Reaction of 5 and 6 year olds to Dental Injection after Viewing the Needle: pilot study

G.M. Maragakis* / R.J. Musselman** / C.C. Ho***

The aim was to evaluate the practice of hiding the needle prior to dental anesthesia administration to children. Fourteen 5 and 6 year olds received dental treatment in two sessions. The needle was shown in one session and hidden in the other. Eleven children were cooperative and 3 uncooperative irrespective of approach. The children's behavior correlated with fears expressed by the mothers. Our initial findings do not support the practice of hiding the needle.
J Clin Pediatr Dent 31(1):28-31, 2006

Downloaded from http://meridian.allenpress.com/jcpd/article-pdf/31/1/28/1749473/jcpd_31_1_g6q6q8j067755071.pdf by Bharati Vidyapeeth Dental College & Hospital user on 25 June 2022

INTRODUCTION

Addelston[1] introduced the Tell-Show-Do technique as the primary method of reducing the natural fears of the child dental patient. The goal was to help children of all ages and all stages of psychological development, to overcome their natural fear of the unknown by telling and showing the child the key parts of the dental experience.

Pediatric dentistry texts[2-5] recommend showing instruments to children, including sharp ones, such as the explorer, before using them and explaining to the child how they will feel. Yet, they recommend hiding the needle, or, if unavoidable, that the dentist show the syringe with the needle capped. The dentist should not even use the word "needle".[2]

The opposite suggestion was made by Glassman,[6] who recommended showing the needle to fearful patients, though not specifically children, in the final steps of a scheduled desensitization process. Duff[7] recommends showing the needle to the child prior to anesthesia. "Allowing the young patient to hold the needle, explore it and experience a feeling other than anxiety with regard to it, such as curiosity and relaxation, can be highly therapeutic".[8] If not shown the needle, the child may imagine a needle that is much larger and more painful than it actually is. Wollin *et al.*[9] reported that parents felt that the physician's explanations help reduce the child's fear of treatment.

This pilot study compares children's reaction to two techniques: one in which the dentist does not show the child the needle and one in which the dentist shows the child the needle prior to local anesthetic administration. It aims at investigating the validity of researching further in the essentially empirical pediatric dental practice of routinely hiding the needle when administering local anesthesia.

METHODS

We obtained ethical authorization from the Institutional Review Board at Louisiana State University Health Sciences Center. We selected 14 English-speaking 5-6 year-old children – 6 boys and 8 girls – without any dental injection experience from the new patients seeking treatment at the LSU School of Dentistry department of Pediatric Dentistry. They all needed treatment requiring the same type (maxillary infiltration or mandibular block) of local anesthesia for each child in two sessions. No children with a mental handicap or a hearing or eyesight impairment that might interfere with their understanding of explanations were included in the sample. Selection was performed randomly: from the new patients seeking treatment in our clinic, those fulfilling the inclusion criteria were in sequence included in the sample after explaining the study to each mother and obtaining her consent for her child's participation. We asked her not to tell her child that the child would be participating in a study or that we would videotape the procedures. In the first visit, we gave the child a complete dental examination, a toothbrush prophylaxis, and topical fluoride treatment.

We made a brief assessment of each mother's attitudes toward dentistry and disciplining her child. Each mother received a questionnaire[10] on her assessment of her own dental experience, dental and other fears, methods of disciplining her child, her child's personality, nervous habits, and medical experience.

We developed a script for each approach – showing and hiding the needle – to explain to each child the needle and the injection procedure. These were practiced for 3 months prior to the investigation. We divided our sample in two groups of 7 children (3 boys and 4 girls). Each child was treated in two sessions one week apart. With one group, we showed the needle in the second session and with the other, we showed it in the first session. Group allocation was performed at the time of inclusion in the study: Children of each gender were in sequence of arrival to our clinic included in the study and allocated to a group (the first boy would be shown the needle in the first session, the second boy in the second session, etc.).

