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Deleterious Effects of Pain for Newborn Infants

Painful procedures place a newborn at risk for brain damage. Moreover, brain damage and generation of free radicals are associated with hypoxia. Rapidly developing tissues in a newborn, such as the lipid-rich brain, are particularly susceptible to damage from free radicals. newborn infants who are sick experience multiple invasive and tissue-damaging procedures in emergency, acute, and critical care units. These procedures (eg, lancing the heel, suctioning an endotracheal tube) are presumed to be painful and occur during the early days of life as part of stabilizing, diagnosing, and treating a baby’s condition. Although neonates are capable of mounting powerful physiological, behavioral, hormonal, and metabolic responses to nociceptive stimuli, these responses can be harmful to an infant’s behavioral and neurological development.

Evidence indicates that early and repeated exposure to pain leads to adverse neurological outcomes, yet babies in neonatal intensive care have a mean of 16 painful procedures a day, the majority of which are performed with inadequate analgesia and comfort measures.

Infants, including preterm babies, for whom intravenous opioid analgesics are not indicated, usually are given no pain reliever or comfort measure for routine minor painful procedures. Examples of these patients include a neonate whose critical condition is improving after surgery, a baby who is being evaluated for sepsis in the emergency department, and an infant with nonaccidental trauma who is being transferred from the pediatric intensive care unit to an acute care unit.

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Painful procedures place a newborn at risk for brain damage. Moreover, brain damage and generation of free radicals are associated with hypoxia. Rapidly developing tissues in a newborn, such as the lipid-rich brain, are particularly susceptible to damage from free radicals.
The destructive interplay of pain, hypoxia, and toxic effects caused by free radicals leads to poor outcomes. Table 1 lists conditions of newborns that are associated with these effects. Nurses must consider the long-term deleterious effects of repeated unmanaged pain for patients in the NICU, including preterm babies. Table 2 lists several routine invasive and painful procedures infants must undergo during hospitalization. Of these, the heel lance is the most common painful procedure in NICUs.

Standard of Care

A report published in 2000 revealed that only 5% of neonatal units routinely used analgesia for commonly performed painful procedures such as venipuncture and insertion of central catheters. Eight years later, Bellieni and Buonocore reported a 30% increase in pain management for similar procedures. This increase is an improvement, albeit an unsatisfactory one, in pain management. Full attention to babies’ personhood, promotion of brain opioids. Use of the sugar is low risk and it is simple to administer. Moreover, this intervention requires minimal time from busy nurses.

Description and Forms of Oral Sucrose

Sucrose is a disaccharide composed of \( \alpha \)-glucose and fructose in a 1:1 ratio. It is obtained commercially from sugarcane, sugar beets (Beta vulgaris), and other plants. Commonly known as table sugar, sucrose is a fine, white, crystallized odorless substance used extensively as a food and sweetener. Table 3 lists descriptions of oral sucrose in the literature. The terms are relatively

Table 1 Conditions of newborns associated with toxic effects of free radicals

<table>
<thead>
<tr>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased arterial pressure</td>
</tr>
<tr>
<td>Increased intracranial pressure</td>
</tr>
<tr>
<td>Oxygen desaturation</td>
</tr>
<tr>
<td>Brain damage</td>
</tr>
<tr>
<td>Chronic lung disease</td>
</tr>
<tr>
<td>Retinopathy of prematurity</td>
</tr>
<tr>
<td>Necrotizing enterocolitis</td>
</tr>
<tr>
<td>Periventricular leukomalacia</td>
</tr>
<tr>
<td>Altered development</td>
</tr>
<tr>
<td>Abnormal sensitivity to pain</td>
</tr>
</tbody>
</table>

Table 2 Invasive and painful procedures experienced by hospitalized infants\(^a\)

