BASAL BOLUS INSULIN FOR MEDICAL-SURGICAL INPATIENTS

CONTACT DIABETES SERVICES FOR MORE INFORMATION 847-917-6907
For the Medical Staff of Northwest Community Healthcare

I have no financial interests tied to diabetes medications, or pharmaceutical companies.

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OBJECTIVES OF THIS PRESENTATION

• Understand importance of insulin for the hospitalized patient.

• Understand the importance of basal insulin to meet the basal metabolic needs of the hospitalized patient who has an infection and/or stress.

• Understand the need for rapid acting insulin to correct hyperglycemia and to “cover” carbohydrates that will be eaten.
INTERESTING STATISTICS

• 38% of Hospitalized Med-Surg Patients have diabetes, nationally. NCH has 34-38% daily.
• Mortality rates of inpatients with “new hyperglycemia” is more than 5 times more that inpatients with a history of diabetes.
• Evidence supports that patients have better outcomes when their blood glucoses are under 200mg/dl.
WHY USE INSULIN RATHER THAN ORAL DIABETES MEDS?

• Better control of fluctuating conditions, such as being NPO, and not feeling well enough to eat.
• Sulfonylureas are probably the most dangerous oral diabetes medications d/t delayed or missed meals and a patient’s poor appetite when ill
• TZDs (Actos and Avandia) are more likely to increase CHF and Edema
• Metformin is not suggested d/t renal impairment and use of contrast dye
GOALS OF THERAPY

• Avoid hypoglycemia: BG <70mg/dl
• Avoid hyperglycemia: BG >180mg/dl
• Prevent glucose variability: there is recent data that glucose variability contributes to poor outcomes
WHO REQUIRES INSULIN?

- All patients with Type 1 diabetes must have a basal insulin and usually a bolus insulin, as well.
- Type 2 patients who take basal insulin at home
- Patients using >20 units of rapid acting insulin for their “Sliding Scale” over the last 24 hours
CONSIDERATIONS ABOUT THE DOSE

- Lantus (glargine), Levemir (detemir) or NPH can be used for basal dosing; *NCH has Lantus and NPH on formulary.* (However, there is less hypoglycemia with Lantus.) If patient cannot afford Lantus post hospitalization, the patient is more likely to buy and continue to take NPH.
- Novolog (aspart), Humolog (lispro), Apidra (glulisine) and Regular insulin are used for BG correction and covering the mealtime carbs. *Novolog is on NCH formulary.* Regular insulin should be ordered for post-hospitalization for patients who cannot afford analogs. However, Novolog is absorbed more like food and therefore, is more efficacious than Regular insulin.
MORE CONSIDERATION ABOUT THE DOSES

• Most often, NPH is ordered BID. If NPH is only given in the AM, the blood glucose the next AM will usually be high.

• If the patient is getting an AM dose of steroids, sometimes just an AM dose of NPH is all that is needed to maintain a normal blood sugar. This depends on the person and the dose of the steroid.

• Pre-meal insulin should be given *pre-meal*. Very few adults should be taking rapid acting insulin before meals. (Sometimes, taking meal-time insulin is a carry-over bad habit from childhood when their parents didn’t know what they would be eating.)
ANALYZING BASAL INSULIN DOSE THAT PATIENT HAS BEEN TAKING AT HOME

• Basal insulin is *always* required for patient with Type 1 diabetes, even if NPO, unless on an insulin drip.
• Patients with Type 2 diabetes may come in with an inflated basal dose. Over time, patients tend to use the basal insulin to “cover” their mealtime requirements and they end up taking too much basal insulin every day.
• Use weight-based dosing in the hospital. For example: 0.4 units of insulin per kg for a person with Type 1 diabetes and 0.6-0.8 units of insulin per kg for a person with Type 2 diabetes. Particulars depend on the patient’s insulin resistance and amount of glucose toxicity.
Patients should always get some amount of basal insulin

- If the patient’s glucose is lower in the morning than the nurse thinks it should be, the nurse might have a tendency to omit the Lantus.
- Lantus works over a 24 hour period. Therefore, even 24 units of Lantus is only 1 unit per hour.
- *Lantus should rarely be omitted.*
ORDERING A CORRECTION AND MEAL DOSE OF RAPID ACTING INSULIN

• Correction insulin is similar to the old “Sliding Scale.”
• Usually start at treating anything over 150mg/dl
• (Then 150, is the target)
• 151-200: 3 units
• 201-250: 4 units
• 251-300: 5 units
• 301-350: 6 units
• If the correction dose is more than that, consider having the nurse call you and the Lantus dose should probably be increased.
ORDERING A CORRECTION AND MEAL DOSE OF RAPID ACTING INSULIN, CONT.

