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Hyperglycemia in critical illness - Risk factor for later development of glucose metabolism abnormalities

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Introduction: Critical illness is commonly complicated by hyperglycemia caused by mediators of stress and inflammation. Severity of disease is the main risk factor for development of hyperglycemia, but not all severely ill develop hyperglycemia and some do even in mild disease. We hypothesized that acute disease exposes a latent disturbance of glucose metabolism which normalizes after discharge but puts those patients at higher risk for developing pre-diabetes and type 2 diabetes.

Patients and Methods: Patients admitted to the intensive care unit of the University Hospital Centre, Zagreb, due to acute coronary syndrome (ACS), sepsis, pulmonary embolism, pulmonary oedema and respiratory insufficiency were included in the research. Patients with no history of impaired glucose metabolism were divided into hyperglycemia group (glucose ≥7.8 mmol/l, measured on at least two occasions) and normoglycemia group. Glycated hemoglobin, fasting glucose on the day of discharge and oral glucose tolerance test within six weeks after discharge were all performed in order to disclose patients with unknown diabetes or pre-diabetes who were excluded from the research.

Results: Hyperglycemia was present in 30.6% of all patients. It was more frequent in patients with sepsis and other diagnoses (pulmonary embolism, pulmonary oedema, respiratory insufficiency) (43%) than with ACS (20.2%). Glucose concentration was 10.2 (8.9-13) mmol/l in the hyperglycemia and 5.7 (5-6.4) mmol/l in the normoglycemia group. Patients with hyperglycemia were older, had higher body mass index and were more severely ill (higher APACHE II, SAPS II, SOFA score) than patients in the normoglycemia group.

Follow-up was done on 70 patients with hyperglycemia, of which 10 (14.2%) developed impaired fasting glucose/ impaired glucose tolerance (IFG/IGT) and 30 (42.9%) diabetes. 186 patients in the normoglycemia group completed the follow up, of which 10 (5.4%) developed IFG/IGT, and 21 (11.3%) diabetes. Relative risk for developing IFG/IGT was 4.13 (95% CI 1.84-9.24), and diabetes 4.19 (95% CI 2.61-6.73).

Conclusion: Patients with hyperglycemia during critical illness who were not diagnosed with diabetes before or during the hospitalization should be considered a population at increased risk for developing pre-diabetes and diabetes.

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