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Evaluation of Methods to Relieve Parental Perceptions of Vaccine-Associated Pain and Anxiety in Children: A Pilot Study

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ABSTRACT

Introduction: The pain and anxiety associated with vaccination is a significant reason why parents are reluctant to have their children vaccinated. Distraction methods and vapocoolant sprays may be used to modify the parent's perceptions of their child's pain and anxiety, thus encouraging parents to return for the child's next vaccination.

Methods: A convenience sample of 68 parents with children ranging in age from 2 to 12 years was selected. The parents and the child were randomly assigned to three groups: a control group, a DVD distraction group, or a vapocoolant spray group. After the child was vaccinated, parents evaluated the child's pain and anxiety.

Results: No significant difference in the parents' perception of their child's pain or anxiety was found between the two treatment groups compared with the control group. Some parents expressed the desire to be able to choose the type of distraction method their child received rather than having them randomly assigned to a group.

Discussion: Although quantitative results were not statistically significant in this pilot study, parents commented that the DVD distraction method seemed helpful before and/or after vaccination, but not during vaccination, and parents appreciated the distraction. Parents, however, would prefer to choose the intervention rather than being randomly assigned to a group. The effectiveness of interventions with regard to parental perceptions of pain or anxiety warrants further study. *J Pediatr Health Care.* (2013) 27, 351-358.

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KEY WORDS

Vaccination, pain, distraction, topical spray

The development and widespread use of vaccinations has dramatically improved public health by decreasing the rate of infectious diseases and is one of the most important public health achievements of the 20th century (Attaran, 2008; Luthy, Thorpe, Dymock & Connely, 2010; Schechter, Zempsky, Cohen, McGrath, & McMurtry, 2007). Despite the immeasurable benefits of vaccinations, many parents are still reluctant to vaccinate their children (Miller, 1993). Multiple studies have reported that the perceived pain and anxiety associated with the administration of vaccines is a significant reason why parents are reluctant to vaccinate their children in a timely manner (Abbott

& Fowler-Kerry, 1995; Luthy, Beckstrand, & Peterson, 2009; Luthy, Sperhac, Faux, & Miner, 2010; Reis & Holubkov, 1997). Therefore it may be helpful to identify ways to reduce the parent's perception of their child's pain or anxiety during vaccination (O'Brien, Taddio, Ipp, Goldbach, & Koren, 2004). The reduction in perceived pain or anxiety by the parent may promote timely return for future vaccinations.

Pain is experienced during many health care procedures and often results in fearful children, which may lead to prolonged procedures and dissatisfaction with care (Cassidy et al., 2001; Farion, Splinter, Newhook, Gaboury & Splinter, 2008). Currently, distraction is recommended as one of the most basic yet helpful interventions to decrease the perception of pain (Schechter et al., 2007). Distraction methods, including singing, reading, counting, watching a movie (DVD), or playing a game are easily and commonly implemented in hospitals during painful procedures, such as intravenous line placement, venipuncture, or lumbar puncture (Cassidy et al., 2001; Cohen et al., 2006). In theory, as children engage in activities that demand attention, they have a limited capacity to process pain during uncomfortable hospital procedures (Jeffs, 2007). The distraction method, however, is most successful when the distraction activity selected is "attentionally demanding" and meaningful to the child (Foster, 2007; Jeffs, 2007; Vessey, Carlson, & McGill, 1994).

Vapocoolant sprays also have been implemented to effectively alter the perception of pain during uncomfortable procedures (Davies & Molloy, 2006; Mawhorter et al., 2004). Ethyl chloride is a commonly used vapocoolant spray that acts as a rapid-acting anesthetic, cooling the surface of the skin to nearly 0°C (Davies & Molloy, 2006; Farion et al., 2008; Hsu, 2012; Reis & Holubkov, 1997; Yoon, Chung, Lee, & Park, 2008). It is believed that the rapid cooling of the skin may desensitize pain receptors and quickly anesthetize the surface of the skin (Hijazi, Taylor & Richardson, 2007; Hsu, 2012; Page & Taylor, 2010). Unlike other topical anesthetics with a delayed onset of action ranging from 10 minutes to 1 hour, vapocoolant sprays can anesthetize the skin up to 4 mm in depth after only a 3- to 7-second application (Farion et al., 2008; Soueid & Richard, 2007).

