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INTRODUCTION

- Although studies are conflicting as to the benefit of intensive insulin therapy (IIT) in the critically ill,^{1,2,3} there is a 6x increase in hypoglycemia incidence in patients treated with IIT⁴
- Anesthesia masks signs and symptoms of hypoglycemia, making intraop hypoglycemia difficult to detect clinically
- We performed this retrospective, observational analysis to:
 - Determine the incidence of intraoperative hypoglycemia and severe hypoglycemia
 - Evaluate possible causes of hypoglycemia
 - Determine intraop monitoring and treatment practices of diabetic patients at a large academic hospital

METHODS

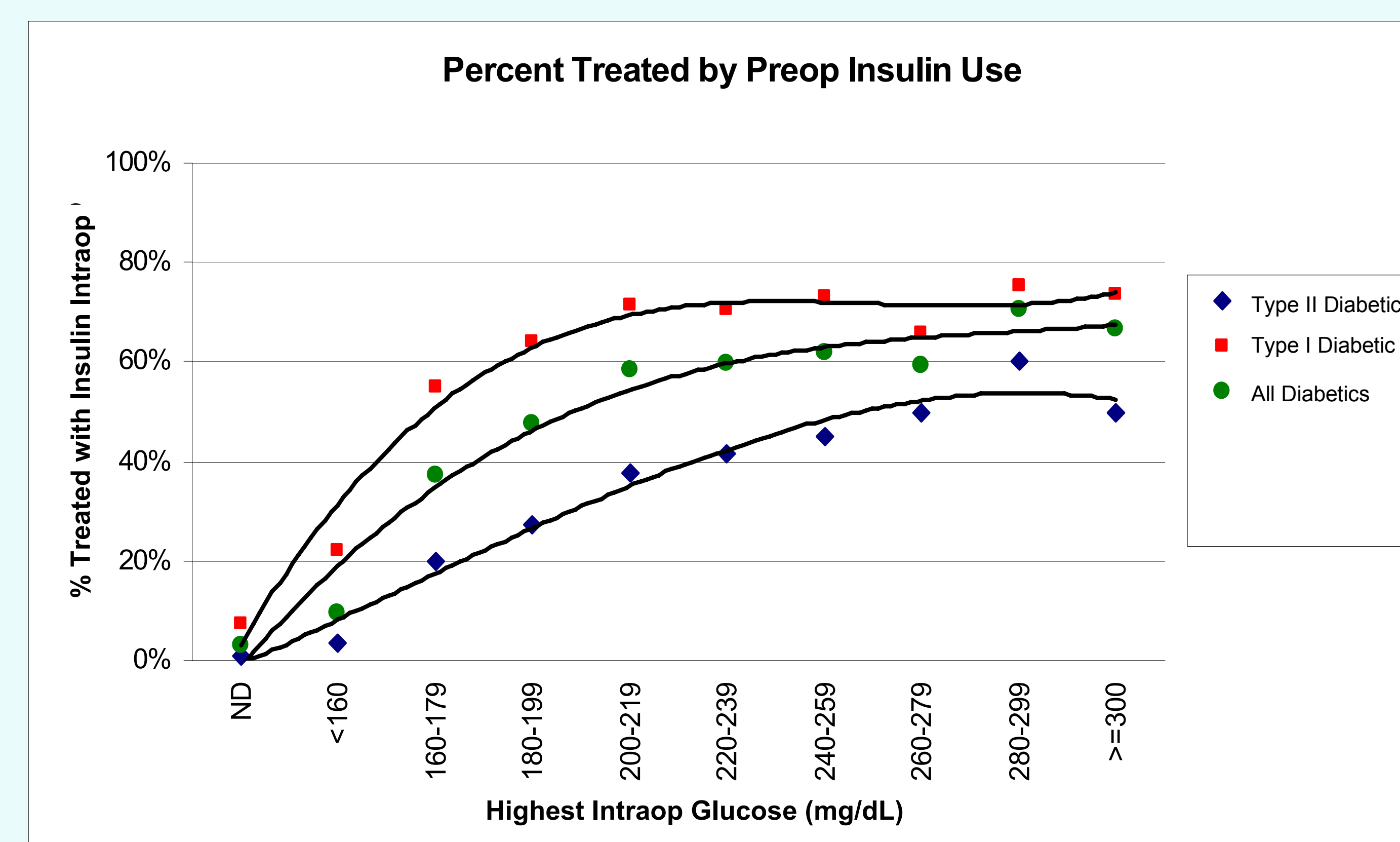
- After IRB approval, diabetic patients who had surgery from 2005-2010 were retrospectively analyzed (Table 1)
 - preoperative insulin status
 - intraoperative blood glucose (BG) values
 - insulin boluses and infusions given
 - dextrose (D50) doses given
- Data obtained from our Anesthesia Information Management System and point-of-care glucose (Accu-Chek) databases
- Manual chart examination and root cause analysis for patients with BG <40
- Patients receiving insulin and D50 for hyperkalemia were excluded
- Insulin treatment as a function of highest intraop glucose was determined (Fig 1)
- Representative examples of 2 patients who experienced severe intraop hypoglycemia are presented graphically (Figs 2 and 3)