*G.M. Maragakis, DDS, PhD, Department of Pediatric Dentistry, Louisiana State University School of Dentistry
**R.J. Musselman, DDS, MSD, Department of Pediatric Dentistry, Louisiana State University School of Dentistry
***C.C. Ho, PhD, Department of Pediatric Dentistry, Louisiana State University School of Dentistry

Send all correspondence to: Dr. George M. Maragakis, 31 Vournazou Street, 11521 Athens, Greece

TELEPHONE: +30-6948-520123
FAX:+30-210-6983429
E-MAIL: g_marag@hotmail.com

When hiding the needle, we followed the principles described by Spedding and Mink.[11] We told the child that we would put his tooth to sleep, but he would stay awake, and that it might feel like a little pinch. The syringe did not enter the child's field of vision at any point before, during, or after local anesthetic administration.

When showing the needle, in addition to the above, we asked the child to help by holding the syringe, and then the dentist assembled the syringe, anesthetic cartridge, and needle while the child watched.

The same pediatric dentist provided all explanations, injections and treatment, aided by the same dental assistant during both sessions with each child. We performed all procedures in the Quiet Room of the LSUSD Pediatric Dentistry Clinic, where inconspicuous videotaping equipment is installed. The mothers were present during both sessions. The children were not told that we were videotaping them and we did nothing to alert them to that videotaping would begin. We videotaped from the start of the script to the moment the syringe was returned to the assistant. A child psychologist viewed the tapes to determine variation in following the script and adequacy of information for the children's behavior to be rated on the Frankl scale.[12] Sessions, in which the operator had varied from the respective script, were removed from the investigation along with the other session of the same child. The same was done for sessions in which the information recorded on the tape was inadequate (poor sound, picture, field of view) for behavior rating.

We edited the tapes to remove the scripts and randomly combined the injections on one videotape. Two pediatric dentists, unaware of the technique used but familiar with the Frankl scale as employed for many years in a standardized manner in the LSU Pediatric Dentistry Clinic, viewed the tape independently and rated the children's behavior on a modified Frankl scale (table 1). Each one rated each child's behavior twice, one week apart.

Using a chi•square analysis, we compared the responses to the children's behavior to assess if a correlation existed. We used the Wilcoxon test for the two-way crossover design[13] to determine the difference in the children's behavior in the two sessions. We performed the analysis using the four possible ratings. We then grouped the ratings according to cooperative (3 or 4) or uncooperative (1 or 2) behavior and repeated the analysis.

Table 1. Modified Frankl scale

Behavior	Rating	Description
Definitely Negative	1	refusal of anesthesia administration, crying forcefully, fearful, or any other overt evidence of extreme negativism
Negative	2	reluctant to accept anesthesia administration, uncooperative, some evidence of negative attitude but not pronounced, i.e. sullen, withdrawn
Positive	3	acceptance of anesthesia administration, at times cautious, willingness to comply with the dentist, at times with reservation but patient follows the dentist's directions cooperatively
Definitely Positive	4	good rapport with the dentist, interested in the dental procedures, laughing and enjoying the situation

Table 2. Behavior ratings per child, approach, approach sequence and observer

Approach Sequence	Child	Frankl Rating Observer 1		Frankl Rating Observer 2	
		Needle Shown	Needle Hidden	Needle Shown	Needle Hidden
Showed Needle in 1st Session	1	3	3	4	3
	2	1	1	1	1
	3	3	3	4	4
	4	3	3	4	4
	5	3	3	4	4
	6	3	3	4	4
	7	3	3	4	4
Showed Needle in 2nd Session	8	3	3	4	4
	9	2	2	2	2
	10	3	3	3	3
	11	2	2	2	2
	12	3	3	4	4
	13	3	3	4	4
	14	3	3	4	4

RESULTS

The child psychologist verified that in all 28 sessions the investigator followed the respective scripts and the tape contained adequate information to rate the children's behavior on the Frankl scale.

Both pediatric dentists rated the behavior of the same 11 children (79%) as cooperative (3 or 4) and the behavior of the same 3 children (21%) as uncooperative (1 or 2) in both treatment sessions of each child. Inter-observer agreement was 100% for the sessions in which the behavior was rated as 1 or 2. In the appointments in which it was rated as 3 or 4, one observer gave 11 children a rating of 3 in both sessions. The other observer gave 2 children a rating of 3 and 9 children a rating of 4 in the session that the needle was hidden and 1 child a rating of 3 and 10 children a rating of 4 in the session that it was shown. In all instances both observers agreed on which children were cooperative (3 or 4) and which were uncooperative (1 or 2) (table 2). Intra-observer agreement was 100%.

