CLINICAL HANDBOOK OF NEONATAL PAIN MANAGEMENT FOR NURSES
Tara Marko, MSN, RNC-NIC, is an adjunct professor of maternal–child nursing at California State University, San Marcos (CSUSM), and a staff nurse at Rady Children’s Hospital San Diego. She is also a faculty advisor with the CSUSM chapter of Sigma Theta Tau International Nursing Honor Society. She received her diploma from Bayonne Medical Center School of Nursing, her bachelor of science in nursing from New Jersey City University, and her master of science in nursing from Seton Hall University.

Michelle L. Dickerson, MSN-Ed, RNC-NIC, RN-BC, is a nurse and nurse educator. She has worked in neonatal intensive care as a bedside nurse and as an educator for 17 years, striving to provide the most compassionate and sensitive care possible to fragile and compromised newborns. An advocate for mitigating pain in neonates, she has championed initiatives to improve the identification and management of neonatal pain through example and education in her current workplace. Ms. Dickerson is currently a neonatal intensive care unit (NICU) educator in a Level III neonatal intensive care unit, where she engages in efforts to bring awareness to and management of neonatal pain.

Ms. Dickerson received her master’s in nursing education from the University of Phoenix and is currently on the last leg of a long journey toward achieving her PhD in nursing education. She is a neonatal resuscitation program instructor; a sugar, temperature, airway, blood pressure, labs, and emotional support (STABLE) instructor; a certified breast feeding counselor; and is nationally certified as a high-risk neonatal intensive care nurse. She has been recognized by her peers through nomination of nursing excellence awards citing a commitment and passion to the continuing education and promotion of patient care. Ms. Dickerson hopes to promote the knowledge and expertise she has gained through years of nursing to future generations of nurses through her academic commitments.
To my husband, Scott, and my two boys, who are my biggest support and inspiration.
I love you so much.

—Tara Marko

I dedicate this book in memory of Paige, for all she has taught me.

—Michelle L. Dickerson
Contents

Foreword  John Tadros, MD, FAAP  ix
Preface  xi
Expert Reviewer  xiii
Acknowledgments  xv

Section I: Neonatal Pain

1  History and Overview of Neonatal Pain  3
2  Methods of Assessing Pain in the Newborn  21

Section II: Pharmacological Management of Acute and Chronic Pain

3  General Principles of Pain Management  57
4  Nonopioids  75
5  Opioids  81
6  Coanalgesics  89

Section III: Nonpharmacological Management of Acute and Chronic Pain

7  Nonpharmacological Methods  101
8  Developmental Considerations  109
Section IV: Integration of Treatment Methods

9 Multidisciplinary Approach 123
10 Role of Family in Neonatal Pain Management 141

Section V: Special Populations

11 Procedural Pain Management 151
12 The Premature Infant 157
13 Neonatal Abstinence Syndrome 167
14 End-of-Life Pain Management and Palliative Care 173

Appendix A Pain Scales 183
Appendix B Conversion Tables 197
Appendix C Drug Classifications 201
Index 213
Foreword

As a neonatologist, I have grown to understand the importance of identifying and managing neonatal pain and the detrimental effects of not doing so. Pain management in the neonate is a subject that has been misunderstood for many years. The prevention of pain in neonates should be the goal of all caregivers, because repeated painful exposures have the potential for deleterious consequences in both the short and long term. We are just beginning to understand pain perception and management in the neonate and I believe this book provides a great tool to help the practitioner understand and reach that very worthy goal.

The content of this book will help any neonatal clinician gain a deeper understanding of the physiology of neonatal pain, as well as pharmaceutical and nonpharmaceutical pain management methods. Over the years, neonatal medicine has been subject to the unfortunate misconception that neonates do not feel pain as acutely as do adults and, as a result, neonatal pain management and its long-term sequelae have long been underserved and undermanaged. The difficulty associated with accurately and comprehensively assessing pain by health care providers has contributed to the many challenges related to effective neonatal pain management. Much progress has been made in recent years to bridge the gap between understanding how neonates process pain, how neonates display pain, and interventions for mitigating neonatal pain, from very premature infants to term infants suffering withdrawal. This handbook provides a tool for nursing and health care workers responsible for neonatal care to help bridge those gaps.
The introductory chapters provide detailed information about the physiology of pain—a topic that has not always been a focus in neonatal care education and provides a foundation for that understanding. Detailed explanation of the pharmacological and nonpharmacological approaches to pain management provides a neonatal clinician with a deeper understanding of the properties of available medications and the neonatal response. Discussion of the role of the family and the special care considerations associated with the premature infant provides guidance for the integration of a variety of treatment approaches to serve the neonatal population. Especially helpful is the end-of-life and palliative care discussion, a much debated topic of pain and pain management in neonatal nursing and medicine. The chapters addressing developmental care approaches and the interdisciplinary team approach to managing pain are especially thoughtful and applicable to any care setting. Neonatal nurses face many challenges in their role as advocates in protecting their fragile patients and this book provides a resource for meeting those obligations as part of the health care team.

The collaborative efforts of Tara Marko and Michelle L. Dickerson have resulted in an eminently useful clinical reference product that all neonatal clinicians can use as a reliable resource in addressing the varied and significant pain management needs of their vulnerable patients.

John Tadros, MD, FAAP
Co-Chief of Neonatology
RWJBarnabas Health
Jersey City Medical Center
Jersey City, New Jersey
Preface

The Clinical Handbook of Neonatal Pain Management for Nurses represents a work of passion and love on a topic that is very timely and important. Increasingly, we realize the effects of pain and the need to protect our most fragile patients. We wrote this book after recognizing the need for a text that emphasized pain management and to start an in-depth, multidisciplinary conversation about neonatal pain. With this book, we hope to bring awareness and understanding of neonatal pain to those already committed to the smallest patients and those interested in joining the specialty.

