Journal of Chemical Health Risks

www.jchr.org

JCHR (2026) 16(2), 2164-2174 | ISSN:2251-6727

Awareness and Utilization of Recent Advances in Pediatric Dentistry among Dental Practitioners: A Cross-Sectional Study

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(Received: 28 January 2026 Revised: 16 March 2026 Accepted: 09 April 2026)

KEYWORDS

Bioflex crowns, Preformed space maintainer,

Pediatric dentistry

ABSTRACT:

Introduction: The field of pediatric dentistry has experienced a significant transformation over the past decade, evolving from invasive surgical approaches toward minimally invasive, biologically oriented, patient-centered, and technology-driven treatment modalities[1,2]. Contemporary innovations such as advanced behavior management strategies[3–6], digital and three-dimensional technologies[7], modern endodontic techniques[8–9], esthetic full-coverage restorations[10,11], interceptive orthodontic appliances[11–13], chemomechanical caries removal agents[14–19], and silver diamine fluoride (SDF)[20] have been increasingly advocated in pediatric dental care. However, the extent to which these advancements are translated into routine clinical practice remains unclear.

Objectives: The present study aimed to assess the knowledge, awareness, and adoption of selected recent advancements—namely Bioflex crowns, prefabricated space maintainers, enzymatic chemomechanical caries removal agents (Brix 3000), bioactive remineralizing agents, Silver Diamine Fluoride (SDF), and Audio-Visual (AV) distraction techniques—among dental practitioners, and to evaluate the existing knowledge–practice gap.

Methods: A cross-sectional questionnaire-based survey was conducted among 315 dental practitioners. A scientifically validated 16-item questionnaire was distributed digitally to collect demographic details and assess awareness and clinical utilization of recent pediatric dental innovations. Data were analyzed using descriptive statistics and Chi-square tests to determine associations between practitioner characteristics such as qualification and specialty, with statistical significance set at $p < 0.05$.

Results: Although a majority of respondents were aware of esthetic full-coverage restorative options such as Bioflex and zirconia crowns[10,21–24], their routine clinical usage remained limited. Awareness regarding innovations in space maintainers was moderate[11,12,25–31]; however, actual implementation of prefabricated and digitally fabricated space maintainers was comparatively low[32–34]. Knowledge of chemomechanical caries removal techniques was present[14–193536], but specific familiarity with enzymatic agents such as Brix 3000 was limited. In contrast, behavior management adjuncts including AV distraction and virtual reality techniques demonstrated higher awareness and adoption rates[37–39]. Acceptance of SDF as a caries-arresting agent was favorable, supported by emerging clinical evidence and parental acceptance studies[20,44,45].

Conclusions: Despite growing awareness of recent advancements in pediatric dentistry, a substantial gap persists between knowledge and clinical implementation. Barriers related to technique sensitivity, limited hands-on exposure, and inadequate training contribute to underutilization of minimally invasive and technology-assisted modalities[46–50]. These findings highlight the need for structured Continuing Dental Education programs and curriculum reinforcement emphasizing practical training and clinical integration of contemporary pediatric dental innovations[51–59].

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JCHR (2026) 16(2), 2164-2174 | ISSN:2251-6727

1. Introduction

Looking at all aspects of the changes in how we practice dentistry today, they are much larger than the changes you have seen over your entire dental career. Technology and biology are changing the way dentists provide dental treatment; we are gradually moving from a model where the dentist is simply repairing teeth mechanically to a model where the dentist uses an approach to provide a prevention-focused, biologically-based, and patient-centered care system[1]. This is especially important when it comes to treating children, as their anatomy, physiology, and psychology require effective, atraumatic, and efficient treatment, as well as a desire for aesthetic[2].