We found no statistically significant correlation between the children's behavior and showing or hiding the needle or the order in which we employed the two techniques. This applies to performing the analysis both using the four possible ratings and after grouping the sessions by cooperative (3 or 4) or uncooperative (1 or 2) behavior.

Thirteen of the 14 mothers (93%) returned the questionnaire (table 3). The chi•square analysis showed that mothers of uncooperative children were more likely to report fear of dentistry (100% vs. 52%, p=0.03) and other fears (65% vs. 30%, p=0.01).

Mothers of uncooperative children were more likely to report their children's initial response to a new situation to be approach rather than withdrawal (p=0.01). They were also more likely to report that their children had been afraid of going to the dentist (p=0.04) and had expressed an exceptionally high level of fear toward a specific dental procedure (p=0.00).

We found no statistically significant correlation between behavior and mother's perception of how easily the child complains about things that annoy him, the child's injection experience with physicians or nurses, and the child's experience of pain from his teeth. Boys' mothers were more likely to report fear of dentistry (p=0.02), fear other than fear of dentistry (p=0.00) and that their sons had experienced pain from their teeth (p=0.00). Girls' mothers were more likely to report that their daughters had had a painful experience from injections by physicians or nurses (p=0.00) and that they had expressed an exceptionally high level of fear toward a specific

Downloaded from http://meridian.allenpress.com/jcpd/article-pdf/31/1/28/1749473/jcpd_31_1_g6q6q80j067755071.pdf by Bharati Vidyapeeth Dental College & Hospital user on 25 June 2022

Table 3. Mothers' responses to the questionnaire

QUESTIONS	RESPONSES	n
How would you describe your fear of going to the dentist?	Very afraid	0
	Afraid	0
	A little afraid	9
	Not afraid at all	4
Do you have any other fears (except going to the dentist)?	Yes	5
	No	8
If yes, which?	physicians:	1
	h eights/snakes:	4
Have you ever used a dental visit as a threat of punishment of your child?	Yes	1
	No	12
Do you think your child has discipline problems at home or at school?	Yes	0
	No	13
Describe, please, your child's initial response to a new situation.	Approach	10
	Withdrawal	3
How easily does your child complain about things that annoy him/her?	Easily	5
	Things have to be serious	8
Does your child have any nervous habits?	Thumb sucking	1
	Nail biting	1
	Tooth grinding	0
	Shaking knee while seated	0
	Other (chewing things)	1
	None	10
How would you describe your child's previous experience with injections by physicians or nurses?	Very painful	1
	Uncomfortable	5
	Good	5
	Excellent	2
Has your child ever been to the dentist before?	Yes	0
	No	13
If yes, how would you rate his/her previous dental experience?	Very painful	-
	Uncomfortable	-
	Good	-
	Excellent	-
Has your child ever experienced pain from his/her teeth?	Yes	4
	No	9
Is your child afraid of going to the dentist?	Very afraid	0
	Afraid	2
	A little afraid	3
	Not afraid at all	8
Has your child ever expressed an exceptionally high level of fear toward a specific dental procedure?	Yes	4
	No	9
	If yes, which? injection:	3
	rubber dam:	1

dental procedure (p=0.02).

We found no statistically significant correlation between the child's gender and the mother's perception of the child's initial response to a new situation, the ease with which the child complained about things that annoyed him and the child's nervous habits.

DISCUSSION

We found the same 11 children (79%) to be cooperative and the same 3 (21%) to be uncooperative irrespective of seeing the needle. Baier *et al.*[14] found 21% of 1-13 year-olds to be uncooperative. Holst & Crossner[15] found 79% of 3-16 year-olds to be cooperative and 8% uncooperative to the point of restraint or delay being necessary to complete the treatment. Incidence of fear of dentistry ranges between 3% and 20% in child and adolescent groups.[14-17] Older children tend to be less fearful.[18] Our findings are in line with these reports, allowing for age differences and that dental fear may not be the only cause of uncooperative behavior.

