

What goes up must come down. Hypoglycaemia following insulin for hyperkalaemia treatment

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INTRODUCTION

Hyperkalaemia, especially when serum potassium >6 mmol/L, is a medical emergency and needs prompt medical treatment to avoid adverse patient outcome such as cardiac arrest. The mainstay of treatment for hyperkalaemia is intravenous short-acting insulin and Glucose Therapy (IGT), although it is associated with a risk of hypoglycaemia (incidence rate 8-21%).¹⁻² The Northern Health (NH) hyperkalaemia procedure states blood glucose level (BGL) monitoring post IGT should occur at regular intervals, regardless of the patient's diabetes status.

AIM

Identify incidences of hypoglycaemia post IGT and to assess compliance with NH's hyperkalaemia procedure, with respect to BGL monitoring.

METHOD

A retrospective audit to measure compliance with the NH hyperkalaemia procedure, with respect to BGL monitoring was conducted for June 2021. Inpatients with a serum potassium level ≥ 6 mmol/L and treated with IGT were reviewed through electronic medical records. Data on patient characteristics, frequency of BGL monitoring & blood glucose levels was collected. Hypoglycaemia was defined as BGL < 4 mmol/L. NH hyperkalaemia procedure states BGL monitoring should occur prior to therapy, followed by 30-minute checks for 2 hours, then hourly checks for 4 hours.

RESULTS

275 inpatient specimens recorded serum potassium >5.5 mmol/L from June 2021

83 patients had serum potassium >6 mmol/L (IV insulin therapy is recommended)

