The Impact of Positioning on Fear During Immunizations: Supine Versus Sitting Up

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This study explored the impact of a child’s position on the level of fear and perception of pain during an immunization injection. One hundred seven children, ages 4–6, participated in a random-assignment, two-group design study to evaluate the effect of positioning on fear and perceived pain. Group 1 was placed in the supine position and Group 2 in the sitting position prior to immunizations. The results substantiated the belief that children are significantly less fearful about receiving an injection when they are sitting up as compared to when they are lying down. There was no difference in perception of pain. © 2008 Elsevier Inc. All rights reserved.

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Research indicates that children identify injections as one of their most feared and painful events (Hart & Bossert, 1994). It is likely that a child who comes to a clinic for an MMR (measles, mumps, and rubella), DTaP (diphtheria, tetanus, and acellular pertussis), or inactivated poliovirus vaccine immunization injection will arrive fearful and reluctant. If this child is placed in a supine position during such a procedure, the result may be a feeling of loss of control, which, in turn, invokes more fear. This fear can be associated with confusion about why trusted adults are inflicting pain on them; anger at the loss of choice, control, and autonomy; and invasion of privacy and body space (Gaskell, Binnes, Heyhoe, & Jackson, 2005). Research related to pain perception in children has explored the relationship of pain to fear, anticipatory anxiety, tension, and distress. Eland (1981) reported that fear was a potentially uncontrollable variable in her study for minimizing pain of prekindergarten intramuscular injections, “If a child was particularly anxious, it is possible that pain reduction interventions might not have been successful.” Sparks (2001) found that a lower level of fear correlated to a decreased perception of pain. Stephens, Barkey, and Hall (1999) reported that during stressful procedures, children experience less fear related to loss of control when placed in a sitting position as compared to a supine position. Lambert, Barkey, Stephens, and Walsh-Sukys (1997) suggested that even in infancy, sitting up seems to be accompanied by a sense of control, and in a situation where an infant or child is forced to lie down, it is common for the infant to cry and struggle to get up. Pate, Blount, Cohen, and Smith (1996) reported that childhood memories of “aversive medical events may last for years, and early negative experiences may lead to negative attitudes about, and avoidance of, health care experiences” for adults later in life. Ost (1991) cited in his study, in which there were 56 adults with needle phobia, that 52% could trace their fear back to a negative childhood event.

Low rates of immunization have been attributed to parental fear of not wanting to see their child cry (Abbotts & Osborn, 1993). Nir, Paz, Sabo, and Potasman (2003) reported that fear of injections in young adults is also associated with fear of needles,
hospitals, surgical procedures, pain, doctors, and dentists. Children receiving routine immunizations have the highest level of fear of injections (Nir et al., 2003) and display significant levels of distress prior to their injections (Jacobson et al., 2001). Child fear has also been identified as a significant predictor for avoidance, correlating to later avoidance of medical situations into adulthood (Pate et al., 1996). Nir et al. studied young adult travelers and reported that more than a fifth of respondents revealed that they had a fear of injections, and of those who were fearful, 8.2% reported experiencing fear “of an unreasonable magnitude.” This fear may keep travelers from receiving recommended immunizations and, thus, spreading potentially deadly diseases (Nir et al., 2003).

There are few studies that focus on relief methods for fear, anxiety, or tension during injections and how these relate to the perception of pain (e.g., Bowen & Dammeyer, 1999; French, Painter, & Coury, 1994). This research study compared whether a child’s fear and perception of pain were affected by lying supine versus sitting up during an upper thigh injection. It was anticipated that a child sitting up when receiving an injection would feel more in control and be less fearful than when lying down. When a child is in an upright position, it is less likely that the thigh muscle will be tense. Administering an injection into a tensed contracted muscle is more painful than an injection into a relaxed muscle and could result in a higher degree of pain (Stephens et al., 1999). A staff person or parent can also effectively immobilize a child’s legs and/or arms if he or she is in an upright sitting position or sitting in a parent’s lap. Although many children appeared comforted by their parents’ support, Kuttner (1989) reviewed literature suggesting that physical restraint is one of six identified factors most likely to result in psychological trauma in pediatric patients. Physical restraint, whether by a parent through a comfort hold or hug or by health care staff with or without the child’s consent, further increases the child’s fear and “fight” against lying down.

