

Relative efficacy of Tell-Show-Do and live modeling techniques on suburban Indian children during dental treatment based on heart rate values: a clinical study

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Abstract

Aim: This study aims at evaluating the relative efficacy of the Tell-Show-Do and Live Modeling techniques on suburban Indian children during dental treatment based on the heart rate values.

Materials & Methods: Children aged between 5 to 11 years were randomly divided into three groups as: *GROUP A:* Children who were presented with the Tell-Show-Do technique to undergo dental treatment. *GROUP B:* Children who were presented with Live Modeling technique, with mother as the live model. *GROUP C:* Children who were presented with Live Modeling technique, with father as the live model. A digital fingertip pulse oximeter was attached to the index finger of child's left hand, in order to record heart rate values at a 30-second interval over a total of 11 data points.

Results: Forty five of the forty six participants completed the entire protocol and participated in the study in three equal groups. Average heart rate over the entire treatment session was significantly lower among children in group B than among those in group A and group C at $p < 0.01$.

Conclusion: Live Modeling is a tangible technique in clinical pediatric dentistry as is supported by findings in other relevant fields also. Additionally, application of technique would require necessary skills, organized approach and innovation.

Keywords: Behavior Management Techniques, Pulse Oximetry, Heart Rate.

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Introduction

Visit to a dental operatory can noticeably mete out primal feelings of anxiety or fear in an apprehensive child. Prevalence of child dental anxiety has been estimated to range anywhere from 3% to 20%¹. Such kind of foreseeable emotional response may lead to compromised quality of care rendered and it is no longer, a bolt from the blue, that, the dental clinic is a place many children would like to circumvent.^{2,3} A pediatric dentist attending the aforesaid strata of patients, visiting for the first time, has distinctively clear options varying from pharmacological to non-pharmacological techniques of behavior management. In the past few consensus meetings, the American Association of Pediatric Dentistry (AAPD) panel has agreed upon the fact, that although there is an abundant data on pharmacological approaches, yet paucity exists in literature on communicative and non-pharmacological techniques of behavior guidance, necessitating for more need based research in latter's domain.⁴ Among various non-pharmacological techniques, Tell-Show-Do or Explain-Show-Do⁵, remains the most widely practiced by pediatric

dentists.⁶ Another technique, rather a lesser known one, Live Modeling, gained enthusiastic interest amongst advocates of non-pharmacological behavior modification during the late twentieth century when Bandura defined it, as, learning resulting from the observation of a model.⁷ Despite the fact that Live Modeling received an encouraging reception from dentistry, it did not evolve much to its caliber as it has been in fields of applied behavior analysis (including specific fears, social withdrawals and language deficits)⁸, Pediatrics⁹ and sports¹⁰. Therefore, to supplement the existing data on non-pharmacological techniques of behavior guidance globally and paralleling with the AAPD's school of thought, we undertook this clinical study to compare the effects of Tell-Show-Do and Live Modeling techniques on suburban Indian children, based on their heart rate measurements.

Materials and Methods

Complying with the ethical standards of the responsible committee on human experimentation of the institute, the study was conducted at the department of Pediatric and Preventive Dentistry of Himachal Dental College and Hospital, Sundernagar, Himachal Pradesh, a tertiary oral health care institution, drawing footfall from more than five districts of Himachal Pradesh, India.

Inclusion criteria: Children reporting for the first time accompanied by both the parents to the department of

Pediatric and Preventive Dentistry were included in the study. Other criteria included a non-contributory medical history of the child and parents, with optimum physical, as well as, mental faculties to serve as a model.

Children posing with language, learning and behavioral barriers were excluded from the study. Also, the subjects were free at their will to surrender at any stage of progression of the study.

The nature and purpose of the study were explained to parents in detail. A written informed consent was then obtained. Following this, the parents were asked to fill a self-administered questionnaire which included demographic data, educational level of parents, previous objective and subjective experiences of the child in a medical setting, if any.

