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

1. **Calculate Carbohydrate Bolus:**
   \[
   \frac{\text{Carbohydrates to Eat}}{\text{CARBOHYDRATE RATIO}} = \text{Carbohydrate Bolus} 
   \]
   (Round to nearest tenth)

2. **Calculate Correction Bolus:**
   \[
   \frac{\text{Blood Glucose} - \text{CORRECTION TARGET}}{\text{CORRECTION FACTOR}} = \frac{\text{Amount to Correct}}{\text{Correction Bolus}} 
   \]
   (Round to nearest tenth)

3. **Calculate Total Insulin Bolus:**
   \[
   \text{Carbohydrate Bolus} + \text{Correction Bolus} = \text{Total} 
   \]
   \[
   \text{*Rounded Total Insulin Bolus} 
   \]

**Insulin for carbs**

**Insulin for high blood glucose**

**Add insulin for carbs to insulin for high blood glucose**
## Bolus Insulin Calculation Worksheet

1. **Calculate Carbohydrate Bolus:**
   \[ \frac{\text{Carbohydrates to Eat}}{15} = \text{Carbohydrate Bolus} \quad \text{(Round to nearest tenth)} \]

2. **Calculate Correction Bolus:**
   \[ \frac{120}{\text{Amount to Correct}} = \frac{30}{\text{Correction Bolus}} \quad \text{(Round to nearest tenth)} \]

3. **Calculate Total Insulin Bolus:**
   \[ \text{Carbohydrate Bolus} + \text{Correction Bolus} = \text{Total} \quad \text{*Rounded Total Insulin Bolus} \]

**Place the example numbers on the worksheet.**
- Carbohydrate Ratio: 15
- Correction Target: 120
- Correction Factor: 30
Bolus Insulin Calculation Worksheet

1. Calculate Carbohydrate Bolus:
   \[ \frac{\text{Carbohydrates to Eat}}{15} = \text{Carbohydrate Bolus (Round to nearest tenth)} \]

2. Calculate Correction Bolus:
   \[ \frac{120}{\text{Blood Glucose (CORRECTION TARGET)}} = \frac{\text{Amount to Correct}}{30} = \text{Correction Bolus (Round to nearest tenth)} \]

3. Calculate Total Insulin Bolus:
   \[ \text{Carbohydrate Bolus} + \text{Correction Bolus} = \text{Total} \rightarrow \text{*Rounded Total Insulin Bolus} \]

Place the example numbers on the worksheet.

Carbohydrate Ratio: 15
Correction Target: 120
Correction Factor: 30
# Bolus Insulin Calculation Worksheet

1. Calculate **Carbohydrate Bolus**:

   \[
   \frac{68}{15} = \text{Carbohydrate Bolus (Round to nearest tenth)}
   \]

2. Calculate **Correction Bolus**:

   \[
   \frac{214 - 120}{30} = \text{Correction Bolus (Round to nearest tenth)}
   \]

3. Calculate **Total Insulin Bolus**:

   \[
   \text{Carbohydrate Bolus} + \text{Correction Bolus} = \text{Total Insulin Bolus (Rounded to nearest tenth)}
   \]

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**Place total carbs and blood glucose on the worksheet.**

- Carb Grams: 68
- Blood Glucose: 214
Bolus Insulin Calculation Worksheet

1. Calculate Carbohydrate Bolus:
   \[
   \frac{68}{15} = 4.5
   \]
   Carbohydrates to Eat \(\text{CARBOHYDRATE RATIO}\)
   Carbohydrate Bolus (Round to nearest tenth)

2. Calculate Correction Bolus:
   \[
   \frac{214 - 120}{30} = \frac{94}{30} = 3.133
   \]
   Blood Glucose \(\text{CORRECTION TARGET}\)
   Amount to Correct \(\text{CORRECTION FACTOR}\)
   Correction Bolus (Round to nearest tenth)

3. Calculate Total Insulin Bolus:
   \[
   \text{Carbohydrate Bolus} + \text{Correction Bolus} = \text{Total}
   \]
   *Rounded Total Insulin Bolus

For example:
4.533 rounds to 4.5
4.555 rounds to 4.6
# Bolus Insulin Calculation Worksheet

1. **Calculate Carbohydrate Bolus:**
   \[
   \frac{68}{15} = 4.5
   \]
   Carbohydrates to Eat \( \div \) CARBOHYDRATE RATIO = Carbohydrate Bolus (Round to nearest tenth)

2. **Calculate Correction Bolus:**
   \[
   214 - 120 = 94
   \]
   Blood Glucose - CORRECTION TARGET = Amount to Correct \( \div \) CORRECTION FACTOR = Correction Bolus (Round to nearest tenth)

3. **Calculate Total Insulin Bolus:**
   \[
   \text{Carbohydrate Bolus} + \text{Correction Bolus} \rightarrow \text{Total Insulin Bolus}
   \]
   *Rounded Total Insulin Bolus

