LEARNING THROUGH QI: NICU NUTRITION

Malinda Harris, MD
TIPQC Annual Meeting 2017

EAST TENNESSEE CHILDREN’S HOSPITAL

- Knoxville, TN
- 152 beds
- 428 physicians
- 647 nurses
- 33 pediatric specialties represented
- NICU
  - 60 private rooms
  - 9 neonatologists, 6 NNPs

FEEDING QI

- Original group aimed at reducing rates of NEC
- Kathy Fulton, NNP
- Recognition that there was little consistency between providers in feeding advancement
- Began effort at developing consensus between providers

ENTERAL FEEDING PROTOCOL

- Enteral feeding protocol concept introduced in 2011
- Established in practice in 2015
- Exclusive use of human milk in all VLBWs
- Gut priming begins within 12 hours of birth
  - May be delayed if inotropes utilized or gut anomalies
  - Residuals are not checked until >5 ml per feed or feeding intolerance:
    - Bilious emesis, clinical instability, abnormal abdominal exam, etc.

<table>
<thead>
<tr>
<th>500-1250 grams</th>
<th>Amount</th>
<th>Increase</th>
<th>1250-1500 grams</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day #1</td>
<td>10 mL/kg/day</td>
<td>None</td>
<td>Day #1</td>
<td>10 mL/kg/day</td>
</tr>
<tr>
<td>Day #2</td>
<td>20-40 mL/kg/day</td>
<td>20-30 mL/kg/day</td>
<td>Day #2</td>
<td>30 mL/kg/day</td>
</tr>
<tr>
<td>Day #3</td>
<td>50-60 mL/kg/day</td>
<td>20-30 mL/kg/day</td>
<td>Day #3</td>
<td>50 mL/kg/day</td>
</tr>
<tr>
<td>Day #4</td>
<td>70-80 mL/kg/day</td>
<td>30 mL/kg/day</td>
<td>Day #4</td>
<td>80 mL/kg/day</td>
</tr>
<tr>
<td>Day #5</td>
<td>90-100 mL/kg/day</td>
<td>40 mL/kg/day</td>
<td>Day #5</td>
<td>110 mL/kg/day</td>
</tr>
<tr>
<td>Day #6</td>
<td>110-120 mL/kg/day</td>
<td>40 mL/kg/day</td>
<td>Day #6</td>
<td>140 mL/kg/day</td>
</tr>
<tr>
<td>Day #7</td>
<td>130-140 mL/kg/day</td>
<td>40 mL/kg/day</td>
<td>Day #7</td>
<td>170 mL/kg/day</td>
</tr>
<tr>
<td>Day #8</td>
<td>150-160 mL/kg/day</td>
<td>40 mL/kg/day</td>
<td>Day #8</td>
<td>200 mL/kg/day</td>
</tr>
</tbody>
</table>

STARTER TPN

- Starter TPN developed and introduced in 2008
- Originally D10, trophamine 1.5% and calcium
- Improved upon in 2011
- Contains D10, 2.5% trophamine and calcium
- Available 24 hours a day
**HUMAN BASED MILK FORTIFIER**

- Introduction of Prolacta into practice 2015
- Incorporated in enteral feeding protocol
- In VLBWs encouraged to begin fortification at 70 cc/kg/day

**TIPQC NUTRITION QI**

**TPN PROTOCOL**

- Identification that TPN calories could be optimized
- Provider education and development of TPN advancement protocol
- Reminder to utilize birthweight to calculate daily fluids until weight is regained

**PARENTERAL NUTRITION FOR INFANTS <1500 GRAMS**

<table>
<thead>
<tr>
<th>TROPHAMINE</th>
<th>ADMISSION</th>
<th>DOL #1</th>
<th>DOL #2</th>
<th>DOL #3</th>
<th>DOL #4</th>
<th>GOAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2-3 g/kg/day</td>
<td>3.5 g/kg/day</td>
<td>4 g/kg/day</td>
<td>4 g/kg/day</td>
<td>4 g/kg/day</td>
<td>4 g/kg/day</td>
</tr>
<tr>
<td>increase by 0.5 g/kg/day</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GIR</td>
<td>4.5 mg/kg/min</td>
<td>5-7 mg/kg/min</td>
<td>6-9 mg/kg/min</td>
<td>7-11 mg/kg/min</td>
<td>8-13 mg/kg/min</td>
<td>12-15 mg/kg/min</td>
</tr>
<tr>
<td>INTRALIPIDS</td>
<td>1 g/kg/day</td>
<td>1/5 g/kg/day</td>
<td>2 g/kg/day</td>
<td>2.5 g/kg/day</td>
<td>3 g/kg/day</td>
<td>3 g/kg/day</td>
</tr>
<tr>
<td>FEEDINGS</td>
<td>10 mL/kg/day</td>
<td>10-20 mL/kg/day</td>
<td>10-30 mL/kg/day</td>
<td>30-50 mL/kg/day</td>
<td>50-80 mL/kg/day</td>
<td>Full feedings</td>
</tr>
</tbody>
</table>

**CURRENT AREAS BEING ADDRESSED**

- Small babies are not getting adequate protein intake in first 24 hours
- Increase starter TPN trophamine to 3 g/100 ml from 2.5 g/100 ml
- Feedings started and stopped frequently in some babies which limited advancement to goal
- Change in protocol regarding residuals- not checking!
- Encouraging to keep feeding volume 160-180 mL/kg/day
- Encouraging to continue gut priming during indomethacin treatment

**FUTURE AREAS TO ADDRESS**

- Hesitancy to advance Prolacta fortification to “28 kcal/oz”
- Some babies not growing adequately on 26 kcal/oz
- Utilization of donor breastmilk with questionable caloric content
- Ideas to assess
  - Testing caloric content of batches of donor milk
- Intervention
  - Education to providers regarding the caloric range of what is being provided
LESSONS LEARNED

• Take it slow
• It's important for everyone to understand why something is being done if you expect them to do it
• Evidence!
• Providers much more willing to entertain changes to status quo if there is evidence to back it up - not only that it's a problem but also an evidence-based solution
• Know the challenge and expect resistance
• In areas that lack evidence, it's really hard to pull everyone's opinions into a consensus