Clinical Use of Hemoglobin A₁c to Improve Diabetes Management

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For more than 25 years, the hemoglobin A₁c (A₁C) test has been the most widely accepted outcome measure for evaluating glycemic control in individuals with diabetes. The test provides an index of a patient’s average blood glucose level during the past 2–3 months and is considered to be the most objective and reliable measure of long-term metabolic control. The Diabetes Control and Complications Trial established that maintaining A₁C levels as close as possible to the normal range results in considerable reductions in long-term health complications. Thus, as the “gold standard” measure of diabetes control, this test provides important feedback to health care professionals and patients. It follows that patients’ understanding of this test and its implications for long-term health risk is essential.

RESEARCH FINDINGS
Research has shown that regular measurement of A₁C over the long term can identify patients with poor glycemic control and facilitate their improvement. The established relationship between A₁C measurements and long-term complications, as well as the association between regular A₁C testing and improved metabolic control, underscore the importance of determining the extent of patients’ understanding of this important test and how its results are used in the clinical setting.

Patient Knowledge of A₁C
Relatively few studies have examined diabetic patients’ knowledge and understanding of A₁C testing. Findings from one recent study conducted in Norway revealed that the majority (82.6%) of 201 adult patients with type 1 diabetes knew what their last A₁C was, and most patients (90%) knew what a satisfactory A₁C value would be. But a significant number of patients (42%) reported they had low knowledge of A₁C testing in general. Furthermore, 25% of patients did not think that treatment intensification should occur at an A₁C value of 10%.

A recent cross-sectional study examined the relationship between patients’ knowledge of their recent A₁C values and diabetes self-management. In this study, an ethnically diverse sample of 663 patients with type 2 diabetes in the United States completed the survey. Results showed that 66% of patients did not know their last A₁C results, with only 25% able to accurately report the value. Knowledge of A₁C results was associated with higher educational levels and ratings of good provider communication, as well as better understanding of diabetes care, but not with diabetes management attitudes or self-management behaviors. These findings are consistent with another study in which just 24% of patients who reported having a recent A₁C test actually knew the result when compared with the medical chart.

A₁C Feedback to Patients
The most frequently used assay to measure A₁C is high-performance liquid chromatography. Although this is the standard reference method, the disadvantage of it is that the results are not available at the time of the patient visit, and patients are typically told about their test results days later with either a letter or follow-up phone call. With this delay in communicating health feedback, opportunities in the clinical encounter for decision-making and changes in regimen prescriptions may be missed.

With recent technological advances, immediately available accurate and reliable A₁C results can be obtained during the clinical encounter with a benchtop analyzer. A controlled study was conducted to evaluate the effects on subsequent glycemic control of immediate feedback of A₁C results. In this randomized study of 201 patients (both type 1 and type 2 diabetic patients with insulin treatment), one group received immediate feedback,
while the other group received delayed feedback via phone call or letter. Patients were followed for 1 year. Results indicated that immediate A1C feedback helped to improve subsequent glycemic control at 6 and 12 months, although this study did not identify any specific changes in behavior that were responsible for the improved glycemic control.

Another more recent randomized prospective study\(^{11}\) examined the effects of rapid A1C feedback on clinical decision making and subsequent glycemic control in patients with type 2 diabetes recruited from an urban primary care setting. The study focused on whether rapid A1C feedback would lead to improved intensification of treatment regimens as well as improved A1C results at follow-up. Of 597 patients initially recruited for a baseline evaluation, 440 had one follow-up visit, and 275 had two follow-up visits over the course of the study period. Results showed that rapid availability of A1C values resulted in more frequent changes in behavior that were responsive to the test average. In addition, for patients with two follow-up visits, A1C decreased significantly in the rapid feedback group but not in the control group.

These findings are similar to a previous report\(^{12}\) that showed that immediate availability of A1C results enhanced clinical decision making in an urban sample of African-American patients. Other recent studies\(^{13,14}\) have shown that presenting A1C results graphically to patients may not only help them understand what the results mean, but also improve their glycemic control.

**CLINICAL IMPLICATIONS**

These research findings indicate that health care providers should not assume their patients understand the A1C test conducted before the patient encounter to engage their patients, discuss their glycemic goals, and work collaboratively with them to improve diabetes self-management.

**REFERENCES**

9. Delamater AM, Patino AM, Schnieder K,


12Chapin RB, Williams DC, Adair RF: Diabetes control improved when inner-city patients received graphic feedback about glycosylated hemoglobin levels. J Gen Intern Med 18:120–124, 2003


15Chapin RB, Williams DC, Adair RF: Diabetes control improved when inner-city patients received graphic feedback about glycosylated hemoglobin levels. J Gen Intern Med 18:120–124, 2003


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