

INSULIN DOSE CALCULATION

Information Needed to Get Started

- How many grams of carbs the child is eating
- Blood glucose (BG) taken before eating
- Important numbers from primary caregiver:
 - Carbohydrate Ratio
 - Correction Target
 - Correction Factor

Insulin Dose Calculation Definitions

- **Carbohydrate Ratio**

How many grams of carbohydrates will be covered by one unit of insulin

- **Correction Target**

Target blood glucose value used for insulin dose calculations when the blood glucose is high

- **Correction Factor**

How many points (mg/dL) one unit of insulin will lower the blood glucose over several hours

Bolus Insulin Calculation Worksheet

Insulin
for carbs

1. Calculate Carbohydrate Bolus:

$$\frac{\text{Carbohydrates to Eat}}{\text{CARBOHYDRATE RATIO}} = \frac{\text{Carbohydrate Bolus}}{\text{(Round to nearest tenth)}}$$

Insulin for
high blood
glucose

2. Calculate Correction Bolus:

$$\frac{\text{Blood Glucose} - \text{CORRECTION TARGET}}{\text{CORRECTION FACTOR}} = \frac{\text{Amount to Correct}}{\text{CORRECTION FACTOR}} = \frac{\text{Correction Bolus}}{\text{(Round to nearest tenth)}}$$

Add insulin
for carbs to
insulin for
high blood
glucose

3. Calculate Total Insulin Bolus:

$$\frac{\text{Carbohydrate Bolus}}{\text{Carbohydrate Bolus}} + \frac{\text{Correction Bolus}}{\text{Correction Bolus}} = \frac{\text{Total}}{\text{Total}} \rightarrow \frac{\text{*Rounded Total Insulin Bolus}}{\text{*Rounded Total Insulin Bolus}}$$

Bolus Insulin Calculation Worksheet

1. Calculate Carbohydrate Bolus:

$$\frac{\text{Carbohydrates to Eat}}{\text{CARBOHYDRATE RATIO}} = \text{Carbohydrate Bolus (Round to nearest tenth)}$$

15

2. Calculate Correction Bolus:

$$\frac{\text{Blood Glucose} - \text{CORRECTION TARGET}}{\text{CORRECTION FACTOR}} = \text{Correction Bolus (Round to nearest tenth)}$$

120 **30**

3. Calculate Total Insulin Bolus:

$$\text{Carbohydrate Bolus} + \text{Correction Bolus} = \text{Total} \rightarrow \text{*Rounded Total Insulin Bolus}$$

Place the example numbers on the worksheet.

Carbohydrate Ratio: 15

Correction Target: 120

Correction Factor: 30

Bolus Insulin Calculation Worksheet

1. Calculate Carbohydrate Bolus:

$$\frac{\text{Carbohydrates to Eat}}{\text{CARBOHYDRATE RATIO}} = \text{Carbohydrate Bolus (Round to nearest tenth)}$$

15

2. Calculate Correction Bolus:

$$\frac{\text{Blood Glucose} - \text{CORRECTION TARGET}}{\text{CORRECTION FACTOR}} = \text{Correction Bolus (Round to nearest tenth)}$$

120 **30**

3. Calculate Total Insulin Bolus:

$$\text{Carbohydrate Bolus} + \text{Correction Bolus} = \text{Total} \rightarrow \text{*Rounded Total Insulin Bolus}$$

Place the example numbers on the worksheet.

Carbohydrate Ratio: 15

Correction Target: 120

Correction Factor: 30

Bolus Insulin Calculation Worksheet

1. Calculate Carbohydrate Bolus:

$$\frac{68}{\text{Carbohydrates to Eat}} \div \frac{15}{\text{CARBOHYDRATE RATIO}} = \frac{\quad}{\text{Carbohydrate Bolus (Round to nearest tenth)}}$$

2. Calculate Correction Bolus:

$$\frac{214}{\text{Blood Glucose}} - \frac{120}{\text{CORRECTION TARGET}} = \frac{\text{Amount to Correct}}{\quad} \div \frac{30}{\text{CORRECTION FACTOR}} = \frac{\text{Correction Bolus (Round to nearest tenth)}}{\quad}$$

3. Calculate Total Insulin Bolus:

$$\frac{\quad}{\text{Carbohydrate Bolus}} + \frac{\quad}{\text{Correction Bolus}} = \frac{\text{Total}}{\quad} \rightarrow \frac{\quad}{\text{*Rounded Total Insulin Bolus}}$$

Place total carbs and blood glucose on the worksheet.

