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Basal-bolus insulin

Traditionally there have been three tiers of intensity of management of glycaemic control for hospitalised diabetic patients during acute illness. These are, from highest intensity:

- Intravenous insulin infusion
- Subcutaneous sliding scale insulin (SSSI)
- Maintenance of normal background therapy

It has become clear that SSSI regimens do not necessarily enable good glycaemic control, and may in fact worsen it, with hyperglycaemia (blood glucose level (BGL) >10mmol/l) being common. In-house research at RGH suggests that patients receiving subcutaneous sliding scale insulin frequently have blood glucose levels that do not fall within the desired range (4-10mmol/L). Problems that might contribute to this include issues with the review and alteration of SSSI after initial ordering, and a lack of a uniform approach to the design of SSSI regimens.

In the broader context, in recent years the consequences of allowing hospitalised patients to remain hyperglycaemic during their admission has become an increasing focus of attention. The importance of this issue extends beyond critically ill patients to more routine admissions, such as exacerbations in airways disease, heart failure, infections, and post-surgical patients. Hyperglycaemia in this setting is associated with increased mortality, increased lengths-of-stay, increased infection rates and increased cost to the hospital.

While it is clear SSSI regimens need to be replaced, the issue of what to use instead has remained largely unanswered. A recent publication however, has cast some light on this. Umpierrez et al compared patients on an SSSI regimen with a basal-bolus regimen.

The study population consisted of known insulin-naive diabetic patients admitted for non-surgical treatment, and excluded intensive care patients. The prospective, randomised trial studied 65 patients in each arm, with all oral anti-diabetic drugs being discontinued on enrolment. Patients in the basal-bolus arm were commenced on a daily insulin dose of 0.4 or 0.5 IU/kg, depending on their admission BGL. Half of this was given as a single daily dose of long-acting insulin (glargine) and half as doses of rapid-acting insulin (glulisine) at mealtimes. SSSI patients received regular insulin four times daily according to BGLs at the time, with a choice of insulin sensitive, usual, or insulin resistant regimens, depending on response. The goal of therapy was to maintain fasting and pre-meal BGLs below 140mg/dL (7.8mmol/L).

After four days of management, the basal-bolus group recorded significantly lower BGLs (on average about 2mmol/L lower), and this continued through to day 10. Despite basal-bolus patients receiving significantly higher daily doses of insulin (42 units versus 13 units) only two episodes of hypoglycaemia occurred in each group. Further to this, after four days of SSSI management, there were nine patients who were still experiencing increasing daily BGLs >240mg/dL (13.3mmol/L). When these patients were transferred to basal-bolus, their BGL control rapidly improved.

Umpierrez G et al. *Diabetes Ca*re 2007;30:2181-6.

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