Journal of Pediatric Nursing (2016) **31**, 64–72

Distraction Using the BUZZY for Children During an IV Insertion

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Received 14 April 2015; revised 22 July 2015; accepted 24 July 2015

Key words:
Pain;
IV insertion;
Distraction;
BUZZY;
Lebanon

Background Needle pricks are rated by children as their most feared medical event resulting in acute pain, anxiety and distress, which negatively affects both the child and his/her parents.
Objectives: To investigate the effects of external cold and vibration via the "BUZZY" on pain ratings of children, their parents and nurses during peripheral IV insertion, to measure the time to a successful IV insertion and to assess the factors that are associated with pain perception of children.
Methods: In this randomized control trial (RCT), children between the ages of 4 to 12 years were assigned to either an intervention or a control group. The intervention group (n = 25) had the "BUZZY" applied during IV insertion while the control group (n = 23) did not have the "BUZZY". Children were asked to rate their pain along with their parents and nurses on the Wong-Baker FACES Pain Rating Scale. Time to successful IV insertion and background characteristic of children were assessed and compared.
Results: Pain scores were significantly lower in the "BUZZY" group for children and the nurses. Time to a successful IV insertion did not differ between groups. Gender, age, previous hospitalization, diagnoses and analgesics were all factors associated with the children's pain scores. However, a multiple regression analysis found that only the "BUZZY" remained a significant predictor of pain scores in children.
Clinical Implications: The "BUZZY" may be an easily accessed, inexpensive ($39.95 each at $0.09 per 3 minute stick), and effective technique to control or reduce pain in young children undergoing IV insertion.

CHILDREN WHO UNDERGO surgery or who have chronic conditions such as cancer often experience many painful procedures, the most common are needle pricks that are highly feared and are often accompanied by significant acute pain and distress (Gupta et al., 2014; Taddio et al., 2012; Windich-Biermeier, Sjoberg, Dale, Eshelman, & Guzzetta, 2007). When a child is distressed, parents and health care providers often experience anxiety, helplessness, and guilt making any procedure more difficult and stressful (Von Baeyer, Marche, Rocha, & Salmon, 2004).

The American Academy of Pediatrics et al. (2001) recommends that whenever possible, children should not be exposed to painful procedures. When unavoidable, interventions should be provided to limit the painful experience. Despite the prevalence of pain stemming from medical procedures and the distress associated with

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http://dx.doi.org/10.1016/j.pedn.2015.07.010
0882-5963/

this, research indicates that pain management continues to be suboptimal (Uman et al., 2013). Several studies have documented that infants and children who had experienced frequent painful events have enhanced pain sensitivity, maladaptive pain responses, poor quality cognitive and motor development, needle phobia and long-term traumatic memories that may persist throughout adolescence and adulthood (Buskila et al., 2003; Chen, Zeltzer, Craske, & Katz, 2000; Valeri, Holsti, & Linhares, 2015). Therefore, reducing the emotional and physical short-and long-term negative effects of painful procedures in children through adequate management is an important part of nursing practice.

Several interventions have been used to reduce painful experiences in children and to alleviate their distress during a needle prick. Some of these interventions have utilized pharmacological drugs, and some have focused on non-pharmacological methods. Pharmacological drugs that include tropical anesthetics have often not been very successful as they are costly, may require long periods of time to achieve an analgesic effect (e.g., EMLA®, Ametop ®) or are not found to be effective in all age groups (e.g., vapocoolant sprays) (Cohen et al., 2009; Costello, Ramundo, Christopher, & Powell, 2006; Farion, Splinter, Newhook, Gaboury, & Splinter, 2008). Non-pharmacologic approaches that have been found to be effective in reducing children's acute pediatric pain include but are not limited to, hypnosis, cognitive behavioral therapy, guided imagery, and distraction (Badr, 2013; Gupta et al., 2014; Vetri- Buratti et al., 2015). The use of distracters, such as auditory or visual distracters, bubble blowing, touch, vibration or massage (Bagnasco, Pezzi, Rosa, Fornonil, & Sasso, 2012; Gupta et al., 2014; MacLaren & Cohen, 2005; Sahiner & Bal, 2015), have long been found to be effective in helping the child to cope not only with the immediate medical procedure, but may also buffer memories of the experience (Uman, Chambers, McGrath, & Kisely, 2008). A recent Cochrane review of 39 trials with 3394 children concluded that there is strong evidence supporting the efficacy of distraction in reducing needle-related pain in children and adolescents, however there is limited evidence to differentiate which aspects of distraction are most efficacious (Uman et al., 2013). Distraction is based on the gate control theory that posits that nerve fibers that transmit sharp pain combine in the dorsal horn as a final common pathway with thermal and mechanoreceptors. Stimulation of Ab mechanoreceptors "shuts the gate" on Ad fast pain receptors via presynaptic inhibition.

