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REVIEW ARTICLE

The Accuracy of Point-of-Care Glucose Measurements

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Abstract

Control of blood glucose (BG) in an acceptable range is a major therapy target for diabetes patients in both the hospital and outpatient environments. This review focuses on the state of point-of-care (POC) glucose monitoring and the accuracy of the measurement devices. The accuracy of the POC glucose monitor depends on device methodology and other factors, including sample source and collection and patient characteristics. Patient parameters capable of influencing measurements include variations in pH, blood oxygen, hematocrit, changes in microcirculation, and vasopressor therapy. These elements alone or when combined can significantly impact BG measurement accuracy with POC glucose monitoring devices (POCGMDs). In general, currently available POCGMDs exhibit the greatest accuracy within the range of physiological glucose levels but become less reliable at the lower and higher ranges of BG levels. This issue raises serious safety concerns and the importance of understanding the limitations of POCGMDs. This review will discuss potential interferences and shortcomings of the current POCGMDs and stress when these may impact the reliability of POCGMDs for clinical decision-making.

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Abbreviations: (ADA) American Diabetes Association, (BA) Bland-Altman, (BG) blood glucose, (CLD) central laboratory devices, (FDA) Food and Drug Administration, (GDH) glucose-1-dehydrogenase, (GOX) glucose oxidase, (Hct) hematocrit, (ICU) intensive care unit, (ISO) International Organization for Standardization, (MBTH) meta[3-methyl 2 benzothiazoline hydrazine]N-sulfonyl benzene sulfonic acid, (NAD) nicotinamide adenine dinucleotide, (NADH) nicotinamide adenine dinucleotide (reduced form), (P_aO_2) blood oxygen content, (P_aCO_2) carbon dioxide tension, (PO_2) oxygen tension, (POC) point of care, (POCGMD) point-of-care glucose monitoring device, (PQQ) pyrroloquinoline quinone, (SMBG) self-monitoring of blood glucose, (YSI) Yellow Springs Instruments

Keywords: blood glucose, glucose error, glucose measurement, hypoglycemia, laboratory, point-of-care device

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