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Impact of Intensive Insulin Treatment on Glycemic Control and Clinical Outcomes in the Cardiac Surgery Intensive Care Unit and Ward

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The impact of intensive insulin treatment on the clinical outcomes of patients hospitalized in intensive care units (ICU) is highly controversial. The objective of the present study was to test the efficacy and safety of a protocol based on intensive insulin therapy in a surgical ICU and ward and to assess its impact on clinical outcomes.

All patients undergoing cardiac surgery with diabetes or a blood glucose >150 mg/dl were treated in the ICU with intravenous insulin based on dynamic algorithms of insulin administration, followed by an intensive multi-injection protocol consisting of 4 Glargine/Aspart insulin injections in the ward. The control group consisted of all patients admitted to the Cardiac Surgery ICU and ward during a similar period immediately prior to the implementation of the protocol. Glucose measurements were analyzed to assess glycemic control and the risk for hypoglycemia. Infectious and cardiovascular complications were retrieved from a computerized database of all patients admitted to Cardiac Surgery.

During a 9-month period, 203 patients were admitted to the department of Cardiac Surgery. During the intervention, mean blood glucose was 151.0 ± 19.3 mg/dl and 156.9 ± 32.5 mg/dl in the ICU and ward, respectively vs 166.0 ± 26.7 mg/dl and 184.0 ± 46.4 mg/dl in the controls ($p < 0.001$). Intensive insulin treatment decreased the risk for infection by 56% ($p = 0.018$), mainly by reducing the incidence of leg wound infection (64% reduction, $p = 0.034$). The overall risk to develop any complication was decreased by 19% ($p = 0.058$). Importantly, the incidence of hypoglycemia (blood glucose <60 mg/dl) was low (~3% of all patients) and was not increased by intensive insulin therapy.

Intensified insulin regimen can be safely used in surgical ICU and wards, with no increase in the incidence of hypoglycemia. Direct ICU and ward-based implementation of the protocol by the nursing staff result in improvement of glycemic control and decreased risk for infection.