

Point-of-care Glucose Meters Vs. Centralized Laboratory Serum Testing

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Diabetes mellitus (DM), a serious chronic medical condition, is diagnosed in approximately 18 million individuals in the United States; an additional almost 6 million are believed to be undiagnosed diabetics (CDC, Diabetes Fact Sheet, 2007). DM is the sixth leading cause of death in the United States (CDC, FASTATS). Increased morbidity and mortality due to DM are linked to a variety of complications, including retinopathy (major cause of blindness), heart disease and stroke, nerve and kidney damage, and amputations (CDC, Diabetes Fact Sheet, 2007). Use of point-of-care (POC) whole blood glucose meters has been strongly recommended by the American Diabetes Association for monitoring of blood glucose levels and assisting in therapy (Khan, Vasquez, Gray, Wains Jr, & Kroll, 2006). There are over 30 different POC whole blood glucose meters approved by the Food and Drug Administration (FDA). With each new device, meters become smaller, faster, and easier to use (Melker, 2003). Values obtained from point-of-care whole blood glucose meters are widely used, both in hospitals and at home, to make therapeutically important decisions, and must, therefore, accurately correlate with centralized laboratory serum glucose values. Much of the medical community assumes good correlation between POC whole blood glucose meter measurements and those obtained in the centralized laboratory. The federal standard for POC glucose measurements is +/-20% agreement with laboratory results (FDA, Diabetes Information). Agreement of POC glucometer values with determinations obtained on the same specimens when measured in a central lab, however, have been reported to be <80%, regardless of the POC method used. (Fahy, 2008). Baig et al. (2007) found that bedside glucose testing with a glucometer is a simple, cost effective method for monitoring glucose but centralized laboratory testing, despite having a longer turnaround time and

higher financial impact, is a more reliable, accepted method for diagnosis and management of the patient in an acute care setting (Baig, et al., 2007). A study performed by Khan et al. (2006) demonstrated that the practice of taking only one measurement with POC whole blood glucose meters might lead to misdiagnosis (Khan, Vasquez, Gray, Wains Jr, & Kroll, 2006). Therefore, medical professionals should recognize the potential for POC whole blood glucose meters to yield inaccurate results.

The overall reliability of values obtained from POC whole blood glucose meters is dependent on a variety of factors, including: underlying diseases, patient drug regimens, instrument analytical performance and user proficiency (*Mayo Clinic Proceedings*, 2008, p. 395). It is of utmost importance that hospital medical personnel utilizing the POC meters be adequately trained in usage, maintenance, and reliability of these devices. Similarly, it is important for patients utilizing these instruments for self-monitoring to be properly trained in a similar manner as the medical personnel. Patients should also be advised to seek medical help, whenever glucose readings are near the hypoglycemic and/or hyperglycemic thresholds, since it is at these critical values that the devices show the greatest inaccuracies and least correlation with centralized laboratory serum glucose testing results.

Although POC whole blood glucose meters provide advantages such as rapid turnaround time and the use of smaller blood volumes, their specimen readings should be checked routinely against a centralized laboratory serum glucose analyzer. POC whole blood glucose meters are least accurate at the high and low ends of the linear range; therefore, it is essential to verify results with centralized laboratory serum glucose methods during hypoglycemic and hyperglycemic episodes to ensure appropriate therapy is initiated promptly. It is up to medical professionals to advise diabetic patients

of the importance of routine centralized laboratory testing, and provide orders for both emergency and routine central laboratory serum glucose testing.

Works Cited

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