

Add the  
QR code

Scan the QR  
code to  
download



**Manually  
calculating insulin  
for meals**



**Patient information**

# **Manually Calculating Insulin for Meals**



**Excellent patient care, together**

## Carbohydrate Counting

For a refresher on carbohydrate (carb) counting and label reading, please see the below link to the DigiBete website's carb counting education videos and resources:

<https://www.digibete.org/carbohydrate-counting/>

### Calculating insulin for meals

Now you are confident in carb counting, the next step is to match bolus (rapid-acting) insulin with your carb intake.

There are two methods that you can use:

- A) Manual calculation (page 2–3)
- B) Calculation using Tables (page 4-5)

#### Definitions:

- The **Insulin to Carb Ratio (ICR)** means the number of grams of carb covered by 1 unit of rapid acting insulin.
- My **Insulin Sensitivity Factor (ISF)** is how much 1 unit of rapid-acting insulin will lower my blood glucose. ISF is also known as 'correction factor'.

#### Rounding down the insulin dose

- The smallest unit from an insulin pen is 0.5 unit. When calculating insulin dose it is recommended to round down to the nearest 0.5 unit.  
Example: 9.4 round down to 9 units and 9.8 round down to 9.5 units.

### A) Manual Calculation

#### i) Calculating insulin dose for your carbohydrate

Your ICR will be given to you by a member your Children and Young People's Diabetes team.

Formula for calculation:

Insulin dose = total carbs in meal ÷ ICR (grams of carbs to 1 unit of insulin)

#### Example 1:

If 60g carbs is calculated in a meal, and your ICR is 1:10g (1 unit of insulin for every 10g carbs)

Insulin dose = 60g (carbs in the meal) ÷ 10 (ICR)

Insulin dose = 6 units

#### Example 2:

If 75g carbs is calculated in your breakfast and your ICR is 1:8g (1 unit for every 8g carbs)

Insulin dose = 75g ÷ 8

Insulin dose = 9.3 = 9 units

## ii) Calculating correction insulin dose

If your blood glucose levels (BGL) are high before a meal (or 2 hours after a meal), you will need to give yourself an additional bolus of (rapid-acting) insulin to bring your BGL back down to target range. To calculate this, you will need an insulin sensitivity factor (ISF).

Your ISF will be given to you by a member your Children and Young People's Diabetes team.

Correction dose = number of mmol I want to lower blood glucose  $\div$  my ISF

Formula for calculation:

Correction dose = (blood glucose – target)  $\div$  ISF

Example:

Your blood glucose level is 13. Your target BGL is 6.0. Your ISF is 5 (1 unit insulin lowers BGL by 5mmol)

Correction dose =  $(13 - 6) \div 5$

Correction dose =  $1.4 = 1$  unit

I would need 1 unit extra of bolus insulin to bring my blood glucose into target range.

## iii) Putting it all together: Calculating Insulin for meals with correction

To put it all together you need to add **insulin for meals + correction dose**

*Example:*

Meal total carbohydrate 100g

ICR: 1:10g

ISF: 6

Blood glucose level 15mmol/L

Target BGL: 6.0mmol/L

Insulin dose =  $100\text{g (carbs in the meal)} \div 10 \text{ (ICR)}$   
= 10 units

Correction dose =  $(15 - 6.0) \div 6$   
= 1.5 units

Total insulin required = insulin meal dose + correction dose  
= 11.5 units

## B) Calculation Using Tables

### i) Calculating insulin dose for your carbohydrate

This chart is useful to help calculate your insulin requirements without having to do the maths manually.

Line up your ICR with your carbohydrate (in grams) consumed for your insulin required for your bolus – see example below of ICR of 1:8 and 80g carbohydrate consumed.

(**Note** if carbs not in increments of 10 round number down; **OR** could add the grams lines together. For example: for 85g you could add both the 80g line + the 5g line and this would give you 10 units + 0.5 unit = 10.5 units).

		Insulin to Carb Ratio (ICR)											
Grams carbs		1:35	1:30	1:25	1:20	1:18	1:15	1:12	1:10	1:8	1:7	1:5	1:3
	0	0	0	0	0	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	0	0	0.5	0.5	0.5	1	1.5
	10	0	0	0.5	0.5	0.5	0.5	1	1	1	1.5	2	3.5
	20	0.5	0.5	1	1	1	1	1.5	2	2.5	3	4	6.5
	30	1	1	1	1.5	1.5	2	2.5	3	3.5	4	6	10
	40	1	1	1.5	2	2	2.5	3	4	5	5.5	8	13
	50	1.5	1.5	2	2.5	2.5	3	4	5	6	7	10	16.5
	60	1.5	2	2.5	3	3	4	5	6	7.5	8.5	12	20
	70	2	2	3	3.5	4	4.5	5.5	7	8.5	10	14	23
	80	2	2.5	3	4	4.5	5	6.5	8	10	11.5	16	26.5
	90	2.5	3	3.5	4.5	5	6	7.5	9	11	13	18	30
	100	3	3	4	5	5.5	6.5	8	10	12.5	14	20	33

### ii) Calculating Correction Insulin Dose

Line up your ISF with your blood sugar level (in mmol/L) to see how much insulin you require to correct your high blood sugar (to blood sugar of 6). See example of ISF of 5 and blood glucose 15 mmol/L. (**Note** if blood glucose is not a round number round down).