This research study occurred in two pediatric clinics where patients typically lie down on the examination table during immunizations. The prevalent thought has been that if the child is supine, with legs bent over the side of the examination table, the nurse or medical assistant giving the injection will have the ability to better control a child’s movement. Although, in the supine position, upper body movement is often limited through parental or staff physical restraint, leg movement from kicking is not as easily managed. It is also common practice for parents to assist in controlling movement by holding the child’s hands and/or arms or by leaning against their child’s upper body to minimize wiggling.

We hypothesized that a child sitting up when receiving an injection would feel more in control and be less fearful than when lying down.

METHODS

A two-group design evaluated the effect of positioning on anxiety and pain during immunizations. A convenience sampling approach was used where consecutive patients qualifying for the study were asked to participate. They were randomly assigned to one of two groups where Group 1 was placed in the supine position and Group 2 in the sitting position prior to immunizations. This study was approved by the hospital’s institutional review board.

Participants

Patients, ages 4–6 years old, at the general pediatric clinics within a Midwest hospital receiving their immunizations (MMR, DTaP, and IVP) were eligible to participate. This age group was chosen because immunizations at this age are a standard requirement for entrance to prekindergarten or kindergarten. Also, 4- to 6-year-old children are likely to be able to verbalize how they are feeling. Each family had to review and sign the informed consent and state no preference for the child’s position during the administration of the injection. Children who had four or more procedures/surgeries within the last 2 years and those with chronic illness, cognitive disabilities, or a physical impairment that affects their ability to sit up were excluded from the study. Families who were unable to understand the study due to language barriers were also excluded.

Measures

Two tools were used with the study participants to measure fear. The Child Medical Fear Scale (CMFS; Broome, Hellier, Wilson, Dale, & Glanville, 1988) identifies overall fear as it relates to health care events. The Fearmometer (Wagner, 2002) provides a subjective measure of fear related to the experience. Two items from the CMFS, a 17-item questionnaire, were used to measure children’s level of worry and fear about
medical procedures prior to receiving their immunizations. Item 2 ("I am afraid of going to the doctor’s office") and Item 3 ("I am afraid of getting a shot") were selected from the questionnaire because they were most relevant to the purpose of our inquiry, which was to determine whether the two study groups differed significantly in their predisposition for fear of injections. This validated scale has been used in several studies (Beyer & Knott, 1998; Hart & Bossert, 1994; 2001). Beyer and Knott (1998) reported using the tool for children as young as 3 years with reliable results. The 2 items from the CMFS were administered at the beginning of the encounter prior to discussing the injection. Children were then asked to identify whether they were not at all afraid (1 point), a little afraid (2 points), or a lot afraid (3 points). The Fearmometer, a visual analog scale designed specifically for children, was used to measure fear once participants were placed in their randomly assigned position. The language used in this scale to describe fear response was adapted to accommodate the language level of a 4- to 6-year-old. Participants were asked to describe their fear by selecting a number between 1 and 10, where 1 was no fear and 10 was extremely fearful.

FACES (Wong & Baker, 1988), a validated pain rating scale, was used to measure pain levels postimmunization. The scale ranges from 0 to 10 in increments of 2 where faces range from a full smile at 0 to a tearful face at 10. This scale is most appropriate for children older than 3 years. Goodenough et al. (1997) reported that it was simple to use and showed a realistic distribution of scores for children 4 to 6 years old receiving their immunizations.

The occurrence of crying was measured pre-injection as Yes/No. Total crying time postinjection was measured using a stop clock. The procedure start time began once the child was in position and had identified the Fearmometer rating; the procedure end time was noted when all immunizations had been given. The start time and end time were recorded to evaluate total procedure time. Procedure time was measured to evaluate the impact that a change in position could have on the length of visit needed to complete the procedure.

Staff Training
Staff members participating in the study included medical assistants and nurses who administered injections in the clinic. They were trained in positioning the child in both the sitting and supine positions to ensure consistency in technique.