LITERATURE REVIEW

Children experience procedural pain, whether it is with the average of 35 vaccines received by the age of 18 years or any other number of medical procedures routinely performed in hospitals and pediatric offices. Although the effectiveness of interventions to mitigate pediatric pain and anxiety varies widely depending on the individual child, pharmacologic and psychological methods to control such pain have been investigated. Researchers exploring needle-related pain and anxiety, in particular, have used various distraction

methods, topical local anesthetics, or a combination of similar interventions.

Systematic review of psychological interventions during needle-related procedures supports the use of distraction in the clinical setting (Uman, Chambers, McGrath, & Kisely, 2006). Distraction was more effective than control and comparison groups in reducing self-reported pain (standardized mean difference of -0.24 , 95% confidence interval [CI] = -0.45 to -0.04). Similar studies using various distraction techniques, including movies, music, short stories, and guided imagery, in a variety of settings also yield similar positive results (Kleiber & Harper, 1999; Schechter et al., 2007).

Although some research supports the use of vapocoolant sprays in decreasing vaccine-related pain (Hijazi et al., 2009; Page & Taylor, 2010), other research examining the effectiveness of vapocoolant sprays versus no treatment found no significant differences between groups (Shah, Taddio & Rieder, 2009). Although results vary for reasons that include the placebo effect, differing administration times, and differing administration techniques, the overall body of research available regarding vapocoolant sprays is small.

We found no published research that specifically studied parents' perception of their child's pain or anxiety during vaccination using vapocoolant spray or while watching a DVD compared with a control group. If distraction using DVD or a vapocoolant spray could successfully reduce the parent's perception of the child's pain or anxiety during vaccination, parents may be encouraged to return for the next vaccination in a timely manner. An increase in vaccination compliance may have significant effects on individuals, families, and communities. Therefore the purpose of this study was to determine if the parent's perception of their child's pain and anxiety was lower with the distraction method (DVD) or the vapocoolant spray compared with control subjects (usual care).

If distraction using DVD or a vapocoolant spray could successfully reduce the parent's perception of the child's pain or anxiety during vaccination, parents may be encouraged to return for the next vaccination in a timely manner.

RESEARCH QUESTIONS

1. Does distraction (i.e., use of a DVD) effectively reduce a parent's perception of his or her child's vaccine-related pain compared with control subjects?

2. Does distraction (i.e., use of a DVD) effectively reduce a parent's perception of his or her child's vaccine-related anxiety compared with control subjects?
3. Do vapocoolant sprays (e.g., ethyl chloride) effectively reduce a parent's perception of his or her child's vaccine-related pain compared with control subjects?
4. Do vapocoolant sprays (e.g., ethyl chloride) effectively reduce a parent's perception of his or her child's vaccine-related anxiety compared with control subjects?

METHOD

Participants

After receiving Institutional Review Board approval, a convenience sample of 68 parents with children ranging in age from 2 to 12 years were informed about the study and selected as subjects. Parents were included in the study if their child was in need of routine vaccinations. Children 8 years of age and older were given the same information about the study as their parents. Consent then was obtained from parents, while assent was obtained from children older than 8 years. Participation in the study was voluntary, and no compensation was provided. To participate in the study, the parent must have been present for at least one of the child's previous vaccinations. In accordance with UpToDate guidelines, parents whose children were diabetic, had poor extremity circulation, or had a previous allergic reaction to any topical anesthetic were excluded from the study (Hsu, 2012). Because stress or anxiety experienced by one child during vaccination may influence a sibling's reaction, parents with more than one child in need of vaccinations also were excluded.