<table>
<thead>
<tr>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arterial puncture, peripheral arterial cutdown</td>
</tr>
<tr>
<td>Venipuncture, peripheral venous cutdown</td>
</tr>
<tr>
<td>Heel lance</td>
</tr>
<tr>
<td>Lumbar puncture</td>
</tr>
<tr>
<td>Umbilical catheter insertion</td>
</tr>
<tr>
<td>Peripherally inserted central catheter placement</td>
</tr>
<tr>
<td>Bladder catheterization</td>
</tr>
<tr>
<td>Suprapubic bladder tap</td>
</tr>
<tr>
<td>Adhesive tape removal</td>
</tr>
<tr>
<td>Suture removal</td>
</tr>
<tr>
<td>Ventricular tap</td>
</tr>
<tr>
<td>Central catheter insertion/removal</td>
</tr>
<tr>
<td>Chest tube insertion/removal</td>
</tr>
<tr>
<td>Nasogastric/orogastric tube placement</td>
</tr>
<tr>
<td>Feeding tube placement</td>
</tr>
<tr>
<td>Dressing changes</td>
</tr>
<tr>
<td>Percutaneous intravenous cannulation</td>
</tr>
<tr>
<td>Screening eye examination for retinopathy of prematurity</td>
</tr>
<tr>
<td>Intramuscular injections of vitamin K</td>
</tr>
<tr>
<td>Endotracheal tube suintoning</td>
</tr>
<tr>
<td>Immunizations(^b)</td>
</tr>
</tbody>
</table>

\(^a\) Based on information from Anand et al.\(^21\)
\(^b\) Although immunizations are normally associated with well babies and primary care, the procedures are done in the hospital and therefore are included.

Oral sucrose is a valuable analgesic option for neonates undergoing brief procedural pain. It has a rapid onset of effects and short-lived action, thought to be mediated by the release of endogenous

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synonymous for the same solution and intent for use. The last 2 descriptions convey NNS more clearly because of the reference to a pacifier. When nurses evaluate the evidence, they should not discount studies that describe oral glucose as an intervention, because glucose is a component of sucrose.

Oral sucrose is a solution of water and sucrose. Two commercial oral sucrose preparations are produced in the United States23,29 (Table 4). Ninety-one percent of the centers that participated in a neonatal intensive care quality improvement collaborative of 12 NICUs chose Sweet-Ease (a prepackaged 11-mL container).30 For the purpose of our article, sucrose for infant analgesia is referred to as oral sucrose.

Research on Oral Sucrose

The analgesic effects of sucrose are not entirely understood. The mechanism of action is thought to involve activation of the endogenous opioid system (the release of β-endorphins) through gustatory pathways or taste.31,32 A preabsorptive mechanism for sucrose-induced analgesia is supported by data on its pain-relieving effects after direct application to the tongue but not after administration into the stomach via a nasogastric tube.31,32 Opioid receptors are present on the tongue, and studies in animals have revealed analgesia reversal by opioid antagonists during noxious stimulation.32 Conversely, findings from 3 recent studies31,34,35 tend to refute the possibility of an endogenous opioid–mediated mechanism of effect of oral sucrose or a sweet solution. Taddio et al31 found no significant difference in the serum concentrations of β-endorphins among preterm infants before and after a single dose of sucrose. Specifically, the authors31 found no detectable increase in the serum levels of the endorphins at the time the analgesic effects of sucrose were anticipated. Opioid tolerance was not observed in a study in which infants received repeated doses of glucose.34 Finally, Gradin and Schollin35 found that intravenous

Table 3 Terms used for oral sucrose in published reports

<table>
<thead>
<tr>
<th>Oral sucrose</th>
<th>Oral glucose</th>
<th>Lingual sucrose</th>
<th>Oral dextrose</th>
<th>Oral sucrose analgesia</th>
<th>Sugar solution analgesia</th>
<th>A sweet pacifier</th>
<th>A sucrose pacifier</th>
</tr>
</thead>
</table>

