Review Article

University J Dent Scie 2021; Vol. 7, Issue 3

Contemporary Distraction Tools Used In Pediatric Dentistry: An Overview.

Abstract:
Behavior management is widely accepted by many clinicians and is one of the important factors in providing dental care to children. If the child's behavior cannot be managed accordingly, then it is almost impossible to perform the dental procedures that are needed. Thus, Professional recognition of these difficulties significantly heightened the interest in behavior management and led to the development of a various well-established child behavior management armamentarium for dentist to reduce child's anxiety in dentistry. And distraction technique is one among them which has gained increasing polpularity due to evolving technology and leading researches. Thus, this articles reviews the various evolving and promising cost- and time-effective distraction techniques of behaviour management used in pediatric dentistry. Articles from primary, secondary, and tertiary literature were selected for inclusion on relevance and significance to the clinician.

Key words: Audio Analgesia, Guided Imagery, Magic Tricks, Mobile Dental App, Virtualreali

Introduction:

More than a century has elapsed since a dentist, writing in one of the professional journals of the day, voiced concern about the behavior of children in his practice (Raymond 1875).[1] It was his opinion that "getting into the good graces of children is almost half the work to be accomplished." This observation opened the gates to a flood of comments on a subject, a subject called behavior management which hitherto had been unrecognized in the dental literature.

Behavior management is as fundamental to the successful treatment of children as are skills and knowledge of dental materials.[2]Uncooperative behavior can interfere significantly with providing quality dental care, resulting in increased delivery time, risk of injury to the child and eventually unsatisfied parents. In fact, surveys of clinicians have found that the dentists consider the uncooperative child to be among the most troublesome problems in clinical practice[3]and also some studies suggested that nearly one in four children (22%) seen by pediatric dentists may present marked management problems.[4] Thus, Professional recognition of these difficulties significantly heightened the interest in behavior management and led to the development of a well-established child behavior management armamentarium for dentist. Further, it also led down the path where dental practitioners began to confer the subject of behavior management, the same respect and objectivity that they have accorded with other areas of science in dentistry.[5] Later, in 1991-1992 the American Academy of Pediatric Dentistry (AAPD) endorsed various behavior management methods in their Guidelines for Behavior Management for reducing patient anxiety in dentistry.[6]Later again, technology, in conjunction with leading research performed on behavior management techniques urged reshaping of the traditionally introduced strategies for the cooperative child. Thus, paving way to the invention of newer non-invasive behavior management techniques for children, among which

Access this article online

Website: www.ujds.in

Quick Response Code

DOI: https://doi.org/10.21276/ujds.2021.7.3.28

[1]NUR FATMA, [2]SAUMYA NAVIT, [3]SULEMAN A KHAN, [4]MEENAKSHI UPADHYAY
[1-4]Department of Pediatric and Preventive Dentistry, Saraswati Dental College; Lucknow

Address for Correspondence: Dr. Nur Fatma
Saraswati Dental College, Tiwariganj, Faizabad Road, Lucknow.
Email: drnurfatmapedo@gmail.com

Received : 5 August, 2021 **Published :** 31 December, 2021

How to cite this article: Nur Fatma. (2021). Contemporary Distraction Tools Used In Pediatric Dentistry: An Overview. UNIVERSITY JOURNAL OF DENTAL SCIENCES, 7(3).

distraction technique like, magic tricks, audiovisual distraction, mobile dental apps, videogame distraction, virtual-reality based distraction has gained immense popularity.[7]These contemporary distraction techniques have significant immersive, interesting and innovational capabilities which allows dentists to efficiently manage children with behavioral problems and perform effective treatment in a stress-free environment.[7]

Description:

Mc Caul and Mallet in 1984 developed the theory of distraction by placing emphasis on the fact that the capacity of humans to pay attention is limited. They pointed out that in order to perceive pain, an individual should concentrate on the painful stimuli; therefore, perception of pain decreases when a person's attention is distracted away from the stimulus.[8]

Later, AAPD in 2016 described distraction as a non-invasive behavior management technique that uses the diversion of patient's attention away from what may appear or perceived unpleasant by them to a totally different sensation or action.[9]

Objectives:

The objectives of distraction are to:[8]

- Decrease the perception of unpleasantness, and
- Avert negative or avoidance behavior.

Types:

a) Active Distraction: Here, the dental health care professional actively distracts child's mind from ongoing procedure by encouraging the child's participation in the activities during the procedures. These techniques involve several sensory components of the child. Some of the employed active distractions are playing with interactive toys or electronic devices, singing songs, squeezing balls, controlled breathing, guided imaginary, and relaxation.[10-16]

b) Passive Distraction: Passive distraction on the other hand, requires the child to remain calm and quiet while the dental health care professional is actively distracting him during a procedure. In this case, distraction is achieved by observation of the activity or stimulus rather than their overt participation. It includes auditory and audiovisual techniques like, reading a book to the child or telling him a story or by using several other such as background music, television sets, computer games, and virtual reality (VR) glasses.[10-16]

