

Three ways to reduce pain in early-life medical procedures

Dr Denise Harrison is a nursing professor who, over the past 15 years, has published many studies about pain relief for infants undergoing painful procedures in their first few months of life. Her research aims to narrow the gap between research evidence and practice. This includes encouraging the implementation of three simple, cost-effective and well-studied strategies to reduce pain in babies during needles and other procedures.

Q&A

Your research into the prevention and management of pain and stress in healthy and sick newborn babies and young children has clear benefits for parents worldwide. What drives you to do this important work and educate others?

As a neonatal intensive care nurse and a midwife with over 25 years of experience, I have seen, helped with and done thousands of painful but necessary procedures on sick and healthy babies and young children. We used to be taught that young babies did not feel pain, or that they did not remember pain, yet it was obvious that this was not the truth, and that babies, no matter how preterm and sick, suffered immensely during painful procedures.

I was driven to research how to improve pain treatment for sick babies after helping a physician place a drip in a very sick baby boy with chronic lung disease due to his prematurity. The little guy became so distressed and after a few weak cries, he turned blue, then grey, and we needed to give him extra oxygen and help him breathe, then still had to put the drip in. It was at that point I became very sad for this little baby, who I can still picture clearly, and angry that we were doing such painful procedures with no pain relief. So I set out to discover how to reduce pain during these painful needles in sick babies.

What are the risks of poor pain management during infant procedures?

More and more, researchers are discovering that poorly-treated pain during the many painful procedures sick babies need as part of their care, is harmful to the growing brain. The scenario described above tells of the short-term effects of harm, with the baby being unable to catch his breath and then needing us to resuscitate him. We now know that the number of painful procedures is the strongest predictor of poor brain development – which means

higher risk of poor learning, higher risk of poor physical strength and coordination, and higher risk of behavioural problems (Ranger & Grunau, 2014). If we consistently use effective ways to reduce pain, during all necessary needles and other painful procedures, we may be able to reduce the risk of these poor outcomes.

You describe breastfeeding and skin-to-skin care as some of the best ways to reduce pain. Why are these simple measures so frequently ignored by doctors, nurses and midwives who care for newborn babies and young children?

The good news is that, if feasible and possible, supporting mothers to breastfeed, or supporting mothers, fathers or their family or friends to hold premature babies skin-to-skin, during painful procedures, is so simple to do and so effective. It not only helps the babies, it is a very powerful way for parents to help and support their role as protectors of their babies. If this cannot occur, very small amounts, just a drop, of sugar water given to babies to suck, is also profoundly calming for small sick babies and babies up to a year old.

Why are these simple measures not being consistently used? There may be many answers to this question. Again, the good news is these treatments are being used more often than they were. The World Health Organization has now publicly recommended that babies breastfeed during early childhood vaccination, which is a huge step in reducing vaccination needle pain. There is more and more awareness of the poor outcomes of very sick babies, and ways we can give far more gentle care, reduce the number of painful procedures and support parents in their role in caring for their sick babies.

However, we certainly know that many babies, both sick and healthy, still have painful procedures with no pain treatment. In some cases, this is due to unfounded ▶

