Decreasing Interventions for Transient, Asymptomatic Hypoglycemia in a Level III Nursery

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FETAL-NEONATAL GLUCOSE TRANSITION

Physiologic transition between fetal and neonatal glucose homeostasis includes a nadir before natural recovery at 2-4 hours of life

- Nadir can be ≤ 30mg/dL

Thompson-Branch A, Havranek T. Neonatal hypoglycemia. Pediatr Rev. 2017;38(4):147-157; Rozance PJ, Wolfsdorf JI. Hypoglycemia in the Newborn. Pediatr Clin North Am. 2019;66(2):333-342.

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RISK FACTORS

Risk factors for transient, asymptomatic hypoglycemia:

- Admission to the NICU
- Small for gestational age
- Intrauterine growth restriction
- Large for gestational age
- Infants of diabetic mothers
- Delayed enteral feeds
- Late pre-term gestation

Tas E, Garibaldi L, Muzumdar R. Glucose homeostasis in newborns: an endocrinology perspective. Neoreviews. 2020;21(1):e14-e29.

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IMPLICATIONS OF INTERVENTIONS

Prolongs NICU admission, impairs dyad bonding, decreases breast-feeding rates, and increases pain-induced stress in neonates

Hypoglycemic events previously correlated with neonatal brain injury and adverse neurodevelopmental outcomes

- Inconsistencies in National Policy statements lead to practice differences

Mckinlay CJ, Alsweiler JM, Ansell JM, et al. Neonatal Glycemia and Neurodevelopmental Outcomes at 2 Years. N Engl J Med. 2015;373(16):1507-18.; Thompson-Branch A, Havranek T. Neonatal hypoglycemia. Pediatr Rev. 2017;38(4):147-157.

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EMERGING EVIDENCE FOR CHANGE

Children with Hypoglycemia and Their Later Development (CHYLD) Study:

- 25% of control infants had glucose <47mg/dL detected on continuous monitoring, not treated
- No increase in neurosensory impairment in neonates with hypoglycemic event on intermittent glucose checks
- Only glucose associated neurosensory impairment was in infants who received intravenous dextrose infusion or bolus dextrose

Mckinlay CJ, Alsweiler JM, Ansell JM, et al. Neonatal Glycemia and Neurodevelopmental Outcomes at 2 Years. N Engl J Med. 2015;373(16):1507-18.

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OUR PRACTICE

- Initiate intravenous dextrose infusion shortly after delivery
- Obtain first blood glucose immediately after clinical stabilization
- No consistent lower limit threshold for intervention
- No goal time to begin enteral feeds

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MISSION STATEMENT

- To improve the screening and management of transient asymptomatic hypoglycemia in infants ≥ 35 weeks gestational age admitted to the NICU

