

Insulin Dose Adjustments

As children grow, their bodies will need more insulin. Children going through growth spurts or coming out of honeymoon may need more frequent changes in their dose.

However, when talking about adjusting insulin doses many things have to be considered before the adjustment can be made. These are important as they may affect how a decision is made and whether dose adjustment is warranted.

- **Timing of injections or missed**
- **Expired or exposed insulin**
- **Injection sites**
- **Carb counting accuracy**
- **Illness**
- **Stress**
- **Change in activity level**
- **Change in season**

Pre vs Post meal dosing:

- Carbohydrates are broken down quickly and are in the blood stream within 30 minutes, food nutrients are absorbed within 2 -3 hours
- Fast acting insulins Novolog or Humalog
 - Begin working in 5 minutes
 - Work hardest in 1- 1 ½ hours
 - Done working in 2 ½ to 3 hours
- To prevent high or low blood sugars after a meal, pre-meal dosing allows the insulin and carbohydrate to be in the bloodstream at the same time & *work together*

Insulin can go bad:

- Change insulin vials and cartridges at least every 28-30 days
- Lantus/Levemir and Novolog/Humalog should be clear-free from specks and floaters
- Insulin should not be exposed to extreme temperatures
 - Less than 40°F
 - Greater than 87°F

Review and develop a site rotation plan/Injecting into lumpy areas:

- Insulin not absorbed
- Insulin may be increased unnecessarily
- Can lead to severe highs and lows
- Can lead to poor overall control

Carb counting is important:

- Have carb counting book available
- Pull out measuring cups regularly
- Calculate carb content of new foods

Stress and excitement can affect blood sugars

- Usually temporary and treated with more frequent blood sugars and extra corrections
- Ex: school stressors, illnesses, injuries, surgeries, life changes (divorce, new baby)

Changes in activity level can affect blood sugar levels

- Water/amusement park
 - Day-long activity can cause lows/delayed lows
- Sports
 - Consider modifications in food or insulin
- Vacations
 - Can cause major changes in daily routine
- Extra walking-mall, shopping
 - May cause lower blood sugars
- Extra sitting-long car rides, school, SM2 class
 - May cause higher blood sugars

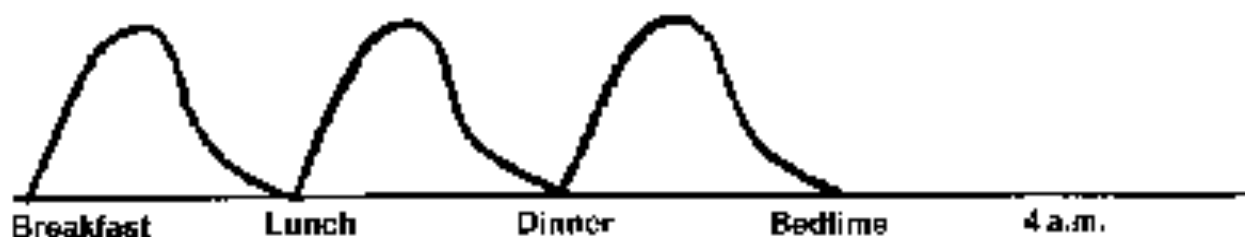
Changes in seasons

- Fall/Winter- tend to require more insulin
- Spring/ Summer- tend to require less insulin

When it's time to adjust the insulin

- Average meal and snack time blood sugars weekly
- Look for patterns or trends
 - Pattern- occurs 3 or more times per week or 3 or more times in a row ex: low after nap
 - Trend- More long term ex: averages increasing slightly over the last few weeks
- Toss out any high or low extremes, don't include in your averages if there is a reason for the extreme
- Look for the point where you lose control
- Goal is 75% or more blood sugars in target range
- Know what target range you are looking for
 - Less than 3 years: 100 to 200 mg/dl
 - 3 to 5 years: 80 to 180 or 80 to 200 mg/dl
 - 6 to 12 years : 80 to 150 mg/dl
 - over 12 years: 80 to 150 mg/dl or 80 to 130 mg/dl
- Change one insulin at a time
 - Lantus/Levemir
 - Unit/carb ratio
 - Correction dose
- Give the change a chance to work
 - You may notice a change in blood sugars quickly if you make a change in the Humalog/Novolog, but you may not be able to see a trend for at least 4-5 days
 - It can take several days to see the affect of a change in Lantus/Levemir-look for results after 5-7 days

