Optimizing Display, Analysis, Interpretation and Utility of Self-Monitoring of Blood Glucose (SMBG) Data for Management of Patients with Diabetes

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Abstract

Background:

Self-monitoring of blood glucose (SMBG) data have not been used to fullest advantage. Few physicians routinely download data from memory-equipped glucose meters and perform systematic analyses and interpretation of the data. There is need for improved methods for display and analysis of SMBG data, for a systematic approach for identification and prioritization of clinical problems revealed by SMBG, for characterization of blood glucose variability, and for clinical decision support.

Methods:

We have developed a systematic approach to the analysis and interpretation of SMBG data to assist in the management of patients with diabetes. This approach utilizes the following criteria: 1) Overall quality of glycemic control; 2) Hypoglycemia (frequency, severity, timing); 3) Hyperglycemia; 4) Variability; 5) Pattern analysis; and 6) Adequacy of monitoring. The "Pattern analysis" includes assessment of: trends by date and by time of day; relationship of blood glucose to meals; post-prandial excursions; the effects of day of the week, and interactions between time of day and day of the week.

Results:

The asymmetrical distribution of blood glucose values makes it difficult to interpret the mean and standard deviation. Use of the median (50th percentile) and Inter-Quartile Range (IQR) overcomes these difficulties: IQR is the difference between the 75th and 25th percentiles. SMBG data can be used to predict the A1c level and indices of the risks of hyperglycemia and hypoglycemia.

Conclusion:

Given reliable measures of glucose variability, one can apply a strategy to progressively reduce glucose variability and then increase the intensity of therapy so as to reduce median blood glucose and hence A1c, while minimizing the risk of hypoglycemia.

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