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Preparing children for venepuncture. The effect of an integrated intervention on distress before and during venepuncture

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Summary

Venepuncture for routine blood sampling is a very distressing experience for a considerable number of children. Not only do they express high levels of distress during venepuncture but also in anticipation of the procedure. Therefore, prevention or reduction of distress should focus on both phases of the procedure. To this end, three preparation elements were combined: local anaesthesia of the skin, provision of sensory and procedural information, and involvement of the parent. In order to test the effect of this integrated procedure on the distress reactions of young children before as well as during venepuncture, 31 children were randomly assigned to one of two conditions: preparation or no preparation. Independent raters, who were blind to group assignments, scored segments of the videotaped behaviour of the children, according to the Groninger Distress Scale. Prepared children displayed significantly less distress before and during venepuncture than not-prepared children, regardless of their gender, ethnical origin, age, injection history, and the tension of their parent.

Keywords: anaesthetic cream, children, distress, injections, parents, venepuncture

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Introduction

Venepuncture for routine blood sampling is one of the most frequently applied medical procedures. Surveys show that more than 50% of children and adolescents who undergo the procedure experience moderate to severe levels of distress or pain (Fradet *et al.* 1990; Humphrey *et al.* 1992). These studies also show considerable anticipatory distress or anxiety. Children become frightened when they know or think that the venepuncture will hurt. Perceived or anticipated pain increases anxiety and anxiety lowers the pain threshold (Litt 1996). Younger children (less than 7 years) express more distress before and during venepuncture than older children (Fradet *et al.* 1990; Humphrey *et al.* 1992; Lander & Fowler-Kerry 1991), probably due to misconceptions and misattributions about the medical procedure. With respect to gender differences findings are inconclusive. In some studies (Fowler-Kerry & Lander 1991; Goodenough *et al.* 1999) girls have been found to experience more distress during venepuncture than boys do, whereas in others (Fradet *et al.* 1990; Humphrey *et al.* 1992) no gender differences in distress are reported. Culture or ethnicity possibly contribute to differences in distress reactions before and during venepuncture. However, their effect is hardly studied and consequently not well understood (McGrath 1995). Research on the influence of previous experience with needle procedures on distress during venepuncture is also inconclusive. For example, Fradet *et al.* (1990) report no effect of previous experience with needle procedures on distress, whereas the study of Frank *et al.* (1995) shows that the child's distress with prior medical and dental procedures is a significant predictor of child distress during immunization. In general, the issue of sensitization, habituation or no effect needs further investigation (Jay 1988). The relevance of the presence of a parent depends on the specific behaviours the parent displays (Blount *et al.* 1991). Parents can lower as well as heighten the distress of the child. Distress-promoting behaviour by the parent is a significant predictor of the child's distress (Frank *et al.* 1995). Anxious mothers seem to heighten the distress in their children, particularly with little previous experience of medical procedures on the part of the child. Children of fearful mothers are better off when their mother is absent, whereas children of non-fearful mothers are better off in the presence of their mother (Blount *et al.* 1991). Pain and anxiety are difficult to distinguish, particularly in acute clinical pain situations. 'It is more than simply pain, and might better be called distress. It is composed at its core of sensory pain experience plus momentary, situation-specific anxiety' (Litt 1996). With regard

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to the measurement of distress during routine procedures such as injections and venepunctures in children under 7 years observational scales are most reliable and preferred over self-reports of pain and anxiety (Jay 1988). Behavioural measures display appropriate age and situational change in short sharp pain (Fradet *et al.* 1990; McGrath 1995). The importance of the prevention of distress in children for medical procedures, especially when these procedures are painful or frightening, is generally acknowledged. Local anaesthesia of the skin can prevent or considerably alleviate the distress that children experience during venepuncture (see for a review Lee & Rubin 1993). The effect of local anaesthetic cream on pain is superior to the effect of placebo and distraction and particularly effective in younger children (4–6 years) (Arts *et al.* 1994). The effect of anaesthetic cream on anticipatory distress has hardly been studied. However, the placebo-controlled study of Young *et al.* (1996) clearly showed that anticipatory distress is not affected by local anaesthesia of the skin, whereas distress during venepuncture is. Therefore, as anaesthesia of the skin in itself does not reduce the often high levels of anticipatory distress an additional intervention integrated with an anaesthetic technique is required to alleviate distress not only during but also before venepuncture. The psychological interventions most suitable for chronically ill children frequently undergoing procedures like blood tests and treatment injections seem to be cognitive–behavioural techniques teaching children coping skills (Jay 1988; Varni *et al.* 1995). The psychological intervention typically used for less frequent procedures like venepuncture for routine blood sampling is preparation by giving information about the procedural as well as sensory aspects of the medical procedure. This preparation method is assumed to make the stress more predictable and thereby alleviating distress before and during the procedure (Jay 1988). Parental involvement, i.e. instructing and coaching, is considered to contribute to the effectiveness of the preparation, particularly in younger children (Blount *et al.* 1991; Manne *et al.* 1990). In addition, parent application of anaesthetic cream has been shown to be as effective as clinician application in reducing children's distress during venepuncture and may result in less anticipatory distress (Koh *et al.* 1999). The present study combined two preparation techniques: (1) local anaesthesia of the skin and (2) provision of sensory and procedural information. The parent applied both. In order to test the effect of this integrated procedure on the distress reactions of young children before as well as during venepuncture, 31 children were randomly assigned to one of two conditions: preparation or no preparation.

