

Hyperglycemia Linked to Death Risk in Some ICU Patients

There is a markedly greater risk associated with heart conditions.

BY RYAN DUBOSAR, CONTRIBUTING EDITOR

Even mild hyperglycemia was associated with as much as a 15-fold increased risk of death in a study of intensive care unit (ICU) patients, researchers reported at the American Diabetes Association's 66th Scientific Sessions in a late-breaking report.

A study of 216,775 consecutive first admissions into Veteran's Affairs (VA) medical centers showed that some conditions — myocardial infarctions (MI), unstable angina and strokes — showed an increased risk of mortality from even 1 mg/dL above the normal range (70 mg/dL to 110 mg/dL). Other conditions, such as chronic obstructive pulmonary disease (COPD) and liver failure, were not linked to mortality, said lead researcher Mercedes Falciglia, MD, an assistant professor of medicine at the University of Cincinnati College of Medicine's Division of Endocrinology.

Hyperglycemia is common in hospitalized patients, about 40% of the non-ICU population, Falciglia said. But prevalence in the ICU can range from 30% to 100%. While previous research has shown a relationship with increased mortality among hospitalized patients, many of these investigations were limited by sample size and an inability to adjust for severity of illness. Benefits of reducing high blood glucose levels have been questioned because results of trials of intensive insulin therapy have varied.

Dr. Falciglia, from the Veterans Affairs Inpatient Evaluation Center, based at the Cincinnati VA Medical Center, reported, "Will treating hyperglycemia decrease morbidity and mortality? The answer — based on evidence from several randomized controlled trials — is yes."

POWERFUL MATHEMATICAL MODEL

Falciglia and fellow researchers tracked patients admitted into 177 surgical, medical and cardiac ICUs at 73 VA medical centers throughout the country between September 2002 and March 2005. Of the patients, two-thirds were aged older than 60 years, and the remaining

one-third were aged between 40 and 60 years. The cohort was predominantly male (97%).

Researchers applied to the large cohort size a powerful mathematical model that allowed them to discriminate risk among numerous variables and diagnoses. The logistic regression model calculated the mortality for each patient using computerized variables such as patient diagnosis, transfer status, age, and laboratory data for levels of sodium, glucose, albumin, bilirubin, among others.

Falciglia reported that the model's discriminatory power remained true whether the patient was extremely ill or not very sick at all.

Patients were then stratified by mean glucose levels. Between 70 mg/dL and 110 mg/dL was the normal glycemic reference group against which researchers compared stratified categories of 111 mg/dL to 145 mg/dL, 146 mg/dL to 199 mg/dL, 200 mg/dL to 300 mg/dL and ≥ 300 mg/dL.

SOME DISEASES CORRELATE

Among the 154,000 patients without a diagnosis of diabetes, a significant association started with mild hyperglycemia and ranged from about a 40% increase in mortality risk to almost a four-fold risk. Among the remaining 62,000 patients with diagnosed diabetes, a significant association did not start until mean glucose reached higher levels.

"We were quite surprised by our findings," Dr. Falciglia said. "Although there was a significant association in both groups, there were clearly striking differences in the magnitude of risk among patients without a diagnosis of diabetes when compared with those with a diagnosis of diabetes."

Mortality risk began at a very mild level of hyperglycemia, she said. Among all patients, starting with the hyperglycemia range of 111 mg/dL to 145 mg/dL, there was already a 40% increase in mortality rates.

Conditions in which researchers noted a correlation

between hyperglycemia and mortality included gastrointestinal bleeding or ulcers, respiratory failure, sepsis and renal failure.

The link between hyperglycemia and mortality was greatest in those admitted with acute MI, unstable angina and strokes. Hyperglycemia increased acute MI patients' risk of death by up to five times. Hyperglycemia raised the death risk of stroke patients between 3.4 to 15.1 times and that of unstable angina patients between 1.7 and 6.2 times.

Researchers noted a correlation between hyperglycemia and mortality in gastrointestinal bleeding or ulcers, respiratory failure, sepsis and renal failure.

UNRELATED CONDITIONS EXAMINED

Among 3,200 hepatic failure patients, only one of the stratified categories showed any correlation between hyperglycemia and mortality, leading Dr. Falciglia to say about these patients, "It's hard to look at that and conclude that there is a real relationship between hyperglycemia and mortality."

Other conditions in which there was no apparent correlation included intestinal neoplasms, perforations and obstructions; ear, nose and throat neoplasms; musculoskeletal conditions; peripheral vascular disease bypass or hip fracture surgery, for example.

Still, when researchers combined all disorders for which they were not able to demonstrate a significant association and analyzed them as one group, a significant relationship still became apparent, Dr. Falciglia said. And, elevated blood glucose may still impact outcomes not examined in this study.

"Randomized trials of glycemic control in hospitalized patients may benefit from focusing on diseases where the risk of death from hyperglycemia appears to be greatest," Dr. Falciglia concluded. ■

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