Carb Grams: 68

Blood Glucose: 214

Bolus Insulin Calculation Worksheet

1. Calculate Carbohydrate Bolus:

$$\frac{68}{\text{Carbohydrates to Eat}} \div \frac{15}{\text{CARBOHYDRATE RATIO}} = \frac{4.5}{\text{Carbohydrate Bolus (Round to nearest tenth)}}$$

2. Calculate Correction Bolus:

$$\frac{214}{\text{Blood Glucose}} - \frac{120}{\text{CORRECTION TARGET}} = \frac{\text{Amount to Correct}}{\text{CORRECTION FACTOR}} \div \frac{30}{\text{CORRECTION FACTOR}} = \frac{\text{Correction Bolus (Round to nearest tenth)}}{\text{Correction Bolus (Round to nearest tenth)}}$$

3. Calculate Total Insulin Bolus:

$$\frac{\text{Carbohydrate Bolus}}{\text{Carbohydrate Bolus}} + \frac{\text{Correction Bolus}}{\text{Correction Bolus}} = \frac{\text{Total}}{\text{Total}} \rightarrow \frac{\text{*Rounded Total Insulin Bolus}}{\text{*Rounded Total Insulin Bolus}}$$

Calculate carb bolus:

$$68 \div 15 = \underline{4.533}$$

Round answer to nearest tenths

For example:

4.533 rounds to 4.5

4.555 rounds to 4.6

Bolus Insulin Calculation Worksheet

1. Calculate Carbohydrate Bolus:

$$\frac{68}{\text{Carbohydrates to Eat}} \div \frac{15}{\text{CARBOHYDRATE RATIO}} = \frac{4.5}{\text{Carbohydrate Bolus (Round to nearest tenth)}}$$

2. Calculate Correction Bolus:

$$\frac{214}{\text{Blood Glucose}} - \frac{120}{\text{CORRECTION TARGET}} = \frac{94}{\text{Amount to Correct}} \div \frac{30}{\text{CORRECTION FACTOR}} = \frac{3.1}{\text{Correction Bolus (Round to nearest tenth)}}$$

3. Calculate Total Insulin Bolus:

$$\frac{\quad}{\text{Carbohydrate Bolus}} + \frac{\quad}{\text{Correction Bolus}} = \frac{\quad}{\text{Total}} \rightarrow \frac{\quad}{\text{*Rounded Total Insulin Bolus}}$$

Calculate Correction Bolus:

$$214 - 120 = 94 \div 30 = 3.133$$

Round answer to nearest tenths

For example:

$$3.133 \text{ rounds to } \underline{3.1}$$
$$3.155 \text{ rounds to } \underline{3.2}$$

Bolus Insulin Calculation Worksheet

1. Calculate Carbohydrate Bolus:

$$\frac{68}{\text{Carbohydrates to Eat}} \div \frac{15}{\text{CARBOHYDRATE RATIO}} = \frac{4.5}{\text{Carbohydrate Bolus (Round to nearest tenth)}}$$

2. Calculate Correction Bolus:

$$\frac{214}{\text{Blood Glucose}} - \frac{120}{\text{CORRECTION TARGET}} = \frac{94}{\text{Amount to Correct}} \div \frac{30}{\text{CORRECTION FACTOR}} = \frac{3.1}{\text{Correction Bolus (Round to nearest tenth)}}$$

3. Calculate Total Insulin Bolus:

$$\frac{4.5}{\text{Carbohydrate Bolus}} + \frac{3.1}{\text{Correction Bolus}} = \frac{7.6}{\text{Total}} \rightarrow \frac{\text{ *Rounded Total Insulin Bolus}}{\text{ *Rounded Total Insulin Bolus}}$$