Subjects, Setting and Design of Study: The study sample comprised of children aged between 5 to 11 years who were randomly divided into three groups in the following criteria:

GROUP A: It consisted of children who were presented with the Tell-Show-Do approach and subsequently undergoing dental treatment.

GROUP B: It consisted of children who were presented with Live Modeling approach, with mother as a live model and subsequently undergoing dental treatment.

GROUP C: It consisted of children who were presented with Live Modeling approach, with father as a live model and subsequently undergoing dental treatment.

Data collection: The procedure for data collection was a modified version of the one outlined by Faraht-McHayleh et al.¹¹ A digital fingertip pulse oximeter was attached to the index finger of child's left hand to record heart rate values over the entire treatment period. The child's hand was gently stabilized by a dental assistant to avoid ambiguous reading, owing to even the slightest movement of the hand. The child was verbally reinforced to avoid any voluntary movement, until necessary. For group A, the dentist, demonstrated the child with the Tell-Show-Do technique. He was consistently encouraged to raise questions about what was the equipment around him and how it worked. Once the technique was instituted, the child underwent the dental procedure with simultaneous recording of heart rate. For group B, dental examination of the mother was performed and the child actively watched the procedure. The child then underwent the dental procedure with simultaneous recording of the heart rate. For group C, dental examination of the father was

performed and the child actively watched the procedure. The child then underwent the dental procedure with simultaneous recording of the heart rate. The same dentist performed the identical treatment which included screening (oral soft-tissue examination) and oral prophylaxis on all the subjects of the study. Concurrently, the data appearing on the pulse oximeter screen was duplicated into the child's case sheet at 30-second intervals over a total of 11 data entry points, by the same dental assistant.

Time span of each trial: The total duration of each trial lasted for 13.00 minutes, which was subdivided into the following schedule:

- a. 1.30 minutes: for familiarizing the child with the staff and the dentist.
- b. 2.30 minutes: for attaching and stabilizing the pulse oximeter.
- c. 4.00 minutes: for psychological preparation of the child employing tell-show-do/Live Modeling technique.
- d. 5.00 minutes: for completion of dental treatment (including screening followed by oral prophylaxis).

Data analysis: Data was analyzed using SPSS for windows release 17.0 (SPSS, Chicago, IL, USA). The three groups were compared by Analysis of Variance (ANOVA). Tukey's HSD (Honestly Significant Difference) test was used for multiple pair wise comparisons between the groups.

Results

Forty five (45) of the forty six participants completed the entire protocol (one subject dropped out) and participated in the full duration of study: fifteen (15) in group A, fifteen (15) in group B and fifteen (15) in group C. Oral screening and prophylaxis was completed for each group. Average heart rate over the entire treatment period was significantly lower ($p=0.05$) among children in group B (Live Modeling by mother) than among those in group A (Tell-Show-Do method) and group C (Live Modeling by father). The difference between group mean heart rates was 6.50 beats/min between group A and B, 5.19 beats/min between group B and group C and 1.36 beats/min between group A and group C. This difference was even more highlighted when oral prophylaxis was performed (which involved use of piezoelectric scaler). The heart rate measurements for this particular period are represented from data points E6 to E11 (Table 1 and Graph 1).

Table 1: Intergroup comparison of difference between mean heart rates (beats per minute) at data entry point (E) from 0(E1) to 300(E11) seconds at 30 second interval between Group A, Group B and Group C

Heart rate measurement	Comparison of study group	Difference between group mean heart rates (beats/min)
Mean E1-E5	Group A vs Group B	-2.8400
	Group A vs Group C	-5.6800
	Group B vs Group C	-2.8600
Mean E6-E11	Group A vs Group B	-7.9000
	Group A vs Group C	-10.0667*
	Group B vs Group C	-2.1667
Mean E1-E11	Group A vs Group B	-5.1900
	Group A vs Group C	-6.5000*
	Group B vs Group C	-1.3600