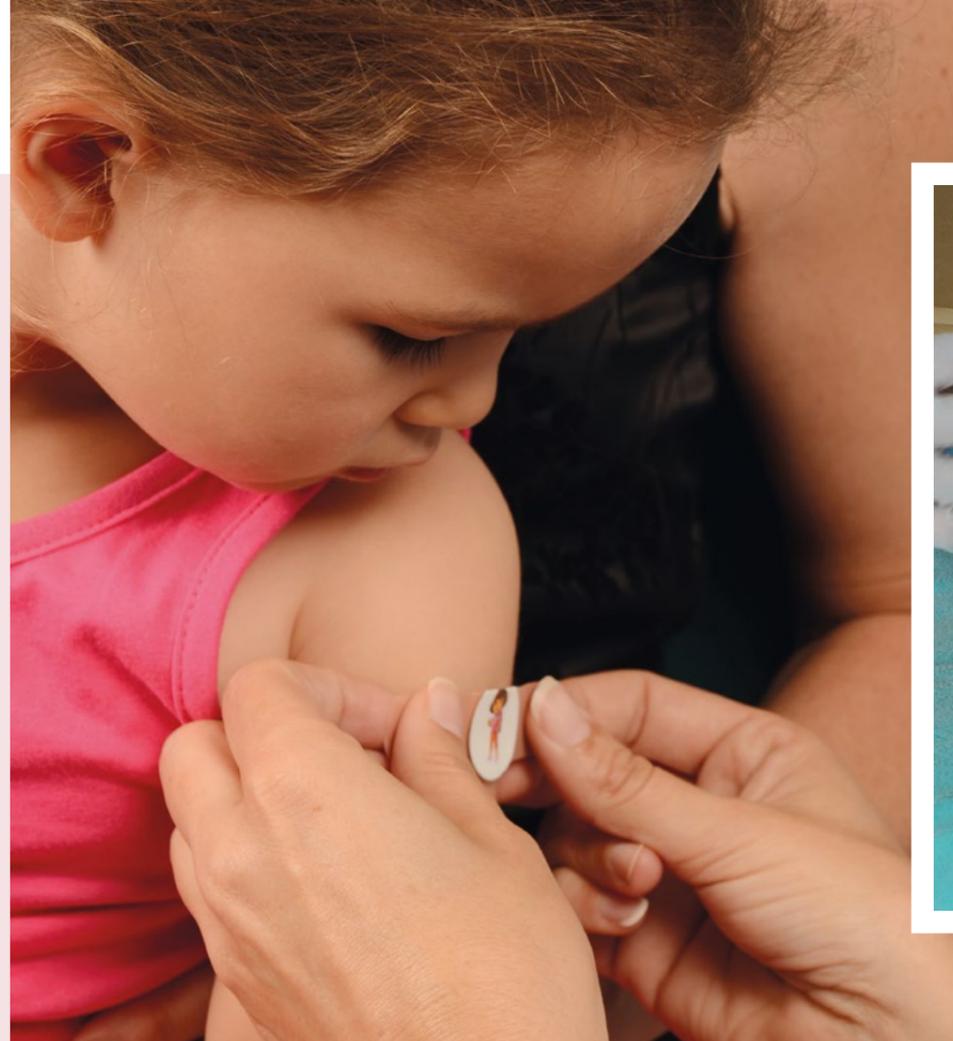
myths about using breastfeeding or skin-to-skin care, including that the baby will choke (this has not been reported in any trials), the baby will associate the mother with painful procedures (this makes no sense, as a baby will breastfeed about 8 times/day, every day, and during only a couple of these feeds will a procedure be performed), or that mothers do not want to be there for their baby's needles. When mothers are asked this question, they tell the opposite, that they do want to do everything they can to help their babies. Other reasons may be due to lack of knowledge of the effectiveness of breastfeeding, skin-to-skin or sucrose for painful procedures, or workload issues. For example, standard practice in a unit may be that babies are taken away from mothers for blood work, or that parents are asked to leave the room when procedures are done.

Could you explain the importance of collaboration in disseminating the evidence behind your work and suggest what more international organisations could do to improve painful procedures for infants?

Although there are 100s of published scientific trials and large systematic reviews (the most recent Cochrane systematic review of sucrose for analgesia in newborn babies is 360 pages long), and extensive clinical practice guidelines, these documents are not easy to read, especially for parents of babies. We need to show health care providers and parents how they can help, and clearly show both groups the profound calming benefits to the babies of using breastfeeding, skin-to-skin or sucrose during painful needles. Widely disseminating clear visual messages in the form of 'usable evidence' to health care providers and parents around the world will help spread the messages. Providing videos which are free, easily accessible, and in many languages helps to ensure the evidence is able to be shared and used internationally.

What could international organisations do to improve pain treatment?

Some organisations are already working on this. [ChildKind International](#) focuses on reducing pain and suffering in organisations that care for children. [The Pain in Child Health \(PICH\)](#) consortium has supported training of a large community of health care researchers aimed at improving knowledge about pain and reducing pain in children around the world. [The Council of International Neonatal Nurses](#), with their



aim of unifying neonatal nurses globally, shares the [BSweet2Babies](#) video series from their site for worldwide dissemination to nurses caring for newborns. We can, and need to, do more, but most knowledge translation begins at our own doorstep: working with our local units, hospitals and health care centres to use such simple strategies consistently is key to changing practices; ensuring that routine practices, such as newborn screening, are performed when mothers are able to breastfeed, or someone is able to hold the babies skin-to-skin; ensuring that non-urgent blood work is done when parents are able to be present, rather than at 4am in the morning – a very difficult time for parents to be with their baby in a NICU, yet this is routine practice in many organisations; truly partnering with parents in our pain care and facilitating their presence and their support; working with our organisations to ensure easy availability of sweet solutions – sucrose or glucose. These are small steps yet they are essential for babies who do not have a voice or a say in the matter.