The book is a collection of information about how pain works, how pain affects neonates physiologically and developmentally, and how to assess and treat pain in various ways. What sets this book apart from much of the information available is the comprehensive nature of the information and the balance between appropriate pharmacological measures and nonpharmacological, holistic interventions. Our aim is to make the text clear, concise, and to provide valuable information to the entire health care team. Neonatal pain management is the responsibility of everyone on the team—physicians, nurse practitioners, nurses, pharmacists, respiratory therapists, speech/occupational/physical therapists, and family members—to ensure that the needs of neonates are met and to advocate for our most fragile patients.

The book also addresses special circumstances, such as prematurity, neonatal abstinence syndrome, and end-of-life care, as well as basic and useful information to care for all neonates who may experience pain. Chapters 9 and 10 provide unique
perspectives and information that focus on a multidisciplinary approach to understanding and managing neonatal pain. Chapter 9 provides examples and case studies that promote communication techniques within the health care team to manage neonatal pain. Chapter 12 focuses on the premature infant and the unique challenges the compromised premature infant poses in recognizing and treating pain. Finally, Chapter 14 addresses the difficult topic of end-of-life challenges and palliative care. This chapter provides suggestions and thoughts on how best to address decision making and pain management to promote a peaceful, dignified death.

We are honored to contribute to this important conversation.

Tara Marko
Michelle L. Dickerson
Expert Reviewer

Michele Beaulieu, DNP, ARNP, NNP-BC, is a full-time neonatal nurse practitioner as well as an author, researcher, and educator. She earned her doctor of nursing (DNP) degree from Case Western Reserve University Frances Payne Bolton School of Nursing. In addition to her full-time neonatal practice, she has been the column editor for “Pointers in Practical Pharmacology” in Neonatal Network: The Journal of Neonatal Nursing, author and reviewer of various peer-reviewed manuscripts and books, and is co-investigator for several research studies. Her research interests include perinatal safety, extremely low-birth-weight infants, neonatal abstinence syndrome, and the management of high-risk newborns in the delivery room. She has developed and taught clinical and online courses for undergraduate and graduate nursing programs. She is a member of Sigma Theta Tau (Delta Beta Chapter) and is actively involved in several neonatal and women’s health professional organizations, among them the Florida Association of Neonatal Nurse Practitioners (FANNP).
Acknowledgments

First, I want to acknowledge the dedicated team that helped bring this book together: Michelle L. Dickerson, my colleague and friend who has taught me so much about neonatal nursing and pain management; Dr. Michele Beaulieu, who lent her expertise in reviewing this book; Dr. John Tadros, for his wonderful words, encouragement, and personal commitment to our special population; Elizabeth Nieginski, for noticing the importance of this issue and bringing Michelle and me on board to author this work and facilitating all of the logistics; Rachel Landes, for assisting and guiding us throughout the process; and the entire production team at Springer Publishing Company, for making this dream a reality.

Also, I’d like to thank my colleagues at Jersey City Medical Center for mentoring me when I was a new nurse and then becoming my wonderful friends and colleagues. The nurses at Rady Children’s Hospital are experts in neonatal care and have taught me so much. I acknowledge the nurses at Tri-City Medical Center, who are committed to expert practice, especially in pain management. I thank the dedicated and wonderful professors at New Jersey City University and California State University, San Marcos, who are experts in their field. And my students, who keep me on my toes and share their beautiful enthusiasm with me.

And to the patients and families I care for: I am forever grateful to be a part of your life and to be able to help you through this difficult time.

Tara Marko
First, I would like to thank Tara for asking me to be a part of this labor of love in creating this amazing book—I was and am honored to be a partner on this journey! Many, many thanks to Elizabeth Nieginiski for her faith in two nurses and believing they could create such a necessary contribution and providing the resources to do so; more thanks to Rachel Landes for her never-ending patience with endless questions and her support throughout this amazing journey; and special thanks to Dr. Michele Beaulieu for her comprehensive and constructive feedback, which truly helped make this book relevant and current.

I would like to express gratitude to my colleagues and peers who provided support, encouragement, and cheered me on through the entire process . . . your support and unfailing faith are forever appreciated.

I would like to thank my family for their unending support, their necessary patience, for tolerating my indifference and absences, and for never disturbing my piles of papers during the course of writing this book—you have always been my source of inspiration to do better and do more, none of which I could ever achieve without you.

Michelle L. Dickerson
Developmental Considerations

Developmental considerations are imperative in delivering comprehensive and safe care to neonates in the neonatal intensive care unit (NICU). Developmental considerations are not only necessary when assessing and supporting physiological function, growth, and musculoskeletal growth, but also affect normal neurological outcomes and pain mitigation. The lower the gestational age of the infant, the more fragile its neurological status when considering brain maturity and neurological innervation. Prevention of aberrant neuronal pathways is crucial in ensuring productive and positive outcomes for all neonates born at any gestational age. Much research detailing the short- and long-term sequelae resulting from disruption of normal neuronal development of neonates is available (Evans, 2001; Grunau, 2013; Grunau, Holst, & Peters, 2006). Promoting health care team behaviors and interventions that reduce the negative stimuli and support the infant through unavoidable stimuli are known to promote positive outcomes. Developing such methods of care is necessary for all health care workers and for families.

Neonates are exposed to upward of 74 painful experiences per 24-hour period. This number increases with decreasing gestational age, with a 24-week gestation infant potentially experiencing upward of 150 painful experiences, namely separation from his or her mother, per 24-hour period. Neurological development continues along a prescribed continuum, whether in utero or born prematurely, with neuronal synaptic connections...
and myelination of those neurons incomplete until almost the fifth birthday. Infants born between 23 and 34 weeks are at greatest risk for rewiring of the normal pathways that establish appropriate responses to stimuli. Interfering with the development of recognition and response to painful stimuli can have short- and long-term effects that alter the infant for life (Grunau, 2013).