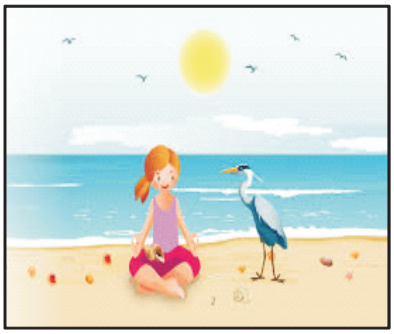
c) Contingent Distraction: In this, children's disruptive behavior can be reduced by making access to a distracter such as an audio tape, dependent (contingent) upon cooperative behavior, as opposed to providing unlimited access to audiotapes.[17,18]Thus, in this technique children are informed that they can listen to audio taped material through headphones, as long as they remain cooperative. Each time the child become disruptive or uncooperative, the dentist immediately terminate the audio presentation and do not reinstate it until the child exhibits cooperative behavior.[19]

Contemporary Distraction Techniques:

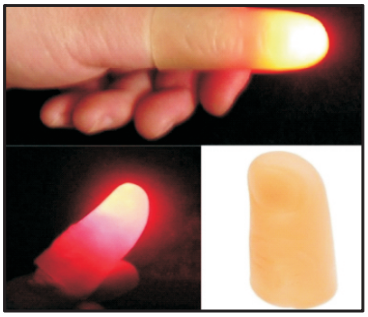
The contemporary distraction techniques used are as follows: 'TRICKS' used in contemporary pediatric dentistry

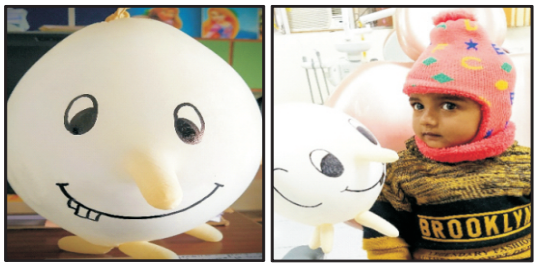
S.NO	TECH-NIQUES	TOOL UTILISED	DESCRIPTION
1.1.	**Rest Breaks**	Short break during a stressful procedure	AAPD recognizes that giving the child patient a short break during a stressful procedure can be an effective use of distraction prior to considering more advanced behavior guidance techniques.[20]

1.2.	**Mobile dental app**	Mobile dental application	Patil *et al.* (2017)[21] utilized mobile dental app for reducing fear and anxiety in children in the dental set up. An interactive session was held in which the children were virtually allowed to perform different dental treatments using the mobile dental app. The authors concluded that by this technique, the fear towards different dental instruments and its use in children could be reduced and more cooperative behavior could be achieved. Also, the mobile dental application could be used as an adjunct behavior management technique.[7,21] However, further research is needed.[7]
1.3.	**Audio-analgesia or White Noise**	White noise combined with stereophonic music	This technique dulls the pain sensation, without the use of any medication. It is a relatively new type of procedure that functions by providing a good stimulus of such intensity that distracts the patient from the procedure at hand and causes sensory confusion.[22] A recent study done by Kumar *et al.* (2020)has shown a significant decrease in the anxiety level as well as pain perception using audio analgesia in pre-teen children aged 8-12 years undergoing dental restoration.[23]
1.4.	**Videogame distraction**	Videogames	This technique is based on the principles of cognitive behavioral therapy and neuro-feedback mechanism for children with anxiety disorders. [7,24] Videogames are interesting and commonly available media, which can help in implementing distraction in children by active participation of the child during the dental procedure![7,25]
1.5.	**Guided imagery or Visual imagery**	Deliberate daydreaming	It is a hypnosis-based technique that can be helpful in certain situations. The visual imagery technique has been defined as a directed, deliberate daydream that uses all the senses to create a focused state of relaxation and a sense of physical and emotional well-being. Further, it is believed to work with children very well because they have good ability to imagine and fantasize. [26] There are generally three stages to guided imagery: *relaxation*, *visualization*, and *positive suggestion*.[27] The patient, seated in the dental chair [*relaxation*], is asked to use their imagination skills to focus on pleasant places (e.g. beach or mountain scenery) [*visualization*] (**Figure 1**). This consciously encourages their psyche to reach a state of relaxation and well-being. The emotion al well -being guides the body to a complete physical relaxation. This, combined with a positive suggestion [*suggestion*], reduces the anxiety-inducing symptoms. The images during this relaxation procedure can be evoked from the dentist or independently chosen by the patient. Nevertheless, in both cases, the imagined scenery must be rich in detail, and should include