- Rapid acting insulin that will cover the carbohydrates the person will eat, should be about 1 unit of rapid acting insulin for every 15 grams of carb the person eats.
- 15 grams of carb is one serving
- NCH menus have the amount of carbs a food has on the menus, so the nurse can calculate how many carbs the person will eat.
- A typical patient tray has 3-4 carb servings per meal.
WEIGHT-BASED INSULIN DOSING FOR A PATIENT WITH HYPERGLYCEMIA WHO IS NEW TO INSULIN

- For patients who have insulin resistance, and/or you suspect they have Type 2 diabetes:
- Take their weight in kilograms and multiply x 0.8
- This would be the maximum total daily dose of all insulins—basal and bolus
- 50% of the above number should be the basal insulin and 50% should be the bolus insulin dose divided by 3 to be given before each meal—if the patient is eating.
EXAMPLE OF DOSING FOR NEW TYPE 2 PATIENT – A MORE CONSERVATIVE DOSING SCHEDULE

- Person is 220lbs, or 100kg
- For minimum daily dose: 100kg x 0.6 units per kg, equals 60 units total daily insulin dose.
- 50%, or 30 units should be basal insulin (Lantus) and
- 50% or 30 units of rapid acting insulin (Novolog) should be given in 3 equal doses before meals if patient is eating.
- If patient is not eating, or eating variable amounts of carbohydrate: use a correction dose (Novolog) of 1 unit for every 50 points BG above 150mg/dl and 1 unit of insulin for every 15 grams of carbohydrate the nurse thinks the patient will eat.
IF YOU ARE UNSURE THE PATIENT IS GOING TO EAT

- At least do a correction dose of Novolog to correct a blood glucose above 150mg/dl.
- Do this at least before every meal or every 6 hours if patient is NPO.
- Always “start low and go slow” so patient has a decreased chance of having hypoglycemia.
- Observe blood glucose, insulin dose patterns and what was going on with the patient from the previous day to determine dose for next day.
Basal insulin is to meet the body’s basal metabolic needs.

Bolus insulin can be ordered for 2 purposes:
1. To correct a high blood sugar; (looking back)
2. To “cover” the carbohydrates the person will be eating; (looking forward)
FOR FASTING GLUCOSES UNDER 100

- Decrease the next Lantus injection.
- The average amount of Lantus patients take per day is: 48 units.
- Therefore, starting the patient out at 10-20 units of Lantus is probably not going to be enough, unless the person is frail and 100lbs.
POINTS TO REMEMBER ABOUT DIABETES EDUCATION

• Diabetes Educators see most inpatients Monday through Friday for basic survival skills.
• Diabetes educators can assist you in finding out which insulin and glucose meter is covered by the patient’s insurance.
• Diabetes education is much better retained by having your patient come for out-patient sessions.
• Medicare and most insurances pay for education, but the benefit is particular to the patient’s policy.
• Hospitalists cannot order Diabetes Education. It must be ordered by the physician following the patient after the hospitalization.
IN SUMMARY*

- **Conservative dose** for 100kg person:
  - 60 units Total Daily Dose
  - 30 units basal and 30 units bolus in 3 equal parts before meals.

- **Assertive dose** for 100kg person
  - 80 units for the Total Daily Dose
  - 40 units basal and 40 units bolus in 3 equal parts before meals.

- *If patient has questionable amounts of carb intake: 1 unit of Novolog for every 50 points above 150mg/dl blood glucose and 1 unit Novolog for every 15 grams of carb (1 serving) that the person will eat.*
DOSING A MORE FRAIL PATIENT OR SOMEONE YOU SUSPECT HAS TYPE 1 DIABETES*

- 100lb person = 45 kg
- 45kg x 0.4 = 18 units Total Daily Dose
- 8-9 units Lantus for the basal
- 3 units before every meal if the patient is eating

* If the patient comes in with a higher BG (Glucose toxicity, they may require more insulin to get their BG into a normal range.)
OTHER POINTS TO CONSIDER

- Hydration
- Serum ketones
- Anion gap
- Patient’s past history with insulin, if any
- If the patient has been insulin naive, be more conservative with the dose
- Is the patient on Steroids? (‘Will need more basal and/or rapid acting insulin to control BG d/t insulin resistance.)
- Consult endocrinologist and/or inpatient diabetes nurse educator at x4478 or call Sue Drogos, RN, CDE, Manager of Diabetes Services to discuss options.
- (847-917-6907)
THANK YOU FOR TAKING THE TIME TO COMPLETE THIS CME ACTIVITY

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If you have found this presentation useful or have suggestions please contact:

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