The brain develops in five stages, beginning with proliferation during the first 8 to 16 weeks of gestation, and continuing through myelination, which occurs through adulthood (Kenner & Lott, 2003). Proliferation begins with the production of neurons and glial cells, which protect and nourish the neurons while guiding the correct migration of neural cells. Migration occurs during 12 to 20 weeks gestation, when neurons begin migration into the cerebral cortex to differentiate. Synaptogenesis begins at 8 weeks gestation and is the process of making connections between neuronal cells during proliferation and migration for organization into specific functions. Organization begins at around 24 weeks and continues through adulthood. During this stage, experiential input and environmental influences will increase or decrease the synaptic connections while glial cells increase in number to nourish the developing neuronal cells. The organization stage is a period for hardwiring specialized function and action of neuronal cells. The final stage, myelination, begins around 24 weeks gestation and continues through adulthood. During the myelination stage, the neuronal cells are covered with a lipoprotein shell that helps facilitate conduction of neuronal impulses (Kenner & Lott, 2003).

All experiential stimulus and environmental influences have great potential to alter the future machinations of the neuromuscular and neurodevelopmental status of the infant. Negative stimulus, pain stimulus, prolonged exposure to noxious stimuli, and lack of positive feedback can all alter the hardwiring of the neuronal organization of the brain. Consideration of the simultaneous development of the sensory system with brain development generates a sense of urgency in clinicians who are striving
to understand the impact of environment on developmental outcomes of fragile neonates.

The sensory system develops in a sequential, orderly manner regardless of gestational age at birth. Development and maturity will continue at the programmed rate and stage, with life in the extrauterine environment only having a negative effect if the infant is not well protected. The tactile system develops first, as early as 8 weeks gestation, and is fully functional by 12 weeks. The tactile system is most mature and most sensitive in the feet, hands, and perioral tissue creating a conundrum for health care workers rendering care for premature infants (Kenner & Lott, 2003). Much negative stimulus centers on the feet for heel sticks for blood sampling and the perioral area for intubation and orogastric tube insertion.

Next is the vestibular system, which is functional by 10 to 14 weeks. The gustatory and olfactory senses develop next, with the auditory system not being complete until 19 to 25 weeks. The visual system develops last, with full maturity not achieved until the end of 1 postnatal year. The visual system begins development around 20 weeks gestation, but does not reach functioning capacity until 38 weeks gestation when the fetus remains in utero. Acceleration of functional units of the visual system is only appreciable for opening of the fused lids and capacity to send stimuli responses to the brain. Focusing, pupillary constriction, and visual acuity do not accelerate in the absence of the uterus (Grunau et al., 2006).

With a basic understanding of the sequence of brain development comes a deeper understanding of how environmental stressors and stimuli can alter that normal process. A myriad of considerations is necessary when approaching assessment care, social interactions, and medical interventions of the fragile neonate to ensure protection of fragile and growing neurological systems to support optimal outcomes. Any alteration in normal sequential development becomes a negative, unpleasant sensory experience for the infant, contributing to increasing risks for pain and thus requiring knowledge of management of that pain.
The short-term impact of pain and stress in the neonate repeatedly exposed to routine care and procedures in the NICU include peripheral, spinal cord and supraspinal processing neuroendocrine functions, and neurological development (Whit-Hall & Anand, 2005). Alterations in physiological stability, such as desaturations and bradycardic episodes, are common in infants experiencing pain. The developmental impact for unmanaged pain can last a lifetime while creating immediate care interventions.

The long-term impacts of pain and stress in the neonate include permanent and abnormal pain thresholds, increased incidence of anxiety disorders, attention deficit disorders, and/or exaggerated startle reflexes, to name a few (Whit-Hall & Anand, 2005). Altering the neuronal pathways early in life will create a brain that responds to pain stimuli differently and abnormally. Delayed pain responses or no neurological recognition of pain creates a scenario that can put the infant at risk for life. Inability to recognize or respond to pain will put the infant at risk for future potentially catastrophic injury, such as foot injuries with severe infections if diabetes develops. Increased incidences of anxiety disorders have been documented in children who were born prior to 34 weeks and parental report of limited management of pain during daily activities in the NICU (Whit-Hall & Anand, 2005). These alterations and abnormal neurological development can affect neuromuscular development, meeting developmental milestones, and leading fully productive lives as adults.

Developmental positioning and pain management practices for all infants regardless of gestational age must focus on promoting rest and sleep above all. Providing containment holding during and after procedures or treatments, reducing unnecessary stimulus through cluster care, and promoting the inclusion of families in the care team help ensure sleep remains as uninterrupted as possible. Promoting cue-based care for assessments and feedings allows the infant to guide the interactions. Understanding and respecting the sleep and behavior states when planning
procedures, interventions, and interactions for the infant helps ensure the infant is ready for our needs. The ultimate goal is providing an environment that mimics the uterine environment as closely as possible to promote the best neurological development and outcomes possible, with more caution and attention paid to the needs of infants with decreasing gestational age.

Developmental positioning and pain management practices by gestational age beginning at 24 to 28 weeks should focus on promoting sleep and rest as a priority, through clustered care, reducing effects of gravity, and environmental manipulation. Providing boundaries and swaddling to promote midline orientation and flexion will promote normal neuromuscular development. Limiting light exposure, controlling for noise exposure, and protecting skin hydration and fluid balance with proper hydration and humidity all work to support midline orientation, neurological development, and recreation of the uterine environment. The goal is always to put the infant back in the uterus in our world as best or as close as we can. Gravity is a force working against supporting musculoskeletal development and alleviating pain. Pain management practices should make the reduction of stressors and interventions a priority. Clustering care, encouraging parents to participate in skin-to-skin practices, providing colostrum oral care, and limiting environmental stressors will reduce the negative experiences, thus reducing the exposure to pain (Kenner & McGrath, 2004). Supportive use of positioning tools, such as soft blanket rolls, that provide boundaries and containment but not barriers—remember, the uterus was flexible—and use of foam, gel, and cushions as available to mitigate the effects of gravity are imperative for this gestational age. Positioning aids to promote neutral head alignment for the first 48 to 72 hours; boundaries provide containment of feet, flexion of shoulders and hips, and encourage hand-to-mouth movement even if intubated—all help to recreate the womb. Use of sucrose and pharmacological options for more invasive or prolonged interventions are necessary considerations to promote optimal outcomes at this gestational age.
Developmental positioning and pain management practices by gestational age beginning at 27 to 31 weeks should focus on continuing to control for light and noise, while working to reduce external stimuli and limit the effects of gravity. Continue to use positioning aids to promote neutral alignment to promote midline orientation, rounding hips and shoulders; promoting physiological flexion is imperative as this is the organizational stage of neuronal development. Promoting normal organization and hardwiring ensures limiting sequelae of negative stimulus and influences. Containment, midline orientation, flexion of shoulders and hips, and comfort are paramount during this developmental stage of growth. Use of positioning aids, limiting sound and light stimulus, and clustering care are imperative. Education of the families continues to focus on appropriate handling, interactions, and encouraging bonding in developmentally appropriate ways.

