



# Stress Hyperglycemia in Acute Illness: Mechanisms, Risks and Clinical Considerations

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## DESCRIPTION

Stress hyperglycemia refers to a temporary elevation in blood glucose levels that occurs during periods of acute illness, trauma, surgery, or severe psychological strain. Unlike chronic hyperglycemia seen in diabetes mellitus, this condition can arise in individuals with no prior history of abnormal glucose regulation. It represents a physiological response to stress in which hormonal and inflammatory pathways interact to increase circulating glucose. Although often transient, stress hyperglycemia is associated with significant clinical implications, particularly in hospitalized patients.

When the body encounters severe stress, it activates a complex neuroendocrine response designed to preserve energy supply for vital organs. Hormones such as cortisol, catecholamines, glucagon, and growth hormone are released in higher amounts. These substances promote glucose production in the liver while reducing the effectiveness of insulin in peripheral tissues. As a result, blood glucose concentrations rise. This process ensures that organs like the brain and heart receive adequate fuel during critical situations. However, excessive or prolonged elevation of glucose may contribute to adverse outcomes.

Inflammation plays an important role in this response. Acute illness often triggers the release of cytokines and other inflammatory mediators. These compounds further impair insulin signaling and promote glucose release into the bloodstream. In patients with sepsis, major trauma, or severe infections, this combined hormonal and inflammatory activity can lead to pronounced hyperglycemia. Even individuals without diabetes may develop significantly elevated glucose levels under such conditions.

Stress hyperglycemia is frequently observed in intensive care units. Patients recovering from cardiac surgery, stroke, or severe respiratory failure often exhibit elevated blood glucose readings. The condition is also common in individuals with acute myocardial infarction or head injury. Studies have shown that higher glucose levels during hospitalization may correlate with

increased morbidity and mortality, particularly among those without preexisting diabetes. The exact reasons for this association remain under investigation, but potential mechanisms include immune dysfunction, increased oxidative stress, and impaired wound healing.

Distinguishing stress hyperglycemia from previously undiagnosed diabetes is an important aspect of clinical evaluation. Measurement of glycated hemoglobin provides insight into average blood glucose levels over the preceding two to three months. If this value is within normal limits while current glucose readings are elevated, stress hyperglycemia is more likely. Accurate differentiation guides both immediate management and long-term follow-up planning.

Management strategies focus on maintaining blood glucose within a safe range while avoiding hypoglycemia. In hospitalized settings, insulin therapy is often used because of its rapid and controllable effects. Continuous intravenous insulin infusions may be administered in critical care environments, with frequent monitoring to ensure stable levels. Subcutaneous insulin regimens are typically sufficient for less severe cases. Tight glucose control must be balanced against the risk of low blood sugar, which can also lead to complications.

The presence of stress hyperglycemia can reveal underlying vulnerability in glucose metabolism. Some individuals who develop elevated blood sugar during hospitalization may later be diagnosed with type 2 diabetes. Therefore, follow-up testing after recovery is advisable. Post-discharge screening allows healthcare providers to determine whether glucose levels have returned to normal or if ongoing management is required. The pathophysiology of stress hyperglycemia continues to be an area of active research.

## CONCLUSION

Stress hyperglycemia represents a temporary elevation in blood glucose arising from the body's response to acute physical or emotional strain. Although intended as an adaptive mechanism

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to supply energy during critical situations, excessive glucose levels may contribute to complications. Careful monitoring, appropriate insulin therapy, and follow-up evaluation after recovery are essential components of care. Awareness of this condition enhances clinical decision-making and supports better outcomes for patients experiencing severe illness or injury.

Scientists are exploring the interaction between immune signaling, hormonal shifts, and cellular metabolism. Improved understanding may refine treatment approaches and clarify which patient groups benefit most from targeted glucose management during acute illness.