Iterative management and improvement of a single insulin protocol in intensive care

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Introduction

The variability of insulin requirements is well known in intensive care patients. Insulin resistance is different in each patient and in the same patient depending on its evolution. Insulin is a drug with a low therapeutic margin. The recommendations [1] are to formalize a protocol to secure its administration and to raise awareness of the seriousness of the sequelae in the event of profound hypoglycemia. We present here the method and the modifications of our protocol according to the adverse events observed.

Description

A protocol has been developed for all 7 intensive care units of our hospital for more or less six years. This consists of an initiation phase and a stabilization phase. Based on the analysis of reported adverse events, we have developed and adapted the protocol according to 3 axes: 1) the subcutaneous protocol, 2) intravenous and 3) preparation for exit to non-intensive wards via 3 different profiles. In two units, we have set up a prospective collection of the reasons formulated by users for deviating from the protocol. On all 7 units, we have automated the collection of an indicator "number of hypoglycemia occurring during a day with insulin, related to the number of days with insulin", both to provide a continuous feedback available on the management tool made available on the intranet to head nurses and permanent doctors in the department, and to select the most severe hypoglycemia by analyzing individual cases.

Discussion

Compliance with the first protocol appears low. Its content is considered unsuitable and does not consider the slope of blood sugar between 2 measurements. This induces informal and intuitive adaptations of insulin infusion flow. The transition from the initiation phase to the stabilization phase is not sufficiently explicit. The lack of staff and the heavy workload encourage the spacing out of blood glucose checks. For example, blood glucose monitoring one hour after a change in intravenous insulin dosage is not always performed. The new protocol considers the delta of glycaemia and adapts the infusion in percentage of flow rather than in units of insulin. During tests, extreme flow rates cause compliance problems and lead to excessive variations in insulin flow and blood glucose levels. A third version will eliminate small extreme data rates by widening the target band and optimizing the frequency of checks. The data from the prospective collection of the reasons for deviation from the protocol and those from the automated monitoring system are currently under analysis.

Reference

1. Jacobi J, Bircher N, Krinsley J, et al. Guidelines for the use of an insulin infusion for the management of hyperglycemia in critically ill patients. Crit Care Med. 2012; 40:3251–3276.