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Factors Influencing Intraoperative Glycemic Control During Cardiac Surgery with Cardiopulmonary Bypass

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Purpose
Glycemic control during cardiac surgery with cardiopulmonary bypass is carefully managed by the clinical team to reduce the risk of postoperative complications and ensuing sequalae. Guidelines for administering insulin are routinely utilized but fluctuations in glucose levels continue to occur. The purpose of this study was to evaluate factors that influence intraoperative glucose levels.

Methods
Data was abstracted from a multi-institutional perfusion registry over a four-year period from January 2012 through November 2015. A total of 74,857 consecutive cardiac surgery cases performed at 199 United States institutions were retrospectively reviewed in accordance with internal institutional quality improvement processes. The highest intraoperative glucose level was determined and patients were categorized by the surgical procedure type and the quantity of packed red blood cell (PRBC) transfusions administered during the procedure.

Results
For all patients the mean highest intraoperative glucose level was 180.9 mg/dL [95% CI, 180.6-181.3]. Patients undergoing either isolated aortic valve surgery or coronary artery bypass (CAB) surgery had the lowest glucose levels, while those undergoing mitral valve (MV) surgeries, either isolated or combined, had significantly higher values with the greatest levels seen in combined MV and CAB surgery (194.8 mg/dL, 95% CI, 192.6-197.0). The quantity of PRBC transfusion was positively correlated with highest glucose level with significant differences seen in patients receiving no transfusions (178.4 mg/dL, 95% CI, 178.0-178.8), one or two transfusions (188.5 mg/dL, 95% CI, 187.5-189.5) and three or more (201.2 mg/dL, 95% CI, 199.1-203.3) $p<.001$.

Conclusions
As demonstrated by this large dataset, intraoperative glycemic control during cardiac surgery is influenced by the type of surgical procedure being performed as well as allogeneic transfusion rate of PRBC. Further studies exploring these relationships are warranted.