In addition to the guidelines outlined

in this article, do you have a key message for parents who must put their babies and young children through painful procedures?

My key message would be: 'ask your nurse or doctor, about ways you can help your baby and young child during painful procedures'. Request to breastfeed, based on the recommendations of the World Health Organization. If you are not breastfeeding, request to hold your little baby skin-to-skin, or your toddler upright and front to front. If your baby is in the NICU, and able to be held, request that non-urgent bloods are done only when you, or your partner / family member / friend is there and able to hold your baby skin-to-skin. You are the ones who will comfort your little toddler when they stumble and graze their knees, when they fall off their bikes and need stitches and whenever they have a 'hurtie' or an 'owie'. Start now, when your baby is just born. You can partner with us – your doctors, nurses, midwives and lab techs – to help us all with your baby's care during painful procedures.



Breastfeeding is a very effective way to keep an infant calm during painful procedures such as a heel lance or venepuncture



Many newborn infants must undergo painful procedures such as a heel lance or venepuncture for blood extraction, or immunisations. Premature or sick infants need more invasive and painful procedures, because they are more likely to need screening and testing to help them recover and become healthy children. After working for many years in neonatal and paediatric intensive care units Dr Denise Harrison began her research career with the question, 'how can we reduce pain during painful procedures in sick babies?'

Pain early on in life can have a negative effect on cognitive development and have long-term adverse effects on brain development that means infants have altered responses to pain. For instance, painful immunisations and injections early in life can cause a fear of needles, with negative consequences later on.

REDUCING PAIN IS SIMPLE

Harrison and her team highlight three simple, cost-effective ways to reduce pain in infants. Firstly, breastfeeding before and during painful procedures can minimise distress to babies. Secondly, skin-to-skin care, also called 'kangaroo care', is

recommended for babies who are not able to breastfeed. This involves the baby being held against the skin of a caregiver before and during painful procedures. Finally, the baby can be given small amounts of a sweet-tasting solution, either sucrose or glucose, before and during a procedure. All three methods are easily administered and can be applied in diverse settings, such as neonatal intensive care units, healthy newborn baby units and immunisation clinics worldwide.

BREASTFEEDING

Although on its own breast milk in small quantities is not a very effective analgesic, the entire process of breastfeeding during procedures is highly valuable. The benefits are multifactorial: it combines maternal holding, sucking, a slightly sweet taste and endorphins. More than anything, it is comforting to babies because it is associated with maternal care. This provides effective pain reduction while a nurse takes blood samples or delivers immunisations. If a mother and baby are able to breastfeed, this method costs nothing because it requires no additional resources. It is suitable for non-urgent procedures and can be used in almost any context.

Social media [is] an effective way of communicating and disseminating information about neonatal pain reduction strategies

SKIN-TO-SKIN CARE

If breastfeeding during painful procedures is not possible, research shows that skin-to-skin care (SSC) also reduces babies' pain. Holding newborns to a parent or caregiver's chest, on their skin, helps to keep the baby relaxed and calm during blood tests or injections. This is especially useful for premature babies, and babies who cannot breastfeed, and means that fathers or other carers can also provide this care. SSC is most effective if started around 15 minutes before a procedure. Nurses, doctors and lab techs can help parents do SSC during painful procedures by doing non-urgent blood tests when parents are able to be present.

SWEET SOLUTIONS

Sweet-tasting solutions are the most commonly studied pain treatment in babies. Very small amounts (just a few drops) of sucrose or glucose, reduce pain during procedures for newborns and babies up to one year of age. The pain reducing effects are due to distraction, because of the sweet taste, and more importantly, an orally mediated sweet-taste-induced opioid response. For best effects, small amounts of sucrose or glucose are given to babies on their tongue, with or without a soother, just before and then during painful procedures. The concentration needs to be sufficiently sweet, therefore at least 20% glucose or sucrose is needed.

