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ORIGINAL ARTICLES

Assessment of Blood Glucose Control in the Pediatric Intensive Care Unit: Extension of the Glycemic Penalty Index toward Children and Infants

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Abstract

Background:

The glycemic penalty index (GPI) is a measure to assess blood glucose (BG) control in critically ill adult patients but needs to be adapted for children and infants.

Method:

The squared differences between a clinical expertise penalty function and the corresponding polynomial function are minimized for optimization purposes. The average of all penalties (individually assigned to all BG readings) represents the patient-specific GPI.

Results:

Penalization in the hypoglycemic range is more severe than in the hyperglycemic range as the developing brains of infants and children may be more vulnerable to hypoglycemia. Similarly, hypoglycemia is also more heavily penalized in infants than in children.

Conclusions:

Extending the adult GPI toward the age-specific GPI is an important methodological step. Long-term clinical studies are needed to determine the clinically acceptable GPI cut-off level.

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Abbreviations: (BG) blood glucose, (GPI) glycemic penalty index, (ICU) intensive care unit, (IIT) intensive insulin therapy, (TGC) tight glycemic control

Keywords: blood glucose, children, critically ill patients, evaluation, glycemic penalty index, infants

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