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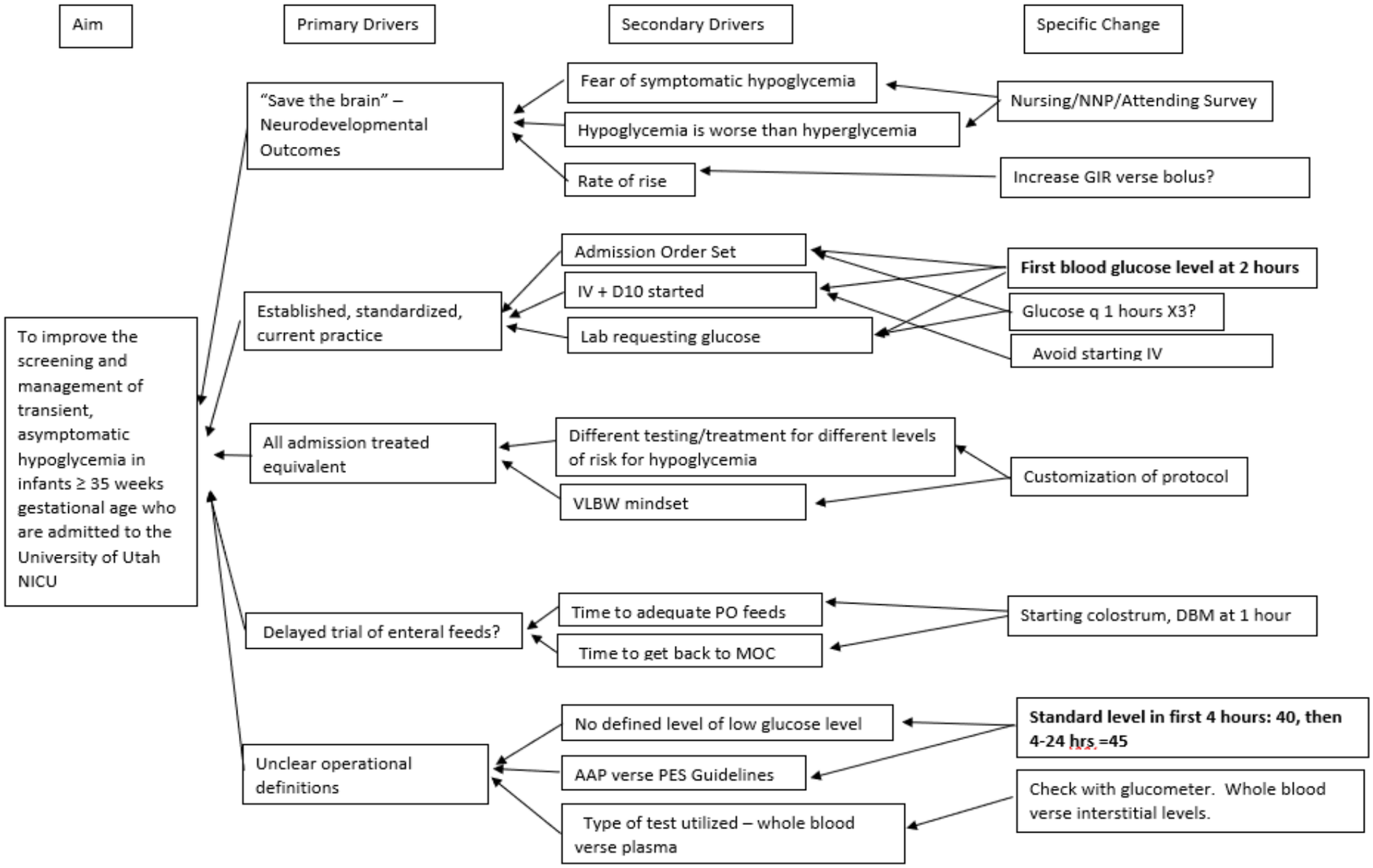
KEY DRIVER DIAGRAM



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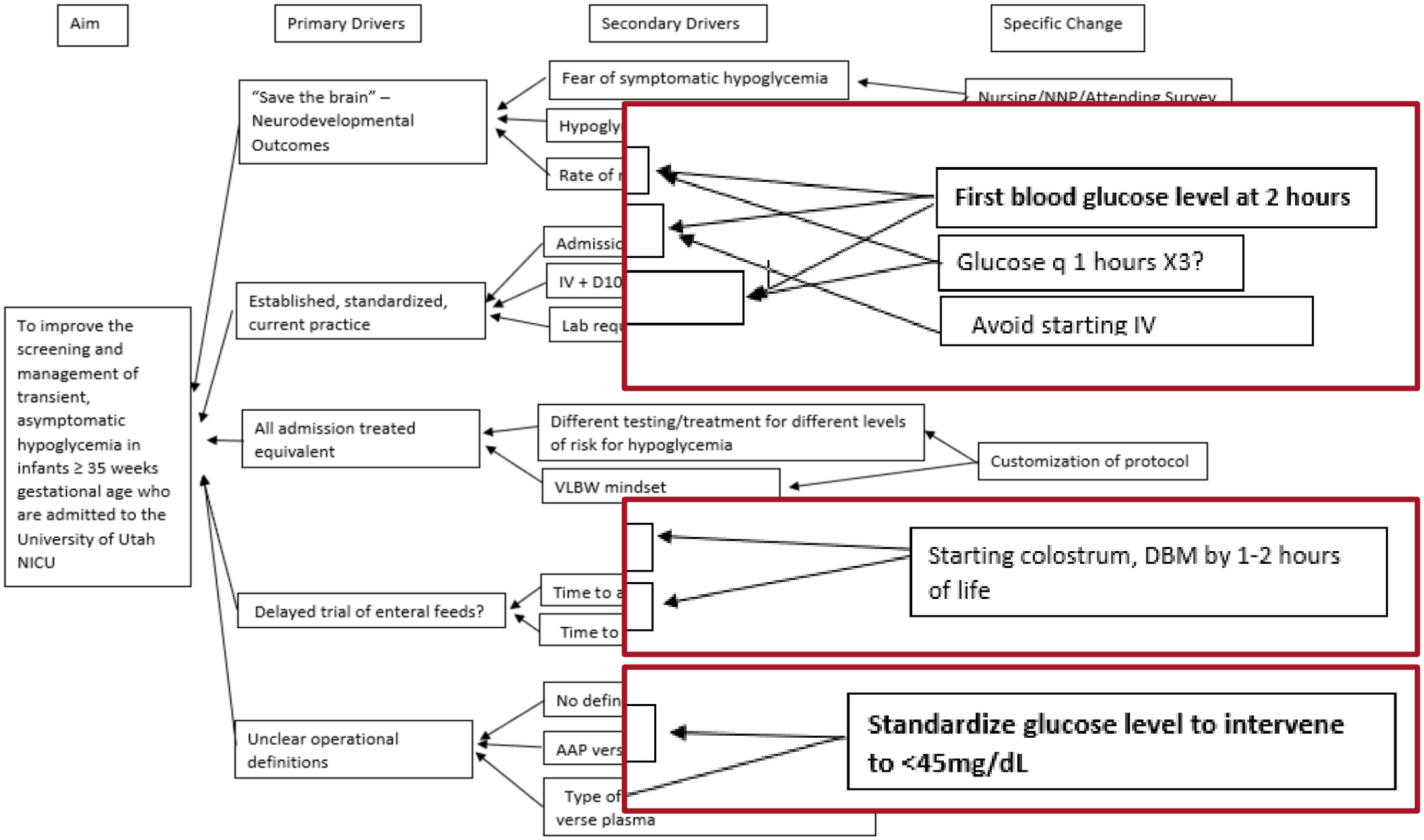
LEVERAGE POINTS



