Starting and Adjusting a Basal-Bolus Regimen

Basal-bolus insulin (or multiple daily injections) refers to use of a long-acting insulin (Lantus is the most common) for the “background” insulin needs in addition to using a rapid-acting insulin (such as Humalog, Novorapid, or Apidra) for all meals, snacks, and corrections for high blood sugars.

This regimen consists of three main components:
1. **Long-acting insulin** (Lantus) – usually given at supper or bedtime. Should be taken within a 1-hour window on a daily basis
2. **Insulin for carbs** (rapid-acting) – given at all meals and snacks (in some cases, smaller snacks may not necessitate an injection)
3. **Insulin for blood sugar correction** (rapid-acting) – additional insulin given to correct a blood sugar that is above your blood sugar target range. This is given in addition to insulin for the food.

**Step 1 – The Long-Acting Insulin – is it the right amount?**

Extra blood sugar checking will need to be done. You need to have at least 4 hours where only the long-acting is working (i.e. no other food eaten or insulin given within the previous 4-hour period).

**Three possible times to do this check would be:**
- 1st check at bedtime → 2nd check at 7:00am (no food or rapid insulin in 4 hours prior to bed)
- 1st check at 3:00 am → 2nd check at 7:00 am (no food or insulin for at least 4 hours prior to 3 am)
- 1st check at 6:00 am → 2nd check at 10:00 am (with this check, no insulin or food until 10am)

**After you have done the checks, use this chart to decide if the Lantus needs to be changed**

<table>
<thead>
<tr>
<th>1st blood sugar check result</th>
<th>At the 2nd check, if the blood sugar rises more than 2 mmol/L from the first check, then increase the Lantus by ___ units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>At the 2nd check, if the blood sugar stays within 2 mmol/L from the first check, then the Lantus dose is just right</td>
</tr>
<tr>
<td></td>
<td>At the 2nd check, if the blood sugar decreases more than 2 mmol/L from the first check, then decrease the Lantus by ___ units</td>
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</tbody>
</table>

**Extra Note:** If the blood sugar at your 1st check is under 4, treat with 10 gm of fast-acting carb, i.e. ½ cup orange juice or 1/3 cup apple juice. You may expect a rise of 2-3 pts from the juice, e.g. 3.5 to 6.5.
Step 2 – *Insulin to Carb Ratio* (example - 1 unit of insulin for 10 grams of carb)

Once you have figured out that the long-acting dose is right, check out if the amount of rapid insulin is covering the carbohydrate adequately.

To do this,

- Look at meals where the blood sugar has been ‘in the blood glucose target range’ before the meal (i.e. a meal time where no correction insulin is given).
- Look at the blood sugar before the next meal.

<table>
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<tr>
<th>Is the blood sugar</th>
<th>Higher</th>
<th>Same</th>
<th>Lower</th>
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- If the blood sugar changes by more than 3 mmol/L, you may need to consider changing the carb / insulin ratio, either up or down.

Example: If you see the blood sugar rising more than 3 mmol/L, the 1 unit for 10 gms of carb **may need to change to** 1 unit / 9 gms of carb as the next step. Note that carb ratio may vary between different meals.

Step 3 – *Insulin Correction*

After you have figured out Steps 1 and 2, check out the correction factor (i.e. how many mmol/L will your blood sugar drop from 1 unit of insulin)

- Look in your records at a blood sugar done before a meal that was higher than you wanted and you used some insulin to ‘correct it’.

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- If you find that the blood sugars are either higher or not coming down, then the correction factor likely needs changing.

Example: Presently, you use 1 unit to decrease your blood sugar 3 mmol/L. By looking at your records, you think that the correction factor used is not working. You may need to try 1 unit to lower 2 points. Below is an example of a formula:

\[
\frac{\text{Blood sugar now (15) } - \text{ Target blood sugar (7)}}{\text{Correction Factor (2)}} = \frac{8}{2} = 4
\]

Starting on long-acting insulin

We suggest to start on your long-acting insulin at supper or bedtime. For the day you start, take your usual insulin in the morning and at lunch. At supper time, start using the dosing for your basal-bolus regimen. Take your long-acting (glargine) insulin at supper or bedtime.

For all of the above information, other variables will affect blood sugar patterns (type / timing of food; activity, injection site used, as examples). The above are guidelines only. Consult with your health care provider as you make changes. This handout is used in the Pediatric Diabetes Team in Saskatoon.