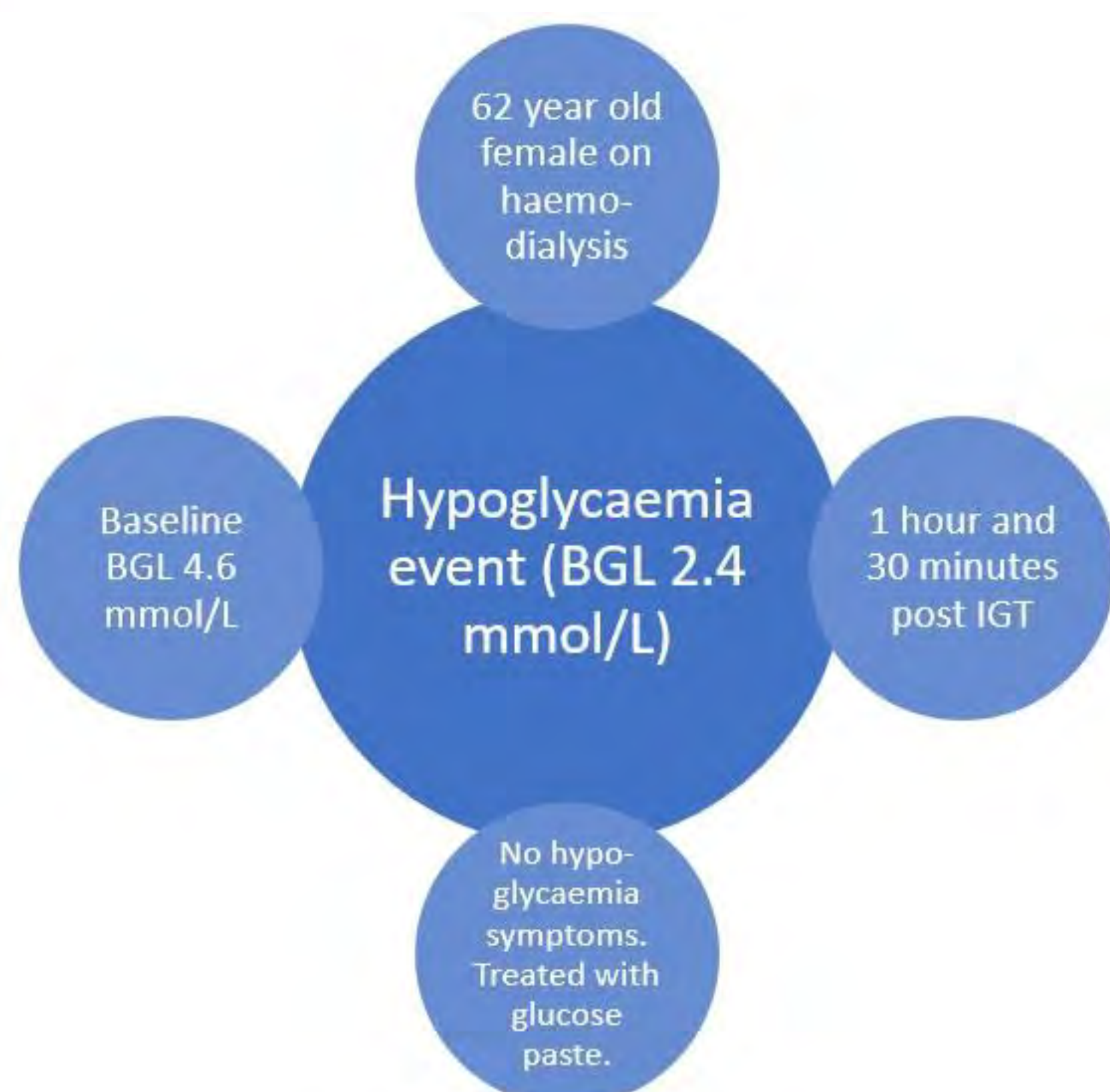
16 patients included

67 patients excluded

1 hypoglycaemia event

56 did not receive IGT (including haemodialysis)
5 End of Life Care
6 Insulin infusion

- Sixteen patients met inclusion criteria (serum potassium >6 mmol/L and treated with IGT) and one incident (6.25%) of hypoglycaemia with BGL 2.4 mmol/L was noted 1.5 hours post IGT. (See Graph 1)



Graph 1. Details of hypoglycaemia event.

Characteristic	Results
Age, mean	66
Sex	62.5% male, 37.5% female
History of diabetes mellitus	62.5%
Prior use of oral hypoglycaemic agents or insulin	50%
History of chronic kidney disease (eGFR<60mL/min, inc haemodialysis)	93.8%

Table 1. Patient characteristics.

Characteristic	Results
IV glucose	81.3%
Insulin type	62.5% Actrapid®, 37.5% Novorapid®
Insulin dose	93.8% 10 units
Monitor BGL (any)	100%
• Every 30 minutes for 2 hours	25%
• Every hour for 4 hours	25%
Number of BGL monitoring (avg. per patient)	2
Location	Emergency department (100%)

Table 2. Details of insulin and glucose therapy.

- The proportion of patients with chronic kidney disease was higher than expected when compared with other similar studies.
- 81.3% of patients received IV glucose concurrently. The remaining 18.7% of patients had BGL >15 mmol/L so did not require IV glucose as per procedure.
- Both ultra-short-acting and short-acting insulins were prescribed, at standard dose of 10 units (except on one occasion, where 8 units was prescribed).
- Only one patient (6.25%) received BGL monitoring in accordance to procedure.
- All patients received some BGL monitoring, on average 2 measurements per patient (out of 8 measurements as recommended by procedure)
- Higher number of BGL monitoring was performed in patients with lower pre-treatment BGL (<7.9mmol/L) than patients with normal or high pre-treatment BGL (>8 mmol/L), 21 vs 14. Compliance rate was 37.5% vs 20%. (see Chart 1)