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SMART AIM

- Increase average time of first glucose measurement to two hours in patients 35 weeks and older admitted to the NICU by February 2021

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PDSA CYCLES

PDSA 1:

- 1st glucose measurement at 2 hours of life
- Intervene if glucose < 45 mg/dL

PDSA 2:

- Decrease IV dextrose infusion initiation
- Use GIR instead of dextrose bolus

PDSA 3:

- Initiate enteral feeds by 1-2 hours of life

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POPULATION AND PROCESS MEASURES

≥ 35 w gestational age

- With non-invasive respiratory support

Exclusions :

- Known congenital anomalies
- Hypoxic-ischemic encephalopathy
- Mechanical Ventilation
- Vasopressors

Process Measures:

- Time to the first blood glucose measurement
- Initiation of IV dextrose
- Number of IV dextrose boluses
- Total hypoglycemic events in the first 24 hours of life
- Time to first feed
- Discharge location

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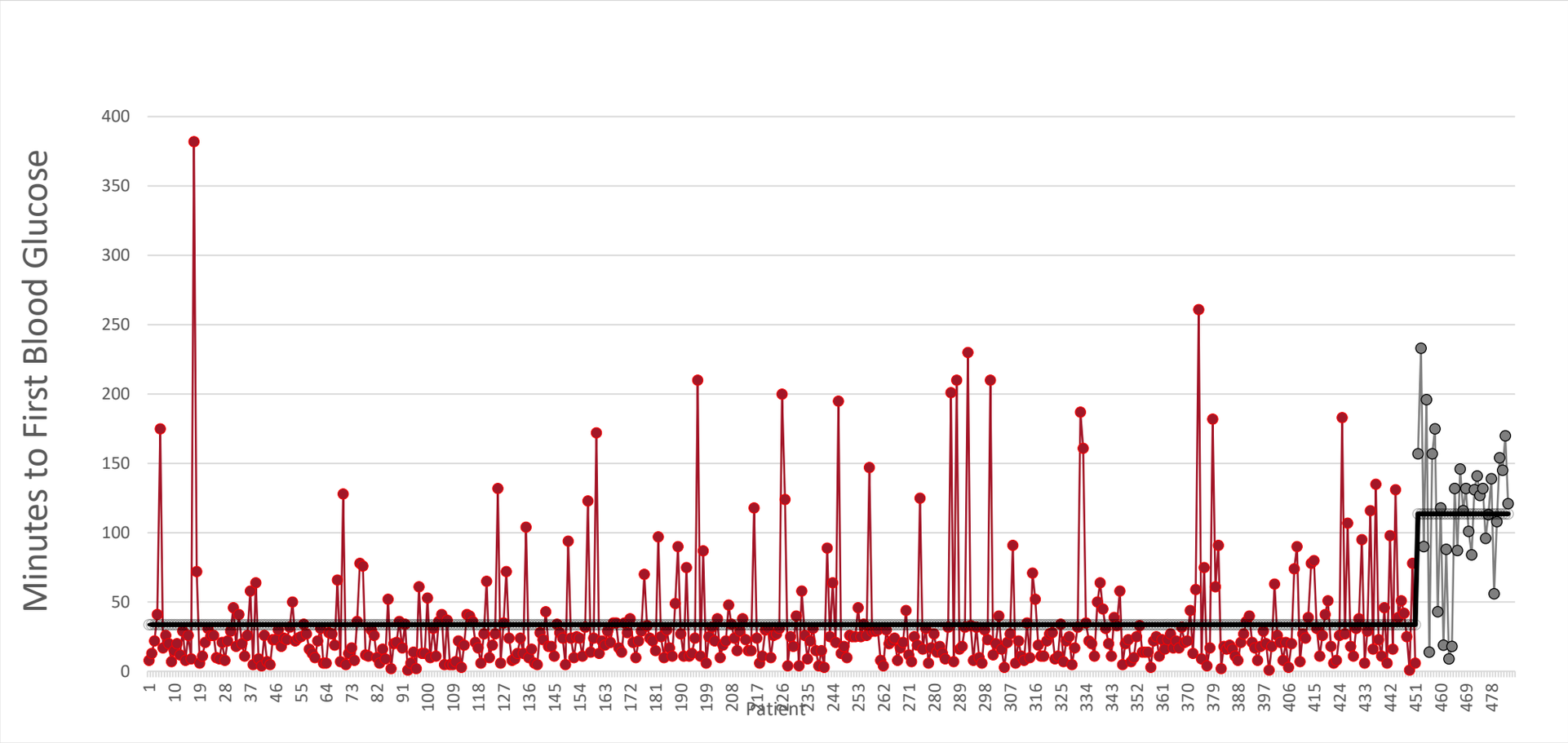
OUTCOME MEASURE



