

Routine Self-Monitoring of Blood Glucose Does Not Improve Glycemic Control in Noninsulin-Treated Diabetic Patients

Farmer A, Wade A, Goyder E, et al. Impact of self monitoring of blood glucose in the management of patients with non-insulin treated diabetes: open parallel group randomised trial. *BMJ* 2007;335:132.

Study Overview

Objective. To determine if self-monitoring of blood glucose in patients with noninsulin-treated type 2 diabetes improves glycemic control.

Design. Open-label, randomized controlled trial.

Setting and participants. Patients were recruited from 48 general practices in the United Kingdom. Patients were included if they were diagnosed with type 2 diabetes, aged ≥ 25 years at diagnosis, managed with diet or oral hypoglycemic medications only; had a hemoglobin A_{1c} (HbA_{1c}) level $\geq 6.2\%$; and could independently complete all activities of daily living. Patients were excluded if they reported measuring blood glucose with a monitor twice a week or more, had any serious comorbid illness, or were unable to follow the trial protocol.

Intervention. Participants were randomly assigned to 1 of 3 arms: (1) standardized usual care, which consisted of HbA_{1c} measurements every 3 months and clinical recommendations based on these measurements; (2) a low-intensity self-monitoring intervention, which included home blood glucose monitoring with recommendations to contact a physician for interpretation of the results; and (3) a high-intensity self-monitoring intervention, which included blood glucose monitoring with patient training in interpreting and using the results to maintain adherence to diet and exercise regimens.

Main outcome measures. The primary outcome measure was HbA_{1c} levels at 1 year. Secondary outcome measures were changes in blood pressure, total cholesterol level, ratio of total cholesterol to high-density lipoprotein cholesterol, and body mass index at 1 year.

Main results. 453 participants were randomized. At baseline, demographic and clinical characteristics were similar between the groups. After adjusting for baseline HbA_{1c} levels, no difference was found in HbA_{1c} levels between the 3 groups at 12 months ($P = 0.12$). The change in total cholesterol levels between the 3 groups was significant ($P = 0.01$); however, this

change was still modest (mean change in total cholesterol from baseline, -0.06 and -0.23 mmol/L in low-intensity and high-intensity groups, respectively). No differences were found between the groups with respect to changes in blood pressure, body mass index, medication dose, or the addition of insulin therapy.

Conclusion. Compared with usual care, self-monitoring of blood glucose does not appear to improve glycemic control in diabetic patients who do not require insulin.

Commentary

Diabetes mellitus is a chronic disease associated with substantial morbidity and mortality. Unfortunately, incidence rates of diabetes continue to increase [1], with an estimated annual cost of \$82 billion to the U.S. health care system [2]. From a public health standpoint, it is critical to improve glycemic control to reduce the burden of diabetes on society. Self-monitoring of blood glucose is 1 strategy proposed to reduce this burden. While there is no debate regarding the importance of self-monitoring in diabetic patients requiring insulin, considerable uncertainty exists regarding whether noninsulin-dependent diabetic patients should routinely monitor their blood glucose levels. A previous meta-analysis had suggested that routine monitoring was not effective for controlling glucose levels in patients with type 2 diabetes [3], and Farmer and colleagues have further strengthened these results through this well-designed randomized controlled study.

A particular strength of this study was the choice of 2 intervention arms. In prior studies that suggested a beneficial impact of self-monitoring, it was unclear whether the improvement in HbA_{1c} levels was related to the act of self-monitoring or the additional health care provider instructions included with the intervention [3]. In the Farmer et al study, regardless of whether patient instructions were provided along with the self-monitoring algorithms, home glucose testing did not appear to be advantageous. Nevertheless, because of the risks associated with hypoglycemia and the fact that many patients are unaware of this side effect, it is prudent to instruct diabetic patients to perform self-monitoring if they take medications that may result in hypoglycemia, such as sulfonylureas.

Applications for Clinical Practice

Routine measurement of blood glucose in patients with type 2 diabetes is costly, inconvenient, and unlikely to result in any improvement in glycemic control. However, daily self-monitoring of blood glucose is recommended in diabetic patients on insulin therapy and in patients who take oral medications that might cause hypoglycemia (eg, sulfonylureas).

—Review by Harvey J. Murff, MD, MPH

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