Hypoglycemia affects as much as 5-15% of babies

- **Standard practices to treat hypoglycemia include:**
  - Supplemental feedings with formula
    - Interrupts breastfeeding, suppresses healthy gut flora and promotes growth of pathogenic microbes (i.e. E coli, bacteroides, clostridia, streptococci)
  - IV glucose with NICU admission
    - Increase hospital cost, separation of parents and baby, interrupts breastfeeding and parental bonding
Normal metabolic adaptation

• Baby’s glucose at birth is 70% of mother’s serum glucose
• Decreases insulin production and increases glucagon, epinephrine, growth hormone and cortisol
• After birth, baby must assume control of glucose through intermittent feed cycle

<table>
<thead>
<tr>
<th>Glycogenolysis</th>
<th>Mobilize glycogen stores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gluconeogenesis</td>
<td>Hepatic synthesis of glucose from substrates</td>
</tr>
<tr>
<td>Alternative fuel</td>
<td>Ketone bodies, lactate, glycerol and amino acids</td>
</tr>
</tbody>
</table>
Newborn Hypoglycemia – The Dilemma

• Normal physiologic decreases occur after birth and continues for 1st 2-3 hours of life

• Committee on Fetus and Newborn found that levels of 30mg/dL are common in healthy neonates during initial 1-2 hours of life

• No evidence that gives a specific number that defines hypoglycemia
• Only documented cases of neurologic damage have occurred when glucose levels drop to low levels for many hours

Normal newborn levels begin to increase to 40-60 mg/dL thereafter – even in the absence of feeds
In 2011 AAP guidelines set threshold for treatment at 25mg/dL for asymptomatic newborns

- Policy changes put into effect to stop glucose testing all newborns
- Focus on differentiation of symptomatic vs asymptomatic at-risk infants
- Decrease threshold for treatment or interventions
- Increase awareness of non-separation, early breastfeeding and skin-to-skin
Clinical Signs: Defining Symptomatic

- Cyanosis
- Seizures
- Apneic
- Tachypnea
- Weak or high pitched cry
- Floppiness or lethargy
- Poor feeding
- Jitteriness
- Hypothermia (<36)

Critical Question
Is this newborn symptomatic?
Immediate testing and treatment for symptomatic newborn
Dextrose gel for neonatal hypoglycemia (the Sugar Babies Study): a randomized, double-blind, placebo-controlled trial

Summary
• Dextrose gel is used to reverse hypoglycemia in adults but there is little evidence to support its use in babies
• Study to determine if treatment with glucose gel was more effective than feeding alone

Methods
• Neonates 35-42 week gestation <42 hours old at risk for hypoglycemia were randomly assigned to 40% dextrose gel or placebo gel
  ❖ 514 enrolled babies, 242 became hypoglycemic and were randomized
  ❖ 118 in dextrose gel
  ❖ 119 in placebo group
Findings

- Dextrose gel reduced frequency of hypoglycemia
- Neonates receiving dextrose gel were:
  - Less likely to be admitted to NICU for hypoglycemia
  - Less likely to receive dextrose
  - Less likely to have episodes of recurrent hypoglycemia
  - Less likely to need expressed breast milk or supplementation with formula

- No serious adverse effects were noted
- Well tolerated by newborns
Implementing a Protocol: Using Glucose Gel to Treat Neonatal Hypoglycemia – A Quality Improvement Project

• Development and implementation of a hypoglycemia protocol including use of glucose gel at a tertiary care hospital with >4000 deliveries/year

• Asymptomatic infants ≥35 weeks gestation with blood glucoses ≤35mg/dL were given a maximum of 3 doses of glucose gel along with feeds

• Findings:
  • NICU transfers from newborn nursery decreased by 73%
  • Glucose gel reversed neonatal hypoglycemia in 88% of neonates during the first 24 hours of life
  • Increased exclusive breastfeeding rate in women intending to breastfeed to 50%
  • Decreased hospital costs with decreased NICU admission rate
  • No adverse events noted
Newborn Nursery/L&D Hypoglycemia Clinical Algorithm – Birth to 4 hours of Age
Late preterm (34 0/7-36 6/7), SGA, IUGR <2200 grams, LGA, Infants of Diabetic Mothers, Mothers on selected drug treatment (beta blockers, oral hypoglycemic agents, terbutaline, or maternal steroid exposure after 34 weeks gestation) at delivery

