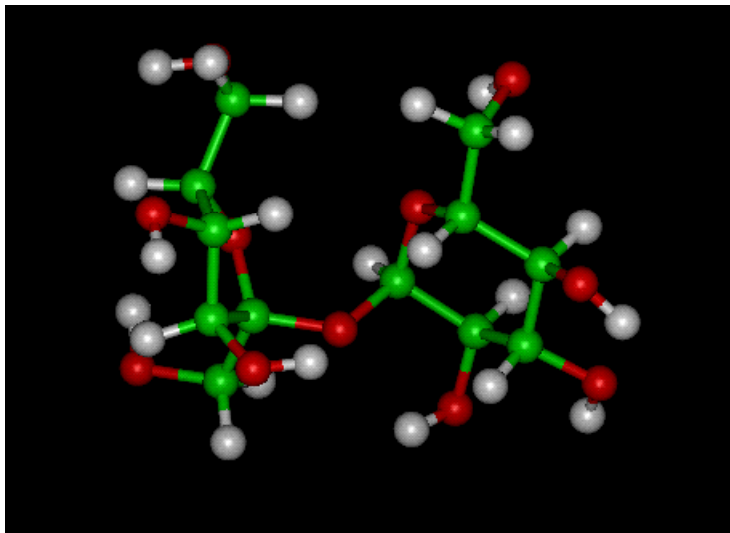


# Sucrose

## The Use of Sucrose as an Analgesic in Infants



Melissa Benderman,  
Cynthia DeBoer  
Patricia Kraemer  
Barbara Van Der Male  
Angela VanMaanen

# Pain Medication Through the Years



# Old Fashion Remedies

- ▶ There has been a history of using sweet tasting solutions for their analgesic properties in infants documented as far back as 632 AD



# Just a Spoonful of Sugar? Helps the pain go away...



Despite this history, it was not until 1991, that a randomized control trial published by Blass and Hoffmeyer demonstrated the effectiveness of sucrose in relieving pain related to procedures



# How Does It Work?

- ▶ The sweet taste of sucrose on the tongue is thought to trigger an opioid release in the infant.



# Why Use Sucrose?



- ▶ The long term effects of unmanaged pain in human infants have been shown to include permanent impairment of elements of cognitive development, including learning, memory, and behavior, and increased somatization in childhood.
- ▶ Early painful experiences affect children's future response to analgesia".
- ▶ Pain is known to cause a significant stress response in both term and pre-term babies.
- ▶ It is unethical to ignore pain relief measures for any baby.



# Evidence Supporting Sucrose Use



# Studies that Support Sucrose For Pain Reduction

In 1991, a randomized control trial published by Blass and Hoffmeyer demonstrated the **effectiveness of sucrose in relieving pain related to procedures.**

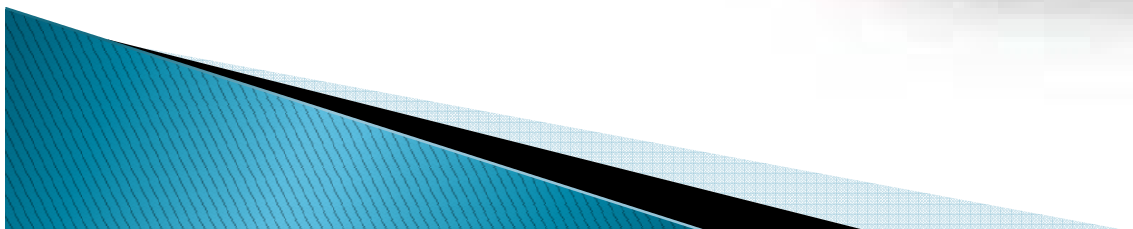
This treatment is **recommended by the American Academy of Pediatrics, the Canadian Pediatric Society, and other professional organizations concerned with the care of infants.**





