

Improving Glycemic Control in the ICU with a Data Management Software Program
Charles C. Reed, MSN, RN, CNRN
University Hospital
Michael G. Corneille

Problem: In published studies tight glycemic control (TGC) in critically ill patients improves outcomes and reduces mortality. However, measuring management of hyperglycemia to the target blood glucose (bG) range is difficult with limited data.

Evidence: A survey to assess the nurse's perceptions about lowering a patient's bG to the target range of 80-110 mg/dl was completed by 92.3% of the STICU nurses (n=60). 86% of the nurses believed they achieved target 50-90% of the time while 59% believed they achieved it 70-90% of the time. Target was actually achieved 38% of the time.

Strategy: A bG data management software (RALS-TGCM) was implemented to provide real-time access to bG results.

Practice Change: Patient Care Coordinators and nursing staff accessed the RALS-TGCM to evaluate patients' bG results. These aggregate results were shared with other nurses and physicians. Daily reports of prospective comparisons for each patient, ICU module, and the whole unit were posted and e-mailed to nursing staff and faculty physicians.

Evaluation: The percent of values reaching and remaining in the target range along with mean bG were monitored daily.

Results: 91,536 bG results were collected during the fifteen month study period. The mean bG pre implementation was 121 mg/dl, and post implementation was 112 mg/dl ($p < 0.001$). The percent of values within range (80-110) during the pre-implementation period was 39% and 46% post-implementation ($p < 0.001$). The percentage of time individual patients' values were in the range was 27% pre-implementation and 41% post-implementation, ($p < 0.001$).

Recommendations:

Improving a glycemic control program with retrospective data yields limited results. The ability to access real-time data resulted in more patients reaching target bG. RALS-TGCM provides an opportunity to measure progress of TGC daily, and one patient at a time.

Bibliography

Van den Berghe G, Wouters P, Weekers F, Verwaest C, Bruyninckx F, Schetz M, Vlasselaers D, Ferdinande P, Lauwers P, Bouillon R. Intensive insulin therapy in the critically ill patients. *N Engl J Med*. 2001 Nov 8;345(19):1359-67.

Reed CC, Stewart RM, Sherman M, Myers JG, Corneille MG, Larson N, Gerhardt S, Beadle R, Gamboa C, Dent D, Cohn SM, Pruitt BA Jr. Intensive insulin protocol improves glucose control and is associated with a reduction in intensive care unit mortality. *J Am Coll Surg*. 2007 May;204(5):1048-54; discussion 1054-5.

Conner TM, Flesner-Gurley KR, Barner JC. Hyperglycemia in the hospital setting: the case for improved control among non-diabetics. *Ann Pharmacother*. 2005 Mar;39(3):492-501.

Gentile NT, Seftchick MW, Huynh T, Kruus LK, Gaughan J. Decreased mortality by normalizing blood glucose after acute ischemic stroke. *Acad Emerg Med*. 2006 Feb;13(2):174-80.

Frontera JA, Fernandez A, Claassen J, Schmidt M, Schumacher HC, Wartenberg K, Temes R, Parra A, Ostapkovich ND, Mayer SA. Hyperglycemia after SAH: predictors, associated complications, and impact on outcome. *Stroke*. 2006 Jan;37(1):199-203.

Krinsley JS. Association between hyperglycemia and increased hospital mortality in a heterogeneous population of critically ill patients. *Mayo Clin Proc*. 2003 Dec;78(12):1471-8.

Yendamuri S, Fulda GJ, Tinkoff GH. Admission hyperglycemia as a prognostic indicator in trauma. *J Trauma*. 2003 Jul;55(1):33-8.

Krinsley JS. Effect of an intensive glucose management protocol on the mortality of critically ill adult patients. *Mayo Clin Proc*. 2004 Aug;79(8):992-1000. Erratum in: *Mayo Clin Proc*. 2005 Aug;80(8):1101.