Setting

The study took place at a pediatric office located in the second largest county in Utah. At this practice, five physicians and two nurse practitioners primarily care for privately insured families of middle to upper socioeconomic status.

Design

A posttest design was used for this study. A pretest/posttest design was not selected because response to pain could change as the child matured between administration times of vaccines in a series (Berberich & Landman, 2009). Also, if children received multiple vaccinations in one visit and received one vaccine with an intervention and another vaccine without an intervention, the pain and anxiety of the first injection could affect the child's reaction to the second one. Instead, parents were asked to compare their perceptions of the child's pain or anxiety during a previous vaccination with this experience.

Use of a DVD and vapocoolant spray (compared with control, which was usual care) were selected as interventions by the researchers because of the ease of administration and nearly immediate effect, thus improving feasibility. Envelopes containing one of two intervention groups or the control group (a total of three groups) were computer randomized prior to the study. Once participants signed consent, the health care professional selected the next available envelope, and parents and children were assigned to one of three groups: control, a DVD distraction group, or a vapocoolant spray group. Subjects in the control group received no intervention but were given the vaccination as usual. This process included a preliminary visit with the office provider, after which a health care professional came into the room and administered the needed vaccination. A bandage was then placed on the injection site, the child was redressed if necessary, and the child and parent were escorted out of the room after the parent completed the 1-page evaluation tool.

After the routine visit with the office provider, subjects in the distraction group watched a DVD movie (*The Lion King*) before, during, and after the vaccination. The movie was viewed on a small portable DVD player on a counter in the examination room and was selected because it was the most popular animated Disney movie at the time this study was completed. A bandage was then placed on the injection site, the child was redressed if necessary, and the child and parent were escorted out of the room after the parent completed the evaluation tool.

After the routine visit with the office provider, the vapocoolant spray was administered to subjects in the vapocoolant spray group for 3 to 7 seconds immediately before the vaccination. A bandage was then placed on the injection site, the child was redressed if necessary, and the child and parent were escorted out of the room after the parent completed the evaluation tool.

The 1-page evaluation tool assessed the parent's perception of the child's pain or anxiety compared with a previous vaccination experience. Finally, each child was able to select a toy after vaccination regardless of their randomized group.

Instruments

A questionnaire was developed that parents could use to record their perceptions of their child's response to vaccination after use of either of two interventions or the control procedure. The 11-item, single-page questionnaire included one visual analog item, one Likert-type item, one yes/no item, one item asking them to rate their experience, six demographic questions, and one open-ended item for comments regarding the study. The demographic items included the child's age, gender, and ethnicity. The parent's gender was

TABLE 1. Participant demographics

Characteristic	Mean (standard deviation)	n (%)
Age of children (yr)	5.2 (3.4)	
Gender of child		
Male		32 (47)
Female		36 (53)
Ethnicity of child		
White		63 (97)
Hispanic		1 (1.5)
Hawaiian/Pacific Islander		1 (1.5)
Time since previous vaccination		
< 6 mo		12 (18)
6-11 mo		11 (16)
1-2 yr		25 (37)
> 2 yr		15 (22)
I don't know		5 (7)
No. injections received		
1		14 (21)
2		25 (37)
3		6 (9)
4		16 (24)
> 4		6 (9)
Scheduled vaccination on time		
Yes		62 (94)
No		2 (3)
Don't know		2 (3)

not collected. It was assumed that the memory of the child's vaccine-related pain and anxiety might have faded over time. Consequently, parents were asked to report the length of time since the last vaccination. The number of scheduled vaccinations also was reported. To evaluate whether the participants had vaccine-related anxiety that affected their willingness to return for vaccines in a timely manner, parents were asked whether or not the child's vaccination was on time, and if not, why not.

