

Perioperative Glycemic Control with the aid of AlertWatch System

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Background: Perioperative hyperglycemia is associated with increased hospital length of stay, morbidity, and 30-day mortality after non-cardiac general surgery.¹ Currently there is no clear evidence on the thresholds for treating blood glucose (BG) during the perioperative period.² BG levels above 200 mg/dL are associated with significant increases in 30-day mortality, with a dose-dependent further increase at higher BG values.¹ On the other hand, overzealous treatment may result in hypoglycemia which may increase risk of adverse outcome. Treatment thresholds for hyperglycemia have not been defined as a standard of care, and little is known of the inter-individual variability in the intraoperative management of hyperglycemia during non-cardiac surgery. We tested the hypothesis that real-time visual notification of recent BG values would modify therapeutic thresholds for treatment of intraoperative hyperglycemia.

Methods: AlertWatch (AW) is a secondary patient monitor for use in hospital operating rooms and ICUs. The AW system pulls historical patient data (risk factors, lab results) from multiple networked IT systems and combines it with the patient's live physiologic data to display them for the clinician. After Institutional Review Board approval, we extracted data from the electronic medical record to evaluate the usage of AW and the relationship between usage and in monitoring BG and initiation of appropriate treatment. AW usage was captured by presence of concurrent access of the AW system, which requires secure login. Two thresholds for hyperglycemia were defined as any point-of-care, ABG or laboratory BG value ≥ 200 mg/dL, and ≥ 250 mg/dL. Treatment was identified by searching the EMR for use of insulin. Significant hypoglycemia was defined as BG value ≤ 70 mg/dL. The study outcome, appropriate BG treatment, was defined as documentation of insulin use in response to preoperative (day of surgery) or intraoperative hyperglycemia. Since the AW system was accessed randomly during ~50% of all anesthetics, we compared the study outcome occurrence during contemporaneous anesthetics between 5/1/2012 and 10/31/2013. We also evaluated the frequency of post-insulin BG check among all patients who were treated intraoperatively. Differences in study outcomes between the AW and no-AW groups were analyzed using Pearson Chi-square tests and p-value of < 0.05 was considered significant.

Results: The AW system was accessed intraoperatively during 10135 (51%) of 19978 adult (≥ 18 years) patients who underwent anesthesia care during the study period. Of these patients, 1451 (7.3%) had BG ≥ 200 mg/dL, and 647 (3.2%) had BG ≥ 250 mg/dL. Use of AW was associated with a 14% increase in the rate of insulin treatment of BG ≥ 200 mg/dL ($p=0.039$), and a 22% increase in the rate of insulin

treatment of BG \geq 250 mg/dL ($p=0.02$). The frequency of hypoglycemia was 332 (3.3%) with AW and 302 (3.1%) in controls.

Conclusion: The use of AW technology is associated with reduced variability in the management of perioperative hyperglycemia and thereby, it may contribute to improved patient outcomes. The positive behavioral response seen with use of the AW system suggests that it may perform as an effective tool in implementation of tighter intraoperative glyceic control. The lack of difference in incidence of hypoglycemia is supportive of the safety of the AW system.

References:

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2. Perioperative Glycemic control: Anesthesiology, V110, No 2, Feb 2009.
3. Grant Kruger, Kevin Tremper, Computers in Anesthesia, Advanced integrated real-time clinical displays, Information Technology Applied to Anesthesiology: September 2011, Volume 29, number 3
4. <http://www.alertwatch.com>

*Has an equity interest in AW

Alert-Watch System display:

