This study primarily aimed to evaluate the efficacy of a dynamic algorithm of intravenous insulin therapy in non-critically-ill patients, and addressed its safety and feasibility in different departments of our university hospital" Montanier et al (2019).

Abstract:

INTRODUCTION: Insulin infusion is recommended during management of diabetic patients in critical care units to rapidly achieve glycaemic stability and reduce the mortality. The application of an easy-to-use standardized protocol, compatible with the workload is preferred. Glycaemic target must quickly be reached, therefore static algorithms should be replaced by dynamic ones. The dynamic algorithm seems closer to the physiological situation and appreciates insulin sensitivity. However, the protocol must meet both safety and efficiency requirements. Indeed, apprehension from hypoglycaemia is the main deadlock with the dynamic algorithms, thus their application remains limited. In contrary to the critical care units, to date, no prospective study evaluated a dynamic algorithm of insulin infusion in non-critically ill patients.

AIM: This study primarily aimed to evaluate the efficacy of a dynamic algorithm of intravenous insulin therapy in non-critically-ill patients, and addressed its safety and feasibility in different departments of our university hospital.

METHODS: A "before-after" study was conducted in five hospital departments (endocrinology

and four “non-expert” units) comparing a dynamic algorithm (during the “after” period-P2) to the static protocol (the “before” period-P1). Static protocol is based on determining insulin infusion according to an instant blood glycaemia (BG) level at a given time. In the dynamic algorithm, insulin infusion rate is determined according to the rate of change of the BG (the previous and actual BG under a specific insulin infusion rate). Additionally, two distinct glycaemic targets were defined according to the patients’ profile: 100-180 mg/dl (5.5-10 mmol/l) for vigorous patients and 140-220 mg/dl (7.8-12.2 mmol/l) for frail ones. Different BG measurements for each patient were collected and recorded in a specific database (e-CRF) in order to analyse the rates of hypo- and hyperglycaemia. A satisfaction survey was also performed. A study approval was obtained from the institutional revision board before starting the study.

RESULTS: Over 8 months, 72 and 66 patients during P1 and P2 were respectively included. The dynamic algorithm was more efficient, with reduced time to control hyperglycaemia (P1 vs P2:8.3 vs 5.3 hours; HR: 2.02 [1.27; 3.21]; p<0.01), increased the number of in-target BG measurements (P1 vs P2: 37.0% vs 41.8%; p<0.05), and reduced the glycaemic variability related to each patient (P1 vs P2, %CV: 40.9 vs 38.2;p<0.05, Index Correlation Class:0.30 vs 0.14; p<0.05). In patients after the first event of hypoglycemia after having started the infusion, new events were lower (P1 vs P2: 19.4 vs 11.4; p<0.001) thanks to an earlier reaction to hypoglycaemia (8.3% during P1 vs 44.3% during P2; p = 0.004). With the dynamic algorithm, the percentage of recurrence of mild hypoglycaemia was significantly lower in frail patients (20.5% vs 10.2%; p<0.001), and in patients managed in the non-expert units (18 vs 7.1%, p<0.001). The %CV was significantly improved in frail patients (36.9%). Mean BG measurements for each patient/day were 5.5±1.1 during P1 and 6.0±1.6 during P2 (p = 0.6). The threat from hypoglycaemia and the difficulty in using dynamic algorithm are barriers for nurses' adherence. CONCLUSIONS: This dynamic algorithm for non-critically-ill patients is more efficient and safe than the static protocol, and adapted for frail patients and non-expert units.

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Montanier, N., Bernard, L., Lambert, C., Pereira, B., Desbiez, F., Terral, D., Abergel, A., Bohatier, J., Rosset, E., Schmidt, J., Sautou, V., Hadjadj, S., Batisse-Lignier, M., Tauveron, I., Maqdasy, S. and Roche, B. (2019) Prospective evaluation of a dynamic insulin infusion algorithm for non critically-ill diabetic patients: A before-after study. PLoS One. 14(1), p.e0211425. eCollection 2019.

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