

Bridge Over Troubled Waters: Building Safe and Effective Transitions off of Insulin Infusion with a Team Protocol Method

Pharmacist Investigator: Kevin W. Box, Pharm.D.

Hospitalist Investigator: Gregory A. Maynard, M.D., M.S.c.

Abstract

Background

Good glycemic control is often achieved via insulin infusion in the modern critical care setting. However, uncontrolled hyperglycemia and failed transitions from insulin infusion are common. A recent observational review of 24 SICU and 17 CCU/MICU patients at our own institution found that glycemic control significantly deteriorated when patients transitioned from an insulin infusion to subcutaneous insulin. This observation was most dramatic in patients with a pre-admission diagnosis of diabetes (21 of 41), who had an average blood sugar of 227 mg/dL in our CCU/MICU and 192 mg/dL in our SICU during the first 24 hours after transition. Only 2 of those 21 patients achieved a 48 hour post transition day-weighted mean glucose of <150 mg/dL. None of the 41 patients received basal insulin prior to the discontinuation of the insulin infusion. Centers that have reported reliable success in this transition generally rely on technology or personnel resources not available to most hospitals.

Objectives and Hypothesis

Our objective is to improve glycemic control for the first 48 hours after a patient transition off of an insulin infusion without a significant increase in hypoglycemia, using a multidisciplinary performance improvement model that is portable to a wide variety of institutions. Our hypothesis is that it is possible to do this with minimal increases in personnel or technology.

Research Design and Methods

This is a prospective study investigating the impact of a “best practice” transition protocol on glycemic control, hypoglycemia, and selected process measures. The protocol will be implemented by a multidisciplinary team utilizing a proven performance improvement framework. We will compare the pilot study cohort (before protocol) to this “after” protocol cohort. Prior to implementation, we will host educational multidisciplinary round-table discussions. All adult intensive care patients on an insulin infusion for >24 hours over the course of 3 months will be enrolled in the study. The unit pharmacist will identify appropriate patients, and assist in calculating and partitioning the Total Daily Dose of insulin based upon the protocol. Blood glucose values will be collected during the final 6 hours on the infusion and for the subsequent 48 hours. Additional data will include patient demographics, the infusion rate, HbA1c, hypoglycemia risk factors, and the patient’s current nutritional intake. Unit pharmacists will be available for any questions regarding the transition, with an additional resource of a hospitalist 24/7 “hotline” pager. Concerns about the process, barriers, and safety issues will be identified in daily “huddles” during the first month of implementation, and mediated via subsequent refinement of the protocol if needed. Monthly Glycemic Control team meetings will facilitate team communication and spread of the protocol to all critical care units.

Outcomes and Measures

The main outcome of interest is the percentage of diabetic patients with a controlled transition (transition with a day-weighted mean of <150 mg/dL). Comparisons with the pre-intervention pilot study group will be made using the Mann-Whitney non-parametric test. We will compare pre and post percent patient days with hypoglycemia, severe hyperglycemia, and dosing of subcutaneous insulin using appropriate statistical techniques.

Significance

We feel a multidisciplinary team approach during this critical transition off of infusion insulin can improve glycemic control safely, in a manner than is portable to a variety of institutions.