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Does Combined Use of the J-tip® and Buzzy® Device Decrease the Pain of Venipuncture in a Pediatric Population?

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Background Both the J-tip® (a needle-free device for subcutaneous delivery of lidocaine) and the Buzzy® (a cooled, vibrating device to employ gate control to minimize procedural pain) have shown some efficacy in diminishing the pain of venipuncture.
Purpose: To develop an optimal protocol for pre-venipuncture/IV start pain management by investigating the impact of adding the use of Buzzy® prior to the use of the J-tip®.
Procedures: Pediatric emergency department patients aged 1 month to 21 years were prospectively enrolled in Phase 1 (J-tip® only) then Phase 2 (Buzzy® + J-tip®) for analgesia prior to venipuncture or IV start. Age-appropriate pain scale scores were collected for the subsequent procedure, as well the administration of lidocaine via J-tip®.
Main findings: With the combined intervention (phase 2), 14.2% of patients had a pain scale score >3 with venipuncture and 16.1% had a pain scale score >3 with application of the J-tip® itself. With no intervention for pain relief, 71% of patients experienced a pain scale score >3 for venipuncture. With the J-tip® alone (phase 1), 21% had a pain scale score >3 with venipuncture and 22.3% had a pain scale score >3 with application of the J-tip® itself.
Conclusions: Patients receiving either intervention reported lower scores on pain scales during venipuncture or IV start than the no analgesia group. The combined intervention did not yield a significant decrease in scores on pain scale scores over the J-tip® alone.

Background Knowledge

MULTIPLE DIFFERENT MODALITIES exist to diminish the pain associated with venipuncture in pediatric patients, with a variety of associated costs and efficacies (Pershad, Steinberg, & Waters, 2008). A recent analysis indicated that the J-tip® was the most cost-effective intervention (Pershad et al., 2008). The J-tip® is a single-use, needle-free device which uses a pressurized carbon dioxide cartridge to force lidocaine through the skin and subcutaneously. Current literature indicates superiority over analgesic creams for venipuncture-related pain management (Jimenez, Bradford, Seidel, Sousa, & Lynn, 2006; Spanos et al., 2008). Another

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analgesic option, Buzzy®, is a rapidly vibrating plastic device shaped like a bee, with cooled wings. The body itself is multi-use and the wings (which are cooled in the freezer) can be purchased as multi-use or disposable. It operates on the theory of gate control and descending noxious inhibitory control, using vibration and cooling to decrease the perception of pain at the procedure site when placed 3–5 cm proximally 30–60 s prior to the procedure. Buzzy® has been shown in some studies to be superior to placebo and to vapocoolants and analgesic creams (Baxter, Cohen, McElvery, Lawson, & von Baeyer, 2011; Canbulat, Ayhan, & Inal, 2014; Inal & Kelleci, 2012). There are drawbacks to each device. The J-tip® emits a loud pop when activated, which may be startling to children, and pain with its application has been reported (Lysakowski, Dumont, Tramèr, & Tassonyi, 2003). The Buzzy® looks like a bee, an insect which may potentially draw a negative reaction from some children.

Local Problem

This study was conducted in a pediatric emergency department (PED). While not all patients require venipuncture, the discomfort experienced by those who do can impact their overall emergency department experience.

Intended Improvement

This represents a combined MD/RN-conceived, RN-driven intervention to achieve the most adequate and consistent analgesia for venipuncture as new devices became available for this purpose, and to potentially overcome the pain associated with the application of the J-tip® device.

Study Question

The objective was to evaluate whether the combination of the Buzzy® device and the J-tip® provided improved analgesia with venipuncture (lab draws or IV start) and diminished the pain that can be associated with the application of the J-tip®, compared with the J-tip® alone and with controls.

Methods

Ethical Issues

As no "standard of care" exists for venipuncture-associated discomfort, trials of different methods were not thought to create ethical dilemma. The Institutional Review Board approved publication of this data set, with a waiver of informed consent. No author had a conflict of interest.

Setting

Data were collected prospectively as part of a nurse-driven quality improvement project to incorporate "ouchless" interventions into our 14 bed academic, urban PED with an annual census of 22,000 pediatric patients per year.

Planning and Study of the Intervention

There were two distinct phases of intervention. The first involved investigation of the J-tip® alone, while the second combined use of the J-tip® and the Buzzy® device. For both phases, patients aged 1 month to 21 years were anonymously enrolled. Prematurely born infants, infants and children with a known allergy to lidocaine, and those receiving chemotherapy were excluded. Each pediatric nurse was required to complete the trial on a minimum of 7 patients for the first phase and 10 subjects for the second. This was, therefore, a non-randomized convenience sample. The first phase took place 5/2012–7/2012. The second phase took place 10/2012–12/2012. Control data for no pre-procedural analgesia were obtained from the pediatric clinic, inpatient ward, and laboratory, where no pre-procedural analgesia is used for needle sticks. For patients requiring multiple attempts, data were collected only on the first attempt, in order to keep the timing from analgesia and duration of procedure evaluated constant.

Phase 1

All J-tip® devices were prefilled by the pharmacy with 0.2 mL of 1% lidocaine. The J-tip® was applied to the anticipated site of needle or IV insertion one to three minutes prior to insertion. A pain scale score out of 10 was recorded using NRS (numeric rating scale), FACES, or FLACC, as deemed appropriate by patient's age and capabilities for insertion of the IV or venipuncture. Also assessed was the score on the appropriate pain scale with use of the J-tip® itself.

Phase 2

The procedure for phase 2 mirrored that of phase 1 with the addition of the use of the Buzzy® device. Buzzy® was placed proximal to the location of the J-tip® application and venipuncture 30–60 s prior to use of the J-tip® and maintained on that site until the IV was placed or venipuncture complete.

Methods of Evaluation

The pain scales used are well-validated and included the FLACC, Wong–Baker FACES Pain Rating Scale, and patient-reported numeric pain scale NRS. The FLACC was entirely assigned by the nurse, and the FACES or numeric scale were chosen by the patient and recorded by the nurse. Patient satisfaction and parent satisfaction were recorded on a simple 1–10 Likert scale. All nurses were in-serviced and completed a standardized data form on each patient. No blinding was performed given the nature of the intervention.

Statistical Analysis

Descriptive statistics were reported using both median and mean. Chi-squared was used in the comparison of proportion of patients with pain scale scores above 3 and those at or below 3. Wilcoxon rank-sum tests were used for comparison of continuous data.

Results

Outcomes: Nature of Setting and Improvement Intervention

Historically, the use of pre-needle stick analgesia was minimal in the PED, the pediatric ward, the pediatric clinic,