

QUICK REFERENCE GUIDE TO DIABETES FOR HEALTH CARE PROVIDERS

A special project of the Michigan Diabetes Outreach Network

Chapter 6

Insulin and Other Injectable Medications Used in the Treatment of Type 2 Diabetes

Insulin

Many with type 2 diabetes will need insulin therapy. As providers, we need to be positive by emphasizing that insulin therapy is a normal part of treatment progression. It is also important to be supportive of the client fears and concerns with using insulin.

Insulin should be initiated if

- A1C level is > 7% for 3 months on maximum effective doses of two or more glucose lowering agents
- Symptomatic and blood glucose (BG) is greater than 300 mg/dl.

Getting Started

1. Select insulin regimen.

Insulin Regimen	Choose as initial regimen if client:
Add basal insulin (Lantus, Levemir) to oral agents	<ul style="list-style-type: none">• Is feeling overwhelmed or fearful of injections• Has mostly elevated fasting BG levels and post-meal levels are met with current oral therapy
Premixed insulin (discontinuing sulfonylureas; continue metformin, TZD)	<ul style="list-style-type: none">• Opposed to more than 2 injections a day and has consistent meal times and food intake• Has elevated fasting and or post-meal BG
Basal and bolus (meal time) insulin (discontinue sulfonylureas; consider adding/maintaining metformin or TZD)	<ul style="list-style-type: none">• Desires tight control and a flexible schedule• Has elevated fasting and or post-meal BG

2. Select starting dose

Insulin Regimen	A1C < 8%	A1C 8-10%	A1C > 10%
Add basal insulin (Lantus, Levemir) to oral agents	0.1 units/kg	0.2 units/kg	0.3 units/kg
Start with one dose, taken at same times each day			
Premixed insulin (discontinue sulfonylureas; may add/maintain metformin or TZD)	0.2 units/kg (divide by 2 doses)	0.4 units/kg (divide by 2 doses)	0.6 units/kg (divide by 2 doses)
Start with 2 doses: before breakfast/morning meal and before evening meal			
Basal and bolus (meal time) insulin (discontinuing sulfonylureas; may add/maintain metformin or TZD)	0.2 units/kg (½ for basal, ½ divided evenly between meals)	0.4 units/kg (½ for basal, ½ divided evenly between meals)	0.6 units/kg (½ for basal, ½ divided evenly between meals)
Calculate basal and meal-time insulin doses. Start with evenly dividing meal time insulin between meals			

3. Monitor blood glucose (BG) levels and adjust insulin dosage

Insulin	Blood Glucose Checks and Adjustments:
Basal insulin*	<ul style="list-style-type: none"> • Check am fasting BG daily <ul style="list-style-type: none"> • If most BG < 70 mg/dl: decrease dose 1-3 units • If most BG 70-120 mg/dl: no change in basal insulin. Consider 2 hour post-meal testing if A1c remains above 7% • If most BG 120-200 mg/dl: add 1-3 units every 3 days • If most BG > 200 mg/dl: add 3-5 units or increase by 10% * Add mealtime insulin if dose reaches 0.5 units/kg body weight OR fasting BG is < 120 mg/dl and A1c remains above 7%.
Premixed insulin	<ul style="list-style-type: none"> • Check fasting (pre-breakfast) & pre-dinner reading every day <ul style="list-style-type: none"> • If fasting BG < 70 mg/dl: decrease pre-dinner dose 1-3 units • If fasting BG 70-120 mg/dl: no change in pre-dinner dose. • If fasting BG 120-200 mg/dl: add 1-3 units pre-dinner. • If fasting BG > 200 mg/dl: add 3-5 units pre-dinner. • If pre-dinner BG < 70 mg/dl: decrease pre-breakfast dose 1-3 units. • If pre-dinner BG 70-120 mg/dl: no change in pre-breakfast dose. • If pre-dinner BG 120-200 mg/dl: add 1-3 units pre-breakfast. • If pre-dinner BG > 200 mg/dl: add 3-5 units pre-breakfast.
Basal and bolus (meal time) insulin	<ul style="list-style-type: none"> • Check BG before all meals and at bedtime (HS) <ul style="list-style-type: none"> • If most BG > 200: increase total insulin 0.1 units/kg....add ½ to basal and ½ distributed equally among meals. • If most BG < 200, but pre-meal BG are elevated, see below: <ul style="list-style-type: none"> • Fasting: adjust basal insulin 1-3 units • Pre-lunch, pre-dinner or HS: adjust previous meal insulin 1-3 units

Adjunct Therapies for Type 2 Diabetes

Exenatide (Byetta) was released for use in 2005 and is used in addition to oral medications and/or insulin to better control of blood glucose levels. **Pramlintide acetate (Symlin®)** is a synthetic analog of human amylin. Amylin is a hormone also made and secreted by the beta cells to control post-prandial blood glucose levels. Anti-hyperglycemic effects of Byetta and Symlin are to:

- Slow gastric emptying.
- Suppress glucagon release, resulting in less glucose release from the liver.
- Regulate food intake due to modulation of appetite.

Both are administered by subcutaneous injection (similar to that of insulin):

- **Exenatide** is taken twice a day (bid) up to 1 hour before am and pm meals (spaced at least 6 hours apart). It comes in a 5 microgram (ug) and 10 ug pen device. Dosage is 5 ug bid for 1 month, then go up to 10 ug bid as tolerated.
- **Pramlintide acetate** is taken prior to meals (of at least 250 calories or 30 grams carbohydrate). It comes in vial/syringe or pen (60 and 120 dosage pens). It cannot be mixed with insulin. Starting dose is 60 mcg before meals and increase to 120 mcg in 3 days if tolerated. Pre-meal insulin may need to be reduced (by up to 50%) to prevent hypoglycemia.

Side effects may include nausea, vomiting, dizziness, indigestion, stomach pain, decreased appetite and fatigue. Its use is contraindicated in those with gastroparesis, hypoglycemia unawareness, women who are pregnant or breastfeeding and children.

Vials/pens can be stored at room temperature (less than 77°F for exenatide and less than 86°F for pramlintide) for 28 days and then discarded. Vials/pens not in use should be stored in the refrigerator and discarded after the expiration date.

References:

American Diabetes Association (2008). Clinical Practice Recommendations. *Diabetes Care*, Vol 31 (1).

Guide to Starting and Adjusting Insulin for Type 2 Diabetes, International Diabetes Center.