Reducing NICU Transfers for Infants at Risk for Hypoglycemia

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Background

• Risk for transient neonatal hypoglycemia is common
  – 1 in 3 infants with at least one risk factor
    • Infant of diabetic mother, SGA, LGA, late preterm gestation
• Management is highly variable both within and between institutions
  – Varied definitions of hypoglycemia, limited options in newborn nursery setting
• Hypoglycemic infants may require NICU transfer for glucose stabilization
  – Separation of mother-infant dyad, increased cost, poor bed utilization

Background

• Providers frustrated with a rigid protocol and perception of infants transferred to NICU being managed with only PO feedings
• Families unhappy with being separated from asymptomatic infant during critical period for bonding and feeding
• Bed constraints in NICU
Aims

- Eliminate “unnecessary” NICU transfers
- Decrease overall transfer rate to NICU to < 10% of at-risk infants
- Update protocol
  - Emphasis on non-pharmacologic management
  - Skin-to-skin care (SSC) and early feeding
  - Standardize timing of initial blood glucose obtainment
  - Incorporate provider input prior to transfer

Methods: Planning the Intervention

- Multi-disciplinary team formed
  - Pediatrics, Family Medicine, Ob/Gyn, NICU, Lactation, Nursing (L&D, OR, mother-baby)
- Population:
  - Inborn infants ≥35 weeks gestation
  - Risk factor for hypoglycemia
    - SGA (<2.5 kg), LGA (>4 kg), IDDM, late preterm
  - Excluded infants with any other reason for NICU transfer or condition that would impact feeding
- Baseline data obtained (4 months, n = 208)
  - 16.7% of infants at risk for hypoglycemia required NICU transfer
  - 10 at-risk infants (4%) transferred to NICU without intervention
Methods: Key Interventions

**Neonatal Hypoglycemia**

**Symptomatic Hypoglycemia (BG<40mg/dL) - notify LP / STA**

**Asymptomatic** Infant with Risk Factors*

### Birth through 4 hours of life:
- First hour: Uninterrupted skin to skin. Initiate first feed by 1 hour of life. Obtain BG at 90 minutes of life.
- If BG <25mg/dL, continue skin to skin & feed measureable amount* Notify NBN LIP
- If after 2nd feeding the blood glucose is <25mg/dL notify NBN LIP to facilitate transfer to NCCC. Continue skin to skin.

### After 4 hours of life:
- Feed at least every 2.3 hrs.
- Check BG prior to each feeding.
- <35mg/dL feed measurable amount* & call NBN LIP
- 35-45mg/dL feed & re-check after 1hr.
- If no improvement Notify Newborn LIP
- >46mg/dL feed on demand min q2-3hr
- Three normal consecutive pre-prandial
- BGs = PASS.
- Call NBN LIP if infant has not passed protocol by 12 hours of life.
Methods: Key Interventions

• Hypoglycemia “bundle” in protocol
  – Uninterrupted skin-to-skin care (SSC) at birth
    • Delay measurements and any non-stabilizing interventions
  – Early feeding (within 1st hour)
  – Initial blood glucose screen at 90 minutes
  – Clinical evaluation of symptoms or hypoglycemia by provider prior to transfer
  – Specific parameters for supplementing a “measureable” amount of expressed breast milk, donor breast milk or formula

Methods: Studying the Intervention

• Charts obtained bimonthly of at-risk infants
• Manual chart review during intervention period
  – Measures:
    • Mean percent of first feeding in first hour of life
    • Mean percent with skin-to-skin care in first hour of life
    • Time to first blood glucose
    • Transfer rate to NICU
    • Management if transferred to NICU (eg. IV dextrose, antibiotics)
  – Balancing/Safety:
    • Symptomatic hypoglycemia, any adverse event, rule-out sepsis occurrence, readmission within 7 days
  – Monitored using statistical process control charts
Results, cont.

- Secondary outcomes in at-risk infants
  - Skin-to-Skin within first hour: 45% to 62%
  - Fed within first hour: 43% to 58%
  - Time to first blood glucose: 78 minutes (SD 137) to 97 minutes (SD 26 minutes)
  - Only 2 unnecessary transfers (4% to 0.9% of at-risk infants)
- No change in symptomatic hypoglycemia
- No adverse events, difference in r/o sepsis, or readmission
### Limitations

- Single center, tertiary care referral center
- Definition of SGA/LGA were strictly weight-based (<2.5 kg or >4.0 kg)
- Some elements rely on accurate documentation
- 7 month gap between baseline data and improvement work
  - No other interventions targeted at this group during the gap

### Conclusions

- Hypoglycemia bundle was effective at reducing rate of NICU transfer
  - 2 out of 3 babies previously transferred stayed with their mother
  - Non-pharmacologic interventions were effective
    - Skin-to-skin placement
    - Early feeding
  - Timing of blood glucose was standardized and targeted to avoid the physiologic nadir
  - Updated protocol was easy to follow, involved provider input, and guided standardized supplementation with measurable milk
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Questions?

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