

Optimizing the Management of Peripheral Venous Access Pain in Children: Evidence, Impact, and Implementation

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VENIPUNCTURE AND INTRAVENOUS (IV) cannulation procedures are a routine part of modern clinical practice. Unfortunately, these procedures also cause pain and distress, which can have a significant impact on children. Pediatric inpatients report IV line placement as the leading cause of procedure-related pain in the hospital, on par with postsurgical pain.¹ A significant proportion of children undergoing venipuncture also experience moderate or severe pain² and elevated levels of preprocedural and procedural distress.^{2,3} Clinical practice guidelines advocate the use of strategies to ameliorate the pain and distress of venous access procedures in children⁴⁻⁷; evidence to date, however, has suggested that implementation of such strategies often remains inadequate.^{8,9}

A multidisciplinary roundtable of experts met in the summer of 2007 to discuss the problem of venous access pain in children. All participants were practicing health care providers and were local or international leaders in the field of pediatric pain management. The roundtable covered 3 broad topics: (1) the biology of the pain-response system in general and, specifically, the immediate and long-term effects of venous access pain on children; (2) behavioral and pharmacologic treatment modalities for pediatric venous access pain; and (3) practical recommendations for institutions that wish to improve systematically their treatment of pediatric pain, including venous access pain. To address

the last topic, several centers of excellence in the area of venous access pain management presented their innovative systematic approaches for reducing pain associated with peripheral venous access. Although more anecdotal in nature, these efforts were intended to provide a framework from which other institutions might develop their own programs.

The ultimate goal of the roundtable was to produce a single, comprehensive, and convenient resource that contains up-to-date information on venous access pain in children. The articles in this supplement to *Pediatrics* represent the panel's deliberations and shared expertise regarding this common cause of pediatric pain.

The biology of the pain-response system and how venous access procedures impinge on this system in children is the subject of the first 2 articles in the supplement. The first article, by Walco,¹⁰ focuses on the complex interplay between developmental, genetic, and experiential factors in the functioning of pain-response systems. The development of the nociceptive system is discussed, and how an individual's unique sensitivity to pain arises from a complex interaction of genetics, temperament, coping behaviors, and memories of past painful events is described. Walco also describes how classical conditioning in children during venous access procedures may have the potential to lead to maladaptive pain responses in adults.

In the second article, Kennedy et al¹¹ explore the impact of painful procedures on children. After reviewing studies that have shown that young children, even neonates, have highly refined pain-sensing systems, they summarize literature that has demonstrated how the memory of previous painful events, including venous access procedures, can have significant psychological and physiological ramifications on later painful episodes. Finally, the impact of venous access pain on procedural success rates and times, and on nursing satisfaction, is discussed.

The next article, by Cohen,¹² summarizes available behavioral approaches for managing the anxiety and pain of venous access procedures in children. Techniques to prepare a child emotionally for a needle-stick procedure are described, including the optimal timing, format, and content of such preparation. The author also discusses the integration of parents into the procedural process and assesses the role of correct positioning and distraction. A number of simple and cost-effective behavioral strategies are presented that are appropriate in most health care settings.

A comprehensive review of pharmacologic approaches to venous access pain is presented by me in the next article.¹³ A wide variety of pharmacologic agents and devices have been developed and examined over the last 2 decades, and this article provides an overview of many of these options. Studies have suggested that local anesthetics are underused for venous access procedures,^{8,9} which likely reflects several underlying causes (Table 1). One key issue may be the inconvenient time delay between application of many of these agents and the subsequent induction of full anesthetic effect. However, delivery mechanisms for local anesthetic agents have undergone significant

