

TITLE: Reduced Organ Failure with Effective Glycemic Control

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INTRODUCTION: Mortality in the intensive care unit (ICU) after the first few days is strongly associated with organ failure rate and severity. This study uses the sequential organ failure assessment (SOFA) score to evaluate the impact of a successful tight glycemic control (TGC) intervention (SPRINT) on organ failure, morbidity, and thus mortality.

OBJECTIVES: To determine if effective TGC reduces the rate, level or number of organ failures in providing a platform for reduced ICU mortality.

METHODS: A retrospective analysis of clinical data from 2003–2007 totalling 784 ICU patients and 6574 patient days. The data includes 371 patients (3358 patient days) on the SPRINT TGC protocol (August 2005–April 2007) and 413 matched retrospective patients (3216 patient days) from the 2 years prior to the implementation of SPRINT in 2005, matched by APACHE III. Cohort details including glycemic and mortality outcome are in [1]. SOFA score was calculated daily for each patient. The effect of the SPRINT TGC intervention is assessed by the percentage of patients each day with a total SOFA score ≤ 5 , and by trends over time. Organ-failure free days (all component SOFA scores ≤ 2) and total number of organ failures in each cohort (SOFA component scores > 2) are examined.

RESULTS: Admission SOFA scores were similar ($p = 0.20$). Patients reached similar maximum SOFA scores ($p = 0.76$) in similar times (median: 1 day; IQR: [1, 3]) for both cohorts ($p = 0.99$). Median length of stay was similar ($p = 0.94$) with 4.1 days (SPRINT) and 3.8 days (pre-SPRINT). The percentage of patients with total SOFA ≤ 5 is significantly different over time ($p < 0.001$), rising over the first 21 days to 85% for the Pre-SPRINT cohort and ~93% for the SPRINT cohort, with clear separation from days 1-2 onward ($p < 0.001$). SPRINT had 41.6% of patient days free of organ failure versus 36.6% for Pre-SPRINT ($p < 0.0001$). The number of organ failures, as a percentage of the total possible for each cohort, was lower for SPRINT (16.0%) than pre-SPRINT (19.0%) ($p < 0.0001$). Trends for survivors and non-survivors were similar within and between cohorts, with non-survivors having higher admission, mean daily, and maximum SOFA scores ($p < 0.05$).

CONCLUSIONS: Effective TGC with SPRINT resolved organ failure faster, and for a greater percentage of patients who had similar admission and maximum SOFA scores, compared to a matched retrospective conventional control cohort. These morbidity reductions mirror the reduced mortality seen with SPRINT. These results suggest that reduced organ failure, assessed by SOFA, is a fundamental element in reduced mortality when TGC is implemented effectively.

REFERENCE:

[1] Chase, JG et al. "Implementation and Evaluation of the SPRINT Protocol for Tight Glycaemic Control in Critically Ill Patients: A Clinical Practice Change," *Critical Care*, 12(2):R49, 2010.