Table 4 Commercial oral sucrose products

<table>
<thead>
<tr>
<th>Products</th>
<th>Manufacturer</th>
<th>Packaging</th>
<th>Preservative-free</th>
<th>Preservative</th>
<th>Product safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweet-Ease</td>
<td>Philips Children’s Medical Ventures, Monroeville, Pennsylvania</td>
<td>Wide-based cups with peel-back lid</td>
<td>Sweet-Ease Natural</td>
<td>Methylparaben</td>
<td>Packaging</td>
</tr>
<tr>
<td><a href="http://sweetease.respironics.com">http://sweetease.respironics.com</a></td>
<td>Directions on foil lid in English, Spanish, and French</td>
<td>No preservatives or artificial ingredients</td>
<td></td>
<td>and potassium sorbate</td>
<td>Hot filling by a Food and Drug Administration–registered food processing facility</td>
</tr>
<tr>
<td></td>
<td>Single patient use</td>
<td></td>
<td></td>
<td></td>
<td>1-year shelf life</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Stability at room temperature</td>
</tr>
<tr>
<td>TootSweet</td>
<td>Natus Medical Incorporated, San Carlos, California</td>
<td>Twist-tip vials</td>
<td>Methylparaben and potassium sorbate</td>
<td></td>
<td>Packaging</td>
</tr>
<tr>
<td><a href="http://www.natus.com">http://www.natus.com</a></td>
<td>Wide-based cups with peel-back lid Single patient use</td>
<td></td>
<td></td>
<td></td>
<td>Fulfillment of an antimicrobial preservative effectiveness test</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Guarantee of a mold- and bacteria-free solution</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2-year shelf life</td>
</tr>
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</table>

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The appropriate volume of oral sucrose has also been examined, and precise dosing based on age is not clearly defined. Two independent measurements indicated that the volume of a 24% solution of sucrose administered from a pacifier dipped once was no greater than 0.2 mL.38 Sucrose volumes ranging from 0.5 to 2 mL have been effective for analgesia for neonates.38,39,41,44 Interestingly, the analgesic effect is not diminished at 4 months.30,38,39,43

The safety of oral sucrose for very preterm infants has been a focus of investigation, and the efficacy of the sugar in older infants has been questioned. Scrutiny of the literature on pain associated with immunization and use of oral sucrose at 2, 4, and 6 months of age has led experts to conclude that the analgesic effect of oral sucrose is diminished at 4 months.30,38,39,43

Despite the demonstration of the effectiveness of oral sucrose in very low-birth-weight infants, some researchers38,39 suggest that limiting injection of an opioid antagonist did not diminish the analgesic effects of orally administered glucose given before blood-sample procedures among newborn infants. Table 5 summarizes the infant pain assessment scales that have been used in the research on oral sucrose.

<table>
<thead>
<tr>
<th>Table 5 Infant pain assessment instruments used in published research on oral sucrose analgesia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cry, requirement for increased oxygen administration, increase in vital signs, expression, and sleeplessness (CRIES) assessment</td>
</tr>
<tr>
<td>Neonatal Facial Coding System (NFCS)</td>
</tr>
<tr>
<td>Neonatal Infant Pain Scale (NIPS)</td>
</tr>
<tr>
<td>Neonatal Pain, Agitation, and Sedation Scale (N-PASS)</td>
</tr>
<tr>
<td>Premature Infant Pain Profile (PIPP)</td>
</tr>
<tr>
<td>Face, legs, activity, cry, consolability (FLACC) pain assessment scale</td>
</tr>
<tr>
<td>Douleur Aigue Nouveau-né (DAN) pain assessment scale</td>
</tr>
<tr>
<td>University of Wisconsin Children’s Hospital (UWCH) Pain Scale</td>
</tr>
</tbody>
</table>

The appropriate group of patients for sucrose analgesia continues to be defined. Evidence36 supports the efficacy of sucrose, with or without NNS, as a nonpharmacological pain-relieving intervention for minor procedural pain in healthy full-term infants. Although NNS reduces pain behaviors and heart rate in response to heel lance, the addition of oral sucrose may result in a superior analgesic effect.36 Weaknesses in the methods used in some studies contribute to the obscurity of the distinct benefits of oral sucrose in preterm or sick infants.36 Sucrose has analgesic effects in infants as young as 25 weeks’ gestation, and most of the medical centers in a neonatal pain collaborative study used sucrose in very low-birth-weight infants.31,37,38

Despite the demonstration of the effectiveness of oral sucrose in very low-birth-weight infants, some researchers38,39 suggest that limiting the administration of oral sucrose to infants more than 32 weeks’ gestational age may be judicious because of possible adverse effects. Johnston40 described possible long-term adverse effects associated with the administration of a 24% solution of oral sucrose to infants less than 31 weeks’ postconceptional age. Infants who received high numbers of doses scored lower than infants who received fewer doses on components of the Neurobehavioral Assessment of the Preterm Infant. In addition, babies who received more doses of oral sucrose had higher Neurobiologic Risk Scores at 2 weeks’ postnatal age, but they did not have higher scores at discharge.