Humalog and Novolog begin working in 5 minutes, work hardest at 1- 1 ½ hours, and are gone in 3-4 hours



- The insulin given at the previous meal affects the blood sugar at the snack-time and following meal (breakfast insulin affects morning snack and lunch blood sugars, etc.)
- A change may be needed in:
 - Unit per carb ratio- if pre-meal numbers are in target and post-meal* numbers aren't
 - Correction factor- if pre-meal and post-meal* numbers are not in target

*Post-meal numbers are blood sugars taken 2 hours from the start of the meal - if you notice higher averages at the next meal, try to do extra post-meal blood sugar checks

Lantus/Levemir usually needs changing if your wake up numbers and bedtime numbers are not consistent

- Look first before changing:
 - Is bedtime snack greater than 1 carb?
 - Is the long acting insulin being given at the same time (within 30 minutes) every night?
 - Are correction doses of fast acting insulin given at bedtime?
 - Calculate the ratio of short vs long acting insulin
- When raising the dose, a change of 10% is usually a safe change to make
- If a decrease is needed due to low blood sugars, change the insulin by 10-20%
- If there are severe lows talk to the Diabetes Clinic about necessary changes

Calculating Dose Changes

Total Daily Doses

Typical total daily doses (TDD) are calculated by size, age and puberty level

- TDD = all insulin given in a day on average
- Weight: 1 kg = 2.2 lbs
 - Take weight in pounds and divide by 2.2 to get weight in kilograms
- Age/Puberty: TDD should not exceed
 - Infants and toddlers –0.5-1.0 units/kg* (when growing rapidly)
 - Pre-pubertal kids - 0.8 units/kg*
 - Mid-pubertal kids – 1.1 units/kg*
 - Late-pubertal teens – 1.2 units/kg*

*We'll call this the puberty factor

- The calculated amounts are the maximum doses your child should be receiving in a day

Your Turn:

- $Weight\ lbs \div 2.2 = weight\ kg$
- $weight\ kg \times (puberty\ factor) = calc.\ TDD$

Is your child's TDD equal to or less than this? Most of the time, it should be less or equal

Ratios of fast vs. long insulin

Typical amounts of long acting insulin vs short acting insulin

- Lantus/Levemir = 30% - 40% of TDD
- Humalog/Novolog = 60% - 70% of TDD
- These ratios may be different if child is eating snacks that approach the same size as meals

Unit per carb ratios

- Use the "400 Rule"
- $400 \div TDD = \# \text{ of grams of carbohydrate } 1.0 \text{ unit of insulin will cover}$

Your Turn:

- $400 \div \underline{\hspace{1cm}} = \underline{\hspace{1cm}} \text{ grams } 1 \text{ unit of insulin will cover}$

Correction dose is based on insulin sensitivity

- Correction dose is based on insulin sensitivity
- Use the 1700 Rule
 - $1700 \div TDD = \text{the mg/dl the blood sugar will drop with } 1 \text{ unit of insulin}$

Your Turn:

- $1700 \div \underline{\hspace{1cm}} = \underline{\hspace{1cm}} \text{ mg/dl the blood sugar will drop with } 1 \text{ unit of insulin}$

So how much do you adjust by?

- Unit per carb ratios
 - If gram counting, you can move your unit/grams ratio by 2-4* grams at a time (if you go up on grams-you give less insulin ; if you go down on grams-you give more insulin)
 - If using carb servings you can move your unit/carb ratio by 0.25-0.5* units at a time
- Correction factors
 - You can move your correction factor by 10-30* mg/dl at a time

Do not make changes that will exceed the amounts that we calculated today without talking to the clinic

**make smaller changes for smaller children*