

## Carbohydrate Counting and Short-Acting Insulin Adjustment Protocol for Type 1 & 2 Diabetes

Patient Insulin Regimen \_\_\_\_\_

### Indications:

1. Patient with uncontrolled Hemoglobin A1c or blood glucose results on current insulin regimen.
2. Patient is willing to test blood glucose at least 4 to 6 times a day.
3. Patient can do simple math calculations and has ability to read and comprehend food labels.
4. Patient is willing to take up to 5 insulin injections a day.
5. Patient is willing to attend classes/education appointments on carbohydrate counting and use advanced insulin dosing calculations.

### Guidelines

- Determine basal insulin dose using long-acting insulin adjustment guide.
- Calculate ISF and insulin to carbohydrate ratio for meal bolus insulin, using the following guidelines.

### For Long-Acting Insulin Adjustment:

1. If the RN determines that the patient's long acting insulin is 2/3 or greater than the total daily dose, the physician must be contacted to adjust the long-acting insulin before the patient may begin using the carbohydrate to insulin dosing regimen.
2. If the RN determines that the average fasting glucose is equal to or greater than 120mg/dl, increase the long acting insulin by the following:

#### For type 1

<u>Pt on single dose</u>	<u>If lows (less than 80mg/dl) *</u>	<u>If highs (greater than target range) *</u>
less than 10 units	decrease by 1 units	increase by 1 units
10 units or above	decrease by 10%	increase by 10%

#### For type 2

- As for above type 1, however if the patient's average blood glucose is equal or greater than 200mg/dl, adjust insulin by 20%
- If the blood glucose is 120 to 200mg/dl, adjust by 10%

\* Two or more values at the same time of day for hypoglycemia, three or more values for hyperglycemia, within one week, out of target range

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## **For Short Acting Insulin Adjustment:**

1. Patients who are willing and able to adjust short-acting insulin doses may be referred for carbohydrate counting and insulin dose self-adjustment education and protocol initiation.
2. The clinician will evaluate the patient's ability and willingness to self-adjust short acting insulin doses. If a suitable candidate, the patient is taught carbohydrate identification, counting (determining number of grams to be consumed), and use of dosing calculations.
3. The patient's total daily dose of all insulin is calculated and divided into 450 to determine the insulin (short acting) to carbohydrate gram ratio. This ratio is compared with the ratio obtained from a weight chart and the patient begins by using the largest ratio to avoid hypoglycemia.
4. The insulin sensitivity factor (ISF) or correction factor is calculated by dividing the total daily insulin dose into 1800 for Humalog insulin or 1500 for Regular insulin. This will determine the mg/dl that 1 unit of insulin will lower the blood glucose.
5. The patient and the clinician agree upon a reasonable blood glucose target to be used with the ISF.
6. The patient is instructed to calculate pre-meal doses of short acting insulin based on intended carbohydrate intake as well as using the ISF to lower or raise pre-meal blood glucose in relation to target blood glucose.
7. The patient is supplied with the "Carbohydrate to Insulin BG Record" on which to record blood glucose results, grams of carbohydrate and insulin doses.
8. Current blood glucose records and carbohydrate intake and meal insulin doses are reviewed by the clinician to assess the patient's accuracy in using the calculations. The blood glucose effects and reliability of the new dosing calculations are also assessed by the clinician.
9. Each pre-meal insulin to carbohydrate ratio is adjusted up or down by the clinician based on the patient's pre-meal, postprandial, and bedtime blood glucose averages for the previous 5 to 7 days until the target goals for all times of day are met.
10. Use the following to insulin algorithm to adjust insulin to carbohydrate ratio every 5 to 7 days until the patient achieves individual target goals:

### ◇ **Pre-meal guidelines**

- If 50 mg/dl over glucose target → decrease the insulin to carbohydrate ratio by 2 grams for the previous meal.
- If 100 mg/dl over glucose target → decrease the insulin to carbohydrate ratio by 4 grams for the previous meal.
- If patient has a pattern of two or more lows at the same time of day, increase previous meal insulin to carbohydrate ratio by 2 grams for the previous meal.
- Out of range fasting averages will need basal insulin adjustment. Use long-acting insulin guidelines above.

### ◇ **Two hour postprandial guidelines for rapid-acting insulin**

- If >50 mg/dl above pre-meal value → decrease the insulin to carbohydrate ratio by 2 grams of carbohydrate for the previous meal.

### ◇ **Three to four hour postprandial guidelines for Regular insulin**

- If >50 mg/dl above pre-meal value → decrease the insulin to carbohydrate ratio by 2 grams of carbohydrate for the previous meal.

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### 3. Hypoglycemia:

- If the patient experiences severe hypoglycemia, immediate, and more aggressive titration down may be needed. If a single event occurs with an explained cause, such as too much insulin, skipped meal, or unplanned exercise, insulin may not need adjustment. If one or more unexplained severe episodes has occurred, RN will document in patient's record and contact physician immediately.

### 4. Patient Education:

- Assess for family's knowledge of glucagon administration, hypoglycemia treatment.
- Patients need to be advised on the importance of more frequent testing of blood sugars, with some 0300 readings and monitoring themselves for symptoms for the next 24 hrs after an episode of hypoglycemia (if the next hypoglycemia episode is within 24 hrs, glucose levels can drop much lower before hormonal counter-regulation and autonomic symptoms occur).

### 5. Follow up:

- In all cases, request that the patient call in, fax or e-mail blood glucose results weekly for further insulin titration instructions. Document progress on Diabetes Encounter Form and Insulin Adjustment Tracking Form. Keep physician informed of progress every 3 – 4 weeks.
- If the patient does not follow up with blood glucose results as agreed the protocol will be discontinued. Attempt to call patient three times and document on Diabetes Encounter Form and Insulin Adjustment Tracking Form. A termination letter will be sent to the patient and the referring physician.

Physician Name (Please print): \_\_\_\_\_

Physician signature: \_\_\_\_\_ Date: \_\_\_\_\_

Approved: \_\_\_\_\_

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### For Office Use Only:

Practice Name Approved for: \_\_\_\_\_

Physician approving protocol (Please print): \_\_\_\_\_

Signature: \_\_\_\_\_ Title: \_\_\_\_\_

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