

# Newborn pain: Evidence and implementation

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Preterm, sick, and healthy newborns are exposed to necessary but painful needles during their first weeks of life. All newborns undergo newborn screening, involving heel prick or venipuncture, and preterm and sick newborns undergo a mean of more than seven procedures with a range of two to 17 painful procedures daily.<sup>1</sup> Heel lances are the most frequently recorded painful procedures in newborn pain studies.<sup>1</sup> Evidence shows that repeated painful procedures put preterm and sick hospitalised newborns at risk of adverse developmental outcomes yet the majority of painful procedures are performed without provision of effective pain management strategies.<sup>1,2</sup> This is despite the exponential growth of research showing analgesic effects of the feasible, safe and cost effective strategies of breastfeeding,<sup>3</sup> skin-to-skin,<sup>4</sup> and small volumes of sweet solutions, with or without non-nutritive sucking.<sup>5,6</sup> These strategies are included in multiple guidelines and recommendations nationally and internationally.<sup>7,8</sup> Additionally, co-produced parent and staff-targeted educational videos with voice overs in multiple languages which are publicly available on YouTube, demonstrate these strategies in real life practice.<sup>9</sup>

Nurses, midwives, and phlebotomists working in newborn care are primarily responsible for performing the majority of painful procedures on newborns and are therefore at the forefront of working with parents and managing pain and distress in this vulnerable population. It is imperative that effective and recommended strategies are used consistently in the diverse settings where painful procedures occur. However, based on a scoping review of newborn pain practices during painful procedures, use of analgesic strategies do not seem to have improved over the past decades.<sup>1</sup> Some improvements however are evident, as demonstrated in two recently published multi-site implementation studies focusing on improving newborn

pain management practices.<sup>10,11</sup> Smith et al., in a pre-post intervention study including over 15,000 newborns (7801 pre-intervention and 7723 post intervention) showed that implementing a parent-targeted video (<https://www.youtube.com/watch?v=L43yoH6XEh4>) in eight maternal newborn units over a 6-month intervention period, resulted in a modest, yet statistically significant increase in use of sucrose or breastfeeding during newborn screening.<sup>10</sup> Specifically, use of sucrose increased in the larger units, which had larger numbers of sicker newborns, while use of breastfeeding increased in the smaller units, highlighting that acuity plays a role in choice of pain management strategies. Stevens et al., in a cluster randomised controlled trial of a multi-faceted pain implementation strategy driven by small teams in each of the 23 participating neonatal units showed a reduction in pain scores, reduced number of painful procedures, and an increase in use of non-pharmacological strategies (grouped together as breastfeeding, skin-to-skin, sweet solutions, non-nutritive sucking, facilitated tucking and swaddling) during painful procedures.<sup>11</sup> Both of these studies were conducted in Canada.

An Australian nationwide online survey of parents of sick hospitalised newborns showed that parents were infrequently involved during painful procedures, yet sucrose was frequently used.<sup>12</sup> Most of the 162 responding parents had not seen the publicly available parent-targeted newborn pain video prior to participating in the survey; only 25% and 37% respectively had previously used breastfeeding or skin-to-skin during a painful procedure yet 84% were aware that sucrose had been used. However, when asked about future intention to use each strategy, over 81% of parents reported breastfeeding, 88% reported they would advocate to use skin-to-skin, and 64% advocated sucrose. Again, these data highlight the more widespread use of sucrose rather than strategies

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involving parents' participation in care in settings where sick newborns are cared for. However parents report wishing to be involved in pain care but barriers to their involvement exist.<sup>12</sup> For example, being asked to leave the room when procedures are planned, and not being informed of how they can participate. Such barriers to parental involvement in their newborns' painful procedures have been reported in numerous other studies,<sup>10,13</sup> including a meta-synthesis of qualitative studies exploring parents' involvement in newborn pain.<sup>14</sup>

Solutions to providing optimal pain care to sick hospitalised infants are elusive. As per the beginning of this paper, we have the evidence and multiple arguments have been made that further trials of pain treatments during frequently occurring painful procedures, especially heel lances and venipunctures, with no treatment/placebo groups are unethical and unnecessary.<sup>15</sup> We have published recommendations to use breastfeeding or skin-skin care where possible and feasible, and sweet solutions and we have various knowledge translation interventions targeted at staff and parents. However, parents are rarely able to be present in neonatal units when routine painful procedures are performed. Firstly, timing of routine blood tests are often in the early mornings to suit hospital routines when many parents are not able to be in the unit with their infants. Secondly, most neonatal units are not set up to fully accommodate parents and visions of family centred care practices are not consistently operationalised in practice.<sup>16</sup> Thirdly, nurses and midwives report their preferences to perform heel lances and other procedures without parents being present.<sup>17</sup> Reasons may relate to both their comfort levels with working closely with parents, and barriers relating to physical positioning while performing procedures when infants are being held. It is no surprise therefore that the parent-led strategies of breastfeeding or holding skin-skin are less frequently used, compared to sucrose, despite parents wanting to be involved.<sup>12,14,18</sup> To address the research to practice gap of parental involvement in newborn pain management would require system-level changes, improved clinical education of staff who perform painful procedures, and improved communication with parents to empower and enable them to be present and confident during non-urgent routine painful procedures. Until such time as healthcare organisations and their maternal newborn units prioritise newborn pain as a strategic priority, and put into play system-wide changes, sub-optimal newborn and infant pain management and parent involvement in care is at risk of remaining the norm.

In conclusion, newborns undergo necessary but painful procedures, and preterm and sick newborns are exposed to large numbers of repeated procedures over the course of their hospitalisation. Such repeated procedures are associated with increased risk of poor neurodevelopmental outcomes. Evidence supports analgesic effects of breastfeeding, skin-skin care and sweet solutions, and

parent and staff-targeted videos and other resources exist demonstrating the use of these strategies in practice. Yet these strategies, especially breastfeeding and skin-skin, remain inconsistently used despite parents wishing to be involved during painful procedures. Implementation of system-level practice change ideally fosters a collaborative environment allowing staff members and families to embed sustained change into the culture of units and workflows. Prioritising system-level improvements in newborn care which fully empower parents in all aspects of care, including during painful procedures, will be the key to improving short and long-term newborn outcomes.

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