



An audit of glycaemic control in the intensive care unit

A Birkinshaw¹, C Webb¹, EJ Walter¹
1. Intensive Care Unit, Royal Surrey County Hospital, Guildford, Surrey, UK.

Royal Surrey County Hospital NHS Foundation Trust

Background

Hyperglycaemia has long been recognised as a problem in critically ill patients. Tight glycaemic control of between 4.0 and 6.1 mmol/L was advocated after a 2001 study¹. The later NICE-SUGAR trial suggests that a more relaxed target of less than 10 mmol/L results in lower rates of hypoglycaemia and mortality².

The previous Royal Surrey County Hospital (RSCH) ICU protocol advised a target blood sugar between 4 and 7 mmol/L. An audit of blood sugar control in 2015 highlighted poor levels of control³, and suggested an update in the protocol. A new policy was introduced, advocating that blood sugars be kept between 4.0 and 10 mmol/L in line with current evidence. This audit reviews glycaemic control with the new protocol compared with the old policy.

Methods

Data were retrospectively collected data from 100 consecutive patients admitted to the ICU between December 2015 and January 2016, using the patients' electronic records.

Fourteen of the patients were diabetic and their data were excluded from the analysis.

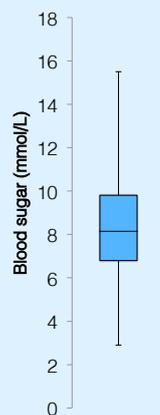
Blood sugars recorded within the first 24 hours of admission, and whether insulin was started according to the protocol, were analysed.

Results

514 results, from 86 patients, were recorded. The age range was 20 to 92 years. In changing the target blood sugar range from 4-7 mmol/L to 4-10 mmol/L, the number of readings within the target range increased from 29.3% to 78.6% (see table 1, and graph 1). The range was 2.9 to 15.5 mmol/L, with a median of 8.15 mmol/L. Only 4.2% of patients had insulin started according to the protocol.

The incidence of hypoglycaemic events was improved, falling from 1.9% to 0.4%.

The new policy has however increased the number of hyperglycaemic events (greater than 10 mmol/L), from 16.5% to 21%.



Graph 1: Box whisker plot to show the average and range of blood sugar results

	Old policy	New policy
Age range (years)	21 - 93	20 - 92
Number of readings	569	514
Hypoglycaemic episodes	11 (1.9%)	2 (0.4%)
Readings between 4 and 7 mmol/L	167 (29.3%)	
Readings between 4 and 10 mmol/L	464 (81.5%)	108 (78.6%)

Table 1: Table to show the blood sugar readings with the old compared with the new policy

Discussion

Introducing a new glycaemic control protocol in line with current evidence has improved the incidence of normoglycaemia and reduced the incidence of hypoglycaemic episodes. However, the frequency of hyperglycaemic episodes was higher.

Adherence with the protocol was poor. This was due to a variety of reasons, most commonly because a higher insulin dose than the protocol advised was required to achieve normoglycaemia. The protocol has therefore been modified so that the insulin dose can be increased if the patient remains hyperglycaemic, instead of a fixed insulin dose.

Further adaptation of the glycaemic control protocol is required to lower the incidence of hyperglycaemic episodes. The insulin dose for a given blood sugar may need to be increased, and there needs to be greater flexibility to adjust the dose if blood sugar levels remain outside the target range.

A further audit would then be required to analyse whether these changes have achieved improved blood sugar control.

References

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2. The NICE-SUGAR Study Investigators. Intensive versus conventional glucose control in critically ill patients. The New England Journal of Medicine 2009. 360(13): 1283-1297.
3. Edwards RM, Angelini T, Miller C, Walter EJ. Glycaemic control in the Intensive Care Unit An Audit of Clinical Practice. 2015.