# The proof is in the Evidence

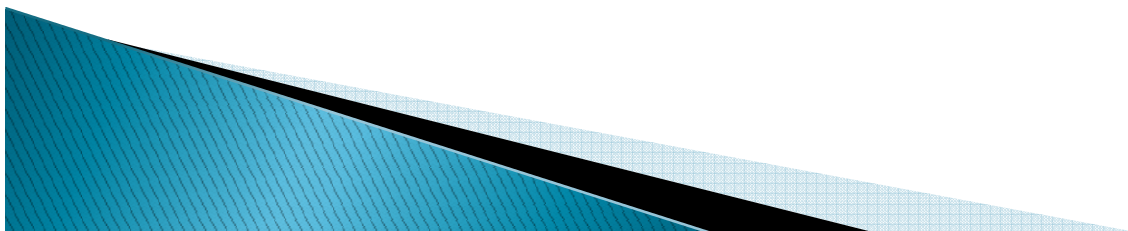
The Cochrane Review concluded that the evidence supported “the efficacy and safety of sucrose for reducing pain from single and repeated **heel lances**”.



# The proof is in the Evidence

Curtis, Hsing Ali, Vandermeer, & Klassen, 2007,  
Concluded their study demonstrates

**“The use of  
pacifier with sucrose as procedural  
analgesia for  
venipuncture in the pediatric  
emergency room is  
effective in reduction of pain in  
infants 0–3 months  
old, as shown by decreased in cry  
times”**



# The proof is in the Evidence

Glucose and sucrose solutions are effective analgesics in infants as old as twelve months during **immunizations**



According to a study published in the British Medical Journal, as reported by Smith in Global Medical News, 2010

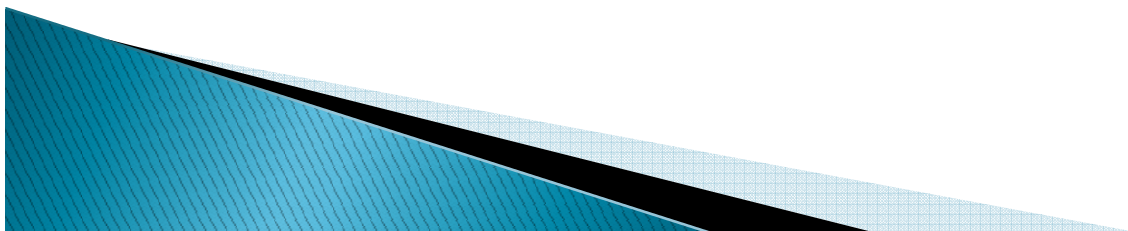


# More Evidence

- ▶ Hatfield, Gusic, Dyer, and Polomano studied the pain responses of 83 two and four-month old infants in a RCT during their routine immunizations (2008) The sucrose treated group returned to normal 9 minutes after the last injection, whereas, the placebo group still reported a mean pain score of 2.91 at 9 minutes based on the UWCH pain scale showing a 78.5% difference.



- ▶ **Infants with sucrose during immunizations returned to normal faster.**





# More Evidence

- ▶ A small study (36 infants) published in late August of last year concluded that their own research combined with previous research shows that **“the synergistic effect of the combination of sucrose and nonnutritive sucking is a statistically and clinically effective and safe intervention for relieving pain during simple procedures as venipuncture or heel stick in pre term and term infants”** (Elserafy, Alsaedi, Louwrens, Sadiq, & Mersale, 2009, p. 187).



# Use in the pre-term infant

- ▶ Gibbins et al. noted a significant decrease in pain response in infants combining sucrose with non-nutritive sucking (pacifier) with no difference in gestational age.
- ▶ The Johnston et al. study found procedural pain in 103 infants born at less than 31 weeks gestation was relieved by sucrose but also found detrimental effects on neurobehavioral development and physiologic outcomes when assessed at 36 and 40 weeks.
- ▶ In a similar study of longer duration in 2005, by Stevens et al., “did not show any such association between sucrose use and adverse outcomes” (Harrison, 2008, p.42).