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Abbreviation

IV—intravenous

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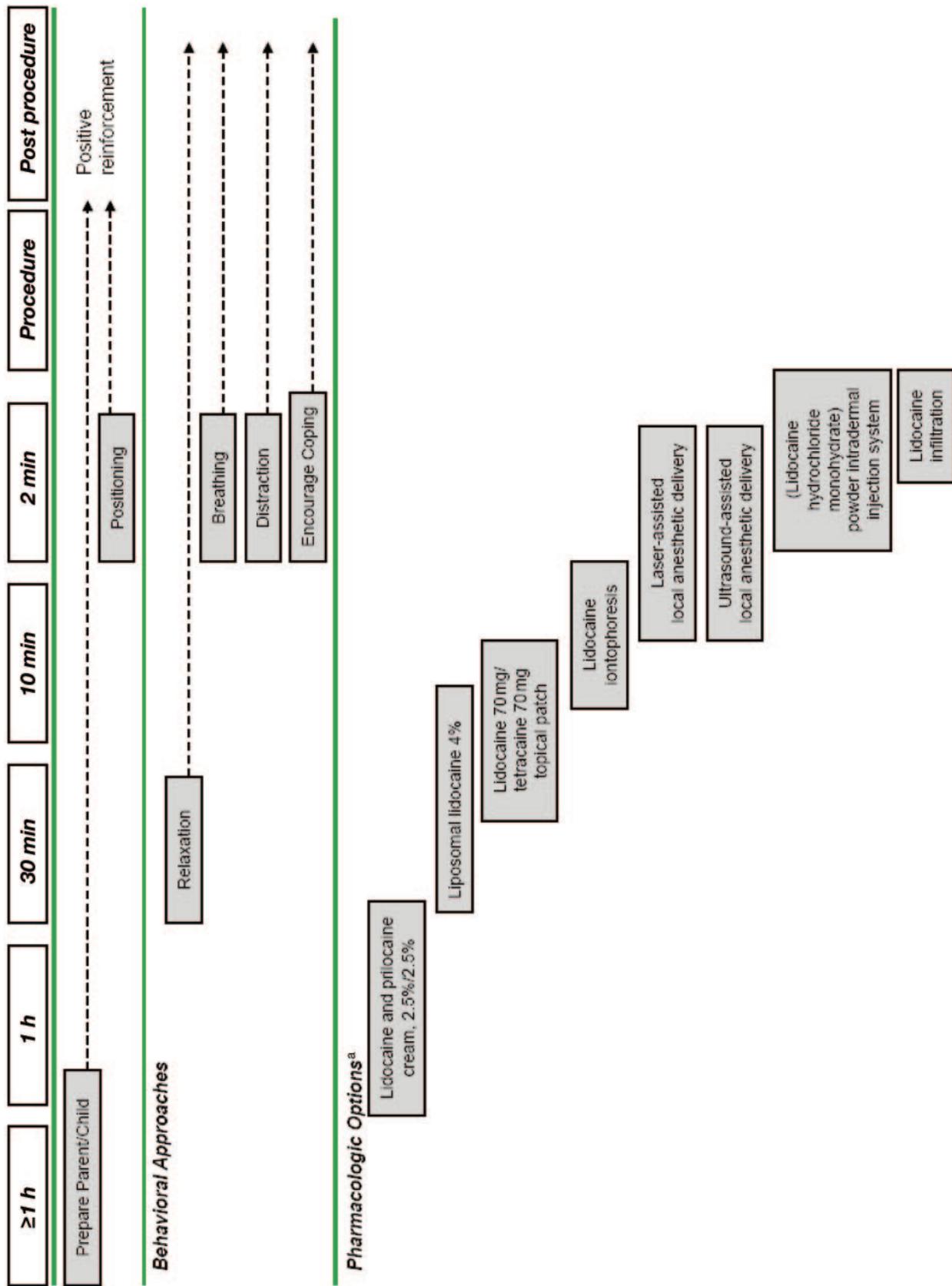


FIGURE 1 Behavioral approaches and pharmacologic options for pediatric peripheral venous access (venipuncture and IV cannulation) procedures.^a This is not an exhaustive list of available agents.

TABLE 1 Challenges to the Implementation of Pain-Management Strategies for Pediatric Venous Access Procedures

Low awareness of guidelines
Many do not know they exist
Not codified within hospitals
Lack of knowledge regarding scope and impact of problem
Many clinicians think they are already doing a great job and do not realize there is a problem
Poor communication
Difficulties coordinating care between disciplines (nursing, IV team, physicians, laboratory/phlebotomy)
Lack of family-centered care
Family presence not always encouraged
May offer calming influence during the procedure
Perspective of parents not sought
Provide insight into child's behavior and temperament
Parents not taught what to do to help the child
Child not empowered
Preferences of the child are not always considered
Environment not child friendly
Use of topical anesthetics
Underused
Minimal education about availability and need
Staff not familiar with topical agents available for use and/or protocols calling for their use
Considered unnecessary
Use of current options often associated with treatment delay
Alters the anatomy/visibility of the vein
Cost concerns
Difficult to predict candidates for application

evolution over the last decade, and products are now available that allow administration to occur nearly contemporaneously with the venous access procedure.

The final 2 articles in this supplement address pain management in children from a more systematic perspective. A number of centers around the country have developed integrated, multidisciplinary, institution-wide programs for pediatric pain management, including the pain of venous access procedures. Schechter¹⁴ describes one of the oldest and most successful of these programs, which was initially described >10 years ago in a previous *Pediatrics* publication.¹⁵ He presents a historical overview of pediatric pain management and reviews the fundamental and profound change in outlook that took place in the 1980s and 1990s. He then describes how an institution converted information from basic research on pediatric pain into a practical, institution-wide, pain-management program for children. Drawing on long experience with this program, the article updates his previous one¹⁵ by recounting interim challenges that have arisen and how they were overcome. It ends with a series of practical recommendations for creating similar programs in other institutions.

Building on the information in Schechter's article, the final article in the supplement, by Leahy et al,¹⁶ takes the form of case studies to illustrate how multidisciplinary programs to manage needle pain have been developed successfully in a number of other institutions. The case studies provide another important link for translating research into clinical practice by reflecting the perspectives of different stakeholders in the process: the nurse, the physician, the pharmacist, and the child life specialist. When viewed as a

whole, this contribution clearly highlights the importance of a multidisciplinary approach in the management of peripheral venous access pain in children.

To synthesize the clinical information in this supplement, a simplified and general algorithm with behavioral and pharmacologic treatment options for managing venous access pain has been provided (Fig 1). This algorithm should serve as a starting point for program managers who are interested in developing institutional protocols for treating pediatric venous access pain.

New research continues to demonstrate the importance of managing the pain and distress of pediatric venipuncture and IV cannulation procedures. A variety of behavioral and pharmacologic interventions are available to ameliorate venous access pain in children, but too often these options are underused. Implementation of successful treatment strategies in health care centers requires broad institution-wide commitment and a multidisciplinary approach that is embraced at all levels. We hope that this supplement will provide the theoretical and practical information necessary to help centers that are committed to managing this important source of pain and distress in children.

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