During 54 glucose interventions (0.3 mL of a 30% oral glucose solution) that were administered to neonates during subcutaneous injections, 7 of the babies experienced slight (85%-88%) and transient oxygen desaturations.41 Five neonates experienced oxygen desaturations during the administration of glucose only, whereas 2 experienced oxygen desaturations during the administration of glucose and a pacifier.41 These findings contrast the absence of oxygen desaturations associated with 24 administrations of placebo.41

Infants (27-31 weeks’ gestational age) who received a 24% solution of oral sucrose alone experienced choking, coughing, vomiting, or sustained tachycardia or bradycardia.42 None of these adverse events were considered clinically important, and none of the babies who received oral sucrose and NNS experienced adverse events.42 McCullough et al35 described adverse events associated with administration of oral sucrose to preterm infants in stable condition who had insertion of a nasogastric tube. Brief apnea or self-limiting bradycardia occurred in a few infants as a result of the sucrose administered or insertion of the tube. None of these events were clinically important or required intervention. Necrotizing enterocolitis and hyperglycemia have been suspected adverse effects, the latter more theoretical than well documented.39 Oral sucrose has not been proved to cause either of these effects.39
Investigators have reported that 0.05 to 0.5 mL of a 24% to 25% solution of sucrose or glucose is sufficient to provide analgesia. The onset of action of oral sucrose is 10 seconds, peak action occurs at 2 minutes, and the effect persists approximately 5 to 10 minutes. Because of the rapid onset of action, analgesia is not attributable to oral absorption and clearance from the circulation.

Research on use of oral sucrose has evolved to include the investigation of more and varied populations of patients and painful procedures. For example, sucrose moderately reduced pain in newborns of both diabetic and nondiabetic mothers when it was used for all medical procedures performed in the first 2 days after birth. However, when each procedure was analyzed separately, sucrose reduced pain for venipuncture but not for intramuscular injection of vitamin K or heel lance. Findings on the effectiveness of oral sucrose in reducing pain and/or distress associated with screening for retinopathy of prematurity have been mixed.

Studies other than those conducted in a NICU or a newborn nursery have had varied findings on the use of oral sucrose for non–skin-breaking procedures. For example, sucrose had no overall treatment effect in infants who were younger than 90 days and received the sugar for bladder catheterization in the emergency department. Another example is use of oral sucrose for insertion of nasogastric tubes. McCullough et al reported that insertion in neonates evokes a pain response comparable to that associated with heel lance. In a randomized, double-blind, placebo-controlled clinical trial, a 24% solution of oral sucrose was effective in reducing the behavioral and physiological pain responses to insertion of a nasogastric tube in preterm infants. Adverse effects (ie, brief apnea, self-limiting bradycardia) were few and occurred equally in each group of patients, leading to the conclusion that oral sucrose for this procedure is a safe intervention.

Last, analgesia due to oral sucrose administered for venipuncture may persist through subsequent care such as diaper changes. Table 6 lists variations in research on oral sucrose analgesia that make interpreting and implementing the findings difficult.

### Table 6 Variations in the evidence on analgesia with oral sucrose

<table>
<thead>
<tr>
<th>Age (preterm, term, neonate, infant)</th>
<th>Weight (very low birth weight, low birth weight, healthy weight)</th>
<th>Acuity (healthy, undergoing mechanical ventilation with an endotracheal tube)</th>
<th>Intensity of pain stimulus (traditional lancet, automated lancet)</th>
<th>Oral sucrose as sole intervention</th>
<th>Oral sucrose as 1 of 2 or more interventions (breast milk, kangaroo care, facilitated tucking by parents)</th>
<th>Clinical setting (newborn nursery, neonatal intensive care unit)</th>
<th>Pain assessment scale (N-PASS, PIPP, CRIES)</th>
<th>Pain assessment physiological parameters (oxygen saturation, heart rate, blood pressure)</th>
<th>Pain assessment timing (before, during, after procedure)</th>
<th>Pain assessment as sole metric or combined with distress measures</th>
<th>Sweet solution (glucose, sucrose, 10%, 24%, 50%)</th>
<th>Sweet solution preparation (commercial, prepared by pharmacy, natural, preserved)</th>
<th>Medical history (infant of healthy mother, infant of diabetic mother)</th>
<th>Ethics (placebo, standard of care)</th>
</tr>
</thead>
</table>

Abbreviations: CRIES, cry, requirement for increased oxygen administration, increase in vital signs, expression, and sleeplessness assessment; N-PASS, Neonatal Pain, Agitation, and Sedation Scale; PIPP, Premature Infant Pain Profile.