			colors, smells, and sounds (Armfield 2013).[28]  **Figure 1: Guided imagery**
1.6.	**Virtual reality based distraction**	Virtual reality headset	This technique utilizes advanced technologies to create virtual environments (VE) that allow patients to be immersed in an interactive, simulated world (**Figure 2**). Thus, less attention is available for the thoughts that are associated with the treatment. Studies have shown that VR distraction can effectively reduce anxiety towards previous dental experiences[28]and could also reduce the intensity of pain in patients with chronic illness. **[29,30,31]** Furthermore, Nunna *et al.* reported that virtual reality distraction was better than counter stimulation in decreasing the dental anxiety and fear in children during Local Anesthetic administration.[32] It has been contraindicated in Medically compromised children  **Figure 2: Virtual Reality** especially children with epilepsy, migraine and vestibular disturbances; and in Children with previous history of nausea or dizziness following the use of VR device.[7,33]
1.7.	**Magic tricks**	Various Magic tricks	Strong-willed children mostly refuse to sit in the dental chair. A study done by Peretz and Gluck (2005)[34] evaluated that a useful way of dealing with strong-willed behavior in the dental situation may be by performing magic tricks for the children where the attention of the child is drawn away from the actual dental situation and cooperation may be achieved by distracting the mind and eye of the child. [34-36] Thus, relaxing the child and helping the dentist to perform necessary treatment.[36]

There are certain 'tricks' that most of the dentist would have come up with and would have used regularly. Further, this tricks that are although not specifically one of the evidence-based non-pharmacological behavior management techniques as above, yet work really well. From the same,

S.NO.	TRICK	AGE GROUP	TOOL USED	METHOD
1.1.1.	**Guessing game**	Younger children who can count up to 20 or so	Guessing game	Ask the child to guess how many teeth they have (often the dental nurse can give them a whispered 'heads-up' as to how many they might have) and offer a reward (sticker) if they get close to the right number. Using a hand mirror, ask the child to count their own teeth. They can then watch you count their teeth, to 'make sure you don't cheat'.
1.1.2.	**Thumb and light trick**	2-7 year olds	Thumb sleeves incorporated with a lighting device	Thumb sleeves incorporated with a lighting device can be worn on the thumb by the operator (**Figure 3)** . The device could be activated/deactivated at the operator's will and various creative hand movements can then be performed to sustain the child's interest as the light appearing and disappearing is visualised as a magical phenomenon.  **Figure 3: Thumb sleeves**
1.1.3.	**Book trick**	2-11 year olds	Coloring book which could display blank pages, black and white images, and colored images sequentially on the same leaf	The book can be displayed to the subject to sustain the subject's interest and negotiate with the subject's reasoning capability. The technique is similar to thumb and light trick where the child visualizes the sequential image development in the book trick as a magical phenomenon.
1.1.4.	**Glove puppets**	Very young child who is very shy	Gloves	Blow up a glove with the three-in-one syringe (thus introducing the three-in-one syringe too). Then encourage the child to help you draw a face on it including a big smile to draw on some teeth (**Figure 4**).

				 Figure 4: Glove puppet **Get the child to help you count the number of teeth on the glove puppet and then to count their own tee**th.
1.1.5.	**Sleeping statues**	5–9 year olds who have a competitive streak	Competitive game	The introduction of a competition with the 'last little boy/girl' can help to encourage good behavior, e.g. 'Margaret, can you lie very still, like a "sleeping statue", and see how long you can stay still for? The last little boy/girl managed to stay still until we counted to 100 and he/she was very clever like you. Do you think you can beat him/her? I bet you can!'
1.1.6.	**The 'mystery prize box'**	Any age	Mystery prize box	Sometimes, reward from the 'mystery prize box' can entice the child enough to allow that final piece of more difficult treatment, e.g. extraction, to be completed. The prize box sits high on the shelf so it is visible, but the child doesn't know what is inside it until the end of the appointment. It contains various inexpensive items such as toothbrushes, color boxes or current movie trend characters on pencils, rubbers, note pads, hair clips, rulers, etc.
1.1.7.	**Competi -tion time**	5–9 year olds who have a competitive streak	Competitive game between patient and dentist	When placing separators prior to Hall technique of stainless steel crown placement, the concept of a competition between a patient and dentist appears to work well e.g. when placing the separators (using floss, authors preference), the dentist tries really hard to 'make your head wriggle from side to side but you have to try and stay very still. If you can stay still then you win the sticker, if your head wriggles then I win the sticker'; inevitably and tha nkfully, it is almost always 1:0 to the patient. When they return for their Hall crown, this time to 'beat the dentist', they have to have the crown put on then bite really hard on the cotton wool roll, while the dentist tries to wriggle out the cotton wool roll from between their teeth, again, generally 1:0 to the patient.

for children.[26,39] Children who have dental anxiety are afraid of dental treatments and they are often difficult to treat.[24,38] There are basic non-pharmacological clinical strategies which are psychological techniques used during dental treatment to effectively reduce the child's dental anxiety and potentially facilitate their acceptance of what may occur in the dental environment.[38,39] This may be by gradually exposing them to potentially anxiety-inducing experiences, helping them feel more in control by providing them with communication strategies, gaining their attention or distracting them, providing positive or negative reinforcement to minimize disruptive behavior and strengthen desired behaviors, and focusing on building a more trusting relationship with their dentist and the dental team. Further, reducing a child's anxiety without using a pharmacological intervention means less threat to their general health, less obstruction to the delivery of timely dental health care in the present, and the likelihood of better compliance with clinical advice and preventive care in the future.[39,40]

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