POCKET: Feasibility of the use of Point of Care Technology to Measure Ketone and Lactate levels in the Newborn at Risk from Hypoglycaemia.

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Background: Hypoglycaemia (Blood glucose < 2.6mmol/L) is common during the first week of life. Although this may be physiologically normal, hypoglycaemia can be pathological leading to neurological impairment. All infants therefore considered at risk of hypoglycaemia undergo blood glucose monitoring after birth. However, identifying those actually at risk from low blood glucose levels due to impaired counter regulation is challenging. Risks are associated with hypoglycaemia, but also from unnecessary separation of babies and mothers. Development of point of care (POC) technology that measures alternative fuels (ketones and lactate) could provide the means to identify those infants at significant risk, whilst avoiding separation of lower risk mothers and babies.

Aims: 1. To validate the accuracy of the Nova med point of care ketone meter in newborn babies considered at risk from hypoglycaemia. 2. To provide pilot data to support a study to investigate the role of these devices as part of standard clinical care.

Method: A prospective validation study at the Rosie Hospital, Cambridge. Infants were eligible if they were clinically stable and having blood glucose levels taken for clinical screening. Informed consent was sought from parents. Blood samples were taken pre feeds for glucose, ketones and lactate measurement at the cot side using the Nova StatStrip POC meters, with paired samples collected for laboratory comparison. The latter were immediately spun, separated and frozen at -20°C before being batch analysed using gold standard techniques (Siemens Dimension analyser).

Results: Forty paired samples were available for analyses with mean POC BG 3.05 mmol/l (SD=0.96), however only 11 samples were obtained when BG <2.6 mmol/l, all of whom were clinically well and asymptomatic for hypoglycaemia. The median (range) ketone levels measured both at the cot side 0.0 (0.0- 0.2) mmol/l and in the laboratory 0.1 (0.0-0.38)mmol/l were low and did not appear to be related to BG level. Lactate levels were significantly higher in hypoglycaemic infants mean (SD) 2.71 (1.8) vs 1.8 (0.99) p<0.01.

Discussion: The low levels of ketones in this population make validation of POC metres difficult, and raises question regarding the clinical importance of ketogenesis. The relation between hypoglycaemia and raised lactate also require further investigation, but if this preliminary evidence will be confirmed it might suggest that metabolic pathways alternative to ketogenesis are active in this patient population.