**These discrepancies suggest further studies on long term effects on the pre-term infant are necessary.**



# Pain assessment in infants



- ▶ Crying or changes in physiology such as tachycardia, tachypnea, and hypertension are not reliable indicators of pain in the infant (Atkinson, Chesters, & Heinz, 2009, p.1074).
- ▶ Behavioral assessment tools such as FLACC (facial expression, leg position, activity pattern, presence of crying, nature of cry, and ability to be consoled) (Atkinson, Chesters, & Heinz, 2009) or the Wisconsin Children's Hospital Pain Scale (UWCH) used in the Hatfield, Gusic, Dyer, and Polomano study, which measures cry, facial expression, behavior and body movement/posture (2008, p. e330) are more comprehensive gauges of pain in the preverbal child.



| Categories    | Scoring                                      |   |  |
|---------------|--|---|--|
|               | 0  | 1   | 2  |
| Face          | No particular expression or smile            | Occasional grimace or frown, withdrawn, disinterested                       | Frequent to constant frown, quivering chin, clenched jaw |
| Legs          | Normal position or relaxed                   | Uneasy, restless, tense   | Kicking or legs drawn up                                 |
| Activity      | Lying quietly, normal position, moves easily | Squirming, shifting back and forth, tense                                   | Arched, rigid, or jerking                                |
| Cry           | No cry (awake or asleep)                     | Moans or whimpers; occasional complaint                                     | Crying steadily, screams or sobs, frequent complaints    |
| Consolability | Content, relaxed                             | Reassured by occasional touching, hugging, or being talked to; distractible | Difficult to console or comfort                          |

**Note:** Each of the five categories Face (F), Legs (L), Activity (A), Cry (C), and Consolability (C) is scored from 0-2, which results in a total score between 0 and 10.

From Merkel, Voepel-Lewis, Shayevitz, & Malviya (1997). The FLACC: A behavioral scale for scoring postoperative pain in young children. *Pediatric Nursing*, 23(3) 293-297.

Source: *Pediatr Nurs* © 2003 Jannetti Publications, Inc.



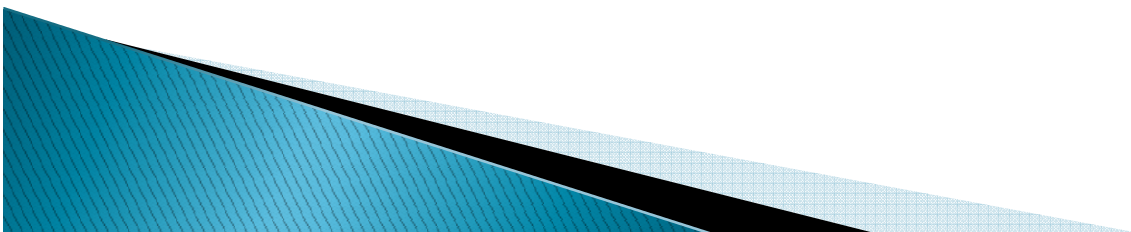
## FLACC Pain Assessment Scale



# Barriers To Using Sucrose



8 myths for  
not Utilizing  
Sucrose



# 1. Not Baby Friendly



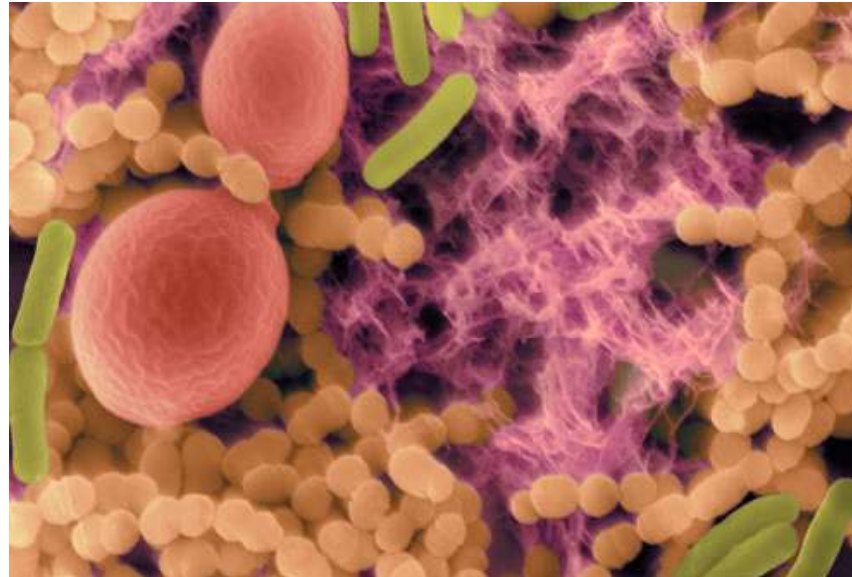
## Myth Buster:

In response to fears that sucrose would supplement breast feeding, The Baby Friendly Health Initiative endorses the use of sucrose as an evidence based pain management strategy.

