

# Blood Glucose Monitoring and Underlying Question of Hypoglycemia Are Both Essential to Preventing Hypoglycemia in Nursing Home Residents

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**H**ealth care providers are often faced with decisions about treatment options for diabetes that must take into consideration a patient's quality of life. One controversial area is whether finger-stick glucose monitoring is necessary once a patient becomes a nursing home resident because of the discomfort involved with fingersticks. This case will illustrate the benefit of glucose checking for all elderly patients who are prescribed medications that can cause hypoglycemia. It also offers strategies to minimize discomfort to such patients.

At the Hurlbut Community Care skilled nursing facility in Rochester, N.Y., it has long been policy to check blood glucose at least before meals in patients who are on insulin or oral agents that carry a risk for hypoglycemia. With the help of Joslin Diabetes Center of Boston, Mass., the facility has established a three-pronged diabetes management program that includes staff and patient training in basic information about the disease and its treatment, the onsite presence of a diabetes care coordinator, and the involvement of an expert nurse practitioner who oversees residents' diabetes management.

## PRESENTATION

Mrs. J. is an 88-year-old African-American woman who was laterally transferred on 16 March 2011 from another skilled nursing facility where

she had resided since 2007. She was moved to the Hurlbut facility to be closer to her family and to receive ongoing diabetes care. Mrs. J. is a poor self-historian because she has severe dementia.

## Medical History

Her medical history includes dementia with psychosis/aggression, type 2 diabetes requiring insulin, hypoglycemia unawareness, hyperlipidemia, hypertension, degenerative joint disease, anemia, vitamin B<sub>12</sub> deficiency, stage 3 chronic kidney disease, and hearing loss. Mrs. J. requires assistance with all activities of daily living. Before being transferred, she had frequent hyper- and hypoglycemia. In her previous facility, her glucose was monitored daily before breakfast only, and her results ranged from 41 to 311 mg/dl. Her most recent A1C was 7.1%. She is 63 inches tall and weighs 138.5 lb; her BMI is 24.1 kg/m<sup>2</sup>.

## Current Medications

- Glargine insulin, 68 units at bedtime
- Sliding-scale lispro insulin, ranging from 5 to 12 units before meals
- Atorvastatin, 40 mg at bedtime
- Amlodipine, 5 mg at breakfast
- Furosemide, 40 mg with breakfast
- Lisinopril, 40 mg at breakfast

After admission, Mrs. J. continued her aggressive, combative behavior, which included yelling and spitting at anyone who tried to inter-

act with her. Initially, this behavior was attributed to her progressing dementia. Fingerstick blood glucose testing was impossible to carry out.

The diabetes care coordinator, who was also a nurse practitioner, questioned the insulin dose based on the patient's weight and A1C of 7.1%. Instead of increasing the glargine dose as other providers had done before the transfer, the care coordinator decided to determine whether the cause of Mrs. J.'s acting out was actually hypoglycemia rather than dementia. Her decision was based on clinical experience as well as the patient's history of unconscious hypoglycemia and hypoglycemia unawareness. Mrs. J.'s worsening mental health status, which included episodes of delirium, might be the result of hypoglycemia.

To test this theory, the care coordinator reduced the glargine dose by 5 units daily and changed the dosing time from bedtime to morning to help avoid nocturnal hypoglycemia. Her food intake was recorded at each meal. During the next 8 days, Mrs. J.'s insulin was reduced by 50% based on one or two blood glucose readings per day taken when Mrs. J. would allow it.

There was no improvement in Mrs. J.'s mental status until her glargine dose was reduced from 68 to 38 units. The patient then seemed less combative and allowed blood glucose to be measured before meals. Of interest, despite the reduction

in insulin, there was no increase in hyperglycemia; in fact, hyperglycemia decreased slightly.

To confirm that hypoglycemia was at the root of Mrs. J.'s aggressive behavior, the care coordinator developed a behavior plan to assist staff with providing care. The plan included blood glucose monitoring for aggressive or inappropriate behavior such as spitting. Validating the presence of hypoglycemia and documenting decreasing hyperglycemia confirmed the need to further reduce the patient's glargine dose.

When hypoglycemia resulted in escalated aggressive behavior, it was treated with 1 mg glucagon. Mrs. J. responded well to glucagon and subsequent oral hypoglycemic treatment. The nurse practitioner discontinued her glargine until her glycemic pattern could be evaluated.

