Reviewer's report

Title: Glucose control in intensive care: Usability, efficacy and safety of Space GlucoseControl in two medical European intensive care units

Version: 1 Date: 14 May 2014

Reviewer: James Krinsley

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Overview

Amrein and coinvestigators have performed an industry-sponsored evaluation of the Space GlucoseControl, a computerized bedside decision support system created to improve glycemic control in 2 European ICU's. The device integrates information from enteral and parenteral infusions, as well as insulin infusion, to provide guidance about insulin dosing. The manuscript is generally very well written and the patient population studied, albeit small, was quite ill, with mean APACHE II score 24.8 and 25% hospital mortality. The question posed by the authors is well defined and the experimental methods are appropriate and well described.

Major compulsory revisions

Please consider adding as a potential limitation the use of the bedside glucometers as the BG measurement device. There is a significant literature describing analytic inaccuracies associated with their use in critically ill patients.

Please consider discussing as a potential limitation of the investigation the BG measurement interval. The mean interval of 2.2 hours was likely associated with “missed” hypoglycemic and hyperglycemic excursions (described in other literature that used continuous or near-continuous measuring devices). In fact, the single episode of severe hypoglycemia that occurred in the cohort was an example of this; the previous BG measurement had been obtained 4 hours earlier. The investigators note that 15% (6/40) of the patients sustained moderate hypoglycemia (associated with increased risk of death in the literature); this reviewer suspects that a higher measurement frequency may have identified a higher percentage.

There is confusion about description of the primary endpoint – whether it is percentage of values in the target range or time in target range. Please see Page 8 and Table 2, as examples.

The subjective assessments of the 2 different nursing staffs are referred to in the text at the end of the Results section and explored in some detail in the Discussion section. Review of Table 4 reveals dramatic differences between the 2 units. The Zurich ICU nurses had a remarkably adverse opinion of the device,
with concerns about workload, reliability, efficacy, etc, even though there was a study nurse who helped during daytime hours (Page 7). Since this device is commercially available (in Europe) and readers of this study may wish to consider use of the device in their own ICU, further discussion of this feedback from the bedside users seems warranted.

Minor compulsory revisions

I would recommend avoiding unnecessary adjectives. For example, Abstract/Conclusions: “…two large European medical intensive care units;” Page 4, Introduction: “…euphoric reactions;” Page 6, Methods “…two large tertiary academic centers.”

Page 4 – Please consider adding citations to the first sentence of the 2nd paragraph: (“Poor glycemic control represented by hyperglycemia, hypoglycemia and high variability is strongly and consistently associated with poor clinical outcomes.”)

Page 4 - Please consider revising the sentence that includes “…one of the least common denominators.” This phrase is unclear.

The authors may wish to cite the large study done by Juneja et al, evaluating a computer-assisted insulin dosing algorithm in a very large cohort of critically ill patients (2,398) – Diab Tech Ther 2007 (93):232-240.

Page 4 – please change “…the quality of GC besides reducing workload” to “the quality of GC and reducing workload.”

Page 9 – please change “…more favorable” to “more favorably.”

Table 1 – Does the admission diagnosis “Resuscitation” mean post cardiac arrest?

Figure 2 seems to be a repeat of the data detailed in Table 4. In addition, the designations “Delios 01” and “Delios 04” are unclear. Perhaps the Figure should be removed.

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Needs some language corrections before being published

Statistical review: Yes, and I have assessed the statistics in my report.

Declaration of competing interests:

I have served as a consultant, or done Advisory Board work for companies that
are creating continuous or near-continuous blood glucose monitors: Medtronic, Edwards Life Sciences, OptiScan Biomedical. However, this has not affected my ability to render a fair and comprehensive evaluation of this manuscript, as is reflected in my comments above.