		Insulin Sensitivity Factor (ISF) to target BGL of 6											
Blood Glucose Level mmol/L		12	11	10	9	8	7	6	5	4	3	2	1
	<4	treat hypo											
	4 to 7	0	0	0	0	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0	0	0.5	0.5	1	2
	9	0	0	0	0	0	0	0.5	0.5	0.5	1	1.5	3
	10	0	0	0	0	0.5	0.5	0.5	0.5	1	1	2	4
	11	0	0	0.5	0.5	0.5	0.5	0.5	1	1	1.5	2.5	5
	12	0.5	0.5	0.5	0.5	0.5	0.5	1	1	1.5	2	3	6
	13	0.5	0.5	0.5	0.5	0.5	1	1	1	1.5	2	3.5	7
	14	0.5	0.5	0.5	0.5	1	1	1	1.5	2	2.5	4	8
	15	0.5	0.5	0.5	1	1	1	1.5	2	2.5	3	4.5	9
	16	0.5	0.5	1	1	1	1	1.5	2	2.5	3	5	10
	17	0.5	1	1	1	1	1.5	1.5	2	2.5	3.5	5.5	11
	18	1	1	1	1	1.5	1.5	2	2	3	4	6	12
	19	1	1	1	1	1.5	1.5	2	2.5	3	4	6.5	13
	20	1	1	1	1.5	1.5	2	2	2.5	3.5	4.5	7	14

### iii) Putting it all together: Adding Insulin for meals with correction

ICR of 1:8 and 80g carbohydrate consumed **AND** ISF of 5 and blood glucose 15.5 mmol/L = using table insulin bolus required 10 + 1.5 = 11.5 units for total bolus

## Your Own Values and Tables

### MY DIABETES VALUES

Fill in below....

Time block OR meal	Insulin to Carb Ratio (ICR)	Insulin Sensitivity Factor (ISF)

Insulin to Carb Ratio (ICR)*												
	1:35	1:30	1:25	1:20	1:18	1:15	1:12	1:10	1:8	1:7	1:5	1:3
Grams carbs	0	0	0	0	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	0	0.5	0.5	0.5	1	1.5
	10	0	0	0.5	0.5	0.5	0.5	1	1	1	1.5	2
	20	0.5	0.5	1	1	1	1	1.5	2	2.5	3	4
	30	1	1	1	1.5	1.5	2	2.5	3	3.5	4	6
	40	1	1	1.5	2	2	2.5	3	4	5	5.5	8
	50	1.5	1.5	2	2.5	2.5	3	4	5	6	7	10
	60	1.5	2	2.5	3	3	4	5	6	7.5	8.5	12
	70	2	2	3	3.5	4	4.5	5.5	7	8.5	10	14
	80	2	2.5	3	4	4.5	5	6.5	8	10	11.5	16
	90	2.5	3	3.5	4.5	5	6	7.5	9	11	13	18
	100	3	3	4	5	5.5	6.5	8	10	12.5	14	20

\*Your ICR not here. See page 6 for additional ICR

Insulin Sensitivity Factor (ISF) to target BGL of 6												
	12	11	10	9	8	7	6	5	4	3	2	1
Blood Glucose Level mmol/L	<4	treat hypo										
	4 to 7	0	0	0	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0	0.5	0.5	1	2
	9	0	0	0	0	0	0	0.5	0.5	0.5	1	1.5
	10	0	0	0	0	0.5	0.5	0.5	0.5	1	1	2
	11	0	0	0.5	0.5	0.5	0.5	0.5	1	1	1.5	2.5
	12	0.5	0.5	0.5	0.5	0.5	0.5	1	1	1.5	2	3
	13	0.5	0.5	0.5	0.5	0.5	1	1	1	1.5	2	3.5
	14	0.5	0.5	0.5	0.5	1	1	1	1.5	2	2.5	4
	15	0.5	0.5	0.5	1	1	1	1.5	1.5	2	3	4.5
	16	0.5	0.5	1	1	1	1	1.5	2	2.5	3	5
	17	0.5	1	1	1	1	1.5	1.5	2	2.5	3.5	5.5
	18	1	1	1	1	1.5	1.5	2	2	3	4	6
	19	1	1	1	1	1.5	1.5	2	2.5	3	4	6.5
	20	1	1	1	1.5	1.5	2	2	2.5	3.5	4.5	7

