# EndoTool Software for Tight Glucose Control for Critically Ill Patients

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Introduction:
Rationale for tight glucose control (TGC) has been established and is becoming the standard of care. TGC is associated with hypoglycemia and increased staff workload and stress.

Hypothesis:
EndoTool Glucose Management System is a software system for calculating intravenous insulin (IVI) doses for TGC, designed to reduce both side effects. Sophisticated feedback mathematics applied to the control of a two variable, quadratic insulin dosing curve should provide prompt and safe glycemic control.

Methods:
EndoTool has been utilized at Carolinas Medical Center since early 2003. January 2005 to June 2006 data from ICUs are presented. Standard of care criteria for starting IVI: BG >130 mg/dL.

Results:
2,510 patients had 95,793 BG readings and IVI calculations during this study period. 86% of BG readings were between 71-150 mg/dL. The mean of all BG readings was 121 mg/dL (±38). The mean BG after 4 hours of control was 118 mg/dL (±26). The hypoglycemia incidence was low, some associated with late BG determinations. The time required to control BG to <150 mg/dL was 2.7, 3.4, 4.5 and 5.0 hours for starting BG ranges 151-200, 201-250, 251-300 and >300, respectively. The critical care staff were supportive of this software application for patient care. The work and stress associated with TGC was subjectively reduced. Documentation of medical care was improved.

Conclusions:
1. EndoTool Glucose Management System provided prompt, effective and safe BG control for critically ill patients.
2. Hypoglycemia incidence was very low (≤40 incidence of 0.13% and ≤60 incidence of 0.97%).
3. Medical record documentation was electronic or paper, simplified and improved.
4. Physician calls were basically eliminated.
5. Quality assurance was convenient and easy.
6. The critical care staff recommended EndoTool compared to previous paper protocols and were instrumental in promoting the software throughout the hospital.