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Patients and methods

Participants

Thirty-one children together with one of their parents (mainly mothers) participated in the study. During a first visit to the outpatient department of the Slotervaart Hospital, Amsterdam the children were referred by a paediatrician or ear, nose and throat (ENT) specialist for venepuncture for routine blood sampling to the laboratory. None of the children received premedication before venepuncture. Children with a serious physical and/or mental handicap were excluded, as were parents and children who had an insufficient understanding of the Dutch language.

The preparation group consisted of 14 children (seven boys and seven girls) between 3 and 8 years old (mean = 5, SD = 1.52). Four of them were of Moroccan or Turkish extraction. The no-preparation group consisted of 17 children (nine boys and eight girls) between 3 and 8 years old (mean = 5.2, SD = 1.72). In this group six children were of Moroccan or Turkish extraction.

The ethical board of the hospital approved the study. Parents were informed in three ways: first, in general by the paediatrician or ENT specialist; second, more specifically in writing; and third, in detail by the experimenter who answered any questions. Informed consent was obtained from the parents.

Preparation

The anaesthetic cream used in this study contains a eutectic mixture of prilocaine (5% w/w) and l-menthol (1% w/w), that is mixed with a carbopol hydrogel (1% w/w), and is comparable to eutectic mixture of local anaesthetics (EMLA) (Nortier *et al.* 1995). The cream is applied to both forearms with an adhesive patch and requires penetration of at least 1 h to be effective.

Before applying the cream, the parent read to the child a short and simple story (available at request) about the effect of the cream and the sensations that go with it. Sometime during the penetration of the cream, the parent read to the child a short and simple story (available at request) containing information about the venepuncture, that outlines the steps of the procedure and the sensations the child can experience during these steps. Because one-third of the children was of Turkish or Moroccan extraction, the material needed for the preparation was translated and available in Turkish and Moroccan if the parent preferred this.

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Measure

Distress

Distress was measured by the Groninger Distress Scale (GDS) (Humphrey *et al.* 1992). The GDS is an observation scale designed to measure behavioural distress during short-term medical procedures. It is based upon the behavioural scale for distress of the Behavioural Approach/Avoidance and Distress Scale (Jay *et al.* 1987). The child's distress is rated on five levels: (1) calm, (2) timid/nervous, (3) serious distress but still under control, (4) severe distress with loss of control, (5) panic. Levels of 3 or greater are considered representing a high level of distress. Correlations between GDS scores and ratings by an instructed phlebotomist ($r = 0.87$, $P < 0.001$) and between GDS scores and scores on Visual Analogue Scales ($r = 0.49$, $P < 0.001$; $r = 0.57$, $P < 0.001$) are reported to support the validity of the instrument (Humphrey *et al.* 1992).

In this study, distress was assessed before venepuncture and during venepuncture. Distress before venepuncture was rated from the moment child and parent were seated and the procedure was unavoidable until just before the nurse announced the insertion of the needle (about 1 min). Distress during venepuncture was rated from the moment the nurse announced the insertion by counting to three until the needle was withdrawn from the blood vessel (about 40 s).

Five raters who were blind to group assignments were trained to use the GDS and to score segments of the videotaped behaviour of the children accordingly. Inter-rater agreement for distress before venepuncture ranged from $r = 0.66$ to $r = 0.80$ ($P < 0.001$). With respect to distress during venepuncture, correlations (r) ranged from 69 to 88 ($P < 0.001$). The scores of the five raters were averaged and resulted in a distress score before venepuncture and a distress score during venepuncture for each child.

Other variables

A short questionnaire was designed to assess the co-variates' age, gender, cultural background, parental tension, and injection history (previous needle procedures). Two questions checked whether the parent had prepared the child in the prescribed way and refrained from other preparation methods (manipulation check). The lab assistant was asked to indicate the difficulty of the puncture on a five-point Likert scale: very easy, easy, normal, difficult, very difficult.

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Procedure

After informed consent was obtained from the parents, the children were alternately assigned to either the no-preparation group (venepuncture only) or the preparation group (preparation followed by venepuncture), and then immediately tested accordingly.

In the no-preparation group child and parent were brought to the examination room and injected right away. In the preparation group parents received oral and written instructions on how to apply the anaesthetic cream and prepare the child. The parents were specifically requested to prepare their child in the prescribed way and to refrain from other preparation methods. They could stay in the waiting room and/or walk around. After about 1 h, parent and child were brought from the waiting room into the examination room where the cream was removed and the venepuncture took place.

