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MGH Intraoperative Glucose Management Protocol for Cardiac Surgery Patients

Stringent glucose management is part of quality care in cardiac surgery patients. Early institution of therapy is important, especially in the diabetic patient. Our experience at the MGH is that better control is achieved if insulin therapy is initiated in the operating suite rather than in the CSICU.

The Society of Thoracic Surgeons have developed guidelines for perioperative management of glucose in patients undergoing cardiac surgery. Certain factors are considered high level recommendations.

Factor	Recommendation	Recommendation Level
Management of Hypeglycemia Using Insulin Protocols in the Perioperative Period	Glycemic control is best achieved with continuous insulin infusions rather than intermittent subcutaneous injections of intermittent IV insulin boluses	Class I
Management of Hypeglycemia Using Insulin Protocols in the Perioperative Period	ALL patients with diabetes should receive an insulin infusion in the operating room, and for at least 24 hours postoperatively to maintain serum glucose level ≤180 mg/dL	Class I
Intraoperative Control Recommendations	If an intravenous insulin infusion is initiated in the perioperative period, it should be continued throughout the intraoperative and early postoperative period according to institutional protocols to maintain serum glucose ≤180 mg/dL	Class I
Glucose Control in the ICU	Patients with and without diabetes with persistently elevated serum glucose (>180 mg/dL) should receive IV insulin infusions to maintain serum glucose < 180 mg/dL for the duration of their ICU care.	Class I
Glucose Control in the ICU	All patients who require ≥3 days in the ICU because of ventilator dependency or	Class I

	requiring the need for inotropes, IABP, LVAD, anti-arrhythmics, dialysis, or continuous veno-venous hemofiltration should have a continuous infusion infusion to keep blood glucose ≤150 mg/dL, regardless of diabetic status	

The recommendations do note that, "**Intraoperative Glycemic Control Using Intravenous Insulin Infusions is not Necessary in Cardiac Surgery Patients *Without* Diabetes Provided That Glucose Values Remain < 180 mg/dL**"

These parameters are intended as a guide toward the tight control of glucose maintenance to a level of 100- 180 mg/dl. Doses of insulin may be modified based upon the patient's level of insulin tolerance and presence/absence of diabetes. Glucose values should be obtained q 30 minutes during CPB in all patients and at least q 60 minutes off CPB. In non-diabetics or in patients in whom tight control <180 mg/dl has been very stable, sampling less frequently than hourly may be appropriate.

To start insulin therapy for a given blood glucose level:

Blood Glucose	Insulin Bolus (U)	Insulin Infusion (U/hr)
<70	Give Glucose 12 gms IVSS	
71-120	0	0
121-150	0	0
151-180	0	0
181-200	2	2
201-250	3	3
251-300	4	4
301-350	10	5
>350	10	8

Maintenance of Insulin Therapy Once Already Being Treated

Blood Glucose	Insulin Bolus (U)	Insulin Infusion (U/hr)
<70	Stop all Rx	Stop all Rx
71-100	0	Stop all Rx
101-120	0	Stop all Rx
121-150	----	Decrease ↓ by 2
151-180	----	---
181-200	2	⇑ by 1
201-250	3	⇑ by 2
251-300	5	⇑ by 3
301-350	8	⇑ by 3
>350	10	⇑ by 3

If glucose values continue to rise out of control, larger doses and dose modifications should be implemented by the attending anesthesiologist.

References

1. Lazar HL, McDonnell M, Chipkin SR, Furnary AP, et al. The Society of Thoracic Surgeons Practice Guideline Series: Blood Glucose Management Durign Cardiac Surgery. Ann Thorac Surg 2009;87:663-9