Sample Size
The sample size was based on the expectation that the proportion of patients reporting an anxiety level greater than 2 would be significantly less for the group in the sitting position compared to the group in the supine position. The breakpoint of 2 was selected based on the findings by Goodenough et al. (1997), where the median rating was 1 for a group of 50 children, 4 to 6 years of age, receiving immunizations. Group sample sizes of 55 and 55 achieved 80% power to detect a difference of 25% between the null hypothesis that both group proportions were the same and the alternative hypothesis that the proportion in the group placed in the sitting position was 25% less at an alpha of .05.

Statistical Methods
Univariate analysis for categorical data included chi-square, Fisher’s Exact Test, and Monte Carlo simulation using chi-square. The latter two tests were used when cell entries were not sufficient to meet the requirements of the chi-square distribution. Measures where these methods applied included comparing groups for gender differences and responses to the two questions from the CMFS. Univariate tests for significance of continuous data included the Student’s t test for mean values and the nonparametric Mann–Whitney U test for median values when the distribution proved to be nonnormal as determined by the Kolmogorov–Smirnov statistic. Measures where these were applied included comparison of age, ratings for fear and pain, and total procedure time. p < .05 was considered significant. SPSS Version 11.5 was used for analysis.

RESULTS
Fifty-five patients in Group 1 (supine) and 53 patients in Group 2 (sitting up) were recruited to participate in the study. Nine families declined to participate because they had a preference for a sitting-up position. Gender distribution was similar in both groups: 45.5% were female in Group 1 and 49.1% were female in Group 2. Mean age of Group 1 at 5.1 years (range = 4.1–5.9) was similar to that of Group 2 at 5.2 years (range = 4.0–6.6). Crying prior to injection was significantly more likely for
patients in the supine position compared to patients who were sitting up, at 65.5% and 41.5%, respectively. Responses to Questions 1 and 2 were similar for both groups. However, the supine group, when surveyed preinjection, reported less fear than the group sitting up based on their answer to the questions “I am afraid of going to the doctor’s office” and “I am afraid of getting a shot” (Table 1).

The median Fearmometer score preinjection was significantly greater for Group 1 with a value of 9, as compared to Group 2 with a value of 5. The percentage of children with a fear score greater than 2 in Group 1 (76.4%) was not significantly greater than that in Group 2 (61.5%; Table 1; added to respond to sample size). Median value for crying time postimmunization for Group 1 (10 minutes) was also significantly greater than that for Group 2 (2 minutes).

Total procedure time and pain scores measured with FACES were not significantly different between the two groups (Table 2).

**DISCUSSION**

This study provides evidence that children are significantly less fearful of an immunization injection when they are sitting up as compared to when they are lying down. A smaller percentage of children cried prior to the injection, and crying time postinjection was significantly less for children who were sitting up.

At the beginning of the health care encounter and prior to injection, in response to the question from the CMFS, “I am afraid of getting a shot,” 33% of the children in Group 1 (supine) selected not at all as compared to 19% in Group 2 (sitting up). These findings differed from the actual outcome in which the supine group reported greater fear, as measured using the Fearmometer, than the sitting-up group once they were positioned for injection. This may indicate that children who report in advance that they are coping well may actually “fall apart” at the moment of the injection when in a supine position. It may be concluded that it can be difficult for children to anticipate what their level of fear may be until the moment injections occur. Based on this conclusion, reducing the position variable and recommending that children sit up for injections may have a significant impact on children’s immunization experiences.

During the recruitment phase, some parents were surprised to find that regardless of their participation in the study, they had the option of having their child sit up for injections. At this juncture, nine families chose not to participate, confirming that parents in fact prefer that their child sit up. Some parents who declined participation in the study stated that their child had already decided to sit up during immunizations. These parents concluded that based on previous immunization experiences in the sitting-up position, this position was ideal for keeping their child comfortable and calm. Parents who did request sitting up outside the scope of the study were often met with reluctance from staff. Observations during the study indicated reluctance on the part of some nursing staff to employ the sitting position. Staff would try the sitting-up position, but if the patients showed any signs of stress or movement, they were told they would need to lie down.