Administration of Oral Sucrose

Summary proceedings from the Neonatal Pain-Control Group include sucrose as a drug class and therapeutic option for the prevention and management of neonatal pain and stress. In contrast, the American Academy of Pediatrics and the Canadian Paediatric Society list oral sucrose as a nonpharmacological pain prevention measure for minor procedures. Many hospitals dispense oral sucrose through a supply chain or materials-management venue; others dispense the product via the hospital pharmacy. Oral sucrose packaging does not include a national drug code. The logistics of an electronic medical record necessitate pharmacy control of oral sucrose if a provider order and documentation on administration as with a medication are required. Supplying oral sucrose on patient care units as part of the units’ stock instead of within the pharmacy or an electronic medication

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dispensing system provides immediate accessibility to clinicians and the retention of administration of oral sucrose as an independent nursing intervention guided by evidence-based pain policies and protocols.

**Patient Safety and Administration**

At one hospital, addition of oral sucrose to preprinted admission orders increased use of the sugar from 8% to 65% for obtaining blood samples at the time of admission. Oral sucrose may also be included in admission order sets and pain management screens or bands within electronic documentation systems.

The data collection form of the National Data Base for Nursing Quality Indicators for pain assessment-intervention-reassessment cycles does not include oral sucrose as a specific analgesic intervention. However, the form does have the choice for Other, and oral sucrose can be included in this intervention option. Nurses should have the means to document oral sucrose as an intervention for pain management with reassessment of pain after the intervention. Nurses can document oral sucrose as a component of a patient’s plan of care and pain education for an infant’s family. Moreover, nurses may support parents participating in this intervention.

A patient care policy on use of oral sucrose should reflect consensus among the following disciplines: nursing, neonatology, general surgery, cardiothoracic surgery, pain medicine, critical care medicine, and pharmacy. A policy must specify who can administer oral sucrose to newborns when minor invasive procedures are performed (e.g., radiological technologists, phlebotomists). Institution-specific factors (e.g., product availability) and parental preferences are important considerations in evidence-based practice. Table 7 is an outline of the components of a policy on use of oral sucrose.

Dunbar and colleagues described the administration of oral sucrose in combination with a pacifier because of the added analgesic effect of NNS. The oral sucrose was dropped precisely onto the tongue with an oral syringe and then the infant was given a pacifier, or the sugar was administered by dipping the pacifier in the sucrose solution. Figures 1 and 2 show oral sucrose packaging and an administration option for different products.

**Parental Participation in Procedures for Pain Management**

In light of the number of invasive procedures a hospitalized newborn experiences, not surprisingly parents of babies in NICUs identified medical procedures as the major source of pain. Parents desire information about and involvement with their infants’ pain and have described

---

**Table 7 Oral sucrose policy components**

1. Scope (e.g., inpatient, outpatient laboratory, satellite surgery center)
2. Approval bodies/disciplines (e.g., pain council, pharmacy)
3. Who can administer (e.g., nurse, phlebotomist)
4. Purpose and definitions
5. Procedure
   a. When to administer relative to a painful procedure
   b. Method of administration (e.g., pacifier, oral syringe)
   c. Information about pacifier dips and the volume of solution
   d. Indications or inclusion criteria
   e. Contraindications or exclusion criteria
   f. How families can participate with the administration of oral sucrose to their infant
   g. Documentation of pain assessment after administration of oral sucrose
6. Evidence

---

**Figure 1** Packages of Sweet-Ease natural.
Image courtesy of Philips Children’s Medical Ventures, Monroeville, Pennsylvania.

