CGM Is Reading Low Values at Night: Causes and Solutions

Summary

Continuous glucose monitors (CGMs) are essential tools for tracking the glycemic health of study participants, offering detailed time-series data, glucose trends, alarms, and events. These data enable calculation of metrics such as time-in-range and coefficient of variation. A key metric - hypoglycemia episodes (low blood sugar) - is of particular importance to researchers and clinicians. However, CGMs sometimes falsely report low glucose values and trigger "low glucose" alerts due to external pressure on the sensor, a phenomenon known as "***compression lows***." This article examines the common causes of these spurious readings and discusses potential solutions.

Details

Problem

When pressure is applied to a CGM sensor, such as when a participant sleeps on their side and lies on the sensor, the CGM may read a false low value. This is often evident by a steep, sudden drop in the continuous glucose graph. This occurs because CGM sensors do not check blood, but rather interstitial fluids (fluids between cells), and the volume of such fluids decreases when pressure is applied to that area, causing the sensor's needle to detect less fluid and therefore less glucose.



Solution

1. Participants should be made aware of the potential for compression lows and asked to avoid sleeping on the sensor. If possible - and depending on the manufacturer's recommendations - apply the sensor in a place where the participant is unlikely to lie on it.
2. Implantable CGMs have been demonstrated to be less prone to compression lows, as the sensors sit in a pocket under the skin. They could be an option depending on study objectives, participant preference, and if applicable, insulin pump compatibility requirements.

Clinical guidelines for managing hypoglycemia, or for when to verify an alert with a finger stick, are outside the scope of this article and are the responsibility of the study team and/or the participant's health care providers.

Notes

- Researchers should apply data analysis techniques to differentiate between compression lows, true fast lows, and reactive hypoglycemia. Generally speaking, a fast sudden drop when values are otherwise steady or slowly changing, in the absence of exercise and fast-acting insulin, would point to a compression low. In contrast, reactive hypoglycemia would show a fast increase, high peak, fast drop, and slow rise over a period of approximately one hour. Confirmed compression lows should be excluded from aggregate measures such as average, minimum, and standard deviation, but should not be excluded from total or average wear time (since participants are still wearing the device in compliance with study protocols).

Resources

- Dexcom - Calibration and Accuracy Issues - Why does my Dexcom G6 say I'm low at night when my blood glucose meter shows otherwise?
- Abbott Freestyle - What substances could interfere with the results?
- Eversense 365 - A Prospective Multicenter Evaluation of the Accuracy of a Novel Implanted Continuous Glucose Sensor: PRECISE II; Table 4: Continuous Glucose Monitoring System Accuracy During Compression Challenge.
- University of Michigan - Childhood Obesity Research Core
- University of Michigan - Elizabeth Weiser Caswell Diabetes Institute

About the Author



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