Intraoperative Point-of-Care Blood Glucose Values Show Poor Agreement with Central Lab Blood Values

Eric Schwenk, MD, Richard H. Epstein, MD, CPHIMS, and Boris Mraovic, MD
Department of Anesthesiology, Thomas Jefferson University Hospital, Philadelphia, PA

INTRODUCTION
• Accuracy of point-of-care (POC) glucose devices compared to central lab values in critically ill patients has come into question, particularly during intensive insulin therapy (IIT) \(^1\)\(^2\)
• POC devices perform particularly poorly in the hypoglycemic range
• Typically tested under ideal conditions in the lab; intraoperative, real-life data are lacking\(^3\)

OBJECTIVES
• To assess the accuracy of the Accu-Chek POC glucometer in the intraoperative setting relative to near-simultaneous central lab values in diabetic patients
• To determine the potential risk of relying on POC measurements during intensive insulin therapy

METHODS
• All surgical cases performed between 11/2005 and 1/2010 were queried
• Retrospective, IRB-approved study
• Data collected in diabetic patients (Types I and II) and those receiving intraoperative insulin
• Accu-Chek\(^\circledast\) blood glucose (BG) values and time performed
• Central lab values and times logged in to the lab
• Demographic data, medications, diagnoses
• POC and central lab values within 15 and 20 min paired for comparison
• Accounts for time to get specimen to lab
• Differences (lab BG – Accu-Chek BG) analyzed
  • Method of Bland and Altman\(^4\)
  • Clark error grid analysis (EGA)\(^5\)
• Differences between measurements were fit to common probability distribution curves using Systat 12.0, method of maximum likelihood

RESULTS
• 80,379 records examined
• Patients classified as diabetic by having taken diabetic meds pre-op, having DM dx, or receiving intra-op insulin
• 10,996 cases in diabetics
  • 6,727 cases had \(\geq 1\) Accu-Chek or central lab value taken
• 307 paired POC and central lab measurements

Bland-Altman Plot

Biais = -4.0 mg/dL
Precision (mean absolute difference) = 24.1 mg/dL

OBJECTIVES

• 4 patients in Area C
• 3 patients in Area D

DISCUSSION
• Accuracy of POC device was poor
• Potential risk of unrecognized hypoglycemia if POC measurements used alone during intensive insulin therapy, since symptoms masked during anesthesia

Study limitations
• Delay in the central lab to perform test not recorded
• Relatively few paired values with Accu-Chek \(\leq\) 60 mg/dL
• Inaccuracy in recording POC data and times in the AIMS

Recommendations
• Relying solely on POC devices during IIT is strongly discouraged
• Frequent lab values should be obtained if an IIT protocol is followed, especially in light of increased risk during perioperative IIT\(^6\)

References
5. Diabetes Care 1987;10:622-8