# **EndoTool Software for Tight Glucose Control for Critically III Patients**

Cochran, Steven; Miller, Edith; Dunn, Kelli; Burgess, William P; Miles, William; Lobdell, Kevin

## 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 ( $\pm$ 38). The mean BG after 4 hours of control was 118 mg/dL ( $\pm$ 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.