## 2. Sucrose grows bacteria

**Myth Buster:**  
Sucrose in these  
stronger,  
pain reducing  
concentrations,  
didn't support bacterial  
growth after four weeks  
and 105 accesses.

Sucrose is now available  
in individual unit doses  
virtually eliminating this  
problem.



# 3. Risk of dental caries

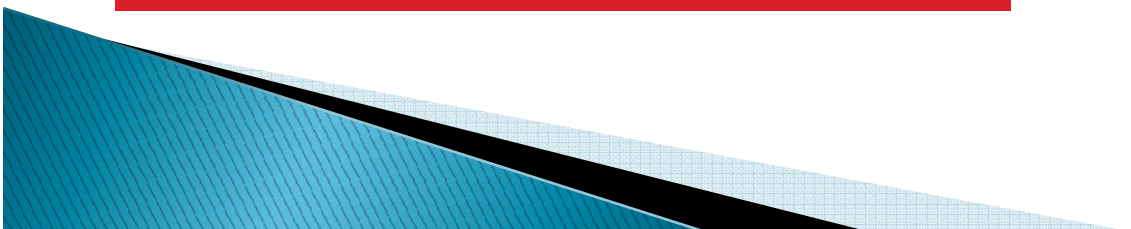
## Myth Buster:

✓The volume and sugar content of other medications is similar to sucrose.

✓They should be reserved for medicinal use and not home comfort measures.

✓It is **doubtful** that it would contribute to caries.

✓ Studies should be done to see if there is any correlation.





# 4. Increased risk of poor neurological outcomes in infants less than 32 weeks

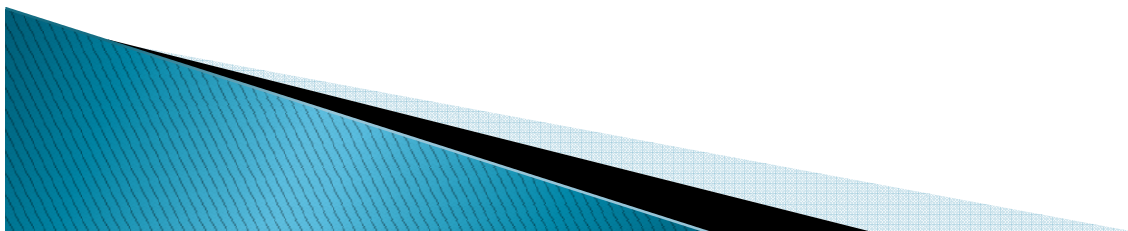
Myth Buster:

A study in 2005 showed no association between consistent sucrose use and poor neurologic outcomes.



# 5. Increases risk of necrotizing enterocolitis

**Myth Buster:**  
Two studies failed to show increases in the occurrence of necrotizing enterocolitis with the use of sucrose. Nonetheless, health care providers are advised to use the recommended dose.



## 6. Results in hyperglycaemia

Myth Buster:

Blood sugar levels of a control group receiving water tested the same as those receiving sucrose.

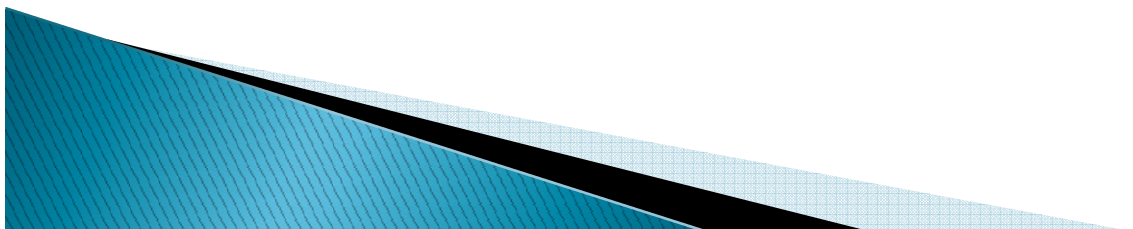
In addition: The way sucrose works with small volumes to tip of tongue, not enough is absorbed by the gut to increase blood sugars.



