

## Benefits and Limitations of Home Glucose Monitoring in Type 2 Diabetes

Franciosi M, Pellegrini F, DeBerardis G, et al. The impact of blood glucose self-monitoring on metabolic control and quality of life in type 2 diabetic patients: an urgent need for better educational strategies. *Diabetes Care* 2001;24:1870–7.

### Study Overview

**Objective.** To determine whether the frequency of self-monitoring of blood glucose (SMBG) in type 2 diabetic patients influences metabolic control and quality of life (QOL).

**Design.** Cross-sectional study.

**Setting and participants.** 3567 patients were recruited by 101 outpatient diabetes clinics and 103 general practitioners. Selection of practitioners and practices was based on their willingness to participate. All patients with type 2 diabetes were eligible for inclusion regardless of age, comorbidities, or duration of disease. Subjects completed questionnaires, and clinical information was obtained from patients' providers.

**Methods.** Data analyses were performed on patients stratified by the number of self-reported SMBG checks performed daily and the diabetic treatment regimen (insulin therapy versus non-insulin therapy). Multilevel logistic regression was applied to account for potential clustering of patients by practice or physician.

**Main outcome measures.** The primary outcomes were patient scores on QOL instruments and metabolic control. QOL was determined by the Center for Epidemiology Studies depression scale along with multiple questionnaires, which assessed diabetes-related stress, diabetes health distress, and diabetes-related worries. Metabolic control was based on hemoglobin A<sub>1c</sub> levels. The last reported value from the previous 12 months was used for the analysis.

**Main results.** 80% of participants (2855/3567) completed responses regarding the frequency of SMBG. The mean age of the cohort was 58.8 years, and 55% were male. 16% (471/2855) of the respondents tested their blood glucose at home 1 or more times daily, 31% (899/2855) tested their blood glucose 1 or more times per week, 15% (414/2855) tested their glucose less than once a week, and 38% (1071/2855) never tested their blood glucose.

On multilevel logistic regression, women (odds ratio [OR], 1.35 [95% confidence interval {CI}, 1.07 to 1.72]),

insulin-treated patients (OR, 2.86 [CI, 1.82 to 4.48]), patients experiencing hypoglycemic symptoms (OR, 2.86 [CI, 1.95 to 4.20]), and patients who self-adjusted their insulin doses (OR, 2.31 [CI, 1.47 to 3.64]) were more likely to perform self-monitoring. Patients older than 65 years (OR, 0.71 [CI, 0.53 to 0.96]), patients with less than 5 years' education (OR, 0.63 [CI, 0.49 to 0.81]), and patients treated by general practitioners (OR, 0.60 [CI, 0.41 to 0.87]) were less likely to check their blood glucose.

When patients were stratified by ability to self-adjust insulin doses, a higher frequency of SMBG was associated with better metabolic control ( $\beta = -0.55$ ;  $P = 0.015$ ). Increased frequency of SMBG was not associated with better metabolic control for patients on non-insulin therapies and those who did not self-adjust their insulin therapy. In non-insulin treated patients, after adjusting for patient characteristics, SMBG frequency greater than once a day was associated with higher levels of distress, worries, and depressive symptoms. There was no association between frequency of SMBG monitoring and the QOL measures in insulin treated patients.

**Conclusion.** SMBG may improve metabolic control, but it is most effective in type 2 diabetics who can self-adjust their insulin therapy. For patients who do not receive insulin, self-monitoring is associated with poorer metabolic control and greater psychological distress.

### Commentary

SMBG is generally considered necessary for the appropriate care of diabetic patients requiring insulin [1]. However, how SMBG should be integrated into the care of patients receiving non-insulin therapies is unclear. Franciosi et al have further contributed to this debate with this cross-sectional analysis of a larger, ongoing prospective trial, the Qualità ed Esito in Diabetologia (QuED). Their study reinforces prior literature suggesting that SMBG in non-insulin treated type 2 diabetics may result in higher psychological distress [2]. Practitioners need to be aware of this added potential risk when prescribing SMBG for type 2 diabetes patients on non-insulin therapies. Furthermore, metabolic control was not improved in non-insulin treated patients who frequently monitored their