**Calculate Correction Bolus:**
\[
214 - 120 = 94 \div 30 = 3.133
\]
Round answer to nearest tenths

**For example:**
3.133 rounds to 3.1
3.155 rounds to 3.2
## Bolus Insulin Calculation Worksheet

1. **Calculate Carbohydrate Bolus:**

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

2. **Calculate Correction Bolus:**

   \[
   \frac{214}{120} = \frac{94}{\text{Correction Bolus}}
   \]
   
   Blood Glucose \[\div\] CORRECTION TARGET = Amount to Correct
   
   (Round to nearest tenth)

3. **Calculate Total Insulin Bolus:**

   \[
   \frac{4.5}{3.1} = \frac{7.6}{\text{Total Insulin Bolus}}
   \]
   
   Carbohydrate Bolus \[+\] Correction Bolus = Total

   *Rounded Total Insulin Bolus

Add the carb bolus to the correction bolus:

\[4.5 + 3.1 = 7.6\]
### Bolus Insulin Calculation Worksheet

1. **Calculate Carbohydrate Bolus:**
   
   \[
   \frac{68}{15} = 4.5
   \]
   
   Carbohydrates to Eat \( \div \) CARBOHYDRATE RATIO = Carbohydrate Bolus (Round to nearest tenth)

2. **Calculate Correction Bolus:**
   
   \[
   \frac{214 - 120}{30} = 3.1
   \]
   
   Blood Glucose \(-\) CORRECTION TARGET = Amount to Correct \(\div\) CORRECTION FACTOR = Correction Bolus (Round to nearest tenth)

3. **Calculate Total Insulin Bolus:**
   
   \[
   4.5 + 3.1 = 7.6 
   \]
   
   Carbohydrate Bolus + Correction Bolus = Total

* Rounded Total Insulin Bolus

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

This example is done in half units.

### Rounding Rules

**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:**
   \[
   \frac{68}{15} = 4.5
   \]
   Carbohydrates to Eat \( \frac{\text{CARBOHYDRATE RATIO}}{\text{CARBOHYDRATE BOLUS}} \) (Round to nearest tenth)

2. **Calculate Correction Bolus:**
   \[
   \frac{214 - 120}{94 \div 30} = 3.1
   \]
   Blood Glucose \( \frac{\text{CORRECTION TARGET}}{\text{AMOUNT TO CORRECT}} \) \( \text{CORRECTION FACTOR} \) (Round to nearest tenth)

3. **Calculate Total Insulin Bolus:**
   \[
   4.5 + 3.1 = 7.6 \rightarrow 8
   \]
   Carbohydrate Bolus \( \text{CORRECTION BOLUS} \) \( \text{TOTAL} \) *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

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**

**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.

<table>
<thead>
<tr>
<th>Step</th>
<th>Calculation</th>
<th>Result</th>
</tr>
</thead>
</table>
| 1. Calculate Carbohydrate Bolus: | \[
\frac{31}{12} = 2.58 = 2.6
\] | Amount to Correct Carbohydrate Bolus (Round to nearest tenth) |
| 2. Calculate Correction Bolus: | \[
\frac{189 - 120}{25} = 69 \div 25 = 2.76 = 2.8
\] | Correction Bolus (Round to nearest tenth) |
| 3. Calculate Total Insulin Bolus: | \[
2.6 + 2.8 = 5.4 \rightarrow 5.5
\] | Total Insulin Bolus |

*Rounded Total Insulin Bolus*

**Rounding Rules:**
- For half units: 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
- For whole units: 0.1-0.4 = Round down to whole unit, 0.5-0.9 = Round up to whole unit
Practice Problem #2

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.

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:
   \[
   \text{Carbohydrate Bolus} + \text{Correction Bolus} = \text{Total} \rightarrow \text{Rounded Total Insulin Bolus}
   \]

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

#### 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.

<table>
<thead>
<tr>
<th>Step</th>
<th>Calculation</th>
<th>Result</th>
</tr>
</thead>
</table>
| 1.   | Carbohydrate Bolus:  
\[
\frac{68}{9} = 7.56 = 7.6
\]  | 7.6 |
| 2.   | Correction Bolus:  
\[
\frac{142 - 120}{24} = 0.92 = 0.9
\]  | 0.9 |
| 3.   | Total Insulin Bolus:  
\[
7.6 + 0.9 = 8.5 \rightarrow 9
\]  | 9 |

**Rounding Rules**

- **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

**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.

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### Solution

1. **Calculate Carbohydrate Bolus:**
   
   \[
   \frac{\text{Carbohydrates to Eat}}{\text{CARBOHYDRATE RATIO}} = \frac{\text{Carbohydrate Bolus}}{\text{(Round to nearest tenth)}}
   \]

2. **Calculate Correction Bolus:**
   
   \[
   \frac{\text{Blood Glucose} - \text{CORRECTION TARGET}}{\text{CORRECTION FACTOR}} = \frac{\text{Amount to Correct}}{\text{Correction Bolus}}\text{ (Round to nearest tenth)}
   \]

3. **Calculate Total Insulin Bolus:**
   
   \[
   \text{Carbohydrate Bolus} + \text{Correction Bolus} = \text{Total} \quad \text{*Rounded Total Insulin Bolus}
   \]

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**Rounding Rules:**

- **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

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