## Additional Insulin to Carb Ratios

Insulin to Carb Ratio (ICR)												
	1:13	1:12	1:11	1:10	1:9	1:8	1:7	1:6	1:5	1:4	1:3	1:2
Grams carbs	0	0	0	0	0	0	0	0	0	0	0	0
	5	0	0	0	0.5	0.5	0.5	0.5	0.5	1	1	1.5
	10	0.5	1	1	1	1	1	1.5	1.5	2	2.5	3.5
	20	1.5	1.5	1.5	2	2	2.5	3	3	4	5	6.5
	30	2	2.5	2.5	3	3	3.5	4	5	6	7.5	10
	40	3	3	3.5	4	4.5	5	5.5	6.5	8	10	13
	50	3.5	4	4.5	5	5.5	6	7	8	10	12.5	16.5
	60	4.5	5	5.5	6	6.5	7.5	8.5	10	12	15	20
	70	5	5.5	6	7	7.5	8.5	10	11.5	14	17.5	23
	80	6	6.5	7	8	9	10	11.5	13	16	20	26.5
	90	7	7.5	8	9	10	11	13	15	18	22.5	30
	100	7.5	8	9	10	11	12.5	14	16.5	20	25	33

Insulin to Carb Ratio (ICR)												
	1:50	1:35	1:30	1:27	1:25	1:22	1:20	1:19	1:18	1:16	1:15	1:14
Grams carbs	0	0	0	0	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	0	0	0	0	0	0
	10	0	0	0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	20	0.5	0.5	0.5	0.5	1	1	1	1	1	1	1.5
	30	0.5	1	1	1	1	1.5	1.5	1.5	1.5	2	2
	40	0.5	1	1	1.5	1.5	2	2	2	2	2.5	2.5
	50	1	1.5	1.5	2	2	2	2.5	2.5	2.5	3	3
	60	1	1.5	2	2	2.5	2.5	3	3	3	3.5	4
	70	1	2	2	2.5	3	3	3.5	3.5	4	4	4.5
	80	1.5	2	2.5	3	3	3.5	4	4	4.5	5	5
	90	1.5	2.5	3	3	3.5	4	4.5	4.5	5	5.5	6
	100	2	3	3	3.5	4	4.5	5	5	5.5	6	6.5

## Exercise Tables

Aerobic exercise (physical activity that raises your heart rate) will usually lower your blood glucose during and after exercise. Examples include walking, running, swimming and cycling. This means you may need to reduce your bolus (rapid-acting) insulin and/ or have extra fast acting carbohydrate.

If you choose to reduce your insulin, it is recommended that you do this for any meal before your exercise if the exercise is within two hours of eating.

After exercise, it is recommended that you eat a complex carbohydrate snack or meal within an hour of the end of the exercise and start by giving the full amount of calculated insulin for the carbohydrates and correction. If you are noticing a trend of low blood glucose levels following exercise, you may need to try reducing your bolus insulin by 10-20%, or more for this meal following exercise.

You can use the table below to calculate your new bolus insulin dose if you are about to and/ or have recently exercised.

	Units of bolus insulin after adjusting for exercise		
	-10% of dose	-20% of dose	-30% of dose
1	0.5	0.5	0.5
1.5	1	1	1
2	1.5	1.5	1
2.5	2	2	1.5
3	2.5	2	2
3.5	3	2.5	2
4	3.5	3	2.5
4.5	4	3.5	3
5	4.5	4	3.5
5.5	5	4	3.5
6	5.5	4.5	4
6.5	5.5	5	4.5
7	6.0	5.5	4.5
7.5	6.5	6	5
8	7.0	6	5.5
8.5	7.5	6.5	5.5
9	8	7	6
9.5	8.5	7.5	6.5
10	9	8	7
10.5	9.5	8	7
11	9.5	8.5	7.5
11.5	10	9	8
12	10.5	9.5	8
12.5	11	10	8.5
13	11.5	10	9
13.5	12	10.5	9
14	12.5	11	9.5
14.5	13	11.5	10
15	13.5	12	10.5

Units of bolus  
insulin for meal

## How to contact us

### Department name

West Herts Children and Young People's Diabetes (CYPD) Team

Children's Outpatients

[Hemel Hempstead Hospital](#)

Hillfield Road

Hemel Hempstead

Hertfordshire HP2 4AD

Tel: 01442 287425

Email: [westherts.paediatricdiabetes@nhs.net](mailto:westherts.paediatricdiabetes@nhs.net)

Hospital switchboard: 01442 213141

## PALS

If you need this leaflet in another **language, large print, Braille or audio version**, please call **01923 217198** or email [westherts.pals@nhs.net](mailto:westherts.pals@nhs.net).



Language



Large Print



Braille



Audio

### Concerns, complaints or suggestions

If you are unhappy with your experience or would like to give feedback, please contact our Patient Advice and Liaison Service (PALS). PALS is available to patients, relatives, carers and friends to raise concerns.

For more information, please scan the QR code or visit our [website](#).

Author	Children and Young People's Diabetes Service
Department	Paediatrics - Nutrition and Dietetics
Ratified / review date	January 2025 / January 2028
ID number	40/2409/V4