The visual analog item included a Wong-Baker FACES Pain Rating Scale ranging in options from 0 = No Hurt to 5 = Hurts Worst. The WBFS was selected because of its reliability, validity, and straightforward approach to pain assessment (Keck, Gerkenmeyer, Joyce, & Schade, 1996). The questionnaire also included a single anxiety item that used a Likert scale of 0 to 5, with higher scores indicating that the child exhibited more anxiety. Another item asked parents to rate how the current vaccination experience ranked compared with the last vaccination experience. The three options were *worse*, *about the same*, and *better*.

The final dichotomous yes/no item asked parents if they would choose the same intervention again (if they received either treatment) for the child's next vaccination. For parents randomly assigned to the control group, the option *not applicable* was included.

Data Analysis

Responses were entered into SPSS (SPSS Inc., Chicago, IL). Frequencies and measures of central

tendency and dispersion were calculated for all quantitative items. Because the data were normally distributed, one-way analysis of variance (ANOVA) tests were conducted to examine whether statistically significant differences existed for both perceived pain or anxiety during vaccination using vapocoolant spray, a DVD movie, or control (i.e., usual care). The open-ended comment item was transcribed and analyzed independently for themes. Final themes were identified.

RESULTS

Randomized Groups

The study had a total of 68 participants. Twenty-seven participants were randomly assigned to the DVD distraction group, 18 participants were randomly assigned to the vapocoolant spray group, and 22 participants were randomly assigned to the control group.

Demographics

The ages of the children ranged from 2 years to 12.5 years ($M = 5.2$ years; $SD = 3.4$). All parents reported their child's gender; 53% ($n = 36$) of subjects were girls and 47% ($n = 32$) were boys. Of the sixty-five parents (96%) who reported their child's ethnicity, 97% ($n = 63$) were White. Time since the child's previous vaccination was most commonly within the past 1 to 2 years (37%). However, a few parents (7%) could not remember when their child's last vaccination took place. Finally, parents were questioned regarding the number of injections the child received during the visit. Most commonly, parents reported that the child received two injections (37%). When asked if the child was on time for his or her current vaccination(s), 67 parents responded, of whom 63 (94%) were on time for vaccinations (Table 1).

Pain

Parents were asked to rate the child's pain after vaccination using the visual analog FACES Pain Scale. The most frequently selected choice for perceived pain was a 1 or "Hurts Little Bit" ($n = 22$; 33%). Only one parent selected zero or "No Hurt" (2%) to describe his/her perception of his/her child's pain following the vaccination (Table 2). A one-way ANOVA was used to test for differences in parents' perceptions of their child's pain among three groups: DVD distraction, vapocoolant spray, or control (usual care). No significant differences in perceived pain scores were found across the three groups ($F(2, 64) = .222, p = .801$; Table 3).

Anxiety

When asked to rate their child's anxiety following the vaccination, the most frequently chosen response by parents was "some anxiety" ($n = 18$; 27%). A few parents reported the child experienced "no anxiety" (9%) during vaccination (Table 4). A one-way ANOVA also

TABLE 2. Parent's perception of pain

Selected parental response	DVD			
	distraction <i>n</i> (%)	Spray <i>n</i> (%)	Control <i>n</i> (%)	Total <i>n</i> (%)
No hurt	0 (0)	0 (0)	1 (2)	1 (2)
Hurts a little bit	7 (10)	6 (9)	9 (14)	22 (33)
Hurts a little more	6 (9)	6 (9)	2 (3)	14 (21)
Hurts even more	7 (10)	1 (2)	2 (3)	10 (15)
Hurts a whole lot	3 (4.5)	3 (4.5)	5 (7)	11 (16)
Hurts worst	4 (6)	2 (3)	3 (4)	9 (13)

was used to test for differences in the parents' perception of their child's anxiety among three groups: DVD distraction, vapocoolant spray, or control (usual care). No significant differences in perceived anxiety scores were found across the three groups ($F(2, 65) = .151$, $p = .860$; Table 5).

