Real Time Continuous Glucose Monitoring in the Management of Neonates with Persistent Hypoglycemia

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INTRODUCTION

Persistent hypoglycaemia is common in the newborn, due to prematurity or congenital hyperinsulinism (CHI) and is associated with the risk of poor neurodevelopmental outcome. Adequate monitoring is critical in prevention but is dependent on frequent blood sampling.

AIM

We aimed to introduce real-time CGM to provide insights into patterns of dysglycaemia and to support the management of infants with persistent hypoglycemia.

METHOD

This is a single centre retrospective study of real-time CGM use over a 4-year period in babies with persistent hypoglycaemia. We had used the mean absolute relative difference (MARD), Bland -Altman analysis and Clarke Error grid plots to explore the impact of CGM.

RESULTS

CGMs were inserted in 14 babies: 8 term and 6 preterm infants, 10 with evidence of hyperinsulinism. The median age at first CGM insertion was 14 days (2-98 days), with a total of 224 days of data collected. A total of 1254 paired glucose values (CGM and blood) were available, and comparison gave a MARD of 11%. The CGM revealed marked fluctuations in glucose levels. There were 22 clinical episodes of hypoglycaemia (blood glucose <2.6mmol/l) and sensitivity for detecting hypoglycaemia was 0.73, specificity 0.94, positive predictive value 0.17 and negative predictive value of 0.99. The CGM data showed that neonates with CHI tended to have greater SD (1.52±0.79 mmol/l vs 0.77±0.22mmol/l, p= 0.07) compared to preterm infants.

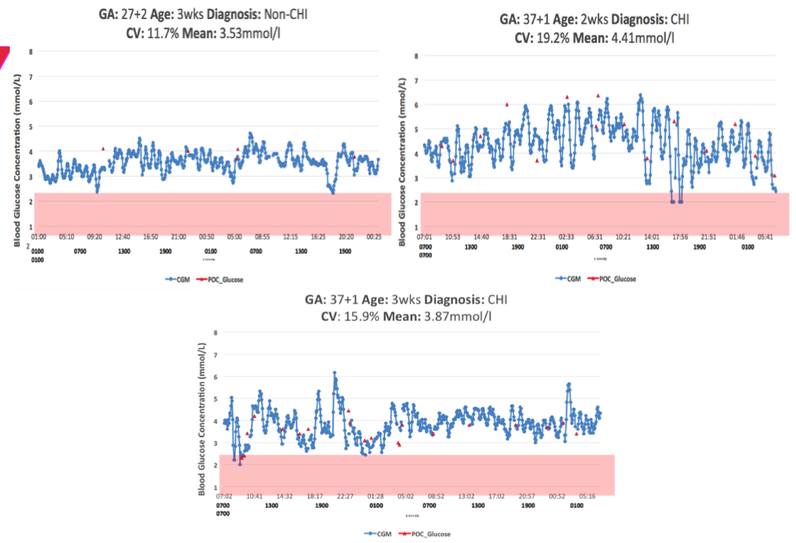

Figure 1: Shows representative CGM patterns of preterm non-hyperinsulinism baby and hyperinsulinism babies who were on diazoxide when on full hourly enteral feeds. This shows the dramatic fluctuations in glucose levels in infants with congenital hyperinsulinism on diazoxide compared to preterm infant who did not have hyperinsulinism and not on diazoxide.

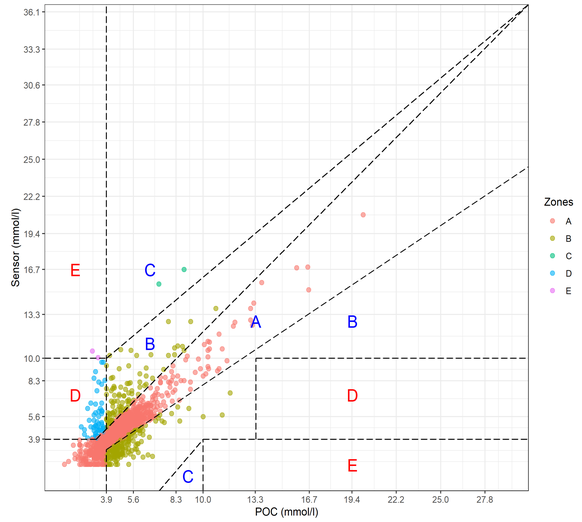

Figure 2: Clarke Error Grid showing the comparison of point of care and CGM glucose levels
Data points in each zone A 981(75%) B266 (20.6%) C2 (0.2%) D56 (4%) E 2(0.2%)

CONCLUSIONS

The CGM data highlighted marked fluctuations in glucose levels in babies with CHI, in contrast to preterm babies, and therefore the challenges of preventing hypoglycaemia in these babies when using intermittent blood glucose levels alone. The low sensitivity despite high specificity of CGM for hypoglycaemia means CGM results in high numbers of false positives but could help to reduce the frequency of blood sampling during normoglycaemia.

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