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Use of CGM in Monitoring Neonatal Diabetes

Emily Metzinger
Children's Mercy Kansas City

Kelsee Halpin
Children's Mercy Kansas City

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Use of Continuous Glucose Monitoring in Managing Neonatal Diabetes in a Very Low Birth Weight Infant with a GATA-6 Mutation

Emily Metzinger, MD[1] and Kelsee Halpin, MD, MPH[1,2]

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[1]Children's Mercy Kansas City, [2]University of Missouri Kansas City – School of Medicine

Introduction

- Preterm infants are at an increased risk of impaired glucose control which is associated with morbidity and mortality.
- There have been several reports evaluating the use of continuous glucose monitors (CGM) in neonates, but there is limited data on CGM use in the management of neonatal diabetes.
- We describe CGM use in a very low birth weight (VLBW) infant with neonatal diabetes mellitus (NDM), reporting outcomes 14 days prior to and following CGM placement.

Clinical Case

- 35-week gestation female infant with IUGR, VLBW, and truncus arteriosus was admitted to the NICU.
- On DOL 5 she started on an IV regular insulin infusion (0.5 unit/mL) for NDM secondary to a GATA-6 mutation. Target glucose was 150-250 mg/dL due to fear of hypoglycemia.
- Weight gain was poor due to hyperglycemia, preventing her from reaching an adequate weight for cardiac repair.
- NICU, nursing, and diabetes leadership discussed CGM trial to hopefully optimize NDM control and improve weight gain.
- Family signed a procedure consent for the use of CGM after review of available literature, risks, and benefits.
- On DOL 48, weighing 1.59kg, CGM (Dexcom G6) was placed.
- A titration chart for nursing was created to titrate her insulin infusion according to the CGM glucose levels and trend arrows (Table 3).
- Correlation between CGM and point-of-care (POC) glucose levels, patient outcomes, and adverse events were monitored.

Image 1

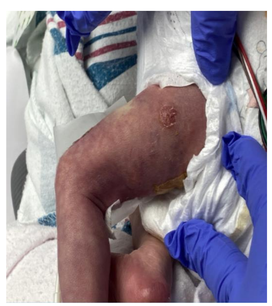

Image 2

Image 3

Images: CGM Sites
Image 1: First CGM placement
Image 2: CGM site after removal
Image 3: New CGM site placement

Patient Outcomes

	Prior to CGM Placement	After CGM Placement
Average Glucose (mg/dL)	238.4±100	176.9±68
# of POC Checks per Day	10.2	6.9
# of Total Glucose Checks per Day	10.2	33.5
Time in Range (70-180 mg/dL)	31%	51%
Mean Daily Insulin Use (units)	0.42	0.52
Weight Gain (g/day)	11.4	20.7
Hypoglycemia: % of checks (<70mg/dL / <50mg/dL)	1.3 / 0.7	3.0 / 2.0
Hypoglycemia: # of D10 Boluses Administered	1	1

Table 1: Outcomes 14 days prior to and after CGM placement.

Glucose, Weight, and Insulin Trends

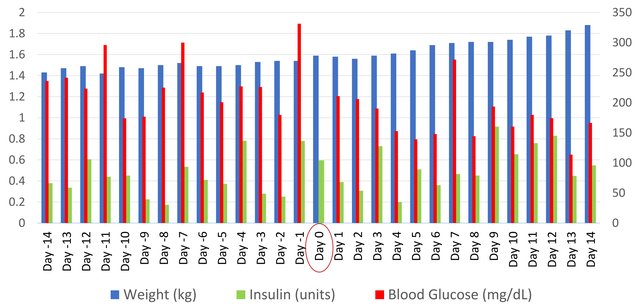

Figure 1: Blood glucose, weight, and insulin trends prior to and after CGM placement. Date of CGM placement is Day 0 (circled).

Correlation between CGM and POC Glucose Readings

	<10%	<20%	<30%	Dexcom's 20 Rule
Discrepancy between CGM and POC (%), N = 54	17	44	70	44

Table 2: Discrepancy between CGM and POC. POC were drawn within 5 minutes of recorded CGM value. There were 54 total values to compare.

Initial Insulin Infusion Titration Chart

CGM (mg/dL)	Trend Arrow	Rate Change	Comments
100-200	Steady	No change	Maintain insulin rate, generally no less than 0.01 units/kg/hr
200-300	Angled rise	Increase by 0.005 units/kg/hr	
200-300	Vertical rise	Increase by 0.01 units/kg/hr	
>300	Angled rise	Increase by 0.01 units/kg/hr	Check CGM in 30 minutes to observe for change in trend, otherwise increase drip
>300	Vertical rise	Increase by 0.02 units/kg/hr	
100-150	Angled fall	Decrease by 0.005 units/kg/hr	Maintain insulin rate, generally no less than 0.005 units/kg/hr unless <100
150-250	Vertical fall	Decrease by 0.01 units/kg/hr	

Table 3: Initial titration chart for regular insulin infusion. Titration chart was adjusted several times based on blood glucose trends.

Adverse Events

- Small abscess with overlying cellulitis was identified underneath CGM site. Received 7-day course of IV antibiotics with resolution.
- Bruising and skin breakdown were noted at the site (Image 2).
- No further skin infection or breakdown occurred during hospital stay.

Conclusion / Discussion

- CGM increased time spent in target range and daily insulin use while decreasing POC glucose checks.
- Daily weight gain improved allowing patient to undergo cardiac repair on DOL 125.
- Prior to discharge she transitioned to SQ dilute U-10 lispro. She continued CGM per family preference.
- Glucose management in NDM can be optimized with CGM use; however, the area of CGM placement should be monitored for signs of infection.

References

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Galderisi A, Facchinetti A, Steil GM, et al. Continuous Glucose Monitoring in Very Preterm Infants: A Randomized Controlled Trial. *Pediatrics.* 2017;140(4):e20171162