



Preface

Pain in vulnerable infants



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Guest Editors

Vulnerable neonates include those infants who are born very prematurely, are ill, or are compromised because of disease, impairment, or adverse events in utero or during the neonatal period. These infants frequently spend their first days and weeks of life hospitalized in the neonatal intensive care unit (NICU) where they are subjected to multiple invasive investigations and treatments that are frequently painful or at least stressful. In preterm infants, this pain and stress occurs during a critical period of rapid brain growth and development, leaving these infants as vulnerable candidates for both immediate and long-term sequelae. Although there have been major scientific advances during the past decade in understanding pain and its management in infants, those who are at greatest risk for its consequences are the least well studied or understood.

The developmental neurobiology of pain clearly demonstrates that the requisite afferent systems are functional at birth; however, the self-regulatory autonomic and neuroendocrine systems modulating sensory experience may be immature in the very preterm infant or may themselves be affected by illness. The development and impact of emotional experience in infants born very preterm who are compromised or very ill is controversial and largely uncharted territory. Careful observation of biologic and behavioral indicators demonstrates with some clarity that the sensory, distressing, and disruptive impact of pain is evident even in vulnerable infants; however, the challenges of recognizing pain and distinguishing pain from other conditions remain consid-

erable in preverbal populations. Little is known about how the nature, frequency, and intensity of multiple and repeated painful and stressful events impact these infants' biobehavioural and neurological development in the immediate and long-term future. Pain in vulnerable neonates needs to be considered within a contextual milieu that includes their stage of gestational and postnatal development, the environment where they are cared for, and other potentially confounding factors such as severity of their illness trajectory. Within this context, caregivers are faced with the considerable challenges of assessing pain and delivering appropriate care. These, essentially social actions, require knowledge and expertise on the part of the care provider in relation to the infant, the phenomenon of pain, and the intricacies of environmental and pharmacologic management to prevent and alleviate distress, all of which differ substantially from other patient populations.

An in-depth knowledge of multidimensional pain assessment measures that are not only valid and reliable but feasible and clinically useful for measuring pain must be implemented as a prerequisite for satisfactory pain management. A pain management approach that includes a broad range of intervention strategies must be considered within the context of the transition of the infant from the intrauterine to the extrauterine and NICU environment. Understanding of the pharmacokinetics and pharmacodynamics of opioids (ie, the mainstay of analgesia for moderate to severe pain in all age groups), the underlying mechanisms of nonpharmacologic (eg, behavioral, environmental, physical, and nutraceutical) strategies and their potential synergies or interactions is paramount to optimal pain management in this vulnerable population. Furthermore, the social, moral, and ethical issues that guide and influence the actions of care providers need to be given careful consideration.

In summary, we are now entering an era in which we have the opportunity to apply lessons learned from research and practice in healthy neonates (eg, term-born infants postsurgery) to those who are much more vulnerable to the consequences of pain; however, just as pain in infancy had to be studied and understood in its own right (rather than simply applying knowledge of pain in adults in a downward extension to children and infants), it cannot be over-emphasized that vulnerable infants (eg, the very preterm) require specialized study because they differ intrinsically from term-born infants and are not simply "smaller." Consideration of the differences in the neurobiology and biobehavior of preterm or sick infants, the context in which pain is experienced, the challenges of assessment and pain management, and the social, ethical, and moral issues of providing optimal care will be necessary to unravel the challenges of preventing the immediate and long-term consequences and optimizing clinical care of pain in vulnerable populations of neonates. These topics are covered

within this issue of *Clinics in Perinatology* by many of the world's leading experts. It has been our pleasure to act as guest editors for this volume and to have the opportunity to interact with those who care deeply about eliminating pain and its consequences in these infants.

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