The two observers completely agreed on which children were cooperative and which were uncooperative. There was a difference in the awarding of the "perfect score" (4) which was given to several children by one observer and to none of the children by the other. The explanation given by the "strict" observer was that he did not see any of the children to be actually "enjoying the situation". This demonstrates the limitations of the Frankl scale in terms of sensitivity. However, since there was only one child that received a different rating in its two sessions – both in the "cooperative" range: 3 and 4 – by only one of the observers, these limitations did not significantly affect the outcome of this investigation. Still, in a follow-up study, besides a larger sample, it would be advisable to use a more sensitive behavior scale.

We based the questionnaire on reports that dental anxiety in children might be due to maternal anxiety, family and peer influences, personality and psychological development, and previous painful medical and dental experience.[18-20] Studying mainly adult populations, Milgrom, Fiset, Melrick & Weinstein[21] found that 66% of people with high dental fear acquired it during their preadolescent life. Examining the influence of Rachman's three pathways to fear[22], Townend, Dimigen & Fung[23] found that, with respect to dental fear in children, the most influential was the conditioning pathway, less so the modeling pathway, while the information pathway was of minor importance. Broome and Endsley[24], studying the effects of childrearing practices on young children's responses to an injection, found that children whose mothers reported high levels of control and warmth in their relationship (authoritative) were significantly less distressed at immunization than children of low control/high warmth (permissive), high control/low warmth (authoritarian) or low control/low warmth (non-responsive) parents.

In this study, children, whose mothers reported fear of dentistry, tended to be uncooperative. Without previous dental injection experience, the "fantasy" about the needle may have been worse than the needle itself. The family attitude may be the critical factor in how the child behaves whether he sees the needle or not. When we showed the needle to the child, we called it a "hollow tube" rather than a "needle," possibly dissociating the dental needle from the vague impression the child may have had of a threatening instrument.

It was interesting to note that no children reacted negatively or gave any signs of fear seeing the needle or actually holding the syringe with the needle, even though their behavior during the administration of anesthesia varied. Needle fear does not always rank highly in children's fears. The 8 most frequently reported fear-inducing stimuli for children are inability to breathe, burglar breaking into the house, fire or burns, bombing attacks, death or dead people, getting hit by a car, looking foolish, and getting poor grades.[25] However, Milgrom, Mancl, King & Weinstein[16] found fear of injections to rank second (after "a stranger touching you") in fears of 5-11 year-olds. Peretz & Efrat[26] found feeling and seeing the needle to

Downloaded from http://meridian.allenpress.com/jcpd/article-pdf/31/1/28/1749473/jcpd_31_1_g6q6q80j067755071.pdf by Bharati Vidyapeeth Dental College & Hospital user on 25 June 2022

rank highest in the reported dental fears of 12-18 year-olds.

In conclusion, showing or hiding the needle prior to the administration of local anesthesia did not affect the behavior of the children in our sample. The children who were cooperative when the needle was hidden were also cooperative when the needle was shown, irrespective of the order in which the two techniques were employed. Certain familial attitudes, such as the mother's fear of dentistry and other fears correlated with the children's behavior during the administration of local anesthesia.

Our results do not support the empirical practice of hiding the needle prior to the administration of local anesthesia. However, the size of our sample does not allow one, at this point, to consider our initial findings directly applicable to the general population of 5 and 6 year-olds. It does allow one, though, to question validly the necessity of hiding the needle in pediatric dentistry and will, hopefully, stimulate more research into this issue. Further research into this should employ larger samples of a wider age spectrum, and, perhaps, a more sensitive behavior rating scale than the 4-level Frankl scale, that would allow smaller behavior differences to show.

