

Self measurement of glucose – how useful is it and how can it be done

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Abstract

Large amounts of money are used for self monitoring of blood glucose (SMBG) instruments although several systematic reviews have shown conflicting evidence when the effect of SMBG on long term complications of diabetes mellitus or decrease of HbA1c have been evaluated, especially concerning the effect in type II DM not using insulin. Whereas in persons with diabetes using insulin more than three times a day, the evidence of usefulness of SMBG is high (1), the evidence in diabetic persons not using insulin is dubious and dependent on the conditions. The International Diabetes Federation recommends that in persons with non-insulin treated type2 DM "SMBG should be used only when individuals with diabetes (and/or their care-givers) and/or their healthcare providers have the knowledge, skills and willingness to incorporate SMBG monitoring and therapy adjustment into their diabetes care plan in order to attain agreed treatment goals" (2). Another important point in this recommendation is that "The purpose(s) of performing SMBG and using SMBG data should be agreed between the person with diabetes and the healthcare provider. These agreed-upon purposes/goals and actual review of SMBG data should be documented". And then to link clinical use to analytical performance, the last recommendation reads: "SMBG use requires an easy procedure for patients to regularly monitor the performance and accuracy of their glucose meter".

Thus to summarize, there are some presuppositions that should be present for successful SMBG monitoring

- a) Instruments should have good enough quality.
- b) Patients should be able to use the instruments.
- c) Patients should be able to interpret the results and take actions when necessary.

Quality specifications should be set for these instruments and the users should definitely be involved. In theory such quality specifications can vary from situation to situation. Quality specifications, based on how results from the instruments are interpreted by the diabetic patients, showed that imprecision should be less than 5% and bias less than 5% (3). The new ISO 15197:2013 dealing with self-measurement of glucose states that 95% of the results must be within ± 0.83 mmol/L at glucose concentrations < 5.55 mmol/L and within $\pm 15\%$ at glucose concentrations ≥ 5.55 mmol/L. This is slightly stricter compared to the limits in ISO 15197 from 2003. Although such criteria can be met when well-trained technicians are using the instruments, they are often not fulfilled by patients for all instruments although the instruments seems to improve as a function of time.

We have developed a standardized protocol where evaluations of glucometers were carried out both by a technicians and patients (with training and without training) and with three different lots of strips. In 2008 we evaluated nine different instruments (4) have been by this method and in 2014 13 systems were evaluated. The results from these evaluations will be presented.

Users of SMBG can benefit from participation in external quality assurance systems (5) and by comparing their results with larger instruments at the GP offices or pharmacies (6).

Self-monitoring of blood glucose (SMBG) has been available for patients with diabetes for more than 30 years. Today, SMBG is important components in diabetes management, helping patients achieve and maintain normal blood glucose concentrations. Implementation of SMBG as an effective glycaemic control tool requires that instruments have acceptable analytical quality, that the patients are educated in using them, and that actions are taken upon the results. This presentation will give an overview of the use and usefulness of SMBG.

References

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