Graph 1: Mean heart rates (beats per minute) (X-axis) for each group at 30 second time interval (Y-axis) over a period of 5 minutes

Discussion

Of particular interest in this study was comparing relative efficacy of Tell-Show-Do and Live Modeling techniques of behavior management by analyzing the physiologic response of child in terms of heart beat variations given that any alteration in heart rate corresponds with a change in level of anxiety.¹² The results of the study indicate that children who were 'pre exposed' to Live Modeling, with mother as a live model (Group B) elicited lowest spikes in heart rate values as compared to children who watched father as live model (Group C) and those who were instituted Tell-Show-Do technique (Group A) as a pre-treatment modality. The peak heart rate values in descending order were: 105.9 beats per minute for Tell-Show-Do at 300 second Data Entry point E11, 102.3 beats per minute for father as live model at 60 second, data entry point E3 and 99.2 beats per minute for mother as live model at 0 second, data entry point E1. The results are discussed in following context. Tell-Show-Do (TSD) technique was first described by Addleston in 1959.¹³ The technique incorporates verbal explanations of procedures in a

jargon appropriate to the developmental level of child (Tell); demonstrations for the patient of the sensory aspects of the procedure in a neatly defined, cordial setting (Show); and then, replicating the procedure in real time (Do).¹⁴ The treatment must be performed immediately without delays as recommended by Kriences¹⁵, which was followed in the present study as 4 minutes TSD application time was immediately followed by 5 minutes of treatment session. The ease of application and non-aversive nature puts TSD on top of the universally practiced techniques by dentists.¹⁶ However, an active involvement of parent in effective behavior guidance has been a focus of exploration since parents can also play an important part in reducing a child's anxiety and allowing the dentist to form a treatment coalition.¹⁷ Parental influences can play a crucial role in how a child copes with the stresses and stimuli of dental treatment.¹⁸ Modeling, a derivative of social learning theory, is a method in which a child observes behavior exhibited by another person – the model – that potentiates the probability of the child adopting the observed behavior.¹⁹ According to Faye,

this approach also has the advantage that the behavior exhibited by the model is entirely predictable and the dentist must assert his acumen to bring the desired results while choosing a model.²⁰ Compiling above stated observations, the role of parents as live models was included in the study. The difference between group mean heart rates (beats per minute) was higher between Group A and Group C along the complete course of treatment (data entry point E1 to E11), which was statistically significant, (-6.5000, $p < 0.01$) compared to Group A and Group B (-5.1900), and Group B and Group C (-1.3600). The results are comparable to the pioneer work done in Lebanon by Faraht-McHayleh et al, in which Live Modeling was inferred better as compared to TSD. In the present study also, mother as live models were favored more compared to TSD. A possible explanation for this can be the positive influence of mother's behavior on child while he/she actively gains motivation from mother while watching her being examined by dentist, in an apparent role of a live model. The reproducibility of Live Modeling has been further documented by Roberts et al.²¹ Also, the results during data entry points E6-E11, were statistically significant, between Group A and Group C (10.0667, $p < 0.01$). This period corresponded with use of ultrasonic equipment for oral prophylaxis, consequently being the most stressful phase; reflecting in the results markedly. A study conducted by Alrshah et al comparing Live Modeling and TSD found the former to be more effective and validates annotations of the current study.²² A more vigorous analysis of confounding variables like, age, gender, level of education of child and usage of live models apart from parents can be deemed as limitations of the present study and investigating their co-relations could be an area of future research, which were not recorded in the present study. The present study was also done on suburban Indian population, which can be expanded to rural as well as urban areas for broader understanding of the topic.

Conclusion

Based on methodology and criteria of the study, it can be concluded that:

1. Live Modeling is a tangible technique in list of non-pharmacological techniques of behavior management and can be safely incorporated in routine clinical practice.
2. Mother as live model can be a highly effective regimen for concrete delivery of oral health care in a child patient.
3. More elaborate clinical trials are needed to establish legitimacy of Live Modeling in Clinical Dentistry for child patient.

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