

Tips and tricks: Insulin Titration

**With Thanks for Peer support and
input to this presentation**

What we know about Insulin

- Insulin may be used in patients with Type 2 Diabetes, Gestational Diabetes, Type 1 diabetes, LADA
 - Primary treatment for Type 1 Diabetes
- Initial starting insulin dose is often a safe dose and requires ongoing titration
 - Understating individualized glycemic targets is important
- Frequent monitoring of glucose values at specific times is essential in titrating insulin
 - ie. check fasting glucose if titrating long acting at bedtime

A Review of Insulin Action

Insulin:	Starts to work in:	Peaks at:	Lasts up to:
Fast-Acting (bolus) Insulin			
Aspart (Fiasp)	4 minutes	30-90 minutes	3-5 hours
Aspart (NovoRapid) Glulisine (Apidra) Lispro (Humalog) Lispro 200u/mL (Humalog 200)	10-15 minutes	1-2 hours	3-5 hours
Regular (Humulin R; Novolin ge Toronto)	30 minutes	2-3 hours	6.5 hours
Regular 500u/mL (Entuzity)	15 minutes	4-8 hours	17-24 hours
Long-Acting (basal) Insulin			
NPH (Humulin N; Novolin ge NPH)	1-3 hours	5-8 hours	18 hours
Detemir (Levemir) Glargine (Lantus; Basaglar)	1-2 hours	No peak	16-24 hours
Glargine 300u/mL (Toujeo)	6 hours	No peak	30 hours
Degludec 100mL & 200u/mL (Tresiba)	1.5 hours	No peak	42 hours

Identifying Patterns

- A pattern is a similar glucose level on 2-3 glucose checks that are done at the same time of day, over several days
- Possible causes of elevated glucose levels:
 - Food intake
 - Inactivity
 - Need for insulin or medication adjustment
 - Stress or pain or illness
- A pattern is not having elevated glucose values at various times of day, over several days
 - This may be best addressed by assessing food intake or activity

Troubleshooting tips with basal insulin

Low fasting glucose levels

- Possible Causes:

- No snack before bed (if on N or NPH)
- Missed evening meal
- More activity than usual
- Alcohol
- Too much insulin
- Incorrect insulin taken

Troubleshooting tips with basal insulin

- If rule out other causes of low fasting, consider adjusting basal insulin
- Decrease by 10% q 2-4 days
 - Tresiba recommendations are to titrate by 4 units weekly (consider if appropriate)

Troubleshooting tips with basal insulin

Elevated fasting glucose levels

- Possible Causes:
 - Large carbohydrate snack at night
 - Late evening meal
 - Less activity than usual
 - Missed insulin dose/wrong insulin(rapid)
 - Low overnight resulting in rebound high
 - Inadequate insulin dose
 - Stress/pain, illness
- Important to ask some questions prior to making insulin adjustments

Troubleshooting tips with basal insulin

- If other causes of elevated fasting glucose values are ruled out , consider adjusting basal insulin
- For some, it may be beneficial to check a few times overnight to assess for hypoglycemia at ~3am
- Increase or decrease by 10% q 2-4 days
 - Tresiba recommendations are to titrate by 4 units weekly (consider if appropriate)

Troubleshooting tips with meal time(rapid) insulin

Low glucose before meals

- Possible causes:
 - Less carbohydrate at previous meal
 - High fat/low glycemic index meal
 - Increased activity or new activity
 - Extra meal time insulin (ie. too much correction)
 - Too much time between or missed meals

Troubleshooting tips with meal time(rapid) insulin

- If other possible causes are ruled out, consider adjusting insulin
- Adjust rapid insulin at the meal prior by 10%
- Encourage consistent carbohydrate intake at meals if using a base dose of insulin
- Consider reducing insulin dose at meal if planning activity
 - Carbohydrate containing snack may be beneficial for unplanned activity

Troubleshooting tips with meal time(rapid) insulin

High glucose before meals

- Possible causes:
 - Snacking on carbohydrates between meals
 - Large carbohydrate intake at previous meal
 - Short spacing between meals (<3 hours)
 - Less activity than usual
 - Stress/pain/illness
 - Not washing hands prior to checking glucose

Troubleshooting tips with meal time(rapid) insulin

- If other possible causes are ruled out consider adjusting insulin
- Adjust rapid insulin at the meal prior by 10%
- Reinforce the need for ongoing checking to assist with recognizing patterns
- Discuss limiting carbohydrate intake between meals, unless eating for activity

Deciding how/when to make adjustments

If you find more than one pattern, focus on one at a time in this order:

1. Low pattern at any time
2. High before breakfast pattern
3. High pattern before other meals

What would you do?

Insulin: 10 units of basal at bedtime

	Before Breakfast	Before Lunch	Before Supper	Bedtime	Comments
Mon	9.6		14.6	16.3	
Tues	10.4	13.3		12.0	
Wed	12.2	10.9		13.1	Birthday supper out with family
Thurs	17.4	11.2		8.3	

What would you do?

Insulin: 25 units of basal at bedtime

	Before Breakfast	Before Lunch	Before Supper	Bedtime	Comments
Mon	13.6	8.0		6.2	
Tues	12.5		7.9	6.7	Went for a long walk after supper
Wed	8.1			6.2	
Thurs	16.4	11.2		8.3	

What would you do?

Insulin: 10 units of rapid with meals 30 units of basal at bedtime

	Before Breakfast	Before Lunch	Before Supper	Bedtime	Comments
Mon	6.4	14.6	6.3	6.9	
Tues	7.1	9.9	7.1	6.3	
Wed	6.8	11.1	8.2	12.3	Birthday supper out with family
Thurs	9.9	10.2	7.9	8.3	

What would you do?

Insulin: 13 units rapid at breakfast

15 units rapid at lunch

16 units rapid at supper

45 units of basal at bedtime

	Before Breakfast	Before Lunch	Before Supper	Bedtime	Comments
Mon	12.5	11.0	13.6	9.4	
Tues	10.2	8.9	12.0	8.9	
Wed	15.3	12.3	7.3	10.5	
Thurs	17.5	10.1	9.9	11.8	

Conclusion

- Insulin is started at safe doses and titrated to meet individual targets and needs
- Adequate glucose self monitoring and recording in order to be able to identify patterns is key to insulin adjustment
- Most insulin should be adjusted by 10% (if on less than 10 units adjust by 1 unit), one dose at a time
- Changes in life style and life stages will often require insulin adjustment, not only when someone is new to insulin
- Managing insulin is laborious can sometimes be difficult for the person with diabetes, your support and encouragement can be invaluable