Management options for early childhood caries and dental trauma have historically relied upon traditional rotary instruments and stainless steel crowns (SSC) which were reliable clinically; however, most children experienced anxiety associated with using the instruments due to the noise/vibrations produced when using them, as well as frequent use of local anesthesia. In view of this, research has focused on finding ways to decrease pain and anxiety through the use of methods including TENS (transcutaneous electrical nerve stimulation),[3-4] computerized injectors for anesthesia[5], and topical anesthetic patches[6]. Recent advances in pediatric endodontics utilize rotary instruments on primary teeth to enhance the efficiency and consistency of procedures[7-8]. However, over time, the "drilling and filling" method often resulted in unnecessary removal of sound tooth structure; this has led to a new way of providing care known as Minimally Invasive Dentistry (MID); within MID, new research and materials will enable practitioners to control the progression of disease with as few surgical interventions as possible[9].

Various advances have led to an increase in different types of dental materials for children with the introduction of hybrid resin polymer crowns; BioFlex® crowns provide an esthetic alternative to stainless steel crowns (SSCs), yet maintain good mechanical properties and simplified placement.[10] - The introduction of prefabricated and 3D-printed space maintainers in interceptive orthodontics reduces the amount of chairside time for the dentist, while eliminating the need to use traditional impressions to take an impression of the child's mouth; therefore, enhancing their comfort.[11-13] More recently chemomechanical agents used for caries removal have progressed from the original products (GK-101 and Caridex)[14-15] to products such as Carisolv and papain-based formulary.[16-18] There has now been an introduction of new enzymatic systems including, Brix 3000. The preventative opportunities now reach beyond fluoride with the increase in bioactive materials and remineralization materials, in addition to the introduction of Silver Diamine Fluoride (SDF), which is an effective way to halt caries in noncooperative patients or for patients who cannot cooperate for any other treatment method.[18] - [19,44-45] Behavior management techniques have advanced through audio-visual distraction and virtual reality techniques, which reduce anxiety levels associated with dental procedures, by modulating the perception of pain.[20,24]

2. Objectives

Currently, although there are many evidence-based advances, they have not been consistently integrated into the normal practice of healthcare providers. In a study performed on the diffusion of innovations concept, experts noted that the amount of knowledge possessed by the practitioner, how difficult they believed the new technology was to use and the environment in which the practitioner operated, all played an important role in determining whether or not that practitioner would adopt a new technology. In the Indian dental care system—a system in which there is substantial variability between academic and private practice—there has been limited study performed on the clinical use of these types of technologies. This study was designed to gain insights into the knowledge and understanding of dental professionals of the latest advances in pediatric dentistry and to determine demographic characteristics (e.g., educational background, specialty) that influence how frequently they are utilized in clinical practice.

3. Methods

Ethical and Design Considerations

This study utilized a cross-sectional observational methodology measuring the KAP of dental professionals regarding new innovations in the field of paediatric dentistry. Many researchers within the healthcare industry have used cross-sectional KAP research designs to identify whether healthcare professionals are aware of and have begun using new innovations in their practice.[49]

The research protocol followed the principles set out in the Declaration of Helsinki for research involving human subjects.[50] Ethical approval to conduct this study was received prior to initiating the data collection phase from the Institutional Review Board (IRB). All subjects who participated in the study did so voluntarily, with informed consents being assigned to the first section of

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JCHR (2026) 16(2), 2164-2174 | ISSN:2251-6727

the electronic questionnaire that was electronically sent to each subject. No identifying information about the subject was collected, guaranteeing anonymity of the subject and confidentiality of the data.

3.2 Sample Population and Sample Size

The sample population consisted of 315 dentists. Sample size estimation was based on the results of a pilot survey conducted on 50% of dentists who indicated they were aware of new paediatric dental technologies and assumed to maximise variance based on this conservative estimate. Based on a 95% confidence interval and +/- 5% margin of error, the calculated sample size was adequate for analysis.

