# Management of Neonatal Pain Levels with Sucrose

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# 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).

http://www.whattoexpect.com/first-year/the-heel-stick-test.aspx

# Introduction

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

- 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 (Holsti & Grunau, 2010)

# 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

| Cignacco et al., 2012 | Stevens et al., 2005 |
| --- | --- |
| Tools used to assess pain response:<br>● *Behavioral Bernese Pain Scale for Neonates* (B-BPSN)<br>● *Physiological Bernese Pain Scale* for Neonates (P-BPSN) | Tools used to assess pain response:<br>● *Premature Infant Pain Profile* (PIPP).<br>  <br>http://missprissiness.com/blog/sweet-sweet-babies/ |

# Results: Pain Response

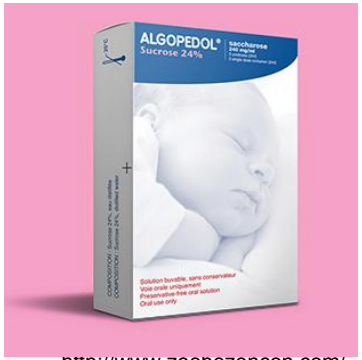
| Cignacco et al., 2012 | Stevens et al., 2005 |
| --- | --- |
| • The combination of FT and sucrose was the most effective in decrease pain levels: B-BPSN ($M_C$=5.49 ± 2.95, $p$ = .007) & P-BPSN ($M_C$=2. 03 ± 1.73, $p$ = .003). | • The combination of sucrose and pacifiers reduced pain more significantly (*P=0.03)* than the standard care group (*P=0.01)* that did not use sucrose or pacifiers. |
| • Facilitated tucking (FT) did not succeed in reducing pain as much as sucrose alone: B-BPSN ($M_{FT}$ =7.01 ± 3.59 vs. $M_S$ = M=5.58 ± 2.95, $p$ =.*01* ) and P-BPSN (M = 2.72 ± 1.98 vs M=5.58 ± 2.95, $p$ = *.0002*). |  http://www.celebritybabyscoop.com/2013/05/02/introducing-stylish-pacifier |

# Results: Side Effects of Sucrose

| Linhares et al., 2014 | Stevens et al., 2005 |
| --- | --- |
| Factors assessed for potential side effects<br>• parenteral feeding<br>• duration of orogastric tube use<br>• weight at 38 weeks postconception<br>• weight at discharge<br>• weight gain between birth and 38 weeks postconception<br>• weight gain between birth and discharge<br>• and feeding patterns.<br>*factors were assessed during hospitalization & after discharge | Factors assessed for potential side effects:<br>Group A (immediate adverse events)<br>• heart rate <100 and >240<br>• oxygen desaturation <85%, apnea > 15 seconds<br>• and choking (*ps>0.05)*<br>Group B ( long-term adverse events)<br>• hyperglycemia >10.0 mmol<br>• oral infection<br>• necrotizing entercoloitis<br>• intraventricular hemorrhages of grades 3 or 4<br>• death (*p*>0.05*).* |

# Results: Side Effects of Sucrose

| Linhares et al., 2014 | Stevens et al., 2005 |
| --- | --- |
| • No significant differences were found in any of the parameters (*ps* >0.05). | • No significant differences in neurological risk status and clinical outcomes as evidenced in both groups. |




http://www.zoebezencon.com/

http://www.connect-medizintechnik.at/neonatologie/algopedol-24-sucrose.php

# Discussion

http://www.missliterati.com/blog/the-ten-most-adorable-pictures-of-babies-reading

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.

# Nursing Implications

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

- 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).

# 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.cute-baby-photos.com/2015/07/top-5-best-cute-baby-photos-in-2015.html

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

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