

Association of the Time in Targeted Blood Glucose Range of 3.9-10 Mmol/L with the Mortality of Critically Ill Patients with or without Diabetes

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Abstract : BACKGROUND: In addition to hyperglycemia, hypoglycemia, and glycemic variability, a decrease in the time in the targeted blood glucose range (TIR) may be associated with an increased risk of death for critically ill patients. However, the relationship between the TIR and mortality may be influenced by the presence of diabetes and glycemic variability. METHODS: A total of 998 diabetic and non-diabetic patients with severe diseases in the ICU were selected for this retrospective analysis. The TIR is defined as the percentage of time spent in the target blood glucose range of 3.9-10.0 mmol/L within 24 hours. The relationship between TIR and in-hospital in diabetic and non-diabetic patients was analyzed. The effect of glycemic variability was also analyzed. RESULTS: The binary logistic regression model showed that there was a significant association between the TIR as a continuous variable and the in-hospital death of severely ill non-diabetic patients (OR=0.991, P=0.015). As a classification variable, TIR \geq 70% was significantly associated with in-hospital death (OR=0.581, P=0.003). Specifically, TIR \geq 70% was a protective factor for the in-hospital death of severely ill non-diabetic patients. The TIR of severely ill diabetic patients was not significantly associated with in-hospital death; however, glycemic variability was significantly and independently associated with in-hospital death (OR=1.042, P=0.027). Binary logistic regression analysis of comprehensive indices showed that for non-diabetic patients, the C3 index (low TIR & high CV) was a risk factor for increased mortality (OR=1.642, P<0.001). In addition, for diabetic patients, the C3 index was an independent risk factor for death (OR=1.994, P=0.008), and the C4 index (low TIR & low CV) was independently associated with increased survival. CONCLUSIONS: The TIR of non-diabetic patients during ICU hospitalization was associated with in-hospital death even after adjusting for disease severity and glycemic variability. There was no significant association between the TIR and mortality of diabetic patients. However, for both diabetic and non-diabetic critically ill patients, the combined effect of high TIR and low CV was significantly associated with ICU mortality. Diabetic patients seem to have higher blood glucose fluctuations and can tolerate a large TIR range. Both diabetic and non-diabetic critically ill patients should maintain blood glucose levels within the target range to reduce mortality.

Keywords : severe disease, diabetes, blood glucose control, time in targeted blood glucose range, glycemic variability, mortality

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