The inclusion criteria for participation in the study required that the participants be a licensed dental professional (either a bachelor of dental surgery [BDS] or master of dental science [MDS]), currently working with pediatric patients in clinical practice and/or teaching; whereas, the exclusion criteria were: undergraduate dental students, interns who are not providing services to children, and those who did not provide a complete answer to the survey.

3.3 Construction and Validation of Survey Instruments

A comprehensive literature review related to the dental care needs of children along with review and validation of existing KAP survey instruments published previously, were utilised to create a structured, self-administered questionnaire containing 16 questions that were closed-ended. [49,51]

Content validity of the questionnaire was established by an expert group consisting of three paediatric dentists and a biostatistician, and the content validity evaluated for the following criteria: clarity, relevance, and coverage of all issues that fall within the domain of the proposed questionnaire; based upon this evaluation of the questionnaire by the experts, minor revisions to four questions were made to clarify measurement intent, and eliminate confusion.

The questionnaire was divided into two sections:

1. Demographics: Gender, age, highest qualification (BDS/MDS), type of practice (academic, clinician, both) and specialty

2. Awareness and Clinical Use of New Developments, such as:

- The use of BioFlex crowns (aesthetic appeal, flexibility, clinical value)
- Prefabricated space maintainers
- Chemomechanical caries removal agents, which includes Brix3000
- Preventive Remineralizing Agents: CPP-ACP and Nano Hydroxyapatite
- Silver Diamine Fluoride (SDF) for Arresting Caries.
- Behaviour Management Techniques: Audio-Visual Distraction and Aromatherapy.

3.4 Methods and Procedures for Collecting Data

Data collection was conducted for a period of three months using a questionnaire created via Google Forms. The survey link was distributed by using snowball sampling—a non-probability sample method that is widely used in professional populations to obtain greater geographic and demographic representation.[52]

A variety of channels were used to distribute the survey link, including dental association mailing lists, professional WhatsApp groups and social media sites. This approach allowed for the recruitment of practitioners from both academic institutions and private practices.

3.5 Statistical Analysis

The gathered information is organized in Microsoft Excel and has been transferred to SPSS (Statistical Package for the Social Sciences) version 25.0 and then analyzed.

- The summary of the demographics and categorical response variables provided descriptive statistics reporting frequencies and percentages.
- The evaluation of the independent variables (Qualification and specialty) concerning the dependent variables (awareness and clinical use of advances) has been conducted using a Pearson chi-square test (χ^2).[53]
- Analyses will conclude that a p-value of less than 0.05 indicates statistical significance, while a p-value of less than 0.01 will indicate high significance.

4. Results

Demographic Profile

A total of 315 dentists completed the survey. The demographic distribution was representative of dental practitioners in the study area. The gender distribution

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was almost equal, with 157 (49.8%) women and 158 (50.1%) men.

Qualification distribution was also nearly equal, with 155 (49.2%) graduated with a BDS degree, while 160 (50.8%) had a MDS degree.

In terms of the nature of the practice, 36.8% of the dentists were academic practitioners, whereas 33.0% were practicing clinicians, and 30.2% were engaged in both academic and clinical practices. Most of the respondents were young practitioners with 28.9% being aged 18 to 23 years and 21.0% of ages from 24–29 years, which indicates a significant number of dentists pursuing postgraduate studies.

As summarized in (See Table 1) Distribution of Dental Specialties, the majority of dentists (37.1%) were practicing as general dentists, while the second largest number were pedodontists (15.2%), prosthodontists (10.8%), and the smallest group were endodontists (9.2%) of responses.

Restorative Advancements: BioFlex Crown

Sixty-five point 1% (n = 205) of the respondents believed that BioFlex crowns were esthetic. A statistically significant association was found between the perception of esthetics and the dentists' specialty χ^2, $p < 0.05$ were noted with the highest percentages of agreement found from pedodontist (43/48) and General Dentists (66/117) who completed the survey.