REFERENCES

1. Addelston H.K. Child patient training. Fortn Rev Chic Dent Soc 38: 7-9 & 27-29, 1959.
2. Johnsen D. Managing the patient and parents in dental practice. In: Wei SHY (ed) Pediatric Dentistry. Total patient care. Philadelphia: Lea & Febiger, 140-155, 1988.
3. Wright G.Z. Non-pharmacological management of children's behavior. In: McDonald R.E, Avery D.R. & Dean J.A. (eds) Dentistry for the Child and Adolescent, 8th edn. St. Louis: C.V. Mosby Co, 33-49, 2004.
4. McDonald R.E., Avery D.R., Dean J.A. Local anesthesia and pain control for the child and adolescent. In: McDonald R.E., Avery D.R. & Dean J.A. (eds) Dentistry for the Child and Adolescent, 8th edn. St. Louis: C.V. Mosby Co, 270-284, 2004.
5. Pinkham J.R. Patient management. In: Pinkham J.R., Casamassimo P.S., Fields H.W., McTigue D.J., Nowak A.J. (eds) Pediatric Dentistry: Infancy through Adolescence, 4th edn. St. Louis: Elsevier Saunders, 394-413, 2005.
6. Glassman P., Peltier B. Guidelines for the administration of local anes thesia in fearful dental patients. J Calif Dent Assoc 23: 23-26, 1995.
7. Duff A.J.A. Incorporating psychological approaches into routine paediaric venepuncture. Arch Dis Child 88: 931-937, 2003.
8. Kellerman J. Helping the Fearful Child. New York: Warner Books, 111-133, 1981.
9. Wollin S.R., Plummer J.L., Owen H., Hawkins R.M.F., Materazzo F., Morrison V. Anxiety in children having elective surgery. J Pediatr Nurs 19: 128-132, 2004.
10. Chess S. Know Your Child. New York: Basic Books Inc, 28-30, 1987.
11. Spedding R.H., Mink J.R. An approach to the injection procedure for the child patient. J N J State Dent Soc 35: 161-168, 1964.
12. Frankl S.N., Shiere F.R., Fogele H.R. Should the parent remain with the child in the dental operatory? J Dent Child 29: 150-163, 1962.
13. Koch G.G. The use of non-parametric methods in the statistical analysis of the two-period change-over design. Biometrics 28: 577-584, 1972.
14. Baier K., Milgrom P., Russell S., Mancl L., Yoshida T. Children's fear and behavior in private pediatric dentistry practices. Pediatr Dent 26: 316-321, 2004.
15. Holst A., Crossner C.G. Direct ratings of acceptance of dental treatment in Swedish children. Community Dent Oral Epidemiol 15: 258-263, 1987.
16. Milgrom P., Mancl L., King B., Weinstein P. Origins of childhood dental fear. Behav Res Ther 33: 313-319, 1995.
17. Ten Berge M., Veerkamp J.S.L., Hoogstraten J., Prins P.J.M. Child dental fear in the Netherlands: prevalence and normative data. Community Dent Oral Epidemiol 30: 101-107, 2002.
18. Klingberg G., Berggren U., Noren J.G. Dental fear in an urban Swedish child population: prevalence and concomitant factors. Community Dent Health 11: 208-214, 1994.
19. Freeman R.E. Dental anxiety: a multifactorial aetiology. Br Dent J 159: 406-408, 1985.
20. Bedi R., Sutcliffe P., Donnan P.T., McConnachie J. The prevalence of dental anxiety in a group of 13- and 14-year old Scottish children. Int J Paediatr Dent 2: 17-24, 1992.
21. Milgrom P., Fiset L., Melrick S., Weinstein P. The prevalence and practice management consequences of dental fear in a major U.S. city. J Am Dent Assoc 116: 641-647, 1988.
22. Rachman S. The conditioning theory of fear acquisition: a critical examination. Behav Res Ther 15: 375-387, 1977.
23. Townend E., Dimigen G., Fung D. A clinical study of child dental anxiety. Behav Res Ther 38: 31-46, 2000.
24. Broome M.E., Endsley R.C. Maternal presence, childrearing practices and children's response to an injection. Res Nurs Health 12: 229-235, 1989.
25. Ollendick T.H., Matson J.L., Helsel W.J. Fears in children and adoles cents: normative data. Behav Res Ther 23: 465-467, 1985.
26. Peretz B., Efrat J. Dental anxiety among young adolescent patients in Israel. Int J Paediatr Dent 10: 126-132, 2000.

Downloaded from http://meridian.allenpress.com/jcpd/article-pdf/31/1/28/1749473/jcpd_31_1_g6q6q80j067755071.pdf by Bharati Vidyapeeth Dental College & Hospital user on 25 June 2022