Add the carb bolus to the correction bolus:

$$4.5 + 3.1 = \underline{7.6}$$

Bolus Insulin Calculation Worksheet

1. Calculate Carbohydrate Bolus:

$$\frac{68}{\text{Carbohydrates to Eat}} \div \frac{15}{\text{CARBOHYDRATE RATIO}} = \frac{4.5}{\text{Carbohydrate Bolus (Round to nearest tenth)}}$$

2. Calculate Correction Bolus:

$$\frac{214}{\text{Blood Glucose}} - \frac{120}{\text{CORRECTION TARGET}} = \frac{94}{\text{Amount to Correct}} \div \frac{30}{\text{CORRECTION FACTOR}} = \frac{3.1}{\text{Correction Bolus (Round to nearest tenth)}}$$

3. Calculate Total Insulin Bolus:

$$\frac{4.5}{\text{Carbohydrate Bolus}} + \frac{3.1}{\text{Correction Bolus}} = \frac{7.6}{\text{Total}} \rightarrow \frac{7.5}{\text{*Rounded Total Insulin Bolus}}$$

The final Rounded Total Insulin Bolus depends if the child uses half units or whole units.

This example is done in half units.

ROUNDING RULE for ½ Unit:

0.1-0.3 = Round down to whole unit

0.4-0.7 = Round to ½ unit

0.8-0.9 = Round up to whole unit

ROUNDING RULES for Whole Unit:

0.1-0.4 = Round down to whole unit

0.5-0.9 = Round up to whole unit

Bolus Insulin Calculation Worksheet

1. Calculate Carbohydrate Bolus:

$$\frac{68}{\text{Carbohydrates to Eat}} \div \frac{15}{\text{CARBOHYDRATE RATIO}} = \frac{4.5}{\text{Carbohydrate Bolus (Round to nearest tenth)}}$$

2. Calculate Correction Bolus:

$$\frac{214}{\text{Blood Glucose}} - \frac{120}{\text{CORRECTION TARGET}} = \frac{94}{\text{Amount to Correct}} \div \frac{30}{\text{CORRECTION FACTOR}} = \frac{3.1}{\text{Correction Bolus (Round to nearest tenth)}}$$

3. Calculate Total Insulin Bolus:

$$\frac{4.5}{\text{Carbohydrate Bolus}} + \frac{3.1}{\text{Correction Bolus}} = \frac{7.6}{\text{Total}} \rightarrow \frac{8}{\text{*Rounded Total Insulin Bolus}}$$

The final rounded total Insulin Bolus depends if the child doses in half units or whole units.

This example is done in whole units.

ROUNDING RULE for ½ Unit:

0.1-0.3 = Round down to whole unit

0.4-0.7 = Round to ½ unit

0.8-0.9 = Round up to whole unit

ROUNDING RULES for Whole Unit:

0.1-0.4 = Round down to whole unit

0.5-0.9 = Round up to whole unit

Practice Problem #1

1. Calculate Carbohydrate Bolus:

$$\frac{\text{Carbohydrates to Eat}}{\text{CARBOHYDRATE RATIO}} = \text{Carbohydrate Bolus (Round to nearest tenth)}$$

2. Calculate Correction Bolus:

$$\frac{\text{Blood Glucose} - \text{CORRECTION TARGET}}{\text{CORRECTION FACTOR}} = \text{Correction Bolus (Round to nearest tenth)}$$

3. Calculate Total Insulin Bolus:

$$\text{Carbohydrate Bolus} + \text{Correction Bolus} = \text{Total} \rightarrow \text{*Rounded Total Insulin Bolus}$$

Scenario:

Ryan's blood glucose before breakfast is 189 and he is about to eat 31 grams of carbs. Ryan uses a half unit insulin pen.

Carb Ratio = 12

Correction Target = 120

Correction Factor = 25

Calculate how much insulin Ryan needs.