When it came to knowledge of the material's flexibility, there was a significant amount of uncertainty as 51.1% identified BioFlex crowns to be flexible, while 41% selected “uncertain.” The uncertainty was an extremely significant finding across the dentist community, χ^2, $p < 0.01$ with general dentists being the least knowledgeable regarding material flexibility.

BioFlex Crowns have a moderate level of awareness, with 24.4% (n = 77) of the physicians reporting their clinical usage. Demographic and specialty factors affected whether an individual had previously used BioFlex Crowns with a larger proportion of pedodontists using BioFlex Crowns (41.6%) compared to general dentists (19.6%). The study revealed there were no statistically significant associations between the usage of BioFlex Crowns based on qualifications held by the dentists (BDS versus MDS) ($p > 0.05$) indicating that specialty orientation rather than academic degrees determines which individuals will use BioFlex Crowns.

Interceptive Orthodontics Prefabricated Space Maintainers

There is a high level of awareness (64.8%, n = 204) that pre-fabricated space maintainers exist. The study revealed that there are some differences in the awareness of the pre-fabricated space maintainers among the different Dental Specialties ($\chi2$, $p < 0.01$), where the awareness of the pre-fabricated space maintainers was very close to 100% among Pedodontists (95.8%).

Clinical Utilization of the pre-fabricated space maintainers is low (26.0%, n = 82). The findings of the study indicate the pre-fabricated space maintainer's clinical utilization was influenced by dentist specialty (χ^2, $p < 0.05$) with the greatest number of users being Pedodontists.

The data revealed there was a significant amount of uncertainty about the clinical use of the pre-fabricated space maintainers. A study found that most dentists believed the pre-fabricated space maintainers were successful in overcoming the traditional obstacles associated with the conventional methodologies of maintaining space for an anticipated permanent tooth, (42.9% of dentists responded Yes, while 47.3% responded do not know.) The dentist's educational qualifications (MDS vs BDS) had an association ($\chi2$, $p < 0.05$) with their definite opinions about pre-fabricated space maintainers.

Chemical Caries Removal: Brix3000

There is a moderate level of awareness that new chemomechanical agents are available to remove caries (62.9%, n = 198). However, more significantly, the study found MDS Graduates were significantly more aware of the existence of new chemomechanical caries removal agents ($\chi2$, $p < 0.05$).

The study showed there was a lower level of awareness (31.7%, n = 100) of the Brix3000 product available to dentists to use for caries removal with 60.3% of the population surveyed, having no knowledge of or were unsure about the Brix3000. Additionally, the study found a strong association ($\chi2$, $p < 0.01$) with dentist specialties in relation to the dentists' awareness of the Brix3000, particularly pedodontists.

No statistically significant difference was observed between BDS and MDS practitioners regarding actual usage (**$p > 0.05$**), indicating a persistent knowledge–practice gap.

Preventive Dentistry: CPP-ACP and Silver Diamine Fluoride

Preventive dentistry includes the use of CPP-ACP and Silver Diamine Fluoride to help prevent dental issues from developing.

The data show that 50.2% (158) of the respondents had prescribed CPP-ACP to patients, with the prescription patterns being significantly associated with the individual’s qualification and specialty level (chi-square test, $p < 0.05$). The prescription of CPP-ACP was much more common among graduates of MDS and pedodontists, and 53.0% of respondents believed in the clinical effectiveness of CPP-ACP for dental remineralization, and this value was significantly higher for the specialists compared to the general dentists.

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The percentage of respondents who stated that they believe SDF to be effective for stopping cavities was 64.4%. There was a significant association between belief in the effectiveness of SDF for halting the progression of cavities to the individual's qualification and their specialty (chi-square test, $p < 0.05$) as pedodontists and endodontists had the highest confidence in this method.