# 7. Not effective in older babies

## Myth Buster:

The pain relief may be less profound in infants over 28 days, but it is still considered adequate. Studies show there may be a need for a stronger concentration for older infants.



# 8. Repeated doses lead to development of tolerance to sucrose

Myth Buster:

Studies do not demonstrate this in human infants during 443 pain assessments during heel lances, despite multiple doses.





Evidence supported



Myth's Disputed



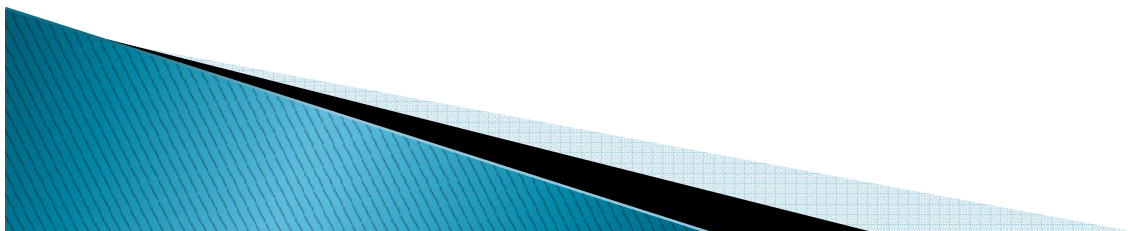
Now for Our  
Recommendations



# Use For heel lances and venipunctures



# Use For Premies

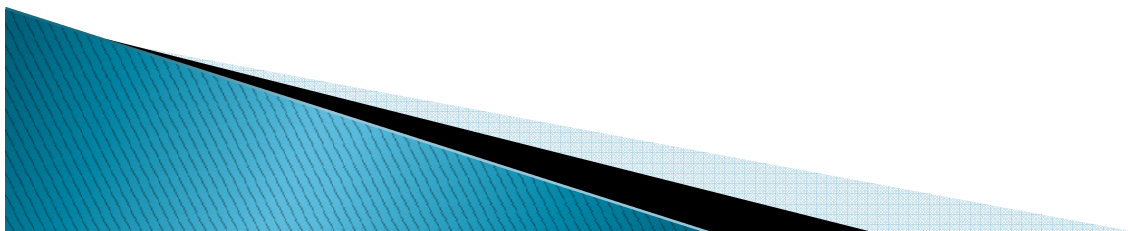


# Use Sucrose for immunizations



west05712 fotosearch.com

# Use For procedures such as circumcisions



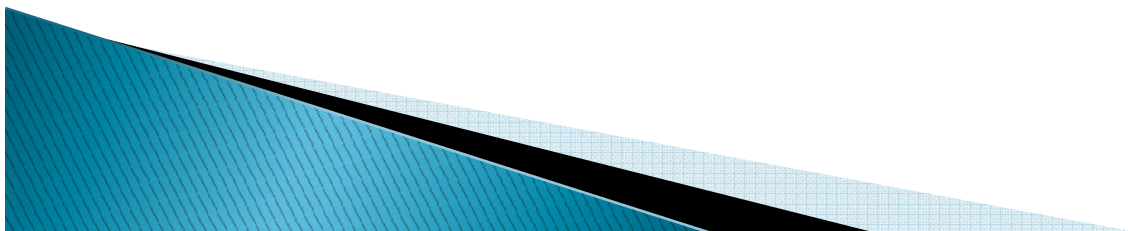


# Ways to Encourage Use of Sucrose

Nurse Education is the primary way to encourage utilization of sucrose.

The proof is strong that sucrose diminishes pain in the infant population.

Through investing in nurse education, more nurses can become aware of how sucrose can help minimize pain in infants



# Ways to Encourage Use of Sucrose

- ▶ Once nurses become aware of the supportive research on sucrose, nurses are empowered to initiate process changes to increase the use of sucrose and advocate for better pain control for the youngest and most vulnerable of patients.

