

Rapid Improvement in Blood Glucose Control in a Patient With Type 1 Diabetes and Complete Blindness Using a Continuous Glucose Monitor

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PRESENTATION

M.P. is a 73-year-old woman who has had type 1 diabetes since 1964. She suffered severe diabetic retinopathy, resulting in bilateral enucleation of the eyes with placement of ocular prostheses. The patient's husband has traditionally checked her blood glucose levels and administered some of her insulin injections. However, her husband is often away from home during the day, and M.P. does occasionally monitor her own blood glucose with a "talking" glucose meter and can administer insulin with an insulin pen device by counting the number of clicks she hears when dialing the units of insulin.

During a clinic visit, her diabetologist noted frequent hypoglycemia on the glucose meter download, especially during the day when the patient herself was administering insulin injections. Her A1C was 6.5%. She has fairly severe hypoglycemia unawareness, and she was often found hypoglycemic by her husband in the afternoon when he returned home or was found by neighbors as she wandered in her neighborhood.

M.P. admitted to correcting high blood glucose levels aggressively during the day without consistently following her correction-dose ratio, as well as to treating hypoglycemia with a whole candy bar or meal. She reported that she had done this for many years and, despite education

on the subject, had not made significant changes in her behavior.

The patient was placed on the Dexcom Seven Plus (San Diego, Calif.) continuous glucose monitoring (CGM) system for 7 days and was instructed on its use by a certified diabetes educator. She required assistance from her husband in calibrating the CGM. She was taught to audibly recognize high blood glucose alerts (set at 180 mg/dl) by a double-beep from the CGM device and low blood glucose alerts (set at 80 mg/dl) by a triple-beep from the monitor.

M.P. was able to quickly learn after a few days that she frequently fluctuated rapidly between hyperglycemia alarms and hypoglycemia

alarms and was likely giving herself an overly aggressive correction dose of insulin when her glucose was high and eating too much when it was low. The patient made appropriate changes on her own and was able to improve her average blood glucose from 162 mg/dl during the first 4 days of CGM use to 138 mg/dl during the next 4 days. Her glucose variability improved, as measured by a decrease in the standard deviation from ± 61 to ± 39 mg/dl. The percentage of time spent in the high glucose range (> 180 mg/dl) improved from 35 to 18%, and the percentage of time spent in the low glucose range (< 80 mg/dl) improved from 9 to 3% with no episodes of severe hypoglycemia (Figures 1 and 2).

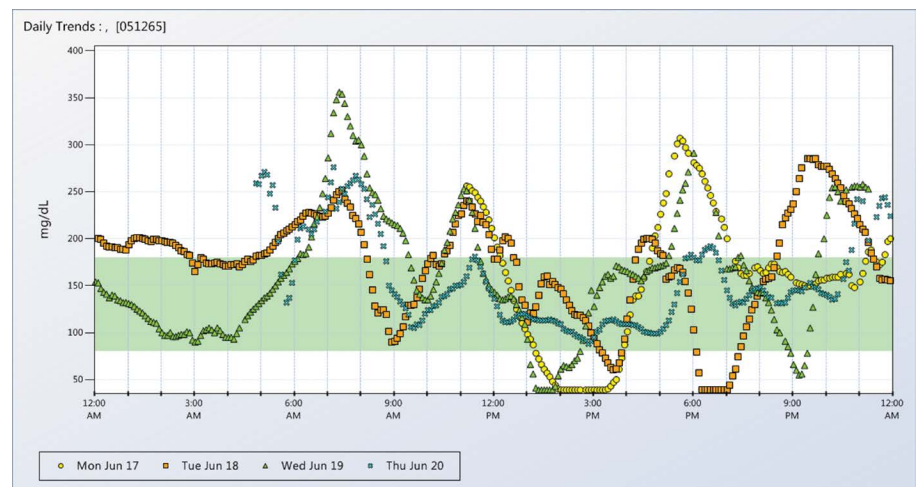


Figure 1. Days 1–4 of M.P.'s CGM usage. Her average glucose was 162 ± 61 mg/dl. Calibrations were made an average of 3.5 times/day. Glucose levels were in the target range (80–180 mg/dl) 56% of the time, were above target 35% of the time, and were below target 9% of the time.

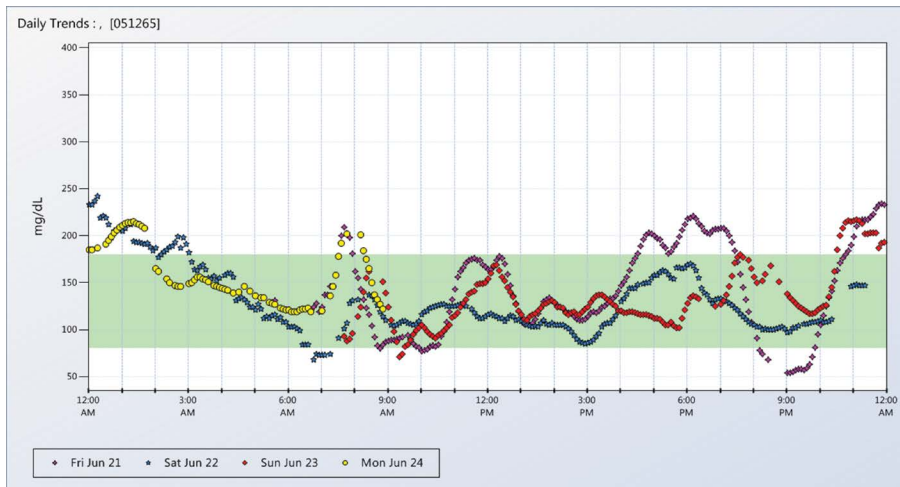


Figure 2. Days 5–8 of M.P.'s CGM usage. Her average glucose was 138 ± 39 mg/dL. Calibrations were made an average of 2.3 times/day. Glucose levels were in the target range (80–180 mg/dL) 79% of the time, were above target 18% of the time, and were below target 3% of the time.

QUESTIONS

1. Can patients with significant vision loss, including complete blindness, benefit from CGM technology?
2. Are elderly patients with diabetes and patients with vision loss poor candidates for CGM therapy?

COMMENTARY

CGM therapy has been shown to improve glucose control in some, but not all, patients with type 1 diabetes.¹ CGM use has also been shown to reduce time spent in hypoglycemia in children and adults with type 1 diabetes.² However, larger studies with results demonstrating improvements in glycemic control have typically focused on younger adults and children.³ Little is known about the potential benefits of CGM technol-

ogy in older and visually impaired patients with diabetes.

This case report clearly demonstrates the utility of CGM technology in elderly or visually impaired patients with diabetes, as evidenced by significant improvements in glycemic control, glucose variability, and patient safety in a short period of time. This is a population of patients that has most likely been thought to lack the ability to benefit from CGM technology, and this case report disproves this myth. With proper patient training, the use of CGM technology in the elderly or visually impaired population should not be discouraged.

CLINICAL PEARLS

- People with diabetes and significant vision loss, including complete blindness, may be appropriate

patients for CGM technology.

- People with diabetes and vision loss can learn to benefit from CGM technology through the use of high and low blood glucose audible alerts.
- Both blood glucose averages and blood glucose variability can improve rapidly with CGM therapy in patients with significant vision loss, including complete blindness.
- Future studies evaluating the efficacy of CGM therapy should include visually impaired people with diabetes.

REFERENCES

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