Behavior Management: Audio-Visual Distraction

Audio-visual distraction was noted to be the most widely used innovation with the most saturation. Nearly 80% of respondents had previously heard of audio-visual distraction (79.7%, 251) and over 62% of respondents to the survey had implemented audio-visual distraction into clinical practice (62.5%, 197). There was a significant association between the specialty of the implementing dentist and the implementation of audio-visual distraction (chi-square test, $p < 0.05$), with a significantly higher implementation rate by pedodontists (89.5%).

The difference in the percentage of respondents who stated that they were both aware of audio-visual distraction and had implemented audio-visual distraction into their clinical practice compared with restorative and orthodontic innovations was significantly less, showing that audio-visual distraction was much better translated into practice with a gap of only 17.2%.

Table 1. Distribution of Dental Specialties Among Study Participants (N = 315)

Specialty	Frequency (n)	Percentage (%)
General Dentist	117	37.1
Pedodontist	48	15.2
Prosthodontist	34	10.8
Endodontist	29	9.2
Periodontist	19	6.0
Orthodontist	18	5.7
Oral Medicine & Radiology	15	4.8
Oral and Maxillofacial Surgeon	14	4.4
Public Health Dentist	11	3.5
Oral Pathologist	6	1.9
Implantologist	4	1.3
Total	**315**	**100.0**

Table 2. Awareness and Clinical Utilization of Recent Pediatric Dental Advancements

Innovation	Aware (%)	Used / Implemented (%)	Awareness–Practice Gap (%)	Leading Specialty (Usage)
BioFlex Crowns	65.1	24.4	40.7	Pedodontist (41.6%)
Prefabricated Space Maintainers	64.8	26.0	38.8	Pedodontist (45.8%)
Chemical Caries Removal Agents	62.9	—	—	Pedodontist (Awareness)
Audio-Visual Distraction	79.7	62.5	17.2	Pedodontist (89.5%)

Note: "—" indicates that overall usage percentage was not quantified independently for chemical caries removal agents.

Table 3. Association Between Specialty and Adoption of Selected Innovations (Chi-square Analysis)

Innovation	Associated Variable	χ^2 Test	p-value	Significance
BioFlex Crown Usage	Specialty	χ^2	< 0.05	Significant
BioFlex Crown Flexibility Knowledge	Specialty	χ^2	< 0.01	Highly Significant
Prefabricated Space Maintainer Awareness	Specialty	χ^2	< 0.01	Highly Significant
Prefabricated Space Maintainer Usage	Specialty	χ^2	< 0.05	Significant
Brix3000 Awareness	Specialty	χ^2	< 0.01	Highly Significant
CPP-ACP	Qualificatio	χ^2	<	Significant

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Prescription	n / Specialty		0.05	
SDF Efficacy Belief	Qualification / Specialty	χ^2	< 0.05	Significant
AV Distraction Usage	Specialty	χ^2	< 0.05	Significant

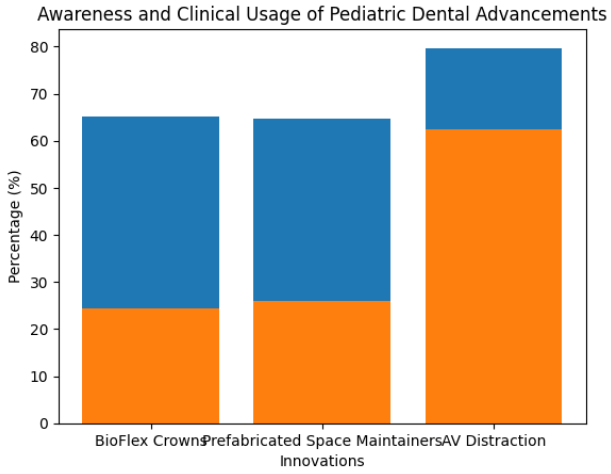

Figure 1. Awareness and Clinical Utilization of Recent Pediatric Dental Advancements

Caption:
Bar graph illustrating the proportion of respondents aware of and actively using selected pediatric dental innovations. A substantial awareness–practice gap is evident for BioFlex crowns and prefabricated space maintainers, whereas audio-visual distraction demonstrates higher translational adoption.