Developmental positioning and pain management practices by gestational age beginning at 32 to 35 weeks begin with focusing on integrating the neonate into the extrauterine environment with gentle introduction to the nursery environment. Transitioning to open cribs and thus more sound and light exposure creates a challenge for the clinician. Practicing cyclic lighting to promote the establishment of circadian rhythm and limiting light exposure to daylight hours will help habituate the infant to day–night rhythms. Continuing to provide boundaries through swaddling supports organization and myelination of synaptic connections for smooth state transitions (Kenner & McGrath, 2004). Bottle feeding and suckling at the breast may be introduced at this gestational age—stimulus that should be a pleasant nutritive experience for the infant and a positive bonding experience for the mother. Encouraging these types of positive interactions with the parents are important to establish the positive hardwiring of pleasant stimulus and interactions.

Developmental positioning and pain management practices by gestational age beginning at 34 to 40 weeks consider the range of ages; the infant closer to 34 weeks will still require
supportive and protective consideration of visual development. Light protection continues to be a focus during this gestational age for fragile and underdeveloped visual structures. Noise is also a consideration and, although the older infant closer to 40 weeks will be better able to process noise stimulus, supporting a quieter environment is still necessary to improve myelination and continue synaptic development for appropriate processing. As the infant gets closer to the 40-week gestational age—actual or corrected—less consideration to proliferation of neuronal cells is necessary, but a focus on supporting correct neurodevelopmental organization is still paramount.

Developmental positioning approaches not only facilitate pain management and comfort but also promote appropriate neurological development to reduce long-term sequelae. Each positioning approach carries its own impact, beginning with hands to mouth, and incorporating several others.

Facilitated tuck is a method of positioning using positioning aids or hands that promote hand-to-mouth behavior, calming, and nonpharmacological pain management. Placing hands on the neonate’s head, and holding feet and legs to the stomach promotes midline orientation and provides boundaries for containment. Facilitated tuck is also known as hand swaddling (Figure 8.1).

Boundaries, such as blanket rolls and commercial containment products, provide the neonate with the artificial uterine environment that promotes midline orientation and hand-to-mouth behaviors. The use of soft blanket rolls, without regard to gestational age, promotes the alignment and shaping of the musculoskeletal system that occurs naturally in the uterus. Effective boundaries promote flexion and midline orientation. Boundaries created through swaddling offer warmth, reduce extraneous movement, promote developmental flexor tone, and support neuromuscular development, which can also be an adjunct pain management intervention (Kenner & McGrath, 2004). Boundaries are an important treatment modality for promoting appropriate neuromuscular and neurodevelopmental outcomes. Through appropriate re-creation of the uterine
environment, supportive sequential development can occur, which works to offset the hostile clinical environment in which the infant is surviving during the first weeks of life (Figure 8.2).

Prone positioning provides many medical and developmental advantages. The medical advantages include better oxygenation and ventilation, better gastric emptying, reduced reflux, decreased risk of aspiration, less energy expenditure, better sleep and less crying, and less sleep apnea (Kenner & McGrath, 2004). The developmental benefits of prone positioning include facilitating development of flexor tone, hand-to-mouth activities, active neck extension, head raising, and forearm propping; coping mechanisms are also improved. Prone positioning does interfere with socialization of the infant because it decreases the ability to make eye contact. The medical and developmental benefits transcend the gestational ages—the benefits are realized from 23 to 43 weeks (Figure 8.3).
The advantages of supine positioning include easier access for medical care, a reduction of sudden infant death syndrome (SIDS) in term infants, easier visual exploration for the infant, and the facilitation of socialization. Supine positioning can help reduce lateral head flattening caused by side-lying positioning,
but has been linked to brachycephaly. Supine positioning can encourage extension of head, neck, and shoulders and must be considered when positioning (Figure 8.4).

Side-lying positioning provides better gastric emptying than a prone or supine position, encourages midline orientation of head and extremities, facilitates hand-to-mouth behaviors, and counteracts external rotation of limbs (Kenneth & McGrath, 2004). Side lying can help reduce symptoms of a number of lung disease by contributing to better oxygenation. Side lying requires assuring that shoulders are rounded; the top hip and shoulder remain slightly forward to reduce the weight bearing of the lower hip (Figure 8.5).

Developmentally congruent care in the NICU, in a nursery, or at home is necessary to ensure optimal neurological outcomes and zero pain. Abating pain is a paramount concern as well.
When integrating principles of developmentally relevant care with gestational age considerations, optimal outcomes can be expected and pain can be controlled or eliminated. Pain as a response to inappropriately overstimulated sensory experiences can be managed and reduced when following the established guidelines for developmentally appropriate care in any particular unit. Reducing noxious stimuli and promoting positioning and flexion are crucial in establishing protocols to champion developmentally appropriate and sound care.

