

# Chapter 13

## Pain Assessment in Neonates

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### ABSTRACT

*In the U.S. it is mandatory to assess and treat pain. Italy, France, and Russia are establishing standards that mean pain assessment and treatment may become mandatory. Physiological, behavioural, and biochemical tools have been used for pain assessment but no gold standard is yet available. These tools have both limits and benefits. The topic of this chapter is to discuss these tools for different infant groups and to conclude if they can fulfill a gold standard for pain assessment. This gold standard should be independent of the infant's level of maturity and level of illness, should give accurate pain measurement, be in real time, give an immediate response, and the index should be valid for all infants.*

### INTRODUCTION

In the U.S., inadequate analgesia in hospitalized patients in 2001 prompted the Joint Commission on Accreditation of Healthcare Organizations (JCAHO), to introduce standards which require pain assessment and treatment (Vila et al., 2005) ([http://www.jointcommission.org/SentinelEvents/SentinelEventAlert/sea\\_32.htm](http://www.jointcommission.org/SentinelEvents/SentinelEventAlert/sea_32.htm)). Pain was defined as the fifth vital sign (Vila et al., 2005). This directive has led to increased patient satisfaction with pain management, but also to an

increased incidence of opioid-associated adverse drug reactions that have the potential for a fatal outcome (Overdyk et al., 2006). From 2010, the Governments in France, Italy, and Russia have drawn up similar new guidelines governing the importance of monitoring and treating pain. These requirements may become mandatory in EU countries and Russia in the near future.

The International Association for the Study of Pain (ISAP) defines pain as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” (ISAP Task Force on Taxonomy, 2011; Follin & Charland, 1992).

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To report pain requires a certain ability to communicate, and is generally not applicable in children below three years of age. When ISAP emphasises the importance of pain treatment in non-verbal patients, they also emphasise the need to assess pain in this patient group. The perception of pain is an inherent quality of life that is developed to protect against tissue damage (Anand & Craig, 1996). The intensity and duration of pain is dependent on the significance of pain for the individual (Stevens et al., 2000; Stevens & Gibbins, 2002; Guinsburg et al., 2003; O'Rourke, 2004). The integration of non-verbal pain assessment tools in preterm infants has to take into account the infants developmental immaturity, physical and psychological status, and the level of illness. The development of such pain assessment tools should be based on knowledge of how the developing brain filters, processes, and modulates pain.

The optimal pain assessment tools should therefore be developed so they can be used independently of the infant's developmental maturity and level of illness. Additional goals should include; display of pain in real time, accurate pain measurement, an immediate response, and an index valid for all infants. The infant's perception and expression of pain are influenced by how the caregiver assesses and manages the pain of the infant. It is of crucial importance that the caregivers understand how the infant communicates the pain.

## **ASSESSMENT OF ACUTE OR CHRONIC PAIN?**

The tools that are available to assess pain in infants mainly focus on acute pain, a specific nociceptive event that is self-limited (American Pain Society, <http://www.ampainsoc.org/>). Examination of behavioural changes such as facial expression, body movement, flexion reflex, cry, and/or physiological indicators such as heart rate, respiratory rate, blood pressure, oxygen saturation,

and palmar sweating, are the basis for acute pain assessment scores. Duhn and Medeves published a systematic review including a huge number of univariate, multivariate and composite measures for assessing acute pain in infants (2004). This focus on developing such tools underscores the demand for a gold standard for pain management. In infants, physiological, bio-chemical and/or behavioural indicators are surrogates for self-reporting of pain.

Chronic pain has been defined as a pathological pain state without apparent biological value that has persisted beyond the normal tissue healing time (i.e., usually 3 months) (Bonica, 1953; Jovey, 2002). A change in pain threshold has been associated with the number of previously painful procedures (Graunau et al., 2001; Holsti et al., 2004), and may therefore be a potential first sign of the development of chronic pain. Little information is available in neonates regarding the possibilities of developing chronic pain, different from adults and children where studies are showing how acute postoperative pain may develop into chronic pain (Kehlet et al., 2006). Interestingly, the prevalence of chronic pain after thoracotomy is lower if surgery is performed in childhood. When examining children it seems that infants are protected against development of chronic pain lasting into childhood (Kristiensen et al., 2010). The suggested lower prevalence of chronic pain after surgery in childhood may be related to both physiological and psychological factors. An immature peripheral and central nervous system combined with an enhanced neuronal plastic capacity in the child's brain may contribute to a lower risk of developing chronic pain (Florence et al., 1996). Bones, tendons, and ligaments are more indulgent and flexible in children and, therefore, thoracotomy, including the use of rib retractors, may be less harmful in children than in adults. Furthermore, the chronic post-thoracotomy pain in children is found to be mainly of neuropathic origin (Kristiensen et al., 2010).

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