Vibration has been proposed recently to involve two cortical areas that are primarily involved in coding pain and touch (Hollins, McDermott, & Harper, 2014). Vibration appears to activate analgesic mechanisms which can powerfully inhibit experimental pain. A major component of vibro-tactile analgesia is proposed to be related to A-beta mediated afferent inhibition of dorsal horn nociceptive neurons (Staud, Robinson, Goldman, & Price, 2011).

Although, several distraction techniques have been assessed, some have been found to be impractical and require time which is often not feasible or possible in a clinical setting. A relatively new devise the "BUZZY" (MMJ Labs, Atlanta, GA, USA), combines a cooling ice-pack and a vibrating motor, and has been found in four studies to date to decrease pain and to enhance patients' compliance during venous blood collection, venipuncture and IV insertion (Baxter, Cohen, McElvery, Lawson, & von Baeyer, 2011; Canbulat, Ayhan, & Inal, 2015; Inal & Kelleci, 2012; Whelan, Kunselman, Thomas, Moore, & Tamburro, 2014). The use of the "BUZZY" in the emergency department with 81 children aged 4- to 18 years who were randomized to the device (n = 41) or standard care (n = 40), found that the pain scores assessed on the Faces Pain Scale–Revised during venipunture were lower in the intervention group for both the children and their parents (Baxter et al., 2011). A recent RCT in Turkey found that the "BUZZY" significantly reduced pediatric pain assessed on the Wong-Baker FACES scale during the peripheral IV insertion in 176 children between the ages of 7–12 years (Canbulat et al., 2015). Likewise an RCT of 120 children between 6 and 12 years of age also in Turkey noted that the "BUZZY" significantly reduced pediatric pain assessed on the Faces Pain Scale-Revised (FPS-R) during blood specimen collection and there was no effect on the success of blood collection (Inal & Kelleci, 2012). In contrast, a quality improvement study with 64 children between the ages of 4 to 18 years found that the "BUZZY" did not decrease the pain responses of children assessed on the Wong-Baker FACES during a venipuncture although the majority of the children (80%) indicated that they liked the device (Whelan et al., 2014). No published studies have assessed the efficacy of the "BUZZY" on younger children during an intravenous (IV) line insertion taking into consideration parental and nurses' reports of pain as well as the impact of childhood characteristics.

The aim of this study was to investigate the effects of external cold and vibration via the "BUZZY" on pain during a peripheral IV insertion in children aged 4 to 12 years, to assess and compare the perceptions of parents and nurses and to measure the difference in the time for a successful IV insertion between the "BUZZY" and "No BUZZY" groups. Finally the associations between child characteristics and pain perception were investigated. The following four hypotheses were tested:

Hypothesis 1. Children between the ages of 4 to 12 years who undergo an IV insertion procedure using the "BUZZY" will experience less pain measured by the Wong–Baker FACES Pain Rating Scale (WBFPS) than children not using the "BUZZY".

Hypothesis 2. Parents of children between the ages of 4 to 12 years who undergo an IV insertion procedure using the "BUZZY" will report that their children have less pain measured by the WBFPS than parents of children who are not using the "BUZZY".