REFERENCES


Multidisciplinary Approach

A multidisciplinary approach that includes the physician, registered nurse, physician assistant, advanced practice nurse, and, most important, the family members is imperative in providing comprehensive pain management for all infants. Consideration of the role of each team member in mitigating infant pain and providing comfort, as well as promoting communication among members of the team is fundamental to the best interests of the infants. Each member of the team has a unique perspective and bears responsibility for recognizing and providing interventions for recognized pain. Providing techniques for communicating those responsibilities becomes the challenge. First, identification of each individual’s role and responsibility is necessary before communication techniques can be discussed.

MEDICAL APPROACH

Physicians, neonatologists, and pediatricians, including medical residents in pediatric rotation, have an obligation and responsibility for the medical management of the infant, whether in a newborn nursery or a neonatal intensive care unit (NICU). The primary responsibility is the medical management of physiological function and disease management. Directives for physiological management in the form of written or electronic orders directing the interventions are given by the physician team. Ideally, the physician should conduct a comprehensive head-to-toe assessment and have a first-hand understanding and working knowledge of the physiological condition of the patient. The key role of the physician in mitigating neonatal pain is detection and management of the pain (Boyle & McIntosh, 2004).
Likewise, the roles of the physician assistant and advanced practice nurse are similar to that of the physician. Primary responsibility for the medical management of physiological stability of the infant falls to the physician assistant and advanced practice nurse. Each is also responsible for providing written or electronic orders for interventions that provide physiological stability and direct the support team’s activities and interventions.

**NURSING APPROACH**

The registered nurse has the primary responsibility of assessing physiological systems and the effects of interventions and treatments, administering and monitoring medications, and educating families. Comprehensive head-to-toe assessments are necessary to monitor the effects of interventions. Written or electronic documentation of findings is also a necessary responsibility. The registered nurse’s primary role in mitigating neonatal pain is recognizing, appropriately assessing, reporting the findings, administering and managing nonpharmacological and pharmacological interventions, and assessing the effects of those interventions.

**FAMILY APPROACH**

The family’s role is to provide support for and advocate for the newborn. Unable to verbalize concerns or needs independently, the neonate is dependent on the family to provide his or her voice. The family has a responsibility to the infant to ensure adequate and safe care is rendered, while providing a voice when further support may be necessary. The family can be key to identifying and reporting pain to health care workers and, as such, are an integral part of the team (Friedrichs, Young, Gallagher, Keller, & Kimura, 1995). The role of the family in mitigating neonatal pain is to understand pain cues of the infant and report and advocate for interventions to treat the pain.
COMMUNICATION IS KEY

A key responsibility in the role of each member of the team is communication. Each member of the team has a responsibility to the neonate to collaborate and communicate, with the infant the primary focus of the interaction. All too often, breakdown in communication between one or more member of the team leads to misunderstanding and, for the purpose of pain management, leaves an infant without adequate support. It is fundamentally imperative for each member of the team not only to understand each other’s role, but to find a way to communicate effectively. A recent position statement set forth by pain management task forces formed through neonatal and pediatric organizations suggests a multidisciplinary approach is necessary for all nonverbal patients (Herr et al., 2006). The National Association of Neonatal Nurses provides a guideline for pain assessment and management of neonates and directs health care workers to take a collaborative and interdisciplinary approach to identifying and managing neonatal pain (Walden & Gibbins, 2008; Figure 9.1).

Methods that can promote effective communication include education, case studies, debriefing, and pain committees.

FIGURE 9.1. Families should communicate with the health care team members.
Education of both health care workers and family members is essential in management of neonatal pain. Walden and Gibbins (2008) suggest all nurses working in NICUs should receive education and competency validation in pain assessment and management skills upon hire and periodically throughout employment. At a minimum, the education should include the anatomy and physiology of pain transmission, modulation, and perception and the physiological and behavioral indicators of pain. Education of pain management for the registered nurse should include nonpharmacological approaches, pharmacological interventions, special procedural techniques, and end-of-life pain management (Walden & Gibbins, 2008). Educational opportunities should also include instruction on how to identify differences in pain for gestational ages and developmental stages. A competent understanding of safe medication administration and adverse effects of pharmaceuticals is necessary. Education should also include the ability to educate the family on pain assessment and management as appropriate for their involvement. The education should include appropriate documentation of pain-assessment findings and intervention responses. Finally, education should include the ability to communicate appropriately with the interdisciplinary team regarding the assessment and intervention status of the infant (Walden & Gibbins, 2008).

**HOW TO IMPROVE EDUCATION**

Education of the physician team should focus on the physiological and behavioral cues of the infant by gestational and developmental stages. A focus on an understanding of the underlying factors that can alter the infant’s ability to demonstrate pain symptoms should be part of the education as well. A focus on the long-term effects of poor pain management will be useful for physicians in understanding the need for pain management at all gestational ages for all painful interventions (Schultz, Loughran-Fowlds, & Spence, 2009). An educational focus on assessment, appropriate interventions, and postintervention assessment are necessary elements. Communication techniques with the family
and interdisciplinary team are a focus for education and annual competency as well.

**CASE STUDIES AS LEARNING TOOLS**

Case studies are a great tool for interdisciplinary collaboration and learning. Using case studies of current, past, or fictional patients is a nonthreatening, informal method of bringing team members together to review symptoms, interventions, and outcomes of pain management. Case studies promote teamwork and communication skills (Bradshaw & Lowenstein, 2014). The Institute of Medicine (IOM) recommends interdisciplinary systematic reviews of practice guidelines and patient outcomes in an effort to promote quality improvement and improving patient outcomes (Newhouse & Spring, 2010). Case studies promote critical thinking, problem-solving, and decision-making skills of health care workers, which aligns with the IOM recommendation for promoting quality improvement. Systematic review of events presented during a case study can foster communication about what is known about the patient, what is understood about the patient, and where gaps in that knowing and understanding exist.

