Practice Pearls for Titrating Antiglycemics

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Diabetes cases may be so complex that practitioners feel they have too little time to devote to blood glucose management. Here are some succinct guidelines that can simplify the process.

Patients with diabetes mellitus generally present with a myriad of health problems, follow elaborate medication regimens, and have a host of laboratory data in their medical records. To mitigate the devastating long-term sequelae of this complicated disorder, clinicians must take a very organized approach to health care delivery. Since macrovascular cardiac complications constitute the number one end-stage disorder in diabetes mellitus,[1] patients must be evaluated for lipid status and blood pressure maintenance at each clinical encounter. In addition, clinicians must monitor patients for potential microvascular complications (involving kidneys, eyes, or feet) and for depression as they provide substantial patient education.

Because diabetes mellitus necessitates such an extensive clinical agenda, practitioners treating patients with this disorder often feel they have little time to devote to blood glucose management and antiglycemic titration. The purpose of this article is to suggest some succinct guidelines busy practitioners can use to titrate antiglycemic medications appropriately—in accordance with the patient's blood glucose pattern.

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AVOIDING HYPOGLYCEMIA

In order to achieve optimal blood glucose levels, patients with diabetes usually have to have their medications titrated in several cycles. As a general rule, one change may be made in the medication plan at each patient visit. Due to day-to-day variance in general health, diet, and activity level, blood glucose patterns need to be monitored for three to four days after each change to determine its effect.

Before prescribing any treatment changes, be sure that the patient is prepared to manage hypoglycemia appropriately. Hypoglycemia detection and management together constitute an important matter of patient safety. One episode of severe hypoglycemia can sabotage current and future attempts to lower blood glucose levels by leaving patients fearful of such attempts and, possibly, mistrustful of the practitioner's expertise.

Usually, a single low blood glucose measurement can be explained by unanticipated activity, a delayed meal, or inadequate carbohydrate consumption. (Pay attention to the contextual details surrounding low blood glucose episodes, as these can inspire teachable moments.) If, however, the patient has two or more low blood glucose measurements at approximately the same time of day, then it's time to consider decreasing the dose of glucose-lowering medication.

Advise patients to monitor bedtime blood glucose to ensure that levels are adequate—particularly if the patient is taking insulin or has erratic exercise patterns. Bedtime snacks no longer are recommended for all patients with type 2 diabetes who take insulin since bedtime snacking can lead to weight gain as well as elevated morning blood glucose and, usually, medication can

be adjusted to prevent nighttime hypoglycemia. If bedtime blood glucose levels tend to fall below 110 mg/dL, however, a 15-g carbohydrate snack is recommended at bedtime.

WHEN BLOOD GLUCOSE IS CONSISTENTLY HIGH

After correcting for any low blood glucose patterns, your next priority is to address any consistently high blood glucose patterns. If insulin increases are required, prescribe changes in 10% to 20% increments, as larger modifications may result in hypoglycemia.[2] If patients will be titrating doses at home between office visits, they should be instructed to raise the dose by no more than 10% every three to four days and only after a pattern has been established without hypoglycemia. As a safeguard, always instruct patients to stop home titration at a specified maximum dose until their next scheduled clinical evaluation.

Mealtime insulin works for patients with type 2 diabetes as well as for those with type 1. For instance, if bedtime values are always high, then perhaps it would be prudent to add to the patient's regimen either a rapid-acting insulin analog (lispro or aspart) or regular insulin to be taken at the time of the evening meal.

Dinner is often the largest meal of the day and patients with diabetes mellitus may be surprised to find that their blood glucose measurements are extremely elevated two hours after this meal. This postprandial blood glucose elevation raises concerns about cardiovascular complications.[3] A small amount of a rapid-acting insulin analog or a short-acting regular insulin will help patients maintain an appropriate blood glucose level throughout the evening. Compared with regular insulin, rapid-acting insulin analogs better approximate the normal matchup of insulin to peak postprandial carbohydrate absorption. Other interventions may include reducing food portions, avoiding excessive carbohydrate intake at dinner, or instituting an after-dinner walk.

Table. Basic guidelines for titrating antiglycemic medication

- **Look for low blood glucose patterns first.** Two or more low blood glucose measurements need to be explained by a skipped meal or increased activity (for example, does it occur every morning or every afternoon after exercise?). Nightmares and night sweats may signify nighttime lows.
- **Look for consistently high blood glucose patterns.** If levels are often high at the same time of day, excessive snacking, inactivity, or failure to take medications may be to blame. If they always occur at bedtime, consider adding dinnertime regular or rapid-acting insulin to the regimen.
- **Correct morning fasting blood glucose levels.** The desired range is between 90 and 130 mg/dL. Bringing morning fasting levels into this range will improve blood glucose levels throughout the day. To rule out the Somogyi effect (rebound hyperglycemia after hypoglycemia, which is rare in type 2 diabetes mellitus), ask the patient to set an alarm to measure blood glucose at 3:00 AM.
- **Titrate medication gradually.** Increase insulin in 10% to 20% increments and make only one medication change at a time, monitoring blood glucose levels for three to four days afterward to determine whether the change has been effective and has not caused hypoglycemia.
- **Correct two-hour postprandial level.** Measure blood glucose levels before and two hours after the largest meal, aiming toward levels below 180 mg/dL. Cardiovascular risk may be linked with elevated postprandial levels.
- **Keep bedtime blood glucose levels above 110 mg/dL.** If this level is too low, the dinnertime insulin dose may be too high. In type 2 diabetes, a bedtime snack is necessary only if bedtime blood glucose levels are below 110 mg/dL.

BRINGING MORNING LEVELS UNDER CONTROL

If the patient's morning fasting blood glucose level closely approaches that recommended by the American Diabetes Association—90 to 130 mg/dL [4]—then the rest of the day's glucose readings will tend to fall within a more acceptable pattern. If the patient already is taking multiple oral medications, then initiating intermediate- or slow-acting insulin (neutral protamine Hagedorn [NPH] or glargine) at bedtime is the most effective way to optimize morning fasting blood glucose levels.[5]

To avoid an overnight peak, be sure that patients don't take their evening NPH insulin inappropriately at 6:00 PM instead of at bedtime (9:00 PM to midnight). If taken at 6:00 PM NPH insulin peaks at

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approximately 2:00 AM instead of in the early morning as intended.

Medication titration can follow basic guidelines, though the "correct" dose for each patient must be determined individually (Table). Medication and lifestyle changes should be guided by records of the patient's blood glucose patterns, incremental changes should be made at specified intervals to avoid hypoglycemia, and the patient should be educated to recognize, prevent, and treat hypoglycemia with a 15-g carbohydrate snack. ●

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