ROUNDING RULE for ½ Unit:

0.1-0.3 = Round down to whole unit

0.4-0.7 = Round to ½ unit

0.8-0.9 = Round up to whole unit

ROUNDING RULES for Whole Unit:

0.1-0.4 = Round down to whole unit

0.5-0.9 = Round up to whole unit

Practice Problem #1: Answers

1. Calculate Carbohydrate Bolus:

$$\frac{31}{\text{Carbohydrates to Eat}} \div \frac{12}{\text{CARBOHYDRATE RATIO}} = \frac{2.58}{\text{Carbohydrate Bolus (Round to nearest tenth)}} = 2.6$$

2. Calculate Correction Bolus:

$$\frac{189}{\text{Blood Glucose}} - \frac{120}{\text{CORRECTION TARGET}} = \frac{69}{\text{Amount to Correct}} \div \frac{25}{\text{CORRECTION FACTOR}} = \frac{2.76}{\text{Correction Bolus (Round to nearest tenth)}} = 2.8$$

3. Calculate Total Insulin Bolus:

$$\frac{2.6}{\text{Carbohydrate Bolus}} + \frac{2.8}{\text{Correction Bolus}} = \frac{5.4}{\text{Total}} \rightarrow \frac{5.5}{\text{*Rounded Total Insulin Bolus}}$$

Scenario:

Ryan's blood glucose before breakfast is 189 and he is about to eat 31 grams of carbs. Ryan uses a half unit insulin pen.

Carb Ratio = 12

Correction Target = 120

Correction Factor = 25

Calculate how much insulin Ryan needs.

ROUNDING RULE for ½ Unit:

0.1-0.3 = Round down to whole unit

0.4-0.7 = Round to ½ unit

0.8-0.9 = Round up to whole unit

ROUNDING RULES for Whole Unit:

0.1-0.4 = Round down to whole unit

0.5-0.9 = Round up to whole unit

Practice Problem #2

1. Calculate Carbohydrate Bolus:

$$\frac{\text{Carbohydrates to Eat}}{\text{CARBOHYDRATE RATIO}} = \text{Carbohydrate Bolus (Round to nearest tenth)}$$

2. Calculate Correction Bolus:

$$\frac{\text{Blood Glucose} - \text{CORRECTION TARGET}}{\text{CORRECTION FACTOR}} = \text{Correction Bolus (Round to nearest tenth)}$$

3. Calculate Total Insulin Bolus:

$$\text{Carbohydrate Bolus} + \text{Correction Bolus} = \text{Total} \rightarrow \text{*Rounded Total Insulin Bolus}$$

Scenario:

Annie's blood glucose before lunch is 142 and she is about to eat 68 grams of carbs. Annie uses a whole unit insulin pen.

Carb Ratio = 9

Correction Target = 120

Correction Factor = 24

Calculate how much insulin Annie needs.

ROUNDING RULE for ½ Unit:

0.1-0.3 = Round down to whole unit

0.4-0.7 = Round to ½ unit

0.8-0.9 = Round up to whole unit

ROUNDING RULES for Whole Unit:

0.1-0.4 = Round down to whole unit

0.5-0.9 = Round up to whole unit

Practice Problem #2: Answers

1. Calculate Carbohydrate Bolus:

$$\frac{68}{9} = 7.56 = 7.6$$

Carbohydrates to Eat **CARBOHYDRATE RATIO** Carbohydrate Bolus (Round to nearest tenth)

2. Calculate Correction Bolus:

$$\frac{142 - 120}{24} = \frac{22}{24} = 0.92 = 0.9$$

Blood Glucose **CORRECTION TARGET** Amount to Correct **CORRECTION FACTOR** Correction Bolus (Round to nearest tenth)

3. Calculate Total Insulin Bolus:

$$7.6 + 0.9 = 8.5 \rightarrow 9$$

Carbohydrate Bolus Correction Bolus Total *Rounded Total Insulin Bolus

Scenario:

Annie's blood glucose before lunch is 142 and she is about to eat 68 grams of carbs. Annie uses a whole unit insulin pen.

Carb Ratio = 9

Correction Target = 120

Correction Factor = 24

Calculate how much insulin Annie needs.

