Clinical Problem

- Interpretation of pain in neonates is often difficult to assess due to their inabilities to communicate their pain (Bowden & Greenburg, 2010).

- A preterm infant could undergo 300 or more painful procedures over a 3 month period in the NICU (Grunau et al, 2007).

- A 2013 study discovered that 69% of 60,969 first-attempt procedures done in a NICU were identified as painful (Hatfield, Meyers, & Messing, 2013).

Introduction

● Sucrose demonstrate benefits including:
  ○ inhibiting pain transmission at the spinal level (Mitchell & Waltman, 2003)
  ○ instigating the hypothalamus’s release of endorphins (Mitchell & Waltman, 2003)
  ○ raising the patient’s pain threshold (Bowden & Greenberg, 2010)
  ○ reducing crying time (Bowden & Greenberg, 2010)

● However, side effects of its repeated use has not been thoroughly investigated (Holst & Grunau, 2010)

http://www.aboutkidshealth.ca/EN/NEWS/NEWSANDFEATURES/Pages/A-spoonful-of-sugar-water.aspx
Methods

- **Search terms**
  - Nicu pain, management, tools, intervention, clinical guideline, pain assessment
- **Databases**
  - Pubmed and CINAHL
- **Article selection criteria**
  - English-only
  - published during or after 2005

1. Examining the side effects of sucrose for pain relief in preterm infants: a case-control study (Linhares et al., 2014).
2. Oral sucrose and “facilitated tucking” for repeated pain relief in preterms: a randomized controlled trial (Cignacco et al., 2012).
3. Consistent management of repeated procedural pain with sucrose in preterm neonates: is it effective and safe for repeated use over time? (Stevens et al., 2005).
# Results: Pain Response

<table>
<thead>
<tr>
<th>Cignacco et al., 2012</th>
<th>Stevens et al., 2005</th>
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**Tools used to assess pain response:**

- *Behavioral Bernese Pain Scale for Neonates (B-BPSN)*
- *Physiological Bernese Pain Scale for Neonates (P-BPSN)*

**Tools used to assess pain response:**

- *Premature Infant Pain Profile (PIPP).*

[Link](http://missprissiness.com/blog/sweet-sweet-babies/)
## Results: Pain Response

### Cignacco et al., 2012

- The combination of FT and sucrose was the most effective in decrease pain levels: B-BPSN ($M_C = 5.49 \pm 2.95, p = .007$) & P-BPSN ($M_C = 2.03 \pm 1.73, p = .003$).

- Facilitated tucking (FT) did not succeed in reducing pain as much as sucrose alone: B-BPSN ($M_{FT} = 7.01 \pm 3.59$ vs. $M_S = 5.58 \pm 2.95, p = .01$) and P-BPSN ($M = 2.72 \pm 1.98$ vs $M=5.58 \pm 2.95, p = .0002$).

### Stevens et al., 2005

- The combination of sucrose and pacifiers reduced pain more significantly ($P=0.03$) than the standard care group ($P=0.01$) that did not use sucrose or pacifiers.

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[Link to the article](http://www.celebritybabyscoop.com/2013/05/02/introducing-stylish-pacifier)
### Results: Side Effects of Sucrose

<table>
<thead>
<tr>
<th>Linhares et al., 2014</th>
<th>Stevens et al., 2005</th>
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<tbody>
<tr>
<td><strong>Factors assessed for potential side effects</strong></td>
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</tr>
<tr>
<td>• parenteral feeding</td>
<td>Group A (immediate adverse events)</td>
</tr>
<tr>
<td>• duration of orogastric tube use</td>
<td>• heart rate &lt;100 and &gt;240</td>
</tr>
<tr>
<td>• weight at 38 weeks postconception</td>
<td>• oxygen desaturation &lt;85%, apnea &gt; 15 seconds</td>
</tr>
<tr>
<td>• weight at discharge</td>
<td>• and choking ($p &gt; 0.05$)</td>
</tr>
<tr>
<td>• weight gain between birth and 38 weeks postconception</td>
<td><strong>Group B (long-term adverse events)</strong></td>
</tr>
<tr>
<td>• weight gain between birth and discharge</td>
<td>• hyperglycemia &gt;10.0 mmol</td>
</tr>
<tr>
<td>• and feeding patterns.</td>
<td>• oral infection</td>
</tr>
<tr>
<td>*factors were assessed during hospitalization &amp; after discharge</td>
<td>• necrotizing enterocolitis</td>
</tr>
</tbody>
</table>

• intraventricular hemorrhages of grades 3 or 4
• death ($p > 0.05$).
## Results: Side Effects of Sucrose

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<tr>
<td>● No significant differences were found in any of the parameters ($ps &gt; 0.05$).</td>
<td>● No significant differences in neurological risk status and clinical outcomes as evidenced in both groups.</td>
</tr>
</tbody>
</table>


Discussion

High internal validity as evidenced by:

- **Study Design**
  - 2 Randomized-Controlled Trials (RCTs)
  - 1 Prospective Case-Control

- **Sampling Method**
  - Implementation of randomization and allocation concealment

- **Data Collection**
  - Standard protocols were applied to confirm proper data distribution.
  - Only trained researchers and data collectors were employed.
  - Young age of all subjects - all under 37 weeks GA - led to overall compliance.
  - Zero to only a handful of dropouts in each study.

[Image: http://www.missliterati.com/blog/the-ten-most-adorable-pictures-of-babies-reading]
Nursing Implications

- Reduce long-term, negative outcomes (e.g. increased risk for morbidity, abnormal brain development, etc.) (Grunau, 2013; Mancuso & Burns, 2009).
- Standardization of consistent pain tool for nurses to utilize.
- Improved outcomes could lead to shorter hospital stays (Kirkby, Greenspan, Kornhauser, & Scheiderman, 2007).
- Decrease costs: average cost of a 17-day in the NICU is $31,000 (Kirkby, Greenspan, Kornhauser, & Scheiderman, 2007).

http://www.123rf.com/photo_14951756_ill-baby.html
Gaps in Literature

- Monitoring health status post-discharge to assess long-term effects of sucrose
- Evaluating neonate until end of stage of infancy - or until 2 years old - could yield significant data
- Performing intervention on neonates at higher risk, including those with: major congenital anomalies, history of severe intraventricular hemorrhages (grade III or IV)

http://www.antiubb.com/2016/03/15/babys-development-process/
Conclusion

- Sucrose administration effectively decreases neonatal pain levels without any significant adverse effects.
- Treating neonates with the appropriate pain intervention falls within the scope of nursing practice.
- Further research is needed to:
  - Assess further neonatal developmental outcomes
  - Apply this intervention to a more extensive population.


http://www.projectundercover.org/2015/07/two-thumbs-up-for-amica/


