

Pain Management in Newborns and Infants

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Pain assessment is a complex procedure. For all those patients who are able to communicate, self-report scales are the most commonly used and accepted method for pain assessment. Since neonates and infants are by nature unable to communicate well, such techniques are not feasible, and clinicians usually rely on alternative methods of assessment.

Reliably determining levels of pain in this population is difficult and there are more than 50 currently used pain scales [1]. Neonates and infants form a unique group. Members of this group are valued very high in society and are precious for family. Parents are willing to spend, all health care providers are very keen to treat this group; with more office visits more frequent hospitalizations and more pricks for lab tests and vaccinations or intramuscular, intradermal and intravenous injections.

Until recently, it was incorrectly believed that nociception is much less in preterm infants due to the structural and functional immaturity of their CNS. But it is now clear that skin receptors and sensory nerves around the mouth appear as early as the 7th week of gestation; secondly the immaturity of the CNS preferentially affects descending inhibitory pathways which modulate synapses in the dorsal horn of the spinal cord, which do not appear until the 32nd week of gestation. Thus, the developmental immaturity of the CNS potentially makes the preterm neonate more likely to feel pain [2]. Newborns and infants experience acute pain-with various medical procedures-as measured by physiologic, behavioural, metabolic, and hormonal responses. It is proved that controlling pain in the newborn period is beneficial, improving physiologic, behavioural, and hormonal outcomes.

Various methods are developed to grade severity of pain in neonates and infants.

Like PIPP (premature infant pain profile), NIPS (neonatal infant pain score), NFCS (neonatal facial coding system), N-PASS (neonatal pain, agitation and sedation scale), CRIES (cry, requires oxygen, increased vital signs, expression, sleeplessness); there are many more and the list is exhaustive. Each method has its pros and cons and none is perfect.

All newborns, even normal ones, will experience iatrogenic pain in the first days of life, commencing with vitamin K injection and blood collection for sugars, bilirubin or metabolic screening before discharge from the hospital. Neonates admitted to present day neonatal intensive care units (NICU) are constantly exposed to pain, discomfort or noxious stimuli of variable intensity for a variety of reasons.

Apart from admissions to Neonatal Intensive Care Unit and Paediatric Intensive Care Units babies experience pain during office visits as well. Heel prick, venepuncture, intramuscular and subcutaneous vaccine injections, intradermal diagnostic pricks, removing adhesive tape, removing bandage, dressing the wound, urinary catheterization, gastric intubation, rectal tube insertion, circumcision and chest tube insertion are common painful or nociceptive events for neonates and infants. Different interventions are suggested to reduce the pain and calm or pacify the baby. Non-pharmacologic therapies like offering sucrose orally, breastfeeding the baby or giving breast milk are quite common [3].

It is necessary to revise about analgesic effects of dextrose or sucrose [4]. Sucrose does not change neural activity, suggesting that pain perception is not affected by this intervention. Instead, sucrose changes the facial expressions of some babies giving the impression that pain is being relieved [5]. Some authors suggested that the effects of sucrose and non-nutritive sucking are mediated by the endogenous opioid and non-opioid systems. It is said that milk and fat have a postgastric antinociceptive effect which is mediated through the release of the gut hormone cholecystokinin [6]. Moreover palatable food- notably sucrose/ sugars and milk- modulates pain perception by activation of endogenous opioid system [7].

Artificial sweetening agent aspartame showed antinociceptive activity like sucrose in rats. Reduction in antinociceptive activity of aspartame and sucrose by opioid and serotonergic antagonists demonstrate the involvement of both opioid and serotonergic system [8].

Other non-pharmacological interventions like Cuddling, soothing patting and holding baby very close to the body by caretaker or mother imparts sense of security and calms and pacifies baby. For the baby; swaddling (tightly wrapping a baby in a blanket almost like a burrito), side/stomach position, shushing sounds, swinging and sucking have similar calming effects.

Distraction can be said as the most primitive form in pain regulation [9]. A baby recognizes her mother's touch and voice, and infants listen better to mother or the nearest care taker. So distraction and suggestion act well in babies when intervened by mother or the primary/nearest care taker. Breastfeeding can help reduce pain and calm a child because it gives the infant comforting skin-to-skin contact and distracts the child. Also, mother's milk contains sugar, which is known to have pain-relieving effects [10,11].

In few cases like post-operative pain etc drug treatment may be asked for. Acetaminophen is the preferred analgesic due to its safety profile. Other modalities notably topical anaesthetics, local anaesthetics or some sedatives may be needed yet in some cases. These may be selected considering the merits in individual cases.

It seems unbelievable how long it took the medical community to realize that newborns also feel pain. Pain may worsen already compromised physiological states like hypoxia, hypercarbia, acidosis, hyperglycemia or respiratory distress. Babies who received good peri-operative analgesia showed stable course and faster recovery [12]. As seen here, newborns experience pain as measured by physiologic, behavioural, metabolic, and hormonal responses. They also experience long-term sequelae from pain including impaired neurologic and behavioural development.

To date, there is no universal approach to neonatal pain assessment. It is noteworthy that sedation does not provide pain relief and may mask the neonate's response to pain and a lack of behavioral responses (including crying and movement) does not necessarily indicate a lack of pain.

Because of the diversity of clinical scenarios presenting in neonates and infants, a uniform/singular approach to acute pain management and analgesia is impossible. Provision of effective analgesia is best accomplished by a comprehensive answer and combination of nonpharmacologic and pharmacologic techniques. The dosing of analgesic agents obviously should be guided by an age-appropriate pain assessment scale. We suggest that the environment should be as conducive as possible to the well-being of the neonate and family. All the same, education and validation of competency in pain assessment and management for all neonatal doctors and nurses, is a professional responsibility of clinical units [12].

Future studies are needed to better quantify the adverse effects of untreated pain on neonates and infants to further emphasize the important role of analgesia in this population.

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