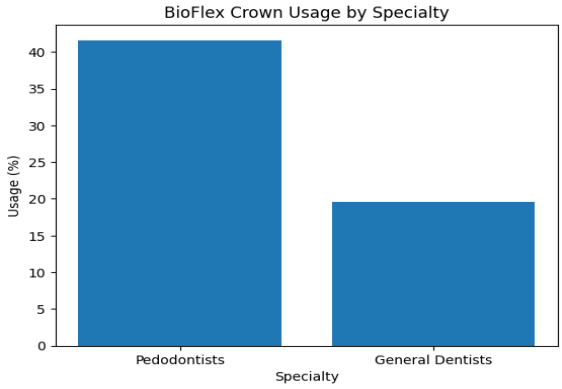

Figure 2. Comparison of BioFlex Crown Usage Among Key Dental Specialties

Caption:
Bar graph showing the percentage of BioFlex crown usage among pedodontists and general dentists. Pedodontists demonstrated significantly higher adoption compared to general dentists.

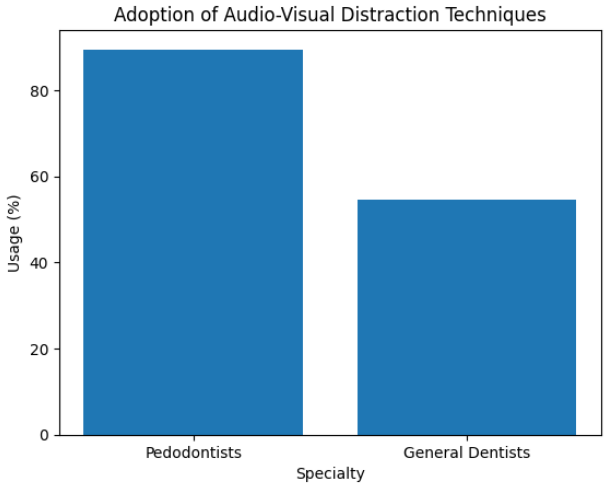

Figure 3. Adoption of Audio-Visual Distraction Techniques by Specialty

Caption:
Bar graph depicting the adoption of audio-visual distraction techniques among pedodontists and general dentists. Audio-visual distraction exhibited the highest clinical penetration among all surveyed innovations.

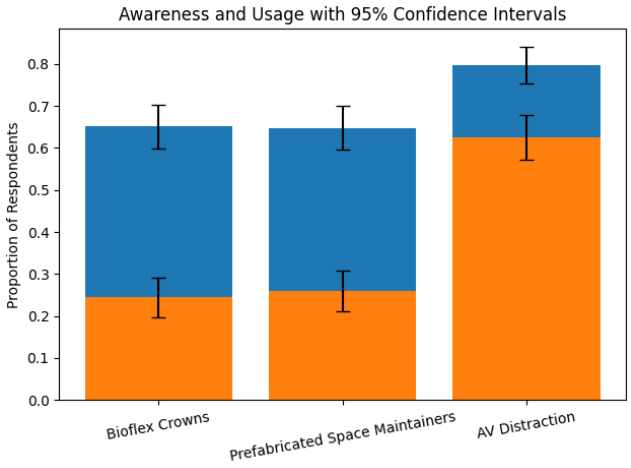

Figure 4: "Proportions are expressed with corresponding 95% confidence intervals (CI) to reflect the precision of the estimates."

