Bliss funds research to understand pain in premature babies

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Bliss for babies born premature or sick

Bliss is delighted to announce that the first award from its new research fund has been granted to a pioneering project that aims to understand pain in premature babies. We have spent a significant period of time over the last two years developing and consulting on our new research funding strategy, which identified three core priority areas for Bliss' future research funding. These are:

1. The most effective ways of judging whether a premature or sick baby is feeling pain
2. The impact of developmental care support on neurodevelopmental outcomes
3. Emotional and other practical support to improve attachment and bonding of premature or sick babies and their families.

We were assisted at every step in this process by our independent research advisory panel, which was made up of half professional members and half public members, and co-chaired by Dr Narendra Aladangady (professional member and consultant neonatologist at Homerton Hospital), and Ben Wills-Eve (public member).

Following a thorough two-stage application and review process overseen by the research advisory panel and with 20 applications received at the first stage, we have awarded the Paediatric Neuroimaging Research Team from the Department of Paediatrics at the University of Oxford a £145,987 grant, spread over three years, to fund a project that seeks to improve the measurement and treatment of pain in premature babies.

About the research project

As recently as 30 years ago, it was thought that a premature baby's nervous system may not be developed enough to process pain. While it is now widely accepted that premature babies do feel pain, essential medical procedures such as intubation, injections and blood tests are still often performed without adequate pain relief. The average baby in neonatal care has around 10 medical procedures every day and those born extremely prematurely can have up to 50 procedures.

Pain in early life can have long-term consequences such as reduced growth, altered brain development[1] and reduced school-age academic performance.[2] Seeing their child in pain can also be incredibly stressful and upsetting for parents.

The research team at Oxford, led by Professor of Paediatric Neuroscience Rebeccah Slater, is seeking to improve both how best to accurately measure pain in premature babies and the way that pain is treated. The project aims to measure the effects of essential but painful procedures on breathing, heart rate, oxygen saturation, facial expression and brain activity in order to identify the best age-appropriate ways to assess and treat pain in premature babies. The researchers will also seek to find out whether a parent's touch during a procedure can reduce pain in infants.

Rebeccah says: "I am thrilled to be working with Bliss on this exciting research project. The Bliss research funding provides a tremendous opportunity to improve the measurement and treatment of pain in premature infants.

"This ambitious project brings together neuroscientists, neonatal clinicians, parent representatives and data analysis experts to tackle some of the most pressing questions in neonatal care. Working directly with the doctors, nurses and parents on the neonatal unit gives us great insight into the challenge of providing effective and safe pain relief for prematurely-born infants."

In order to measure pain effectively, a specially designed electroencephalogram (EEG – a method of measuring the electrical activity of the brain) is used. The EEG will be placed on the infants while they have short medical procedures that are essential for clinical care but are also painful. These procedures include heel lances (to take blood samples), retinopathy of prematurity screening (eye tests), cannulation and injections.

The researchers also plan to investigate whether parental touch can help alleviate pain during these procedures by examining what changes occur in brain activity of the infants. Dr Vaneesha Monk, Clinical Research Director, explains: "Parental involvement is absolutely key for our research. By working with parents we can make sure that our research is run in a family-friendly way and that our research explores areas that parents feel are important for their baby's care and wellbeing."

By researching and finding a reliable and accurate measure of pain in premature infants the team will be able to enhance clinical care and refine procedures to minimise pain in babies. With an accurate way to measure pain, new interventions – including medical and parental touch – will ensure that both short- and long-term improvements can be made to babies' lives.

Next steps

The research project will take place over a three-year period, ending in late 2021. Infants born between 24 and 37 weeks' gestation will be recruited for the study from the neonatal unit at John Radcliffe Hospital, Oxford. Parents have been and will continue to be consulted throughout the course of the research project in order to alleviate any fears and to ensure they understand the scope of the project and what the results could mean for babies in future.

We are absolutely delighted that our first funding grant is going towards this pioneering research project. Many people do not realise just how many medical procedures a premature baby goes through during their hospital stay, and just how new the area of pain measurement and reduction is in neonatal research.

Anything that can be done to reduce a baby's experience of pain and ensure the best possible long-term outcomes is a huge step in the right direction to ensuring that babies born prematurely receive the best possible standard of care. We are proud to support the vital work of the research team at the University of Oxford and look forward to continuing to build our partnership.

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LETTER TO THE EDITOR

Dummies for infants on neonatal units and the impossibility of adequate decontamination

In 2016 a joint working group of the Healthcare Infection Society (HIS) and the Infection Prevention Society (IPS) published its guidance Decontamination of Breast Pump Milk Collection Kits and Related Items at Home and in Hospital jointly in the *Journal of Hospital Infection* and the *Journal of Infection Prevention*.[1] It is freely available at: www.sciencedirect.com/science/article/pii/S0195670115003527#!

We are concerned that this may not have been an effective means of communication for staff working directly in neonatal care. This letter is an attempt to remedy this situation with particular reference to dummies (pacifiers/soothers) for infants on neonatal units (NNUs).

