Maximal Glycemic Gap, Strongest Glycemic Variability Parameter to Predict Mortality in ICU Patients

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Background: Insulin therapy for controlling blood glucose (BG) concentration has been considered as a standard care in intensive care unit (ICU) and reduces mortality and morbidity. In addition to BG concentration, several evidences suggest a correlation of glycemic variability (GV) and ICU mortality. However, there have been no report of correlation between various parameters of GV and medical ICU mortality in Thailand.

Objective: To determine the correlation between various GV parameters and medical ICU mortality in Songklanagarind Hospital.

Methods: A retrospective cohort study was performed at medical ICU in Songklanagarind Hospital. The electronic and medical ICU records were reviewed. Patient characteristics, insulin therapy, 24-hour point of care glucose, ICU infection, and ICU/hospital mortality were recorded. Glycemic variability parameters: maximal blood glucose difference (MGD.), standard deviation (SD.), coefficient of variation (CV.), and J-index were compared with ICU mortality using receiver operating characteristic (ROC) curve and the area under the curve (AUC).

Results: A total of 538 medical ICU patients were recruited with 442 patients (82.2%) being survivors. In non-survival patients, there were more malignancy as comorbidity (22.9% vs 13.3%), APACHE II score (23 vs 18) and respiratory as cause of admission (78.1% vs 62.7%). All GV parameters of 24-hour POC glucose were higher in the non-survival group compared to the survival group (p-value < 0.05). AUC was largest for MGD. (AUC 0.693 (95%CI 0.638-0.747)), followed by CV. (AUC 0.677 (95%CI 0.619-0.736)), SD. (AUC 0.672 (95%CI 0.614-0.730)), J-index (AUC 0.634 (95%CI 0.571-0.698)) (All with P < 0.05). Pairwise comparison of AUC between MGD with SD and J-index were significant (p < 0.05), but not significant for CV.

Conclusion: Glycemic variability is associated with ICU mortality. Maximal blood glucose difference has strongest correlation with ICU mortality in critically ill patients.

Keywords: Glycemic variability, Intensive care unit, ICU, Mortality.