Comparison With Previous Vaccination

When asked to compare this vaccination experience with the previous experience, most parents ($n = 38$; 59%) claimed their child's current vaccination experience was about the same as their previous experience. However, some parents reported the child's vaccination experience was better ($n = 21$; 32%), and a few claimed the child's vaccination experience was worse ($n = 6$; 9%) compared with their previous vaccination experience (Table 6).

Preference for Same Treatment on Future Vaccinations

Parents also were asked to report whether they would like the same intervention during vaccination at future visits; 65 parents (96%) responded. Of those who responded, 38 (58.5%) parents chose "yes," while 19 (29.2%) chose "no." Of those responding "no," six children were in the DVD distraction group, six children were in the control group, and seven children received the vapocoolant spray.

Comments

In the open-ended comment section, parents were invited to share any comments regarding the study. Twenty-eight parents (41%) wrote a response. Two major themes were identified: (a) the DVD distraction

TABLE 4. Parent's perception of anxiety

Selected parental response	DVD			
	distraction <i>n</i> (%)	Spray <i>n</i> (%)	Control <i>n</i> (%)	Total <i>n</i> (%)
No anxiety	1 (1)	2 (3)	3 (4)	6 (9)
Little anxiety	7 (10)	6 (10)	3 (4)	16 (24)
Some anxiety	8 (13)	3 (4)	7 (10)	18 (27)
More anxiety	5 (7)	1 (1)	2 (3)	8 (11)
Lots of anxiety	3 (4)	4 (6)	3 (4)	10 (14)
High anxiety	4 (6)	2 (3)	4 (6)	10 (15)

method was helpful before and/or after the vaccination, but not during, and (b) parents wished they could have chosen which intervention their child received.

Six parents claimed the DVD distraction method was helpful before and/or after the vaccination, but not during the vaccination. For some children, the DVD distraction method was perceived as being especially helpful in relieving anxiety prior to the vaccination. As stated by one parent, the "movie worked to help wait for shots." Although the DVD distraction method relieved anxiety prior to vaccination for some children, for others the distraction method was most helpful immediately after the vaccination. As one parent stated, "Even though the movie didn't decrease her anxiety before the shots, it helped distract her after the shots and she quit crying sooner." For some parents, the DVD distraction was helpful in reducing pain. As stated by one parent, "It distracted him about the pain right after. Overall, I would say [the movie was] worth it."

Interestingly, seven parents stated they appreciated the intervention to reduce anxiety or pain associated with the child's vaccination. However, they would prefer to choose the intervention method rather than being randomly assigned to a group. The reasons for choosing the child's intervention were mostly justified by unique personality differences or specific needs of the child. For example, one child had an unfavorable response to the vapocoolant spray. As the parent of this child stated, "[she has] bad eczema on her arms [and] the spray stung." Other parents preferred a different intervention based upon their child's personality. As stated by one parent, "Distraction with video would

TABLE 3. Analysis of variance for parent's perception of child's pain

	Sum of squares	<i>df</i>	Mean square	<i>F</i>	Significance
Between groups	.984	2	.492	.222	.801
Within groups	141.732	64	2.215		
Total	142.716	66			

TABLE 5. Analysis of variance for parent's perception of child's anxiety

	Sum of squares	<i>df</i>	Mean square	<i>F</i>	Significance
Between groups	.766	2	.383	.151	.860
Within groups	165.366	65	2.544		
Total	166.132	67			

TABLE 6. Parent's overall experience compared with last vaccination

Selected parental response	n (%)
Worse	6 (9)
About the same	38 (59)
Better	21 (32)

[have worked] well for our child better than spray.” Another parent, whose child was randomly assigned to the DVD distraction group, stated, “My son is not into movies so I think that is why it did not help.” Even parents whose children were randomly assigned to the control group expressed the desire to choose the child’s anxiety and pain reduction intervention. One parent expressed, “... I would love to try a movie or spray next time.”