ROUNDING RULE for ½ Unit:

0.1-0.3 = Round down to whole unit

0.4-0.7 = Round to ½ unit

0.8-0.9 = Round up to whole unit

ROUNDING RULES for Whole Unit:

0.1-0.4 = Round down to whole unit

0.5-0.9 = Round up to whole unit

Practice Problem #3

1. Calculate Carbohydrate Bolus:

$$\frac{\text{Carbohydrates to Eat}}{\text{CARBOHYDRATE RATIO}} = \text{Carbohydrate Bolus (Round to nearest tenth)}$$

2. Calculate Correction Bolus:

$$\frac{\text{Blood Glucose} - \text{CORRECTION TARGET}}{\text{CORRECTION FACTOR}} = \text{Correction Bolus (Round to nearest tenth)}$$

3. Calculate Total Insulin Bolus:

$$\text{Carbohydrate Bolus} + \text{Correction Bolus} = \text{Total} \rightarrow \text{*Rounded Total Insulin Bolus}$$

Scenario:

Colton's blood glucose before a school birthday party at 2 pm is 214 and he is about to eat 30 grams of carbs from a cupcake. Colton uses half unit syringes.

Carb Ratio = 45

Correction Target = 150

Correction Factor = 100

Calculate how much insulin Colton needs.

ROUNDING RULE for ½ Unit:

0.1-0.3 = Round down to whole unit

0.4-0.7 = Round to ½ unit

0.8-0.9 = Round up to whole unit

ROUNDING RULES for Whole Unit:

0.1-0.4 = Round down to whole unit

0.5-0.9 = Round up to whole unit

Practice Problem #3: Answers

1. Calculate Carbohydrate Bolus:

$$\frac{30}{\text{Carbohydrates to Eat}} \div \frac{45}{\text{CARBOHYDRATE RATIO}} = \frac{0.667}{\text{Carbohydrate Bolus (Round to nearest tenth)}} = 0.7$$

2. Calculate Correction Bolus:

$$\frac{214}{\text{Blood Glucose}} - \frac{150}{\text{CORRECTION TARGET}} = \frac{64}{\text{Amount to Correct}} \div \frac{100}{\text{CORRECTION FACTOR}} = \frac{0.64}{\text{Correction Bolus (Round to nearest tenth)}} = 0.6$$

3. Calculate Total Insulin Bolus:

$$\frac{0.7}{\text{Carbohydrate Bolus}} + \frac{0.6}{\text{Correction Bolus}} = \frac{1.3}{\text{Total}} \rightarrow \frac{1}{\text{*Rounded Total Insulin Bolus}}$$

Scenario:

Colton's blood glucose before a school birthday party at 2 pm is 214 and he is about to eat 30 grams of carbs from a cupcake. Colton uses half unit syringes.

Carb Ratio = 45

Correction Target = 150

Correction Factor = 100

Calculate how much insulin Colton needs.

ROUNDING RULE for ½ Unit:

0.1-0.3 = Round down to whole unit

0.4-0.7 = Round to ½ unit

0.8-0.9 = Round up to whole unit

ROUNDING RULES for Whole Unit:

0.1-0.4 = Round down to whole unit

0.5-0.9 = Round up to whole unit

There are times you will not calculate a Correction Bolus and will only calculate a Carbohydrate Bolus.

1. Calculate Carbohydrate Bolus:

$$\frac{\text{Carbohydrates to Eat}}{\text{CARBOHYDRATE RATIO}} = \text{Carbohydrate Bolus (Round to nearest tenth)}$$

2. Calculate Correction Bolus:

$$\frac{\text{Blood Glucose} - \text{CORRECTION TARGET}}{\text{CORRECTION FACTOR}} = \text{Correction Bolus (Round to nearest tenth)}$$

3. Calculate Total Insulin Bolus:

$$\text{Carbohydrate Bolus} + \text{Correction Bolus} = \text{Total} \rightarrow \text{*Rounded Total Insulin Bolus}$$

Note: The correction bolus calculation in step 3 is crossed out with a red X.

Skip this step →

Do not calculate a Correction Bolus:

- If blood glucose is less than the **CORRECTION TARGET***
- If it has been less than three hours since the last carbohydrate bolus or correction bolus*
- If you have treated a low blood glucose in the past three hours*
- If it has been less than one hour since vigorous exercise*

* These rules may vary depending on the diabetes prescriber. REFER TO THE MEDICAL ORDERS FOR DETAILS.

Following these rules will help prevent giving too much insulin that can lead to a low blood glucose.