RESULTS

Table 1. Hypoglycemia incidence

Description	Number	% of Diabetics
Total surgical patient-cases	80,379	-
Diabetics	10,966	-
Taking insulin pre-op	4,301	39.2
Taking only oral agents pre-op	6,665	60.8
Received intra-op insulin	3,890	35.5
Received intra-op D50 for hypoglycemia	61	0.56
Hypoglycemia (BG 41-60)	88	0.80
Severe hypoglycemia (BG ≤40)	27	0.25

Figure 1. Insulin use by preoperative insulin status



DISCUSSION

- Despite conservative glycemic practices, clinically relevant intraoperative hypoglycemia still occurred in 115 (1.05%) of diabetic patients (95% CI 0.87 – 1.26 % by Clopper-Pearson)
- Hypoglycemia incidence similar to that in conventional tx group in ICU studies^{1,3}
- Frequent monitoring of BG during administration of IV insulin is mandatory
- Differences in treatment thresholds between patients on and not on pre-op insulin may reflect a reticence to institute a new treatment modality in insulin-naïve patients
- Explanations for severe hypoglycemic events include taking insulin while NPO, excessive insulin administration, and not checking hourly BG while on an insulin infusion
- Most episodes of severe hypoglycemia were likely preventable

Figure 2. Failure to check hourly BG while on insulin infusion

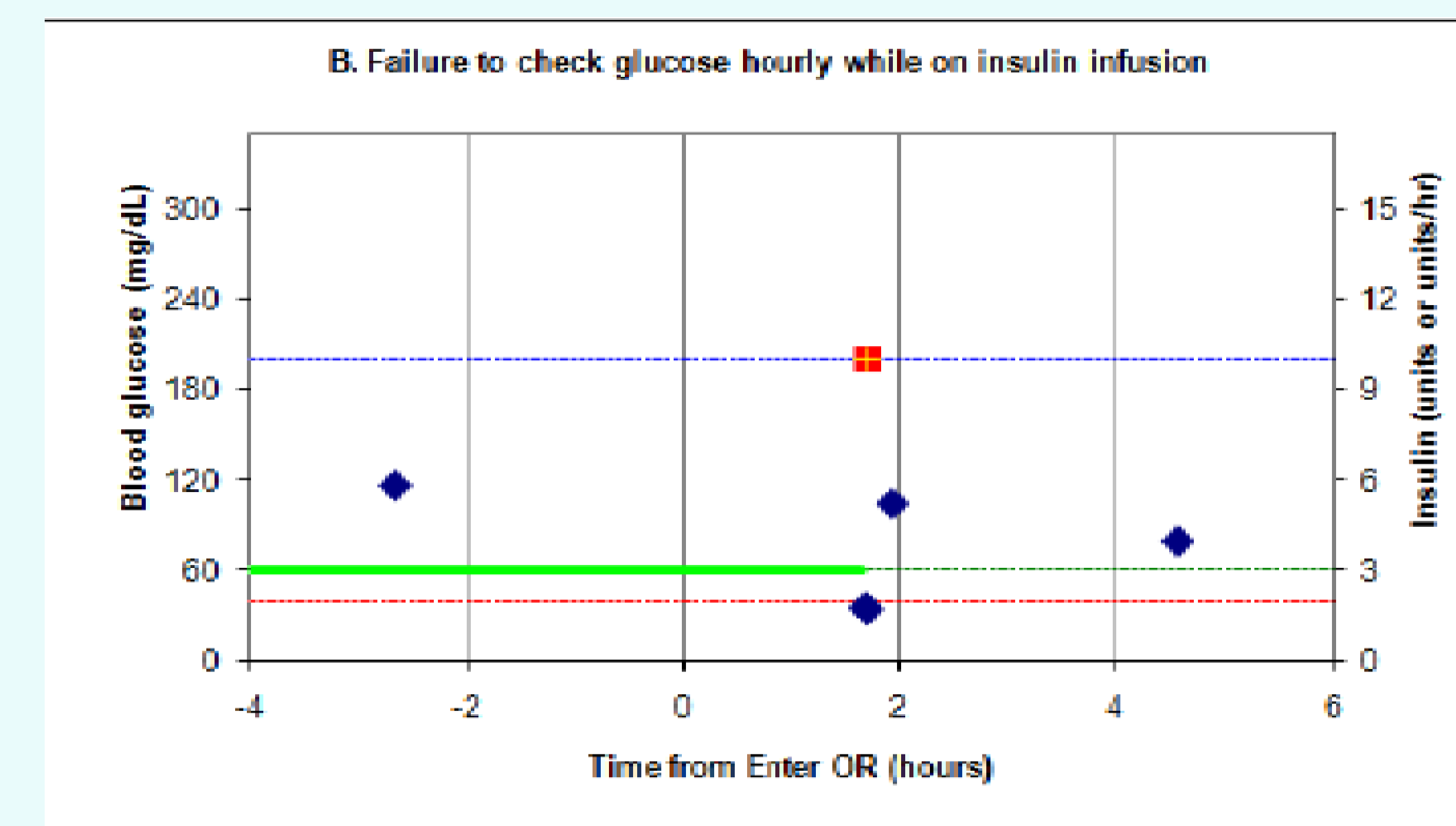
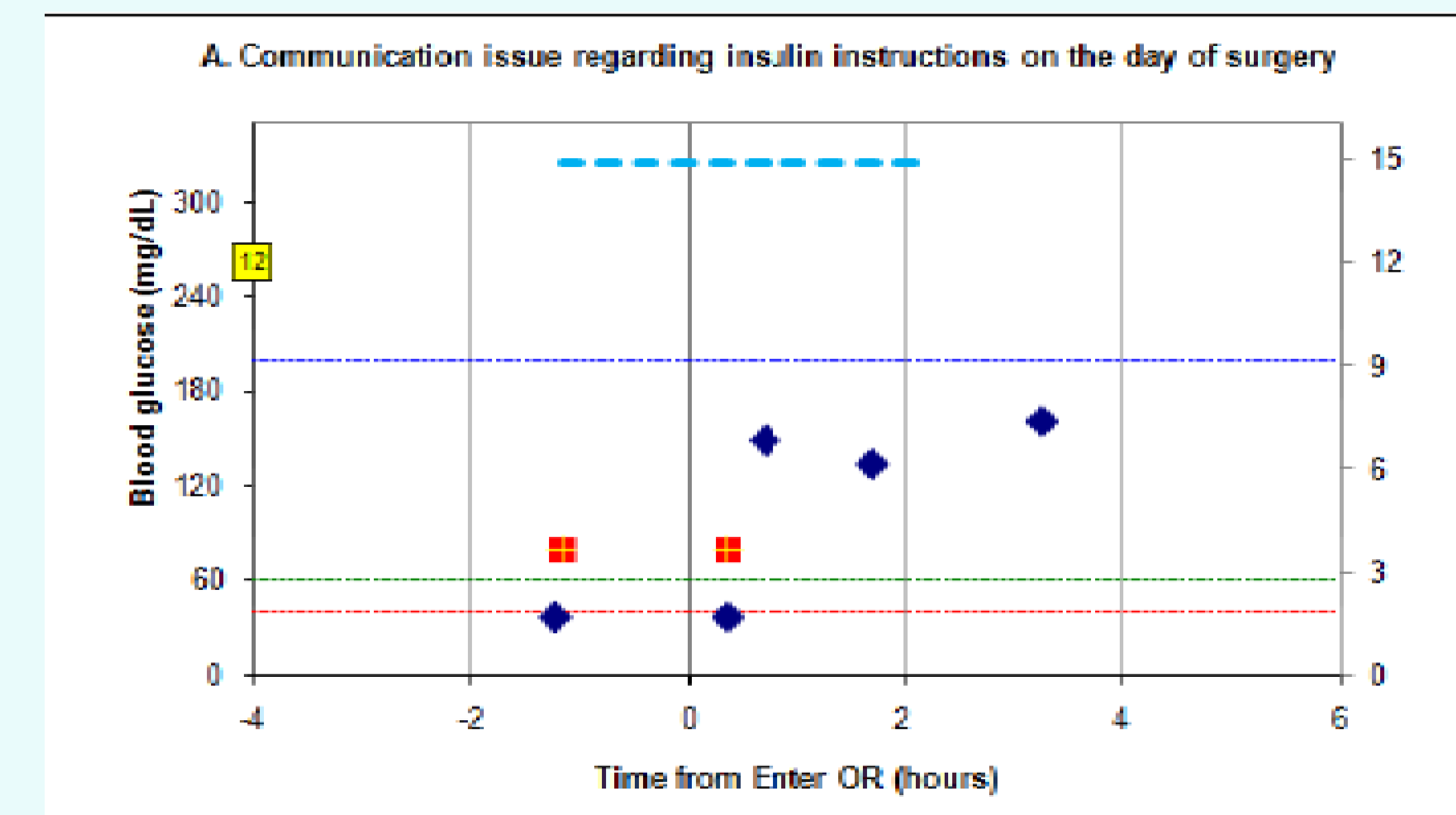


Figure 3. Patient who took normal insulin dose while NPO



Figures 2 and 3

- Blood glucose (mg/dL)
- Insulin infusion rate
- D50 bolus dose
- Dextrose infusion
- Severe hypoglycemia
- Hypoglycemia
- Hyperglycemia
- Insulin Bolus dose

References

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