Outcomes of a quality improvement project integrating Continuous Glucose Monitoring Systems into the routine management of neonatal hypoglycaemia

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Study aim

We designed a quality improvement project successfully implementing the use of continuous glucose monitoring systems (CGMS) in hypoglycaemic infants in a Level 3 Neonatal Intensive Care Unit (NICU).

Methods

- CGMS are safe and have the potential to improve the management of neonatal hypoglycaemia.
- CGMS was first piloted in our NICU in June 2017. A New Generation Enlite™ Sensor (Medtronic, Northridge, California) was inserted into a term baby admitted with hypoglycaemia linked with a Minimed® REAL-Time Transmitter and MiniMed® 530G System.
- Five key problems were elucidated as potential barriers to the effective implementation of CGMS in our unit:
  - Lack of NICU staff confidence in device usage
  - Infant discomfort during device removal
  - Calibration errors
  - Wireless connection disruptions during nursing cares
  - Bruising after device removal resulting in parental dissatisfaction
- CGMS may need to be adapted for use within resource-limited, time-constrained clinical practice.

Aim

- We aimed to reduce the problem rate per patient associated with CGMS use in our NICU from 5 to 0 over a one-month period.

- This study was conducted from June 2017 to July 2017 in a level 3 NICU. A CGMS was inserted into five consecutive infants admitted with hypoglycaemia (≥1.5kg, hypoglycaemia <2.6mmol/L, first 48 hours of life).
- A pilot process followed by four “Plan-Do-Study-Act” (PDSA) cycles tested the change intervention.
- A run chart tracked the improvement in problem rate per patient over time.
- Eligible for inclusion were term neonates ≥1.5kg admitted for hypoglycaemia (<2.6mmol/L) within the first 48 hours of life.

Main Findings From PDSA Cycles

- Lack of staff confidence in device usage
  - Near-peer teaching methods (Peyton’s Four-Step Approach) successfully one-on-one teach NICU staff CGMS device usage
- Infant discomfort during device removal
  - The Neonatal Infant Pain Score (NIPS; >3=discomfort) monitored infant discomfort during insertion and removal
  - Oral dextrose gel (0.5ml/kg) reduces discomfort during insertion and removal
- Calibration errors
  - Educational sessions to NICU staff focused on technical aspects of device usage such as when and how to correctly calibrate
- Wireless connection disruptions during cuddles and cares
  - Notice on the incubator walls reminds parents and NICU staff to remove the MiniMed® from the incubator along with baby
- Bruising after device removal resulting in parental dissatisfaction
  - Layer of Duoderm® reduces bruising
  - Loosening adhesive dressings resulted in device dislodgement.

Discussion

- We implemented a change intervention in a structured manner using basic quality improvement methodologies and elucidated aspects of its use that need to be adapted for its successful incorporation into real-life clinical practice.
- Future quality improvement projects incorporating CGMS into hypoglycaemia management protocols might investigate its potential to improve key clinical outcome measures such as duration of hypoglycaemia or duration of NICU stay.