In utilizing sucrose for pain control in infants, nurses will see infants' painful behaviors diminish in procedures and parents' anxiety levels decrease as they witness our concern for the pain and well-being of their child.



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# References

A photograph of a baby lying down, wearing a light green hospital gown, holding a blue pacifier in their mouth. The baby's eyes are closed, and they appear to be resting or sleeping. The background is a soft, out-of-focus blue and white pattern.

- ▶ Gibbins, S., Stevens, B., Hodnett, E., Pinelli, J., Ohlsson, A., & Darlington, G. (2002). Efficacy and safety of sucrose for procedural pain relief in preterm and term neonates. *Nursing Research*, *51*(6), 375–382.
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# Picture references and access

## Pictures:

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2. Sucrose picture of worker with baby  
<http://www.thestar.com/living/article/411271>
3. <http://www.askbaby.com/give-babies-sucrose-to-relieve-pain.htm>
4. Preterm <http://www.babble.com/CS/blogs/strollerderby/preemie.jpg>
5. Circumcision with pacifier  
<http://i.ehow.com/images/a04/f1/s4/care-newborn-s-circumcision-200X200.jpg>
6. Crying baby cut  
<http://www.manandhisbaby.com/wp-content/uploads/2007/11/cut.jpg>
7. Heel poke  
[http://farm3.static.flickr.com/2515/3928227095\\_fe221ddb33.jpg](http://farm3.static.flickr.com/2515/3928227095_fe221ddb33.jpg)
8. Poke  
<http://www.hss.state.ak.us/dph/wcfh/metabolic/images/poke.jpg>
9. Babypacifier  
<http://www.babble.com/CS/blogs/strollerderby/baby-pacifier.jpg>
10. baby pacifier  
<http://www.newbornbabyzone.com/wp-content/uploads/2007/08/baby-pacifier4.jpg>

# Picture references and access

11. baby with pacifier

<http://newbornmed.com/wp-content/uploads/2010/01/Baby-with-pacifier.jpg>

12. Baby yellow with pacifier

<http://media.photobucket.com/image/baby%20pacifier%20nicu/Kikadesa/ClaraDay2.jpg>

13. Painfree baby

<http://www.bmc.org/Images/painfree-newborn-care-atBMC.jpg>

14. Tootsweet

[http://www.jlmaccutek.com.au/data/images/20090401170542hawaii\\_tootsweet\\_new\\_med.jpg](http://www.jlmaccutek.com.au/data/images/20090401170542hawaii_tootsweet_new_med.jpg)

15. Sweetease <http://sweetease.respironics.eu/Images/Home/ProductSweetease.jpg>

16. Premie peaceful sleeping [http://www.aboutkidshealth.ca/Shared/Media/BRAND-](http://www.aboutkidshealth.ca/Shared/Media/BRAND-PHO/premie_sleeping_peaceful.jpg)

[PHO/premie\\_sleeping\\_peaceful.jpg](http://www.aboutkidshealth.ca/Shared/Media/BRAND-PHO/premie_sleeping_peaceful.jpg)

17. Baby getting shot <http://scopeblog.stanford.edu/baby%20getting%20shot.jpg>

17. Baby fol [http://photos.demandstudios.com/227/177/fotolia\\_2684966\\_XS.jpg](http://photos.demandstudios.com/227/177/fotolia_2684966_XS.jpg)