Although certain pediatric health care facilities offer parents and children the choice of sitting up or lying down for immunizations, caregivers in our clinic often suggest that children lie down for these injections. The rationale for this practice includes patient and nursing safety concerns and staff time constraints. Prior to and during the duration of the study, nursing staff stated concerns that the procedure would take longer if the child sat up.

**Nursing Safety Concerns**

Nurses at our facility identified concerns regarding placing a child in a sitting position, including
the possibility of the needle bending or inadvertently being poked into the hand of the child, parent, or nurse. Due to these safety concerns, nursing staff state that they feel more in control of the injection when the patient is lying down. Pettit, Gee, and Begue (1997) argue that appropriate use of restraint with children during and immediately after injections will decrease the incidence of accidental needle sticks. During the study, it was substantiated that health care staff and parents were able to effectively restrain children in the sitting-up position for successful administration of immunizations. This is evidenced by the fact that there were no accidental needle sticks during this study. Despite these findings, it became clear that laying children down for injections is a long-standing, accepted practice in these clinics.

**Time Constraints**

Although not statistically significant, the study results did suggest that it may take less time to administer injections to a patient in the sitting-up position than to a patient who is supine.

**Implications for Practice**

Based on the findings of this study and evidence from the literature (Stephens et al., 1999), it can be concluded that a child’s physical position during injections can affect the child’s level of fear.

In most cases, it appears that a child who is placed in a sitting position prior to an injection will experience less fear than a child who is placed into a supine position by the nurse or medical assistant. This was correlated to a greater sense of control for the child as reported by Stephens et al. (1999). Formative experiences, such as how a young child is positioned during a medical procedure, whether positive or negative, have a far-reaching impact on perception and response to future health care experiences (Pate et al., 1996).

Staff at Rainbow Babies and Children’s Hospital in Cleveland, OH, have found that patients can begin sitting up for procedures as soon as they achieve some trunk and head control, usually at 3 to 5 months of age (Stephens et al., 1999).

As this positioning study progressed, although certain nurses came to recognize the benefits of administering immunizations in the sitting position or felt it was more appropriate for the 4- to 6-year-old age group, by the end of the study period, there was no consensus among the nursing staff regarding the most beneficial positioning for children when given immunizations via injection. Parents often will not speak out on the child’s behalf in the medical environment, and empowering them with the knowledge and skills necessary to support their child during immunizations may improve the experience for all involved.

**LIMITATIONS**

The main limitation of our study was that there was no control regarding the amount of information given to a child in advance by family members in preparation for the injection. It is reasonable to expect that children who were more effectively prepared for the injection by parents experienced less fear and/or pain. This effect was not controlled for in the analysis. Additional uncontrolled variables were the inability to measure the potential impact of both the nurse’s bedside manner while administering the injection and the parent’s anxiety level regarding the procedure on the child’s fear or pain response.

**CONCLUSIONS**

According to Pate et al. (1996), childhood may be a critical time for the development of medically related attitudes and behaviors. The results of this study indicate the need to reevaluate the way in which young children are positioned for injections. Due to the fact that children sitting up during routine immunizations experience less fear, it is appropriate for clinics to use this position first, unless otherwise indicated by the child or parent. Staff may need additional training in immobilization techniques to be used with a child in a sitting position, as they were similarly trained to immobilize a child in a supine position. Immobilization techniques used by staff will vary according to the age and size of the child as well as parents’ weight and/or strength. Staff may also need to provide additional instruction for parents to help develop the ability to support their child through the immunization experience as well as all upcoming health care encounters. Stephens et al. (1999) and Lambert et al. (1997) offer suggestions and photographs of sitting positions used by health care professionals and parents to support children’s needs during injections and other medical procedures.

For many children, immunizations serve as the first health care experience that they will remember. Creating a “positive memory” will impact future health care visits. Research indicates that health
care experiences in childhood have a lasting effect on attitudes about health care. Children in this study indicated feeling less fear when given a choice to sit up for injections. Health care staff has an obligation to listen and support their needs.

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