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5. Discussion

The analysis conducted here generates one snapshot of a practice often described as "evolving." Aspects of innovation and implementation are being addressed concurrently. It is noteworthy that three significant patterns were identified within the survey that were consistent across all domains: the level of awareness among practitioners was high; practitioners demonstrated moderate levels of acceptance; however, the extent to which practitioners applied the innovations within their practice was limited. This indicates the significant 'knowledge-practice gap' between those that are knowledgeable of the innovations and those that utilize them. Additionally, the size of the knowledge-practice gap varied depending on the type of innovation being introduced (technological or biological), as well as the qualifications and specialty of the practitioners, which affirmed many of the same concepts presented in the diffusion models of healthcare innovation.[9]

5.1 The Knowledge-Practice Gap of Restorative Innovations: Bioflex Crowns

The high levels of practitioner awareness regarding the esthetic benefits offered by Bioflex crowns (65.1%) reflects the widespread "esthetic imperative" occurring in pediatric dentistry today, primarily driven by parent expectations, as well as changing social perceptions of primary teeth.[10] Although practitioners reported high levels of awareness for esthetic benefits, only (24.4%) of practitioners stated that they used Bioflex crowns in their clinical practice. This disparity indicates that structural barriers in addition to educational ones continue to limit the utilization of this restorative material. Unlike stainless steel crowns (SSCs), which provide mechanical retention through crimping, Bioflex crowns rely solely on passive friction fit and adhesive cementation protocols, both of which are inherently technique sensitive.[27] The diversion from the traditional method of placement likely contributes to the reluctance of practitioners to utilize these crowns.

In addition, the fact that an additional portion of respondents (41%) were unsure about some aspects of material flexibly indicates they have not had enough opportunity for hands on experience with this product. The differences between responses based on the type of specialty also support this conclusion: Pedodontists were significantly more likely to adopt (rate of adoption) Bioflex crowns than General Dentists; this is likely because Pedodontists are responsible for a greater number of complicated pediatric restorative cases where esthetics, parental demand, and long-term outcome's justify the added expense of the product and the learning curve that comes with using it. The results of this study indicate that General Practitioners will continue to be limited in their use of the product without formalised training and cost-benefit analysis.

5.2 Space Maintenance: Tradition vs. Efficiency

Response patterns regarding the use of prefabricated space maintainers show a significant contradiction: High levels of awareness amongst respondents (64.8%); however, only 26% were actively employing them. This finding is contrasted with previous literature in which the use of prefabricated space maintainers has been supported because of the decreased time spent chairside, eliminated or replaced the need for impressions, and comparable rates of survival to custom-made space maintainers [11-13]. It is conceivable that this resistance to the adoption of prefabricated space maintainers may be linked to the emphasis that has been placed on the teaching of custom-made appliances as a fundamental skill within the undergraduate dental educational setting in India and the perception that custom-made appliances represent the level of expertise of an individual clinician.

The relationship between MDS training and perception of practitioner efficacy suggests that training on the use of evidence-based practice in postgraduate education allows clinicians to overcome preconceived notions regarding traditional fabrication methods.[33] Additionally, issues related to inventory and concern over prefabricated sizing systems may prevent practitioners from adopting this technology. Therefore, reframing prefabricated appliances as not only tools for ease of fabrication but also tools to achieve efficiency and provide child-friendly solutions better aligns with modern pediatric practices.

5.3 Technology Evaluation of Behavior Management

The use of audio-visual (AV) distraction technologies was translated most successfully from practitioner awareness to practice among all innovation types evaluated. A total of 62.5% of participants indicated that they actively use AV distraction technology. This statistic supports the behavioral literature that describes the use of distraction as an effective behavioral intervention for the management of pain in children through the application of Gate Control Theory.[20],[47] The fact that AV distraction technologies can be easily implemented—by utilizing already readily available devices (e.g., smartphones, tablets)—lowers the threshold for clinicians to adopt this technology into their practices.

Interestingly, a high percentage of reported AV distraction use was reported by general dentists, indicating that innovations that are cost-effective and demonstrate immediate clinical benefits are rapidly adopted by all levels of practicing dentists. This emphasizes the point that the perceived simplicity and immediacy of return on clinical investment play a

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critical role in the rate of adoption of innovative technologies.