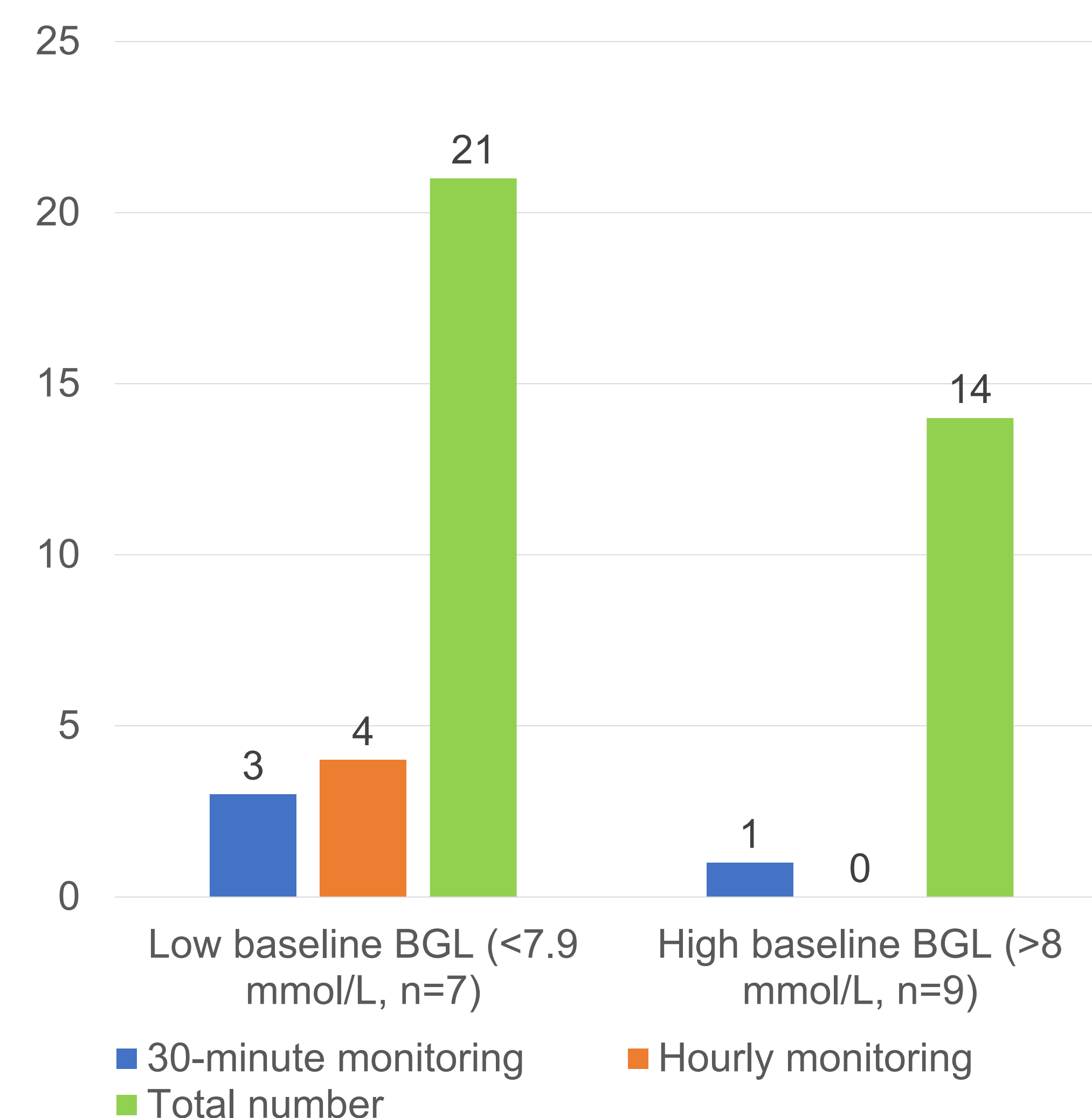


Chart 1. BGL monitoring post IGT

DISCUSSION & LIMITATIONS

- ONE hypoglycaemia event was captured during this audit. Incident rate was similar to other studies.
- All IGT was commenced in the Emergency Department, although it is acknowledged that some patients may have transferred to the ward prior to completion of BGL monitoring.
- Some studies suggested that weight-based dosing of insulin reduced risk of hypoglycaemia.³ This could not be assessed due to most patients included in this audit having received standard dose insulin.
- It was observed that reasons for non-compliance to BGL monitoring included doctors prescribing out-of-protocol monitoring frequency due to clinical judgement, lack of understanding of existing procedure, transfer of patient to other ward and competing clinical demands.
- Limitations of this audit were the fact it was single-centered, small sample size. Contributing factors to risk of hypoglycaemia were not analysed.

CONCLUSION

- Hypoglycaemia is a known complication of IGT. Frequent BGL monitoring can provide a trend of patient's BGL status, so clinical assessment and/or treatment can be administered in a timely manner, before adverse events occur.
- Compliance with post-treatment BGL monitoring was poor. However, patients' experience in frequent clinical procedures should also be taken into consideration when determining the post-treatment monitoring.
- Increasing familiarity with procedure through education and the use of Electronic Medical Records order set in the future may improve compliance.

REFERENCES

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