Elements of a case study for promoting critical thinking, problem-solving, and decision-making skills, as well as communication skills include the problem or situation, the patient scenario, each participant’s contribution, priorities and a solution, implementation of the solution, and results. Presentation of the problem or situation will provide the situation, background, and assessment of the scenario in a neutral format, without consideration of discipline or outcome. It requires simple, straightforward, unbiased accounting of the events and circumstances. Next, each discipline’s contribution to the recommendations and outcomes can be presented and reviewed, ideally without opinion or commentary from other disciplines. Remaining neutral when reporting facts will promote collaboration without creating barriers or placing responsibilities on a particular discipline. Keeping information strictly factual is key.
Once all salient information is presented and understood by all members present, a group discussion of what each discipline deems a priority can ensue. A word of caution: It may be wise to include a nonbiased, third party to ensure discussions remain productive and not accusatory, as the intent is to promote quality, not point blame, especially when reviewing particularly difficult cases. Ideally, to build communication skills, a team new to case study activities should begin with patient outcomes that were positive.

Once priorities from each discipline are determined, a discussion can begin about the rationale for the priority with recommendations for a solution. The recommendations should be supported with evidence-based research and documented proof of outcomes, not simply based on practitioner comfort or experience. Using the IOM recommendation of promoting outcomes through evidence-based research is key in promoting best practices and establishing consistent standards of care. Comparison of interventions that were implemented to evidence-based research can be the key to overcoming barriers, communication gaps, and advancing practice to the standards supported by evidence. Review of the implemented interventions and the response and outcomes can provide robust conversation for improving processes for future patients. Identifying the gaps in knowledge from any contributing discipline and working collaboratively to overcome those gaps not only improves patient outcomes, but also works to promote teamwork and communication.

Case studies are a useful and productive tool for promoting critical thinking skills and communication retrospectively in a controlled, planned atmosphere. Debriefing allows a similar process to take place in a more abbreviated format in a more real-time manner. Debriefing is a conversation between care providers that includes the sharing and examination of information after a specific event takes place. The Agency for Healthcare Research and Quality (AHRQ) provides comprehensive tools and support to promote health care communication that promotes patient safety in response to the IOM reports of improving patient outcomes. Debriefing is a tool AHRQ provides
through the TeamSTEPPS initiative—an evidence-based program with the singular goal of promoting patient safety (AHRQ, n.d.).

DEBRIEFING

The debriefing checklist created by the AHRQ through the TeamSTEPPS initiative covers nine elements of review. This systematic, organized review should include all persons intimately involved in the situation for review, including parents. The elements of the debriefing tool cover communication concerns, task assistance, resources, and process-improvement elements of what went well and what needs adjustment. Using the debriefing tools when considering managing neonatal pain is a productive way to include all members of the team.

A debriefing session can occur after each episode of neonatal pain, with review of the nine elements to promote a better outcome for future episodes of pain. Include all team members in the review to determine whether communication was clear: Did everyone understand his or her roles and responsibilities in alleviating pain? Were the resources available to alleviate the pain, and, if so, were they successful? Should anything change for the next episode? Debriefing is simple, comprehensive, and timely in promoting patient outcomes. Debriefing can be highly effective in engaging all members of the team, promoting communication skills in an objective manner, and focusing on the patient.

DEBRIEFING CHECKLIST

The team should address the following questions during a debriefing:

___ Was communication clear?
___ Were roles and responsibilities understood?
___ Was situation awareness maintained?
___ Was workload distribution equitable?
___ Was task assistance requested or offered?
__ Were errors made or avoided?
__ Were resources available?
__ What went well?
__ What should improve?

Adapted from the AHRQ website.

**PAIN COMMITTEE APPROACH**

Pain committees are another method used to promote interdisciplinary collaboration and to align with IOM recommendations, while focusing on patient outcomes. Pain committees should include one member of each disciplinary team responsible for mitigating neonatal pain—physicians, advanced practice nurses, registered nurses, pharmacists, and families. Each member should have an equal say in the development of an individualized pain management plan. Each member of the team has valuable insight and experience to contribute. Pain committees should meet at regular intervals. Although the pain committee will contribute to the development of individualized pain management plans for neonates, the pain committee should also have activities that are more global.

As a committee, each member should have a working knowledge of the pain management policies and philosophy of the organization. The committee should have the responsibility for developing, implementing, and maintaining currency of all pain management policies that drive patient management. The committee should have a method and process for communicating the policies to all new families and employees. Once a comprehensive policy and a method for communicating the language of that policy are in place, the committee can work to develop its goals.

The goals of a pain committee should include assurance that the committee’s objectives align with the organizational vision and mission; the committee must have a process in place for systematic review of objectives and outcomes. Committee objectives that align with organizational visions ensure organizational support and encourage compliance from all members in adhering to the principals set forth by the committee. Systematic review processes ensure performance improvement is an
ongoing process, ensures standards of care are adhered to, and validates the accountability of each member for mitigating neonatal pain.

The pain committee has primary responsibility for providing information to all health care workers who are responsible for assessing and alleviating neonatal pain using pharmacological and nonpharmacological interventions. Interdisciplinary collaboration becomes key when considering the working knowledge of pharmacological interventions. Pharmacists are educated in pharmacokinetics and pharmacodynamics of pharmaceuticals. Physicians, physician assistants, and advanced practice nurses also have a fundamental understanding of the physiological effect of pharmaceuticals. The contribution from these specialties is imperative for comprehensive management of pain.

Nursing staff and parents have an intimate understanding and knowledge of the behavioral and physiological cues infants present during assessment of pain and are integral to the team. As the primary assessors and deliverers of interventions, the contribution of nurses and families are instrumental in the development of comprehensive, successful pain management plans. Parents and nurses are responsible for delivery of nonpharmacological interventions of pain management and, as committee members, their working understanding of those interventions is paramount in their appropriate use.