Symptomatic and <40 mg/dl → NICU evaluation

Asymptomatic – High Risk Infants

Birth to 4 hours of Age – Goal is ≥40 mg/dl
Initial feed within 1 hour. Screen glucose 30 minutes after feed completed
OR
If unable to feed/won’t feed, obtain glucose at 1 hour of life

Initial screen <40mg/dl

Yes
Administer dextrose gel, feed and check glucose 30 minutes after feed completed

If after 30 minutes <25mg/dl
Transfer to NICU

If after 30 minutes 25-39mg/dl
Administer gel, feed and check glucose 30 minutes after feed completed

If glucose remains <40mg/dl after 2 gel/feed cycles. NICU consult

≥40mg/dl
Glucose checks q2-3 hours before feeds

Key Points:
- Early skin to skin contact, initiate breastfeeding/colostrum feeds or formula feeding within 1 hour of life (3-10ml/kg)
- Initial blood glucose 30 minutes after first feeding completed/OR if unable to feed, obtain at 1 hour of life
- Repeat POC and send serum for any glucose <40mg/dl, regardless of clinical presentation
- Dextrose gel works best when administered concurrently with feeding

Symptoms of hypoglycemia include: irritability, tremors, jitteriness, exaggerated Moro reflex, high-pitched cry, seizures, lethargy, tachypnea, hypotonia, poor feeding, apnea, coma, temperature instability and hypothermia (<36)

<table>
<thead>
<tr>
<th>Infant’s weight</th>
<th>Dose (ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤2 kg</td>
<td>1 ml</td>
</tr>
<tr>
<td>2.1 to 3 kg</td>
<td>1.5 ml</td>
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<td>4.1 to 5 kg</td>
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Newborn Nursery/L&D Hypoglycemia Clinical Algorithm – 4-24 hours of Age

Late preterm (34 0/7-36 6/7), SGA, IUGR <2200 grams, LGA, Infants of Diabetic Mothers, Mothers on selected drug treatment (beta blockers, oral hypoglycemic agents, terbutaline, or maternal steroid exposure after 34 weeks gestation) at delivery

**Symptomatic and <40 mg/dl**  →  NICU evaluation

**Asymptomatic – High Risk Infants**

4-24 hours of Age – Goal is ≥45
Continue feeds q2-3 hours
Screen glucose prior to each feed

Screen <45mg/dl

Administer dextrose gel*, feed and check glucose 30 minutes after feed completed

If after 30 minutes <30mg/dl
Transfer to NICU for IV glucose

If after 30 minutes 30-44mg/dl
Administer gel*, re-feed and check glucose 30 minutes after feed completed

If after 30 minutes <45mg/dl
Initiate NICU consult

Glucose ≥45 continue AC d-sticks

*Nursing cannot administer more than 2 gels in a 24 hour period without notifying NICU – doses need not be consecutive*

**Key Points:**
- Maximum of 4 gels can be ordered by pediatric providers in a 24 hour period
- Repeat POC and send serum for any glucose <40mg/dl, regardless of clinical presentation

For LGAs/IDMs may discontinue screens once baby is both:
- Greater than 12 hours of age
- Has had 2 consecutive POC glucoses ≥50mg/dl (at 12 or more hours of age)

For All other high risk infants may discontinue screens once baby is both:
- Greater than 24 hours of age
- Has had 2 consecutive POC glucoses ≥50mg/dl (at 24 hours or more of age)

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</tr>
</tbody>
</table>
Supplies:
• 40% glucose gel (pyxis)
• 3ml oral syringe
• Medicine cup

Squeeze gel into medicine cup

Draw up ordered dose
1. Dry buccal cavities with sterile 2x2

2. Place partial dose on latex free gloved finger

3. Massage into buccal mucosa alternating sides until dose is complete
Glucose gel will be ordered as prn for all babies in Newborn Immediate Power Plan.
• Once glucose gel is administered, baby should be breastfed, given expressed breastmilk or be given formula - and be placed skin to skin
• Skin to skin supports increased glucose levels, thermoregulation, and decreases the physiologic stress in newborns
• 2 glucose gel should not be administered within a 24 hour period without notifying NICU – need not be consecutive doses
References