18. Colic <http://i.ehow.com/images/a05/7j/2l/old-timer-remedies-colic-120X120.jpg>

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- ▶ 19. Pain drops  
[http://www.google.com/imgres?imgurl=http://www.oddee.com/\\_media/imgs/articles/a271\\_a2.jpg&imgrefurl=http://coolpicturegallery.blogspot.com/2008/12/10-cocaine-and-other-drug-products-of.html&usg=\\_\\_kdxZ5GvdZphEjqTy1Lj8ApfYUGo=&h=512&w=355&sz=19&hl=en&start=5&um=1&itbs=1&tbnid=w\\_BNknSZHb3mRM:&tbnh=131&tbnw=91&prev=/images%3Fq%3Dold%2Bfashion%2Bpain%2Bmedicine%2Bcocaine%26um%3D1%26hl%3Den%26tbs%3Disch:1](http://www.google.com/imgres?imgurl=http://www.oddee.com/_media/imgs/articles/a271_a2.jpg&imgrefurl=http://coolpicturegallery.blogspot.com/2008/12/10-cocaine-and-other-drug-products-of.html&usg=__kdxZ5GvdZphEjqTy1Lj8ApfYUGo=&h=512&w=355&sz=19&hl=en&start=5&um=1&itbs=1&tbnid=w_BNknSZHb3mRM:&tbnh=131&tbnw=91&prev=/images%3Fq%3Dold%2Bfashion%2Bpain%2Bmedicine%2Bcocaine%26um%3D1%26hl%3Den%26tbs%3Disch:1)
- ▶ 20. Opium  
[http://www.google.com/imgres?imgurl=http://www.oddee.com/\\_media/imgs/articles/a271\\_a2.jpg&imgrefurl=http://coolpicturegallery.blogspot.com/2008/12/10-cocaine-and-other-drug-products-of.html&usg=\\_\\_kdxZ5GvdZphEjqTy1Lj8ApfYUGo=&h=512&w=355&sz=19&hl=en&start=5&um=1&itbs=1&tbnid=w\\_BNknSZHb3mRM:&tbnh=131&tbnw=91&prev=/images%3Fq%3Dold%2Bfashion%2Bpain%2Bmedicine%2Bcocaine%26um%3D1%26hl%3Den%26tbs%3Disch:1](http://www.google.com/imgres?imgurl=http://www.oddee.com/_media/imgs/articles/a271_a2.jpg&imgrefurl=http://coolpicturegallery.blogspot.com/2008/12/10-cocaine-and-other-drug-products-of.html&usg=__kdxZ5GvdZphEjqTy1Lj8ApfYUGo=&h=512&w=355&sz=19&hl=en&start=5&um=1&itbs=1&tbnid=w_BNknSZHb3mRM:&tbnh=131&tbnw=91&prev=/images%3Fq%3Dold%2Bfashion%2Bpain%2Bmedicine%2Bcocaine%26um%3D1%26hl%3Den%26tbs%3Disch:1)
- ▶ 21. Baby getting shot <http://i.ehow.com/images/a04/c2/mi/use-sugar-first-aid-1.2-120X120.jpg>  
BBC News Nov. 26 1999 sugar relieves baby pain [http://www.google.com/imgres?imgurl=http://news.bbc.co.uk/olmedia/535000/images/\\_536644\\_baby300.jpg&imgrefurl=http://news.bbc.co.uk/2/hi/health/536644.stm&usg=\\_\\_grsbuijnzk04UeqkApMREELI-tM=&h=180&w=300&sz=14&hl=en&start=20&um=1&itbs=1&tbnid=Aykl-xMAo4K6UM:&tbnh=70&tbnw=116&prev=/images%3Fq%3Dsugar%2Bbaby%2Bpain%26um%3D1%26hl%3Den%26tbs%3Disch:1](http://www.google.com/imgres?imgurl=http://news.bbc.co.uk/olmedia/535000/images/_536644_baby300.jpg&imgrefurl=http://news.bbc.co.uk/2/hi/health/536644.stm&usg=__grsbuijnzk04UeqkApMREELI-tM=&h=180&w=300&sz=14&hl=en&start=20&um=1&itbs=1&tbnid=Aykl-xMAo4K6UM:&tbnh=70&tbnw=116&prev=/images%3Fq%3Dsugar%2Bbaby%2Bpain%26um%3D1%26hl%3Den%26tbs%3Disch:1)
- ▶ 22. Painful baby vaccination  
<http://www.windsorstar.com/health/2147957.bin?size=620x400>  
Baby getting medicine <http://www.windsorstar.com/health/2147957.bin?size=620x400>  
Baby pain  
[http://4.bp.blogspot.com/\\_ZPUIbpPI1ME/SvBVPMW507I/AAAAAAAAALU/qU5SGq9kCgw/s200/Baby+Pain.png](http://4.bp.blogspot.com/_ZPUIbpPI1ME/SvBVPMW507I/AAAAAAAAALU/qU5SGq9kCgw/s200/Baby+Pain.png)