	Baseline Average	Post-intervention Average	P-Value
Time to first blood glucose (mean)	33 minutes (SD±42)	113 minutes (SD±56)	P<0.01

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BALANCING MEASURES

	Baseline	Post-intervention	P
Dextrose Bolus	22%	11%	P<0.01
Hypoglycemia <45mg/dL in first 24 hours	30.5%	18.1%	P=0.07

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CONCLUSIONS

Interventions improved the capture of hypoglycemia episodes occurring after the physiologic glucose nadir

- Resulted in a decrease of IV dextrose boluses and documented hypoglycemia events within the first 24 hours of life

Rate of infants receiving IV dextrose infusion remained constant

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NEXT STEPS

DRAFT : Transient, Asymptomatic Hypoglycemia Management Plan

Contact NICU provider if whole blood glucose level is:
1. 0-24 hours of life < 45 mg/dL
2. Any signs of hypoglycemia: seizure, lethargy, jitteriness, apnea, hypotonia, hypothermia

Eligible Patient
Do not start IV fluids prior to first blood glucose measure

↓

Obtain 1st whole blood glucose measure at 2-3 hours of life (After physiologic nadir)

Eligible Patients:
1. ≥35 weeks gestational age
2. Less than 24 hours of life
3. Respiratory support: CPAP or less

Excluded if:
1. Known congenital anomaly
2. HIE, cooling
3. Intubated, vasopressor, iNO
4. Requires immediate transfer to PCH

Glucose ≥ 45 mg/dL

1. Provide 5ml/kg breast milk or formula PO/NG/OG *
2. Continue enteral feeds q 2-3 hours

↓

Check next whole blood glucose in 2-3 hours prior to next feed

Glucose 31-44 mg/dL

1. Notify NICU care provider
2. Provide oral glucose gel 40% 0.5ml/kg
3. Provide 5mL/kg breast milk or formula

Glucose <30 mg/dL

1. Notify NICU care provider
2. Place IV and start D10W at 60-80ml/kg/day
3. If already on IVF, increase D10W rate by 20 ml/kg/day
4. No bolus
5. Provide 5mL/kg breast milk or formula PO/NG/OG

Recheck whole blood glucose in 1 hour

Glucose ≥ 45 mg/dL

↓

If 2X glucose ≥ 40, no more required blood glucose

Glucose between 31-44 mg/dL

Glucose < 30 mg/dL

1. Notify NICU care provider
2. Place IV and start D10W at 80ml/kg/day
3. If already on IVF, increase D10W rate by 20 ml/kg/day, or change to D12.5%
4. No bolus
5. Continue enteral feed of 5ml/kg q 3 hours from first feed

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Thank you!

The University of Utah
Division of Neonatology

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