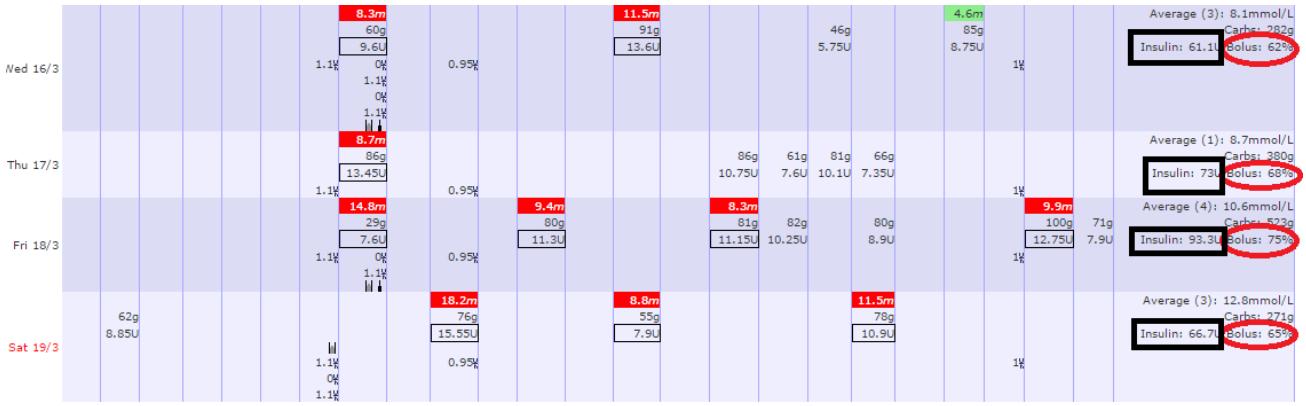
30 units divided by 40kilogram, = 0.75units/kg/day

b) **Bolus proportion of total daily dose**:
Bolusing at least 4 times a day is required. This will include bolusing for food and for corrections.

On a normal diet, 50 – 70% of the total daily dose given as boluses is usually best. Basal Bolus ratios and TDD can be found on the reports as below



Bolus percentage and TDD on Carelink



Bolus percentage and TDD Diasend

How to check the carbohydrate ratio

The carbohydrate ratio works out how much insulin is given for the carbohydrate eaten and entered for each meal. The lower the ratio, the more insulin is given for the carbohydrate

The aim is that 2-3 hours after a meal the blood glucose level should not be more than 2 mmol/l higher than the pre meal level

To get a general idea of what the carbohydrate ratio should be use the **500 RULE**. The 500 rule is starting with 500, and dividing by the average amount of insulin given over the last 5 days.

For example-
If the average daily dose of insulin over the last 5 days is 50 units:
Calculation is therefore 500 divided by 50

500 / 50 = carbohydrate ratio of 10.

The table below tells you how much to change the carbohydrate ratio by if you need to:

Remember by making the number lower, the pump will give MORE insulin any carbohydrate entered into the pump

Trend of BG 2-3 hrs after the meal	Action needed	Suggested ratio change			
High (More than 2 mmol/L **above** the pre-meal BG)	Decrease the number of grams of carbs that 1 unit of insulin will cover	1:2→1:1.5	1:7→1:6	1:15→1:12	1:30→1:25
		1:3→1:2	1:8→1:7	1:18→1:15	1:35→1:30
		1:4→1:3	1:9→1:8	1:20→1:18	1:40→1:35
		1:5→1:4	1:10→1:9	1:22→1:20	1:45→1:40
		1:6→1:5	1:12→1:10	1:25→1:22	1:50→1:45
Low (More than 2 mmol/L **below** the pre-meal BG)	Increase the number of grams of carbs that 1 unit of insulin will cover	1:1.5→1:2	1:6→1:7	1:12→1:15	1:25→1:30
		1:2→1:3	1:7→1:8	1:15→1:18	1:30→1:35
		1:3→1:4	1:8→1:9	1:18→1:20	1:35→1:40
		1:4→1:5	1:9→1:10	1:20→1:22	1:40→1:45
		1:5→1:6	1:10→1:12	1:22→1:25	1:45→1:50

How to check the Insulin Sensitivity Factor

The insulin sensitivity factor is the setting in the pump that controls how much extra insulin should be given for a high blood glucose reading that will bring the glucose level into range (5.0-5.5 mmol/L) after about 2 – 3 hours.

For example, a sensitivity of 2 means that 1 unit of insulin will lower the blood glucose by 2mmol/L. The lower the number – the more insulin will be given for a correction.

To get a general idea of what the insulin sensitivity factor should be, use the **100 RULE**. The 100 rule is starting with 100, and dividing by the average amount of insulin given over the last 5 days.

For example:

If the average daily dose of insulin over the last 5 days is 50 units:
Calculation is therefore 100 divided by 50

100 / 50 – insulin sensitivity of 2

Look for high blood glucose levels that have been entered into the pump and see if the glucose value corrects within 2 – 3 hours.
If you find that that it over or under corrects a change to the insulin sensitivity factor is required. These changes are described in the table below.

Remember by making the number lower, the pump will give MORE insulin

If calculated insulin sensitivity is:	Adjust insulin sensitivity by:
1.0-1.9 mmol/L/U	0.1
2.0-2.5 mmol/L/U	0.2
2.6-4.9 mmol/L/U	0.5
5-9.9 mmol/L/U	1.0
10 mmol/L/U or higher	2.0

How to change the basal rates

The basal insulin is the background insulin that is given slowly throughout the day. This is the hardest to change. The basal insulin should be about 30 – 50% of the total daily dose.

Look to see if there is a drift up or down between meals that is not explained by eating and giving too much too little bolus insulin. If all meals require a correction (out of target) this probably means more basal insulin is needed.

Multiple different basal rates are not recommended and over complicate therapy. As a general

guide, up to four different basal rates should be sufficient.Below is a table of how much to change basal rates by:

If total Insulin is:	Adjust basal rate by:
Less than 10 units per day	0.025 units per hour
10-20 units per day	0.05 units per hour
20-40 units per day	0.1 units per hour
40-60 units per day	0.15 units per hour
>60 units	0.2 units per hour

Monitoring

After making any changes, you should increase blood glucose tests including an overnight test.

Government of **Western Australia**
Child and Adolescent Health Service

This document can be made available in alternative formats on request for a person with a disability.

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Produced by Endocrinology and Diabetes
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