5.4 Minimally Invasive Dentistry: Conceptual Acceptance Versus Clinical Reality

The shift toward minimally invasive dentistry (MID) has been reflected in the results of the study regarding chemical agents used to remove caries as well as silver diamine fluoride (SDF). The findings demonstrate that the integration of concepts regarding MID into postgraduate courses is effective (as evidenced by the higher level of awareness of the chemical agents used to remove caries among MDS graduates).[16–18] However, while there was a good level of awareness of the chemical agents used to remove caries, there was low awareness of more recent products (Brix3000) (31.7%). This indicates a "brand-specific lag", which means that clinicians are aware of the MID concept, but do not have a lot of awareness regarding current refinements.

A high level of confidence (64.4%) in the ability of SDF to halt the progression of caries is consistent with a significant amount of supporting evidence as well as endorsement by international guidelines.[19] Furthermore, the high level of confidence among Pedodontists and Endodontists in their ability to halt caries is related to the fact that they treat a significant number of deep carious lesions and teeth with pulp involvement. While the level of belief in the caries-stopping ability of SDF is high, literature demonstrates that parents resist using SDF because of its potential to stain teeth.[46] As a result, the level of reported use of SDF is much lower than the belief regarding its ability to stop caries progression. This highlights the complicated relationship between the weight of clinical evidence and social acceptance in terms of caries treatment.

5.5 Influence of Demographic and Professional Factors

The strongest correlation for awareness and adoption across all sample innovation groups was specialization; meaning, Pedodontists have substantially more awareness and are more likely to adopt a greater amount of innovations than General Dentists. This disparity within the Indian Dental Ecosystem is notable, given that General Dentists are typically the first point of contact for their patients who present with pediatric dental problems. It is arguable that the most innovative approaches (e.g., SDF, AV distraction, and prefabricated space maintainers) provide the most benefit in general practice; especially due to time constraints and behavioral difficulties, which make mainstream intervention viability difficult. As illustrated by the above findings, there exists a need for not only developing the latest innovative technology but also for developing specific distribution plans; changing the curricula to include hands-on training programs in order to better implement the knowledge gained into action—particularly for General Practitioners.

5.6 Clinical Implications and Future Directions

This have important clinical and educational implications regarding pediatric dental practices and particularly support the development of future research.

The large knowledge/practice gap that has been identified in this research means that education in of itself is not going to be enough to facilitate the implementation into practice by dental practitioners or dentists functioning in this role.

CDE programs focused on providing hands-on training, cost-effective methods, and simplified treatment protocols will assist General Dental Practitioners in implementing newer dental technologies in to practice.[9,10] Specifically, low-cost and low-complexity techniques that provide immediate behavioral benefits, such as Audio-visual Distraction and Silver Diamine Fluoride, provide the greatest scalability for implementation into routine pediatric dental practice.[19,20]

These methods are especially beneficial for pre-cooperative patients, medically compromised patients, and in areas of limited access to advanced technologies. Adding these modalities to Standard Treat and Undergraduate Programs may promote a higher level of awareness and encourage implementation of these principles in the treatment of patients, thereby creating an environment that supports a Nixon-L, methodology of care.[16-18]

Future research should shift from surveys based solely on knowledge and perception to longitudinal and intervention studies determining the actual clinical outcomes, whether parents accept biological dentistry, how much it costs relative to other forms of treatment, and what patients think about the kinds of care they receive. Qualitative studies will also provide insight into the specific barriers that practitioners encounter – for example: lack of materials; perceived medico-legal risks from practicing biological dentistry; aesthetic concerns – and thus help to identify why practitioners resist adopting new technologies. Evaluating how using structured training modules and/or digital decision support tools affect clinical adoption of new technology will be valuable in developing policies to support and reform education curricula. In summary, a successful partnership between technology and prepared practitioners will ensure that technological advances are implemented into modernizing and improving the delivery of oral health care to children while also enabling equitable access to biologically based, child-friendly treatment options.

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