The recommendations relating to dummies for NNU infants needing them for non-nutritive sucking are not being applied in all units. The guidance recommends that dummies on NNUs should be kept in use for no longer than 24 hours and then discarded, with no attempt being made to decontaminate and reuse them. A recent letter to the *Journal of Hospital Infection* detailed findings from sampling containers used to store dummies in use at five babies' cot sides on an NNU.[2] The dummies were stored in dilute hypochlorite identical to that used to disinfect baby bottles. Despite the use of this disinfectant, bacteria of concern were found on 60% of the lids of these containers. The authors of that letter note that: "Even two years after publication of guidance from the HIS and IPS, we believe that many NNUs continue to reuse dummies for longer than the recommended 24 hours."

Dummies are hollow, with access to internal spaces allowing ingress of saliva and other organic matter on which bacteria thrive. They also have complex structures with recesses that can hold contamination and are difficult to clean, an essential prerequisite to effective disinfection. In everyday practice in NNUs, dummies cannot be disinfected with adequate quality assurance. In addition to this, should cleaning and disinfection be attempted, complete rinsing of the detergent and disinfectant will be difficult to achieve with the required quality assurance. Although the clinical relevance is uncertain, NNUs may not want infants in their care to ingest dilute detergent and disinfectant.

We consider that not discarding dummies 24-hourly for this susceptible group of patients is an infection risk and a false economy. The containers for dummies in use should also be washed, rinsed and dried daily.

Yours sincerely

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Dummies and non-nutritive sucking for preterm infants in neonatal care

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Non-nutritive sucking (NNS) is the process of sucking without a milk flow and consequent need to co-ordinate swallowing and breathing. It is one of the earliest motor reflexes to develop in fetal life and can be observed *in utero* at as early as 11 weeks' gestation; on scans babies are seen bringing their hands to their mouth and sucking on their fingers. Even *in utero* this self-initiated, innate activity is associated with comfort and self-regulation and has been observed in response to stress.

The pattern and co-ordination of NNS starts with occasional mouthing movements proceeding to more rhythmic tongue and jaw movements and sustained bursts of sucking. NNS is an integral part of early oro-motor experience and important for oral motor skills and sensory development. There is a critical period for the development of sucking neural networks in the brainstem that is experience-dependent and may remain in a waiting state until appropriate sensory input is received.[1,2]

NNS is a reflexive activity associated with perioral stimulation that initiates rooting and mouth opening. Preterm infants can be supported with positioning to bring their hands to the midline and suck on their fingers. They may suck on their oral ventilation and feeding tubes, comfort cloth, a carer's fingers, a recently expressed breast or on a dummy (soother/pacifier). A variety of dummies are available to suit the size and medical circumstances of preterm babies, however more research is required to understand how the properties of different dummies impact NNS patterns to support manufacturers' claims.[2,3]

There are a number of potential benefits specific to babies in neonatal care, in that NNS:

- contributes to self regulatory behaviour[4]
- improves physiological stability[5,6]
- reduces stress during painful procedures if used with sucrose[7]
- maximises nasal continuous positive airway pressure delivery by providing an oral seal, reducing the need for chin straps
- improves gastric motility[5]
- may support bonding when used to support parents' understanding of their baby's communication[6,8]
- provides positive oral touch and experience that may reduce the incidence of sensory-based oral feeding aversion
- supports and preserves the development of the suck reflex[6]
- speeds up transition from tube to enteral to full suck feeding.[5,9]

Conversely, there has also been concern and debate about the potential disadvantages of NNS. Use of dummies and teats in the early establishment of lactation and breastfeeding behaviour in the healthy term infant may impact on breastfeeding success. The mechanism of this seems likely to be that a baby's feeding cues are responded to by giving the baby a dummy to settle, rather than putting the baby to the breast. Frequent and unlimited access to the breast stimulates lactation and establishes a good early milk supply that enables breastfeeding success. This was reflected in the Unicef Baby Friendly Initiative's (BFI) *10 Steps to Successful Breastfeeding* (recommendation 8): "No artificial teats and dummies are given to breastfeeding infants." Unicef BFI has since updated *10 Steps* advising professionals to "counsel mothers on the use and risks of feeding bottles, teats and pacifiers."[10] This highlights a shift in awareness of the use of dummies and offers flexibility for units needing to rationalise their use while adhering to Baby Friendly standards. There is little evidence to support the theory of nipple teat confusion; that a baby is unable to suck on a teat or dummy and then go back to effectively sucking at the breast.[11-13] In clinical practice babies in neonatal care seem able to be provided with NNS experiences on a dummy and go on to establish successful breastfeeding.[14] What seems important is the establishment of a good milk supply by supporting the mother to express milk, practise skin-to-skin contact while her baby is too immature for active breastfeeding, respond to her baby's feeding readiness cues with opportunities at the breast, and reduce use of the dummy during this transition period.

Concerns regarding dental malocclusion and speech delay relate to long-term dummy use in childhood. Our recommendation would be that dummies are used to settle to sleep if that is what the baby is accustomed to but are otherwise used minimally post-discharge from neonatal care.

NNS is an important element of feeding support and development for the sick or preterm infant; however its use needs to be in context of the need to support lactation and cue-based responsive feeding in transition to enable breastfeeding success. The potential risks of infection through dummy use discussed in detail in the accompanying Letter to the Editor (page 9) need to be considered when selecting a dummy for use in neonatal care.

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