

## Methods of Evaluating the Utility of Continuous Glucose Monitor Alerts

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### Abstract

#### **Background:**

The evaluation of continuous glucose monitor (CGM) alert performance should reflect patient use in real time. By evaluating alerts as real-time events, their ability to both detect and predict low and high blood glucose (BG) events can be examined.

#### **Method:**

True alerts (TA) were defined as a CGM alert occurring within  $\pm 30$  minutes from the beginning of a low or a high BG event. The TA time to detection was calculated as [time of CGM alert] – [beginning of event]. False alerts (FA) were defined as a BG event outside of the alert zone within  $\pm 30$  minutes from a CGM alert. Analysis was performed comparing DexCom™ SEVEN® PLUS CGM data to BG measured with a laboratory analyzer.

#### **Results:**

Of 49 low glucose events (BG  $\leq 70$  mg/dl), with the CGM alert set to 90 mg/dl, the TA rate was 91.8%. For 50% of TAs, the CGM alert preceded the event by at least 21 minutes. The FA rate was 25.0%. Similar results were found for high alerts.

#### **Conclusion:**

Continuous glucose monitor alerts are capable of both detecting and predicting low and high BG events. The setting of alerts entails a trade-off between predictive ability and FA rate. Realistic analysis of this trade-off will guide patients in the effective utilization of CGM.

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**Abbreviations:** (BA) benign alert, (BG) blood glucose, (CGM) continuous glucose monitor, (FA) false alert, (FN) false negative, (FP) false positive, (HbA1c) hemoglobin A1c, (ISF) interstitial fluid, (MA) missed alert, (ROC) receiver-operator characteristic, (TA) true alert, (TN) true negative, (TP) true positive, (YSI) Yellow Springs Instruments

**Keywords:** alert performance, blood glucose, continuous glucose monitor, glucose sensor

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