Before and during venepuncture the behaviour of the children in both groups was videotaped by the experimenter for later behavioural coding. To minimize the distracting effect of the presence of other patients, the blood draw took place in a separate room. Before and during the venepuncture the child sat on the parent's lap. If the child showed physical resistance, the parent or a second lab assistant was asked to physically restrain the child.

All children were injected by one of the three lab assistants that participated. The lab assistant was kindly requested to treat and inject all children in the same way and to avoid reassuring talk.

After venepuncture, the parent completed the questionnaire and the lab assistant rated the difficulty of the venepuncture, while the experimenter informally asked the child about what it had experienced.

Results

The scores of all the 31 children participating in the study could be used for the statistical analysis. The prepared and not-prepared children were comparable in gender, age, ethnical extraction, injection history, and tension of the parent during the venepuncture. The children in both groups were similar with respect to the difficulty of the venepuncture (Table 1). The parents of all the children in the prepared group followed the instructions for preparation. In general, the reactions of the children revealed that they had understood well the stories told by their mother. They could tell what was going to happen and asked questions accordingly (manipulation check).

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Table 1 Sociodemographic and clinical characteristics of study groups

	Prepared children	Not-prepared children
Male	7	9
Female	7	8
Ethnical extraction:		
Dutch	10	11
Moroccan/Turkish	4	6
Age (mean(SD))	5.0 (1.5)	5.2 (1.7)
Injection history:		
First time	3	4
Second time or more	11	13
Parent tense	6	4
Parent not tense	8	13
Difficulty of injection:		
Very easy/easy	9	12
Normal	4	4
Difficult/very difficult	1	1

Table 2 Mean and standard deviations of distress before and during venepuncture of prepared and not-prepared children

	Before venepuncture	During venepuncture
Prepared	1.90 (0.89)	1.84 (0.67)
Not prepared	2.64 (1.18)	2.98 (1.29)

Prepared children exhibited less distress (mean = 1.85, SD = 0.69) than not-prepared children (mean = 2.80, SD = 1.21). Before venepuncture one of the children (7%) in the prepared group and seven of the children (41%) in the not-prepared group showed a high level of distress (a score of 3–5). During venepuncture, two of the children (14%) in the prepared group and nine of the children (53%) in the not-prepared group showed a high level of distress.

As expected, prepared children showed less distress than not-prepared children before as well as during venepuncture (Table 2). An analysis of variance (ANOVA) with repeated measures was conducted to ascertain the differences between the prepared and the not-prepared group. The degree of child distress was significantly different among the two groups ($F(1,29) = 6.76$, $P = 0.01$). The results showed no significant difference between distress-scores *before* and *during* venepuncture ($F(1,29) = 1.02$, $P = 0.32$). In addition, no

interaction effect was found between preparation and before/during ($F(1,29) = 3.97$, $P = 0.06$).

Analyses of covariance (ANCOVA) were conducted to control for the influence of gender, ethnical origin, age, injection history, and parental tension. Results show a robust main effect of preparation. Irrespective of differences in gender, ethnical origin, age, injection history and parental tension prepared children show significant lower distress than not-prepared children did.

Discussion

The results of this study demonstrate that a combination of local anaesthesia of the skin and provision of sensory and procedural information, both applied by the parent, can indeed reduce and prevent distress reactions of young children, not only during venepuncture but also before. Prepared children displayed less distress than not-prepared children, regardless of their gender, ethnical origin, age, injection history, and the tension of their parent. The children seemed to benefit from this integrated preparation method. Therefore, it is suggested that the development of preparation methods and research into the effectiveness of these methods should take account of phases of the medical procedure and explicitly distinguish between them.

Implementation of the tested preparation method as a standard procedure for routine venepunctures would have a definite practical advantage over regular methods. As the parents proved to be willing and able to prepare their children in the prescribed way, there seems to be no need to take up valuable time of the hospital staff.

In our study, differences in distress can be attributed to anaesthesia of the skin, sensory and procedural information, and parental involvement. However, it is still possible that the children developed positive expectations about the efficacy of the anaesthetic cream and therefore experienced less anticipatory distress although this would be contrary to the disbelief of the children in the intervention group.

Neither our study nor any adequate study we know of does allow an estimation of the relative contribution of the three possibly effective elements of our intervention. That would require testing the integrated intervention against sensory and procedural information alone, against parental involvement alone, and against anaesthesia of the skin alone in one study. Unfortunately, this was not feasible at the time. As we argued earlier, we would expect a relatively prominent role of anaesthesia of the skin during venepuncture, whereas before

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venepuncture sensory and procedural information would be most effective in reducing distress.

Additional research could focus on a more comprehensive design and include more subjects. Such research could also confirm the influence of variables like gender, ethnical origin, age, injection history and the tension of their parent.

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