MEASURING PAIN

Due to extensive research by nurses, doctors, psychologists and scientists over the last 20 years, Harrison's team have good ways to measure pain. For babies, they use the Premature Infant Pain Profile-Revised (PIPP-R) and for older babies and young children, they have the FLACC index ▶

(Face, Legs, Activity, Cry, Consolability). The most commonly used indicator in pain measurement is facial expressions of pain. It is clear that for studies measuring pain in babies during procedures, babies given no treatment have higher pain scores compared to babies breastfed, held with SSC or given sucrose or glucose.

BARRIERS TO IMPLEMENTATION

Harrison emphasises the importance of working at translating knowledge into action, and tries to identify facilitators and barriers to the implementation of pain reduction strategies. It seems counter-intuitive that these methods are not widely used, because they are easily administered and incur few financial or time costs. In one study, where they examined YouTube videos of infant immunisations, Harrison's team concluded that there were very few cases where any pain relief was used, with consequent impacts on the babies' discernible level of distress.

In a later study exploring the barriers to the implementation of pain reduction strategies, Harrison's team found that the main reasons that measures were not taken were related to the knowledge and education of healthcare practitioners, and practical factors related to the medical procedure and organisational structure. Further constraints, such as the attitudes of healthcare practitioners and the preference to complete procedures without parents present were also identified.

OVERCOMING BARRIERS

Understanding the reasons why pain reduction strategies are not widely adopted in neonatal contexts is the

first step to breaking down the barriers to their implementation. After many years of research, educating healthcare practitioners (nurses, doctors, lab techs) and encouraging adoption of pain management strategies in clinical settings, there has been little actual uptake. This led Harrison to try a different approach. She now also partners with parents of babies, and targets the communication of her findings at parents, advising how to assist during procedures, and how to advocate on behalf of their babies.

As part of her campaign 'Be Sweet to Babies', Harrison and her team have produced Youtube videos to promote pain management strategies to parents, and to demonstrate how to deliver them. She sees social media as an effective way of communicating and disseminating information about neonatal pain reduction strategies. They have also produced simple posters outlining the three techniques that can be used, which aim to encourage parents and healthcare practitioners to adopt them. These methods of communication can also be extended to other settings, such as the developing world, or clinics with poor resources or training.

Harrison also identifies the need for a coordinated and uniform approach to reducing neonatal pain, involving participation from healthcare professionals, parents, frontline carers and the leaders of organisations and professional associations. Clear guidelines for clinicians on pain management techniques are necessary, but advice for parents is also needed. The evidence is clear that parents can help reduce babies' pain with simple strategies – Harrison wants to help healthcare professionals work together with parents to put this evidence into practice.

Detail

RESEARCH OBJECTIVES

Dr Harrison's program of research, called 'Be Sweet to Babies', focuses on pain management in neonates, infants and children. Her studies include efficacy, effectiveness, safety and utilisation of sucrose in diverse neonatal, infant and child populations; systematic reviews of sucrose for pain management; pain prevalence in diverse clinical settings; pain management in NICUs and community settings during immunisation; knowledge translation; and ethics of conducting clinical trials in vulnerable patient populations.

COLLABORATORS

- Sandy Dunn from [BORN](#)
- [Baby Friendly Initiative](#)
- Bonnie Stevens at [SickKids](#) and University of Toronto
- Paula Forgeron and [The Pain Hub](#) at University of Toronto
- And all parents of babies and young children

BIO

Dr Denise Harrison is the Chair in Nursing Care of Children, Youth and their Families at the Children's Hospital of Eastern Ontario (CHEO) and CHEO Research Institute and an Associate Professor at the University of Ottawa. Her research program "BSweet2Babies"

focuses on improving pain management for sick and healthy babies and young children. Her research includes using innovative ways to move pain treatment knowledge into action.

CONTACT

Faculty of Health Sciences
538-540 KE, Ottawa, ON, K1N 6N5
Canada

E: Denise.Harrison@uOttawa.ca

T: +1 613 562-5800

W: www.cheori.org

T: [@dharrisonCHEO](https://twitter.com/dharrisonCHEO)

F: [BeSweetToBabies](https://www.facebook.com/BeSweetToBabies)

To see Denise's work for yourself check out her videos on [YouTube](#)