# Picture references and access

24. Premie getting sugar <http://imagecache02.pixsy.com/10172007/c3/c3ccae62-1846-45b1-a3c5-c2ecaa1602e4.jpg>
25. Sugar cube <http://0.tqn.com/d/chemistry/1/7/k/c/sugarcubes.jpg>
26. Baby medicine with hands [http://blogs.babycenter.com/momformation/files/2008/09/images\\_baby\\_medicine1.jpg](http://blogs.babycenter.com/momformation/files/2008/09/images_baby_medicine1.jpg)
27. Circumcision: [http://www.google.com/imgres?imgurl=http://3.bp.blogspot.com/\\_XuF6Q0eKsh8/SIR3oXCjeXI/AAAAAAAAABc4/VIPVVibFY5A/s400/baby.jpg&imgrefurl=http://www.forgeflyer.com/2008\\_07\\_01\\_archive.html&usq=\\_\\_3AjvroTgPGpW6ftCiAQT0LTgyA=&h=160&w=240&sz=15&hl=en&start=46&um=1&itbs=1&tbnid=z9s658zUEykrwM:&tbnh=73&tbnw=110&prev=/images%3Fq%3Dcircumcisions%26start%3D40%26um%3D1%26hl%3Den%26sa%3DN%26ndsp%3D20%26tbs%3Disch:1](http://www.google.com/imgres?imgurl=http://3.bp.blogspot.com/_XuF6Q0eKsh8/SIR3oXCjeXI/AAAAAAAAABc4/VIPVVibFY5A/s400/baby.jpg&imgrefurl=http://www.forgeflyer.com/2008_07_01_archive.html&usq=__3AjvroTgPGpW6ftCiAQT0LTgyA=&h=160&w=240&sz=15&hl=en&start=46&um=1&itbs=1&tbnid=z9s658zUEykrwM:&tbnh=73&tbnw=110&prev=/images%3Fq%3Dcircumcisions%26start%3D40%26um%3D1%26hl%3Den%26sa%3DN%26ndsp%3D20%26tbs%3Disch:1)
28. Nurse at incubator: <http://www.fotosearch.com/bigcomp.asp?path=RBL/RBL008/b13927.jpg>
29. Doctor with syringe: <http://www.fotosearch.com/csp013/k0131250/>
30. Syringe: <http://www.fotosearch.com/wtd263/westfo5712>
31. FLACC scale: accessed at : <http://img.medscape.com/fullsize/migrated/452/694/pn452694.tab3.gif>
32. Painful baby: [http://www.google.com/imgres?imgurl=http://www.chiro.cc/health\\_images/crying\\_baby.jpg&imgrefurl=http://www.chiro.cc/health\\_page.php/health\\_page.php%3Fpage%3Dcolic&usq=\\_\\_IT35YzZOBMpFeVtL7bbt\\_pLvRYU=&h=323&w=250&sz=11&hl=en&start=2&um=1&itbs=1&tbnid=mrueYI26w\\_9LnM:&tbnh=118&tbnw=91&prev=/images%3Fq%3Dbaby%2Bpain%26um%3D1%26hl%3Den%26tbs%3Disch:1](http://www.google.com/imgres?imgurl=http://www.chiro.cc/health_images/crying_baby.jpg&imgrefurl=http://www.chiro.cc/health_page.php/health_page.php%3Fpage%3Dcolic&usq=__IT35YzZOBMpFeVtL7bbt_pLvRYU=&h=323&w=250&sz=11&hl=en&start=2&um=1&itbs=1&tbnid=mrueYI26w_9LnM:&tbnh=118&tbnw=91&prev=/images%3Fq%3Dbaby%2Bpain%26um%3D1%26hl%3Den%26tbs%3Disch:1)
33. Incubator baby pain: [http://newsimg.bbc.co.uk/media/images/39855000/jpg/\\_39855693\\_incubator203.jpg](http://newsimg.bbc.co.uk/media/images/39855000/jpg/_39855693_incubator203.jpg)



The End