Together, each member of the committee should have an understanding of the availability, effect of, and appropriate use of pharmacological and nonpharmacological interventions. Team knowledge of available pharmaceuticals in the organization allows quicker response to pain mitigation from all parties. Knowledge of the effects of the pharmaceutical allows better follow-up assessment from direct caregivers and parents. Appropriate use of nonpharmacological interventions allows synergy of interventions. The pain committee has the responsibility of ensuring each member is accountable for the understanding, availability, and use of available therapies for neonatal pain management.
Cumulative responsibilities of all members of a pain committee are maintaining currency in evidence supporting best-practice standards, education plans for health care staff, process-improvement strategies, and working collaboratively with all members. Inclusion of families allows for individualized care plans and interventions. The committee needs to work collaboratively with families to understand spiritual and cultural beliefs of pain management and to develop appropriate, individualized plans. Implementing the generalized knowledge and processes of the committee as a whole for each family will allow a quality, personalized approach to pain management and improving outcomes (Joint Commission Resources, 2003).

Communication techniques can support the elements of a pain committee, promote the benefits of debriefing, and advance the education of all team members. Good communication techniques also promote family involvement and greater patient or family satisfaction with care delivery and pain management. The elements of good communication techniques require understanding of the three steps of the communication process—the sender, the message, and the receiver. Communication can only occur if the receiver fully understands the message the sender intends to send. The flow of communication is typically what the sender intended to say, what the sender actually said, what the receiver heard, and what the receiver thinks he or she heard. It is imperative to ensure the flow of communication is understood and is working to relay information about the infant’s pain, how to manage the pain, and the response to the interventions used.

Health care workers can promote good communication using techniques or processes that support transfer of information comprehensively and completely. AHRQ promotes the use of evidence-based tools, such as call-outs and check-backs, to ensure the message the sender intended is the message the receiver received. Call-outs ensure all team members receive information simultaneously while helping all team members to anticipate the next steps; they also direct responsibility of a specific individual to carry out a specific task (AHRQ, n.d.). Check-backs close the loop of communication to ensure the information
sent is understood. The receiver is required to restate the message sent by the sender for validation, and the sender restates the message to confirm the transfer of correct information. These methods of communication reduce misinterpretation and misunderstanding in communication, promote collaboration, and support best practice. Reducing misunderstanding and misinterpretations of information transfer is fundamental in promote better pain management of neonates, especially when including the parents in the pain management team.

Techniques that can be taught to families so they can communicate pain symptoms of their infant are the call-out and check-back; it is essential to create a safe environment for the families to report their findings. Ensuring language barriers are controlled is a first step in creating that safe environment. Providing tools that are universal will help to encourage family collaboration and communication of assessment findings. Educating the family on the behavioral cues of the infant how to communicate the findings in a nonthreatening and supportive environment helps create a team approach to care and a trusting relationship. Teaching families how to check-back—making sure the communication tools the family is using are fully understood by the health care worker and the information sent back to the family by the health care worker is fully understood—works to promote better pain management. Educating families about neonatal behavioral pain cues is a necessary step in creating a trusting, safe environment that uses universal language and reporting tools that will help families communicate pain symptoms to the health care team.

A multidisciplinary approach to pain management of the neonate is imperative for the best outcome of the infant. Collaboration among all disciplines, an understanding of what each discipline’s role is in mitigating pain, and the importance of quality communication processes work together to promote the best outcomes and best pain management of the neonate. The importance of education of health care workers and families, the use of case studies for education and process improvement, the need for pain committees and debriefing cannot be
emphasized enough. Following is an example of how good communication techniques during a debriefing session of an interdisciplinary team can promote process improvement for better pain management for future incidences and future infants.

GOOD COMMUNICATION TECHNIQUES

SCENARIO ONE

A 40-week, 36-hour-old infant was born via vaginal delivery with thick meconium and was subsequently admitted to NICU for respiratory distress and suspected right-sided pneumothorax. A 5 French chest tube was placed anteriorly at 42 hours of life. The mother and father of the infant were at bedside after chest tube insertion and attempting to console the infant, who was grimacing, tachycardic at 180 bpm, tachypneic at 45 breaths per minute, and crying. Both mother and father insisted the infant was in pain and repeatedly questioned the nurse about pain medication and helping their baby to stop crying. The nurse caring for the infant informed the parents that the infant had received pain medication at the time of chest tube insertion and would calm down soon. The mother was crying and the father was getting very upset. The father insisted the physician present at the bedside and demanded to speak to the nurse in charge. The physician presented at the bedside, ordered a stat dose of intravenous (IV) pain medication, which the nurse subsequently administered. Within 10 minutes, the infant’s heart rate was 160 bpm, respirations were 30, facial expression was calm, and the infant was falling asleep as his mother held his hand. The father insisted on a conversation with the charge nurse, physician, and bedside nurse. The director of nursing (DON) for the NICU arranged for a parent meeting within the hour in a conference room within the unit, away from the bedside. The following debrief conversation occurred with the team as they used the debriefing checklist presented earlier.

The DON inquires as to whether the family felt communication between themselves and the health care team was clear.
The DON understands the importance of ensuring and promoting clear, timely communication among all members of the health care team and ensuring protocols are adhered to for ensuring patient safety and comfort.

The physician understands the parents were concerned about the acute pain the child was experiencing. The physician further understands that the nurse communicated that the infant was in pain and the parents were requesting pain medication at the time of the chest tube insertion. The physician does not understand what the parent’s role could be in making sure the child stayed pain free.

The nurse understands her role in educating the family in how to assess and report their child’s pain and being a stronger advocate in requesting that the physician manage the pain faster. The nurse understands her role in bridging the gap of communication between the interdisciplinary team and being an advocate for the patient and the family.

The pharmacy staff understands the role in ensuring requested medication is delivered in a timely fashion to the NICU for administration during or before painful procedures. The pharmacy staff understands the importance of stat dosing of medications and the need to dispense and deliver medication as quickly as possible.

The family understands their role in advocating for their child, communicating with appropriate language and tone to promote teamwork to ensure their child is pain free. The family understands the need to request education, inclusion, and to acknowledge teamwork when good communication exists.