DISCUSSION

Although no statistically significant quantitative results were found with regard to the parents’ reports of their child’s pain or anxiety between intervention groups compared with the control group, the interventions seemed to have had a marginal effect for a few children. Whereas ideally an intervention would completely eliminate vaccine-associated pain, it is much more realistic to expect a mild to moderate reduction in pain during vaccination, such as was perceived by the majority of parents in this study. Likewise, no statistically significant reduction in anxiety was found between intervention groups. However, more than half of the parents selected “a little anxiety” or “some anxiety.”

Although the majority of parents claimed the child’s vaccination experience with intervention was about the same as without an intervention, almost one third reported that the intervention improved the child’s vaccination experience. However, this difference may simply be due to the fact that the child had matured since his or her last vaccination. Indeed, several of the children were 1 to 2 years older than they were at the time of their previous vaccination. In addition, parents were required to compare the child’s pain and anxiety to a previous vaccination. For some parents, this request involved recalling the child’s vaccine-induced pain and anxiety from more than 5 years ago. Certainly the parent’s ability to recall the child’s previous response to a vaccine could have had a confounding effect on the results.

It is interesting to note that one of the main themes of the open-ended comments was appreciation for an intervention to relieve vaccine-associated pain. Even though no statistically significant difference in reducing pain and anxiety was found between groups,

more than half of parents reported they would like the same intervention during vaccination in the future. Although the quantitative and open-ended comment results seem contradictory, perhaps the difference between results could be resolved with a larger sample size. Also worth mentioning is the fact that parents seemed to prefer any intervention rather than no intervention at all; however, they wanted to choose the child’s pain- and anxiety-reducing intervention rather than being randomly assigned to a group.

CLINICAL IMPLICATIONS

In children as young as 3 years old, experiences with pain can affect future perceptions of painful procedures and response to painful stimuli (Paway & Garten, 2010). Because vaccinations occur at regular intervals during childhood, children with painful vaccination experiences may exhibit increasing anxiety and perception of vaccine-associated pain before and during subsequent vaccination administration. As a result, some parents may procrastinate in scheduling the child’s vaccinations because of the anxiety and pain associated with the injections. It is important that health care professionals assess the level of a child’s anxiety regarding vaccinations and, when appropriate, offer a choice of anxiety- or pain-reducing intervention to parents. Because parents are most familiar with the child’s unique personality and specific needs, they are more likely to choose an effective intervention.

It also is evident, through analysis of the open-ended comment, that parents believed the DVD distraction method decreased anxiety in the children before and after the vaccination, although not during the vaccination process. For several children, the DVD distraction method was able to take the child’s mind off the vaccination experience before administration and then helped calm the child much more quickly following administration of the vaccination. Although further research still needs to be completed, implementing distraction using a DVD in the clinical setting may be useful to decrease anxiety prior to vaccination, especially if the child will be waiting for some time in the office before receiving the injection.

...parents seemed to prefer any intervention rather than no intervention at all; however, they wanted to choose the child’s pain- and anxiety-reducing intervention rather than being randomly assigned to a group.

LIMITATIONS OF THE STUDY

The sample was small, primarily White, and from one state, so it may not represent the entire population of parents in the United States, thus the findings cannot be generalized to other populations. A limitation to this study was that it was underpowered. Although it would have been useful, an initial power analysis was not undertaken to determine our sample size for this exploratory study. Rather, we restricted our data collection efforts to a 12-month period, which resulted in 68 participants. A post hoc power analysis indicated that to obtain significant results for the one way ANOVA at $\alpha = .05$ with 80% power and a medium effect size of .25, a total sample size of 165 (or 55 per group) would have been needed. Another limitation was that parents were not asked what treatments (such as a pain-reducing medication) or behaviors (such as promise of a reward) they had either given or offered the child before coming for vaccinations. If children were pre-medicated with an oral pain medication or offered a reward for “good behavior” during vaccination, results may have been affected.

