Glycemic Variability, hypoglycemia and organ failure in the Glucontrol study

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Introduction

Organ failure is a common complication associated with increased mortality in Intensive Care Unit (ICU) patients. Increased mortality is also related to glycemic variability (GV) and hypoglycemia [1]. This research evaluates the influence of GV and severe hypoglycemia on organ failure rate.

Methods

Patients: N=704 (Glucontrol study)
Randomized
• Intensive Insulin Therapy (IIT), blood glucose (BG) target: 4.4-6.1 mmol/L (N=350)
• Conventional Insulin Therapy (CIT), BG target: 7.8-10.0 mmol/L (N=354)
Matched for age, sex, diagnosis and severity of illness (APACHE II score)

GV and SOFA score:

 Patients on Day i

\[ GV_{p,i} > \text{median}(GV_i) \]

High GV patients on Day i

\[ GV_{p,i} > \text{median}(GV_i) \]

Low GV patients on Day i

Daily assessment:
Organ failure: SOFA score
Glycemic variability (GV): lability index

\[ \sum_{N} \frac{(BG_{N+1} - BG_N)^2}{h_{N+1} - h_N} \]

Hypoglycemic event: BG < 2,2 mmol/L

Hypoglycemia and SOFA score:

Patients

Hypoglycemic event?

Yes

No

Hypo patients

No-hypo patients

Comparison of daily SOFA scores (median, IQR, mean) for each group, on each day. Note: glycemic outcome are considered independently of glycemic target.

Results

Patients with high GV: higher SOFA score
(p < 0,05 on Days 2-4)

Patients with a hypoglycemic event: higher SOFA scores
(p < 0,05 on Days 2-14)

Results matched with those of other studies

Fig. 1 : Evolution of mean SOFA score for patients with high GV (red) and patients with low GV (blue)

Fig. 2 : Evolution of mean SOFA score for patients with (red) and without (blue) hypoglycemic event

Conclusions

High glycemic variability and hypoglycemia are both associated with increase in SOFA score, and thus increase in organ failure rate.

Reference


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