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

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Study aim

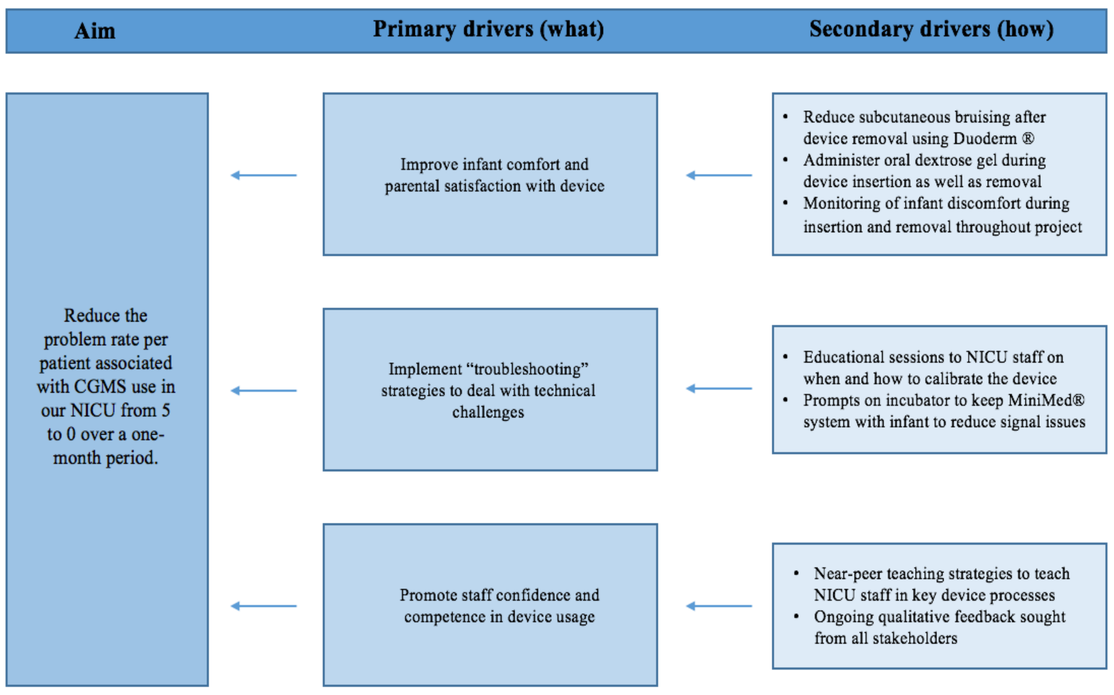
We designed a quality improvement project successfully implement the use of continuous glucose monitoring systems (CGMS) in hypoglycaemic infants in a Level 3 Neonatal Intensive Care Unit (NICU)

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.

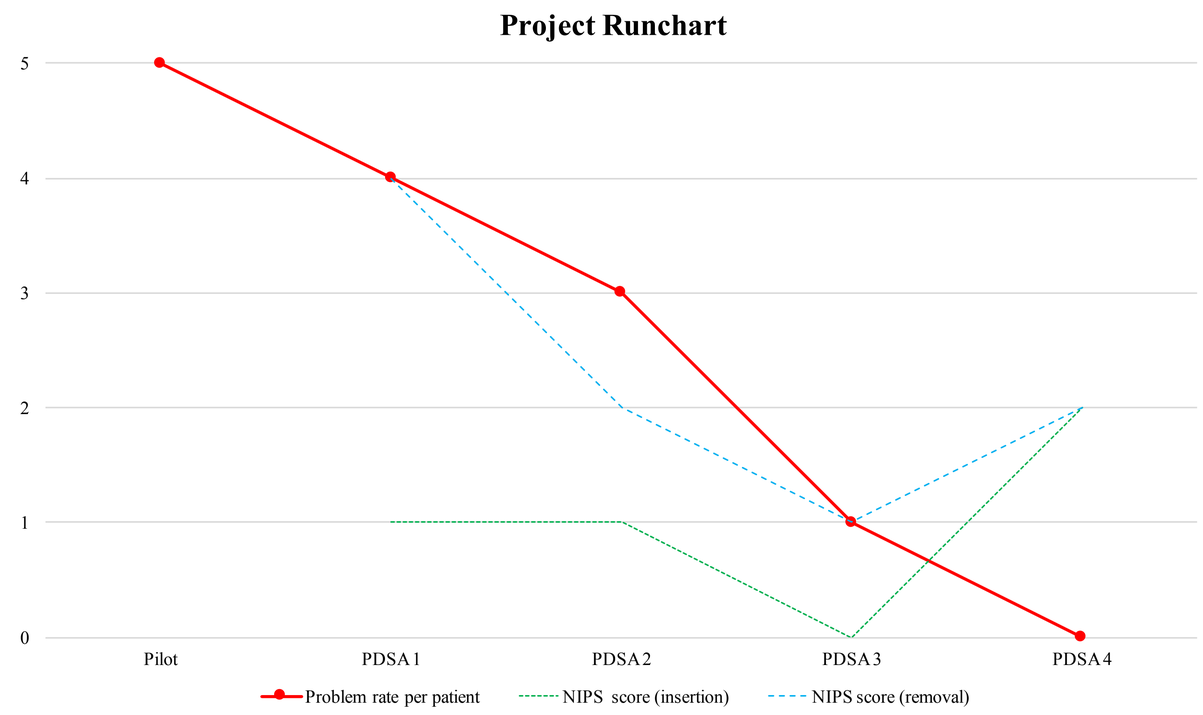


- This study was conducted from June 2017 to July 2017 in a level 3 NICU. A CGMS was inserted into five consecutive infants admitted with hypoglycaemia (≥1.5kg, hypoglycaemia <2.6mmol/L, first 48 hours of life)
- A pilot process followed by four "Plan-Do-Study-Act" (PDSA) cycles tested the change intervention
- 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

Problem/error	Pilot	PDSA 1	PDSA 2	PDSA 3	PDSA 4
Infant discomfort during device removal	X	X			
Bruising after device removal	X				
Wireless connection losses	X		X	X	
Calibration errors	X	X	X		
Lack of staff confidence in device usage	X	X	X		
Device dislodgement		X			
Total identified problems per patient	5	4	3	1	0

- **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

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