**Figure 2** TootSweet twist-tip vial.
Image courtesy of Natus Medical Inc, San Carlos, California.
specific ways in which staff in the NICU can help them and their babies cope with pain.53 Parents who are empowered to administer oral sucrose to their newborn might be less affected by the infant’s pain and less worried about their relationship with the infant as a result of painful experiences. Nurses are in an ideal position to assess parents’ preferences for being involved in managing infants’ pain and to facilitate parental independence in providing nonpharmacological pain interventions as part of patient-family–centered care.

**Case Reports**

The following case reports are about 2 patients treated in units other than an NICU or a newborn nursery. The standard of care for minor painful procedures relative to analgesic medications for infants is represented. Age determinants for analgesic effectiveness are considered as well as the combination of oral sucrose with other nonpharmacological pain interventions. Incomplete details on pain control before the time covered in these case reports challenge nurses to consider possible implications for the effectiveness or ineffectiveness of oral sucrose.

**Case Report 1: Oral Sucrose Effective**

A newborn boy with coarctation of the aorta was hospitalized in a cardiac intensive care unit. He was swaddled in a radiant warmer bed. His parents were consulting with a physician outside the unit. No analgesics had been ordered as part of the baby’s treatment plan. The infant required percutaneous intravenous cannulation before surgical correction of the cardiac abnormality. A pacifier dipped in a 24% solution of oral sucrose was provided to the infant by a nurse 2 minutes before the intravenous cannulation. The infant had mild extremity withdrawal in response to the first tourniquet application; his CRIES score was 1. The CRIES pain assessment scale is used to measure cry, requirement for increased oxygen administration, increase in vital signs, expression, and sleeplessness.53,54 Scores can range from 0 (no pain) to 10 (the worst possible pain). When a site was chosen for the intravenous cannulation and the procedure was started with a break in the skin, the baby continued to suck on the oral sucrose pacifier. The pacifier was redipped and offered to the baby 3 times during the procedure and for approximately 1 minute after the catheter was secured. The baby slept through most of the procedure. During brief wakefulness, his CRIES score never increased to greater than 1. The baby was swaddled again, and he was resting peacefully when the parents returned to the bedside.

**Case Report 2: Oral Sucrose Ineffective**

A 4-month-old girl was hospitalized in a pediatric intensive care unit with severe bronchopulmonary dysplasia that necessitated high-frequency oscillatory ventilation and prone positioning. When the baby’s condition improved, oxygen was administered via nasal cannula. She required percutaneous intravenous cannulation for maintenance intravenous fluid before transfer to an acute care unit the next morning. The nurse caring for the baby played a television channel in the infant’s room that shows continual imagery scenes accompanied by music (eg, waterfalls, green meadows). No analgesics were ordered as part of the baby’s treatment plan. She was soothed only briefly with oral sucrose for the first tourniquet application to an extremity. As the procedure went on, with 3 unsuccessful attempts at percutaneous intravenous cannulation, oral sucrose had no effect on the infant’s pain, as indicated by no reduction in a CRIES score of 8. Whether or not adequate pain management was provided earlier during hospitalization for multiple urgent and necessary invasive procedures, potentially resulting in hyperalgesia, was not clear. The ineffectiveness of oral sucrose might have been attributable to the infant’s age.

**Conclusion**

Oral sucrose has a valuable role in reducing procedural pain for infants. Generally, the sugar is safe and effective for infants who experience minor invasive procedures. Inconsistencies in studies of the analgesic effects of oral sucrose during common minor invasive procedures may be responsible for the varied findings. Furthermore, an optimal dose has yet to be determined. Nurses need to remember that oral sucrose reduces, but may not eliminate, pain. Combining oral sucrose with other nonpharmacological interventions may enhance pain relief. Oral sucrose should not

be used as a first-line intervention for moderate, severe, or chronic pain in infants.

Oral sucrose for analgesia in newborns remains an area of research and a relevant topic of interest. Additional investigation is needed on repeated administration of oral sucrose, optimal dosing, and use in babies who have extremely low birth weight, are in unstable condition, or are being treated with mechanical ventilation.  

References

None reported.

In loving memory of Beverly Sahlaney.

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Hospitalized Infants Who Hurt: A Sweet Solution With Oral Sucrose
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