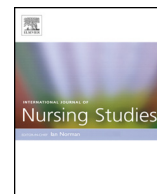




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Mitigating procedural pain during venipuncture in a pediatric population: A randomized factorial study



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ABSTRACT

Background: Evidence suggests that a significant number of children receive less than optimal management of procedure-related pain.

Objectives: To determine if there was a difference in the perceived pain associated with a venipuncture procedure in a group of pediatric patients based on the preparatory intervention used during the procedure and, to determine if age, sex, or ethnic group were associated with the effectiveness of the preparatory interventions used.

Design: A quasi-experimental, 3 × 4 factorial design was used.

Setting: Participants were recruited from a non-profit, regional hospital in the southeast United States.

Participants: Participants were recruited from children between the ages of 18 months and 17 years who were admitted to the facility. Criteria for inclusion was the first needle stick during admission with a parent or guardian present, English as the primary language. Potential participants were excluded if they had previous experience with any of the preparatory interventions, were sedated, unconscious, hemodynamically unstable, developmentally delayed for their age, or had a known chronic condition. Of the 285 participants consented to participate, 173 children completed the process including 35 (20.2%) toddlers, 34 (19.7%) preschool and 65 (37.6%) school age children, and 39 (22.5%) adolescents. There were 77 (44.5%) females and 96 (55.5%) males; and 101 (58.4%) non-Hispanic white children and 72 (41.6%) minority children.

Methods: Children were randomized to one of three treatment interventions. There was a purposeful effort to include representative numbers of each age group, ethnic group, and sex and in each treatment group. Measures of pain before and after the procedure included an observational measure completed by the parent/guardian and a self-report measure completed by the two older age groups.

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Findings: There were no statistically significant differences among treatment groups based on the observational measures of pain or the self-report measures of pain. There was a statistically significant interaction between ethnic group and treatment group ($p = 0.006$) based on the observational measure of pain which was also found between ethnic group and treatment group ($p = .04$) based on self-report scores in school age children and adolescents.

Conclusion: Findings support the use of both mechanical vibration and topical anesthetic as effective in children regardless of age group or sex. Further, the interaction between ethnic group and treatment contributes to a growing body of knowledge that suggests ethnic group is an important factor in the pain response and requires further study in an effort to better customize approaches to pain management in children.

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What is already known about the topic?

- Venipuncture pain is one of most distressing and painful healthcare experiences for children.
- Untreated needle pain can have damaging effects on future pain perception in children.
- A significant number of children receive less than optimal management of procedure-related pain.

What this paper adds

- Demonstrates the effectiveness of different treatments as preparations to mitigate venipuncture pain across four age groups of children.
- Presents some of the first evidence that ethnicity should be taken into account when considering approaches to mitigating pain during venipuncture procedures in children.

Procedural pain in general and venipuncture pain in particular is one of most distressing and painful healthcare experiences for children (Hands et al., 2009; Jeffs et al., 2011; Ortiz et al., 2012; Walco, 2008). Children do not suffer pain like adults, they exhibit greater emotional and behavioral components due to their lack of coping mechanisms (Chidambaran and Sadhasivam, 2012; McCarthy et al., 2010). In addition, evidence is accruing related to the long term impact of early pain experiences (Kennedy et al., 2008; Walco, 2008). Untreated needle pain can have damaging effects on future pain perceptions as well as provoke negative psychosocial effects (Baba et al., 2010). Over the past two decades, concerted effort has been put forth to improve pain and distress related to venipuncture (Chidambaran and Sadhasivam, 2012; Cramton and Gruchala, 2012; Kennedy et al., 2008; Po' et al., 2012; Zempsky, 2008).

Evidence from several studies suggests that a significant number of children receive less than optimal management of procedure-related pain (Birnie et al., 2014a; Chidambaran and Sadhasivam, 2012; Helgadottir, 2000; Stinson et al., 2008). Multimodal options for procedural pain management exist, however, due to the lack of time, knowledge of pediatric pain, or simply a lack of interest, these practices are not being used (Chidambaran and Sadhasivam, 2012; Stinson et al., 2008). For instance, in a study by MacLean et al. (2007),

out of the 1678 procedures evaluated in a pediatric emergency department (ED), only 245 were given any type of pain management. Bhargava and Young (2007) surveyed directors of emergency department fellowship training programs in the United States (U.S.) and found that only 38% of the respondents used any type of pharmacologic approach to pain management for intravenous (IV) catheter placement procedures. In a systematic review on procedural pain in children, Stinson et al. (2008) concluded that many of the approaches to pain management in children "...have not been rigorously evaluated, and there is limited evidence for their effectiveness" (p. 55).

The present study aimed to determine the efficacy of three preparatory approaches on the experience of pain associated with venipuncture procedures in a group of pediatric patients. The study also sought to determine whether age, sex, or ethnic group were influencing factors. More specifically, the following research questions were asked:

1. Is there a difference in the perceived pain associated with a venipuncture procedure in a group of pediatric patients based on the preparatory intervention used during the procedure?
2. Is the effectiveness of the preparatory intervention used to reduce perceived pain during a venipuncture procedure influenced by age, sex, or ethnic group?

1. Review of literature

The literature review focused on two areas: (1) the influence of age, sex, and ethnic group on children's experience of pain, and (2) approaches to addressing pediatric pain associated with venipuncture procedures. The following is a synthesis of the findings.

1.1. Factors influencing children's response to pain

Within the context of age, sex, and race/ethnicity, some clarification is appropriate. For the literature review, the authors chose to make an assumption of normal development for age. Young (2005) remarked that the correlation between age and development is quite strong, but not perfect. Similarly, sex and gender are interrelated and

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