**SCENARIO TWO**

A 31-week, 20-day-old infant is 8 days postop from a complicated abdominal surgery for necrotizing enterocolitis with a jejunal stoma and mucus fistula. The infant received a continuous fentanyl drip immediately for 5 days postop and was vigorously weaned off pain medication on day 6. On day 8, the infant is irritable, with a heart rate consistently in the 180s,
is tachypneic with respirations at 50 on continuous positive airway pressure, exhibits guarding with abdominal auscultation and diaper changes, and is grimacing with concomitant nasolabial furrowing. The parents are at the bedside requesting the nurse administer pain medication. The nurse informs the family no pain medication is ordered for the infant and that a facilitated tuck and reducing stimuli will be sufficient. The mother insists pain medication be ordered and administered while the father insists the physician assess his child. The nurse alerts the covering physician of the parents’ concerns and she presents at the bedside. The father adamantly insists pain medication be ordered and given to his child, while the mother begins to become visibly distraught over her child’s signs of pain. The physician is reluctant to order pain medication and attempts to explain the risks of respiratory depression and the use of non-pharmacological interventions to manage pain. The parents become even more upset as the infant’s vital signs continue to show tachycardia and tachypnea and the infant begins crying. The parents begin to demand a transfer of the infant to an institution that will listen to their concerns and manage the infant’s pain. The bedside nurse alerts the DON of the escalating situation, who immediately calls a family meeting with the covering case manager, physician, family, and nurse. Using the debriefing checklist, the following debriefing conversation occurred with the family and health care team.

The DON inquires as to whether the family feels communication between themselves and the team was clear. The DON understands the importance of ensuring and promoting clear, timely communication among all members of the health care team and ensuring protocols are adhered to for ensuring patient safety and comfort. The parents are adamant because the communication is not clear and their concerns for the child’s pain are not being considered.

The physician understands the parents’ concern about the acute pain that the child is experiencing. The physician further understands the communication with the nurse that the infant was in pain and the parents were requesting pain medication.
The physician was not clear what the parents’ role could be in making sure their child stayed pain free or indicating that the infant was demonstrating acute signs of pain that affected his or her vital signs. The physician was not receptive to the family or nursing staff suggestions to mitigate the infant’s pain with pharmacological interventions.

The nurse understands her role in educating the family on how to assess and report their child’s pain and to be a stronger advocate to the physician for managing pain. The nurse understands her role in bridging the gap of communication between the interdisciplinary team and being an advocate for the patient and the family.

The workload distribution is not a concern in this scenario.

The bedside nurse requested task assistance from the DON seeking, intervention and mediation between the physician and the family in addressing the emotional distress the parents were experiencing and developing an amicable resolution. The DON immediately understood the seriousness of the situation and the need to find a reasonable and agreeable resolution to promote family satisfaction and end to de-escalate an emotionally charged scenario. The DON understands case management can be an integral part of the health care team in explaining to families the financial impact of transfers to other facilities of medically fragile patients.

The family understands its role in advocating for the child, communicating with appropriate language and tone to promote teamwork and ensure the child’s pain is managed. The nurse and DON understand the role of advocate for patient treatment, but also recognize the support the parents need in making decisions and having their concerns addressed. The case manager understands her role in helping to educate the family on the financial impact of decisions made during emotional crisis.

A positive event in this scenario was the bedside nurse’s success in de-escalating the situation before parental emotions became unreasonable or unmanageable. The DON recognized the need to bring available resources to the situation and to call
all members together to discuss the concerns and plan of care so as to find a reasonable and agreeable resolution. The team learned that in future situations better communication with families is needed regarding the pain management treatment plan before, during, and after surgery, as well as documenting parental understanding of the risks and benefits of pharmacological pain management.

SCENARIO THREE

A 36-week, 4-day-old infant is demonstrating signs of withdrawal after being born to a mother receiving 100 mg of methadone for the last 15 weeks of pregnancy after a history of heroin use. The infant is tachypneic with respirations of 48, tachycardic at 185 bpm, diaphoretic, is arching his back, has an angry rash across his buttocks, and is extremely irritable and inconsolable. The mother has not visited since day 2 and nursing staff have not been successful in securing a reliable method of communication with the mother or other family members. The nursing staff have provided the infant with clothing, blankets, and a quiet space with limited environmental stimulation. As day 4 progresses, the infant’s symptoms continue to escalate with vomiting after feeds. The assigned nurse alerts the covering physician of the worsening symptoms, suggesting pharmacological intervention for reduction of withdrawal symptoms.

The first-year pediatric resident responds to the bedside, does a preliminary assessment and determines the infant can be managed with nonpharmacological management and continued assessment. The bedside nurse does not agree and again details the infant’s signs and symptoms, including the infant’s elevated temperature. The first-year pediatric resident refuses to reconsider, at which time the bedside nurse contacts the resident’s superior to assess the infant and review infant history. The third-year resident reviews the maternal history, the infant’s history, and agrees to order pharmacological intervention for the infant. Using the debriefing checklist, the following debriefing conversation occurred with the health care team.
The nurse understands her role to advocate for the child’s pain and escalates her intervention as necessary to manage pain. The nurse understands her role in ensuring the infant’s best interests are managed in the absence of family. The third-year resident understands his role in ensuring optimal care of withdrawal symptoms is managed.

The workload distribution is not a concern in this scenario.

Task assistance was requested by the bedside nurse from the third-year superior resident for intervention and to provide experienced direction to the first-year resident in the best interest of the infant. The physician, as the superior, immediately understood the seriousness of the situation and the need to treat the symptoms of opiate withdrawal to reduce negative physiological impact to the infant. The first-year resident understood the need to respect and defer to the experience of a superior medical team, which contributed to what went well in this situation. What needs to improve is the first-year resident’s understanding of when to seek advice while gaining a deeper understanding of opiate withdrawal symptoms of neonates.

REFERENCES