Tight glycemic control was not the objective in view of the resident's multiple comorbid conditions, including chronic kidney disease, which further increased her risk for hypoglycemia. Patient safety came first. The care coordinator set an individualized target blood glucose range of 100–200 mg/dl and an A1C goal of < 8% to reduce Mrs. J.'s risk for hypoglycemia. Blood glucose excursions were managed with correction doses of lispro.

Mrs. J.'s episodes of aggression decreased significantly with a decline in hypoglycemia. Her ability to be social with staff and other residents also improved.

Mrs. J. had refused blood glucose checks for the first 4 days of her admission while the glargine dose was being reduced. During the time her glargine was withheld for glucose evaluation, her blood glucose levels ranged from 99 to 214 mg/dl. Five units of glargine were resumed when a pattern of blood glucose > 200 mg/dl occurred for 3 days. The hyperglycemia subsided when

the glargine dose was increased to 7 units. With this dose, no correction doses were necessary, and her blood glucose consistently averaged 150 mg/dl before breakfast and between 140 to 200 mg/dl before lunch and dinner during her first month in her new residence.

### QUESTIONS

1. How often should fingerstick blood glucose testing be performed in the nursing home population to establish glucose patterns?
2. What are typical causes of hypoglycemia and hyperglycemia?
3. Why is assessment of patients' oral intake important?

### COMMENTARY

Blood glucose and A1C goals in elderly nursing home patients should be individualized. A rule of thumb would be that intensive diabetes management is essential to promote healing and decrease the risk of developing infections for those who will have a short stay in a nursing home. But for frail elderly patients who will live out their days in a long-term care setting, safety should guide the setting of glycemic targets.

Establishing a baseline at the time of admission will help in determining whether patients are at risk for the development of acute diabetes complications. Checking glucose before meals and at bedtime and recording oral intake for 1 week will provide a foundation for establishing the best diabetes management plan for each resident. Information obtained from oral intake records and blood glucose testing can help in identifying probable causes for glucose excursions.

However, oral intake is only one probable cause for hypo- or hyperglycemia. Once oral intake patterns are identified, exploration of medication or activity imbalance can be

explored. It is important to postpone making insulin adjustments until this information is obtained.

Once a pattern is established, the number of fingerstick blood glucose tests can be reduced. Periodic monitoring at different times of the day before meals should continue to assess glucose fluctuations that occur with changes in overall health. Insulin should not be increased until further glucose results are obtained.

Treatment goals for Mrs. J.'s diabetes management included consideration of clinical criteria, including her age, cognitive impairment, functional status, and comorbidities. Primary considerations for her safe and effective diabetes management included:

- An increased risk for hypoglycemia secondary to insulin treatment and stage 3 chronic kidney disease
- The potential for hyperglycemia and dehydration
- Inconsistent oral intake, which increased the risk for weight loss
- Increasing hypoglycemia-induced aggressive behaviors, which placed the resident and staff at risk for injury

### CLINICAL PEARLS

- Elderly patients with hypoglycemia may have an unusual presentation that may be attributed to symptoms of coexisting diseases. Decreasing the number and severity of hypoglycemic events was the first priority in this case. This was extremely important because the patient was not able to recognize or report when she was experiencing hypoglycemia. When hypoglycemic events decreased, the resident became more cooperative, allowing fingerstick blood glucose testing to be performed. Glucose monitoring performed at least three times per day and during aggressive behavior was the key factor in determining insulin requirements.

- When starting insulin, a rule to remember is, “Start low, and go slow.” This is especially important because insulin has been cited as one of the medications often associated with preventable causes of hospitalizations in adults > 65 years of age.
- Insulin should not be increased based only on fasting blood glucose levels or A1C. Weight and oral intake should also be taken into consideration to avoid overdosing.
- Changes in mental status should also be investigated because hypoglycemia can increase confusion and aggressive behavior and could be mistaken for worsening dementia.
- Diabetes management is all about understanding the probable causes of hypo- and hyperglycemic events.

Symptoms of hypoglycemia in the elderly can present differently than in younger cohorts.<sup>1</sup> Nocturnal hypoglycemia in elders has been documented to last for up to 86 minutes.<sup>2</sup> Studies have found that frequent episodes of asymptomatic nocturnal hypoglycemia can cause higher glucose thresholds for counterregulatory hormone release, as well as reducing cognitive functioning.<sup>3</sup>

- Establish glycemic trends before making changes in diabetes medications.
- Reducing the number of acute complications can improve quality of life for nursing home patients.

#### REFERENCES

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