

Lack of Compliance With Home Blood Glucose Monitoring Predicts Hospitalization in Diabetes

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Home capillary blood glucose (CBG) monitoring is the standard of care for patients with diabetes (1,2). Patients with type 1 diabetes should monitor their CBG concentration at least three or four times daily, and patients with type 2 diabetes should probably monitor their CBG concentration at least twice a day (1). Nevertheless, up to **67% of patients with diabetes fail to routinely monitor their CBG levels** (3). Although the relationship between rigorous home blood glucose monitoring and improved glycemic control is well-established, determinants of compliance with home blood glucose monitoring recommendations are not known. Reported here are the results of a marketing survey exploring attitudes and behaviors surrounding compliance with home CBG monitoring.

My group has previously published a study examining the efficacy of a laser skin perforator for the attainment of capillary blood samples for home CBG monitoring (4). In response to the large number of telephone inquiries received, the manufacturer of this device (Lasette Laser Skin Perforator; Cell Robotics, Albuquerque, NM) mailed out a brief questionnaire examining current home blood glucose monitoring practices and attitudes about this activity during the years 1999 and 2000. Of 6,600 questionnaires mailed, 1,895 (29%) were returned, and the data were analyzed using SAS. Respondents were entered into a drawing for a free laser skin perforator. This study was exempted from informed consent requirements by the University of New Mexico Human Research Review Committee.

Data collected from the questionnaires included the duration of diabetes, the number of times per day the patient had been instructed to monitor CBG by a healthcare provider, the number of times per day the patient actually monitored CBG, the reason the patient monitored CBG less frequently than recommended (if applicable), the number of hospitalizations and physician's office visits over the past two years, and the presence or absence of continuous subcutaneous insulin infusion (CSII) therapy.

The mean duration of diabetes (means \pm SD) among respondents was 16.2 ± 13.2 years. The mean recommended frequency of CBG testing was 3.9 ± 2.1 tests per day, whereas the actual reported frequency of testing was 3.7 ± 2.6 tests per day ($P < 0.001$ by paired t test). CSII therapy was used by 256 (14%) of the respondents, and both the recommended frequency of CBG testing (6.1 ± 2.4 vs. 3.6 ± 1.8 tests per day, $P < 0.001$) and the actual frequency of testing (6.3 ± 2.9 vs. 3.3 ± 2.3 tests per day, $P < 0.001$) was significantly greater in the CSII patients than in the non-CSII patients, as determined by unpaired t test.

There were 15,564 visits to physician's offices among 1,871 patients (8.3 ± 6.8 visits per patient), and there were 698 hospitalizations among 339 patients (0.4 ± 1.3 hospitalizations per patient) over the previous two years. Reported healthcare utilization rates were compared as a function of reported compliance with home CBG monitoring recommendations. For this purpose, a compliance term was devised using the difference between actual and recommended testing, with values <0 denoting noncompliance. Compliance improved with increasing duration of diabetes (OR 1.01 per year, 95% CI 1.003–1.018, $P = 0.009$ by logistic regression). Compliance was negatively related to the number of physician's office visits ($P = 0.03$) and to the number of hospitalizations, as determined by regression analysis ($P = 0.004$). Post hoc testing revealed that patients with more than two hospitalizations over the past two years were less compliant with CBG monitoring than patients with less than two hospitalizations (compliance scores: -0.21 ± 1.72 , -0.44 ± 1.74 , and -0.72 ± 1.54 , respectively, for fewer than two, two, and more than two hospitalizations; $P = 0.02$). **Finger soreness was the most common reason given for self-reported noncompliance with testing recommendations ($n = 492$), followed by pain ($n = 428$),** inconvenience ($n = 347$), fear of needles ($n = 117$), and "other" (including cost; $n = 96$). Interestingly, fear of needles was reported as a reason for noncompliance by 6% of all respondents and by 14% of the noncompliant respondents ($P < 0.001$ by χ^2).

Limitations of these data include the fact that they are derived from a self-reported sample of convenience and not a randomized study. Moreover, some potentially important information, such as sex and type of diabetes, was not captured by the questionnaire.

Nevertheless, these data demonstrate that

1) there is wide variation in the perceived recommended frequency of CBG monitoring,

2) compliance with home CBG monitoring is often less than recommended,

3) rates of healthcare utilization are increased among patients who are noncompliant with CBG monitoring, and

4) pain and soreness are the most common reasons for noncompliance with CBG monitoring.

Clear guidelines should be developed for CBG monitoring frequency in patients with diabetes so that a consistent message is delivered by diabetes care providers. Moreover, compliance with CBG monitoring should be assessed at patient visits, and its importance should be reinforced. **Strategies to improve compliance with CBG monitoring, including reducing the pain or perceived pain associated with the procedure, should be developed and implemented with the aim of improving the acceptability of this essential component of diabetes management.** Finally, needleless methods of blood sampling for CBG monitoring may also improve compliance in patients with needle phobia (5).

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Footnotes

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