Evaluating pain perception in children is a complex process and thus presents additional limitations because of the presence of many variables. For example, our study solely evaluated the parent’s perception of the child’s pain, although this measurement may have altered results because some parents may not have been able to differentiate between subtle variations of the child’s pain and anxiety (i.e., “Hurts Little Bit” and “Hurts Little More”). Also, it is possible that the older children, who were capable of self-reporting pain and anxiety, may have perceived their own pain and anxiety differently than their parents, although in this study only parent perception of the child’s pain and anxiety was measured. Furthermore, some variables were not controlled, such as age and maturity of the child, the ability of the child to respond to patient education or remember previous vaccinations, or the interventions instituted by parents before arriving at the clinic (i.e., administering a pain-reducing medication), which likely would affect their levels of anxiety regarding vaccination-associated pain. Moreover, the level of restraint used during injections differed between children. Although physical restraint during injections also may influence the perception of pain and anxiety, the level of restraint required for each child’s vaccination was not recorded.

FUTURE RESEARCH

A replication of this pilot study with a larger sample is needed to determine if statistically significance differences exist between treatment groups. While the researchers opted to exclude interventions that took an extended amount of time to take effect, such as EMLA cream, other quick and inexpensive methods to alter the perception of pain and anxiety should be further ex-

amined, such as placing an external thermomechanical stimulation device on the limb of the injection site. Thermomechanical stimulation devices, such as Buzzy (MMJ Labs, Atlanta, GA), simultaneously utilize several mechanisms for pain relief: the gate control theory, descending noxious inhibitory control, and distraction (Baxter, Cohen, McElvery, Lawson, & von Baeyer, 2011; Baxter, Leong, & Mathew, 2009). However, no studies are available for review addressing the anxiety among children regarding the device itself.

Many parents also stated that the child’s anxiety was reduced before and after the vaccination was administered if the child was watching a DVD movie. Because this intervention is perceived by parents as reducing the child’s anxiety, future research should be conducted specifically exploring a DVD distraction method’s effect on anxiety prior to vaccination. With a larger sample size, the DVD distraction method could prove to effectively reduce anxiety for pediatric patients in need of vaccinations.

Parents expressed the desire to choose the child’s intervention to reduce vaccine-induced pain and anxiety. It would be interesting to compare the research findings of this study with a similar study in which parents chose the child’s pain- and anxiety-reduction intervention. The perception of intervention effectiveness may be positively influenced if the parent feels empowered to make choices according to the child’s personality and needs.

Ideally, parents who purposefully delay childhood vaccinations because of vaccine-related pain and anxiety should be studied regarding pain- and anxiety-relieving interventions. However, in this pilot study, parents were not asked to reveal the reason their child was late for vaccinations until they were already enrolled as a participant. Therefore it is recommended that replication studies require parents to identify themselves as delaying vaccinations because of worry regarding the child’s pain or anxiety prior to enrollment. Only parents who delay childhood vaccinations because of negative pain and anxiety perceptions should be eligible for participation.

Furthermore, some of the pilot study questions did not yield helpful results, although it was anticipated a correlation could be identified between the parent’s perception of the child’s vaccine-related pain and anxiety and time since last vaccination, number of injections due, and description of why the parents were not on time for vaccinations, the data collected were not useful in this regard. As a result, we recommend that these items be removed from the questionnaire in future studies.

CONCLUSION

If distraction with a DVD movie or a vapocoolant spray successfully alters a parent’s perception of the pain and anxiety experienced during vaccinations, timely return

for future vaccinations may be fostered. Although no statistically significant results were found of the children randomly assigned to one of three groups, many parents still expressed the desire to have the same intervention on future vaccinations. Parents clearly preferred the ability to choose the pain- and anxiety-reducing intervention, rather than being randomly assigned to a group. Therefore it may be helpful to evaluate the child's level of anxiety regarding vaccinations and offer a variety of interventions from which parents can choose. Further research needs to be conducted to determine whether a difference in a parent's perception of their child's pain and anxiety occurs when the pain- or anxiety-reducing intervention can be selected.

... it may be helpful to evaluate the child's level of anxiety regarding vaccinations and offer a variety of interventions from which parents can choose.

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