

The effectiveness of an artificial intelligence based mobile application with the conventional approach in the management of child behavior during pediatric oral healthcare

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A year spent in artificial intelligence is enough to make one believe in GOD. -Alan Perlis.

McElory (1895) has beautifully stated that “Although operative dentistry may be perfect, the appointment is a failure if a child departs in tears”, it stresses the importance of behavior management over technical excellence in Pediatric Dentistry. Fear and anxiety are often associated with child’s first dental visit and have a negative impact on child’s psychology making the dental appointment an unpleasant one.

Child Dental Anxiety has been a matter of concern for many years and can be defined as a nonspecific feeling of apprehension, worry, uneasiness or dread, the source of which may be vague or unknown. Hence means of conquering this anxiety in a dental setting has been long sought after and is essential to identify anxious children at the earliest age possible in order to institute a precocious behavioral treatment.

Sometimes a child may vocalize their fears and anxiety, while others manifest it in behavior such as crying, agitation, and cessation of conversation or play and even attempting to escape from care providers. It may also be accompanied by significant physiological changes such as increase in heart rate, other hemodynamic changes and secretion of stress hormones.

The cornerstone of success in pediatric dentistry is behavior management and the use of these of behavior management techniques enable children to learn appropriate behavior, coping skills, reduce anxiety, and facilitate the delivery of adequate oral health care. Owing to the limitless burden of expectations from parent, society and child there has been a constant evolution in application of behavior management techniques in dental clinics.

Smartphone application intervention reduced anxiety in Pediatric patients in a better way as compared to conventional behavior modification techniques. It is an established fact that there is a strong relationship between a child’s dental anxiety and successful dental treatment. More recently, virtual reality immersion is a promising technique of distraction which obstructs the dental environment and allows the child to adapt to dental operatory and allows good communication of child and clinician.

Artificial intelligence (AI) is a technology that utilizes machines to mimic intelligent human behavior. To appreciate human-technology interaction in the clinical setting, augmented intelligence has been proposed as a cognitive extension of AI in health care, emphasizing its assistive and supplementary role to medical

professionals. While truly autonomous medical robotic systems are still beyond reach, the virtual component of AI, known as software-type algorithms, is the main component used in dentistry. Because of their powerful capabilities in data analysis, these virtual algorithms are expected to improve the accuracy and efficacy of dental diagnosis, provide visualized anatomic guidance for treatment, simulate and evaluate prospective results, and project the occurrence and prognosis of oral diseases.

Behavior management techniques (BMT's) have been long sought as a solution for preoperative anxiety. Various behavior management strategies have been proposed to manage anxiety and distress during dental treatment form children. A variety of BMT's existing in routine pediatric practice however, distraction appears to be the safe and inexpensive. The application of distraction is based on the assumption that pain perception has a large psychological component in that the amount of attention directed to the noxious stimuli modulates the perceived pain.

Anxiety is a human reaction to any unknown situation and this preoperative anxiety produces far reaching effects like increased postoperative pain, poor behavior outcomes for the child and increases the treatment challenges when treating a pediatric patient. The pediatric patients with his/ her first visit to dentist are mostly found anxious and apprehensive because of dental equipment's and the newness of the experience.

The present trend advocates the use of non-aversive behavior management techniques which may be equally effective and more acceptable to parents, patients and practitioners. In distraction, the patient's attention is diverted from what may be perceived as an unpleasant situation. Audio distraction is a non-aversive distraction technique in which patients listen to music or stories during a stressful procedure. The accomplishment of audio distraction technique has been affirmed in medical setups however scanty literature is available to gauge the potency of this technique in terms of pediatrics population.

Researchers have identified several mechanisms by which music works to reduce anxiety. Music is believed to send enough competing sensory inputs through pathways descending from the brain to cause the brainstem to signal some of the gates shut, thereby reducing the amount of pain that the patient listening to the music perceives.

A second mechanism is distraction. Noguchi defines this as "any technique which diverts attention from a noxious stimulus, such as the sound of the dentist's hand instrument scraping across a rough tooth surface". A final mechanism is masking; music is able to "mask" unpleasant sounds such as the noises of the dental drill thereby averting the patient's anxiety.

Despite major advances in dentistry in terms of techniques, technologies and materials, anxiety related to the dental environment and specific procedures is a significant and common problem faced by child patients worldwide and considered as an obstacle in providing quality dental care.

Various aspects and factors are involved in the acquisition and development of dental anxiety in children. It not only concerns fear of pain or of invasive procedures, but also entails separation from the parents, confrontation with unfamiliar people and surroundings and the experience of loss of control.

Nowadays children from all age groups play countless games on the phone, talking to their friends for long hours, or even browsing the internet. Today, we have many apps available on mobile phones to educate the children about the procedures of their dental treatment which can help to alleviate fear.

Conclusion: Though artificial can't replace all the traits of human mind, it has made a huge contribution in reducing a dentist's efforts and assisting him in decision making. It is of prime importance for a practitioner to be alert of the potentials of artificial intelligence to assimilate this technology for enhancing his practice in forthcoming years.

Importance of Research: Electronic globalization with such a gigantic technological advancement during last few decades has made a huge impact on our everyday life. Artificial intelligence has been a breakthrough in hi-tech progression and has entranced the brains of scholars worldwide. It is a field of technological science dealing with computer science and ability of computers to mimic the function of human brain to perform the tasks readily. Ever since its commencement in the field, dental science has witnessed modernization. From patient data records preservation, diagnosis and treatment planning to robots performing surgeries in supervision of a clinician has now become possible because of artificial intelligence. In current scenario, it has become necessary for dental professionals to get oriented with clinical as well as technological advancement to provide easy, quick, relatively cost-effective and excellent patient care.

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Biography

Krishna Patil is Assistant Professor at Bharati Vidyapeeth (Deemed to be) University, Pune, India. He is currently pursuing his PhD in the Pediatric Dentistry. He has presented many National and International Papers at various Conferences. He has many National as well as International Paper a publication to his credit He was chairperson for many conferences as well as in the organizing committee. Currently, he is working on Artificial Intelligence use in Pediatric Dentistry and clinical application of [Dental Implants](#) to prevent the malocclusion and as a natural space maintainer. Recently he has been awarded by Maharashtra State Dental council as COVID warrior for his tremendous work during the Pandemic time.

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