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EDITORIAL

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# Current and future research trends in clinical pediatric dentistry

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## 1. Introduction

Pediatric dentistry has undergone significant transformations in recent years, driven by advancements in technology, materials science, and a deeper understanding of child-specific oral health needs [1–5]. These developments have not only enhanced diagnostic and therapeutic approaches but have also paved the way for more personalized and preventive care strategies [6, 7].

One of the most notable trends is the shift towards minimally invasive dentistry (MID), which emphasizes the preservation of healthy tooth structures and reduces treatment-related trauma [8–10]. Techniques such as silver diamine fluoride (SDF) application, resin infiltration and atraumatic restorative treatment (ART) have gained prominence for their efficacy and child-friendly nature. SDF, in particular, has demonstrated high efficacy in arresting caries progression, although its esthetic drawbacks due to tooth discoloration remain a concern [11, 12]. Resin infiltration offers a non-invasive solution for white spot lesions, improving esthetics without the need for drilling [13–15]. ART provides a cost-effective and less intimidating approach to caries management, especially beneficial in resource-limited settings [16–18].

The integration of digital technologies has further revolutionized pediatric dental care. Artificial intelligence (AI) and three-dimensional (3D) printing have enhanced diagnostic accuracy and treatment planning. AI algorithms assist in early caries detection and risk assessment, while 3D printing facilitates the creation of customized dental appliances, improving patient outcomes [19–24].

Laser-assisted therapies have emerged as a promising tool in pediatric dentistry, offering precise and painless procedures. Despite their benefits, widespread adoption is hindered by high costs and the need for specialized training [25–29].

Preventive strategies and early intervention remain cornerstones of pediatric dental care. Emphasis on educating parents and caregivers about oral hygiene practices, dietary habits, and the importance of regular dental visits is crucial. Early diagnosis and intervention can prevent the progression of dental caries and other oral diseases, ensuring better oral health outcomes [30, 31]. The first 1000 days of a child's life present a critical window for establishing healthy oral habits. Healthcare providers must identify and address unhealthy behaviors during this period to prevent long-term oral health issues. Implementing educational and preventive strategies early on can mitigate the risk of dental caries, erosive tooth wear, hypomineralization and malocclusion [32–34].

Biomimetic materials are gaining traction in pediatric dentistry, aiming to replicate the natural properties of dental tissues. These materials not only restore function but also promote tissue regeneration, aligning with the principles of conservative and patient-centered care [35–37]. Also the role of probiotics and other natural compounds has been proposed for prevention purposes [38, 39]. Finally, technologies and techniques to minimize anxiety and pain, such computerized devices or needle free instruments have been tested [40, 41].

Looking ahead, personalized pediatric dentistry is poised to become a focal point of research and clinical practice. Advancements in genomics and biomarker identification will enable tailored treatment plans based on individual risk profiles, enhancing the efficacy of preventive and therapeutic interventions. Addressing adolescent oral health presents unique challenges, including behavioral factors and lifestyle choices. Targeted research is necessary to develop strategies that cater to the specific needs of this age group, ensuring continuity of care from childhood through adolescence [42].

Global health disparities in pediatric oral care underscore the need for research focused on improving access to dental services in underserved populations. Developing cost-effective, scalable interventions can bridge the gap and promote equitable oral health outcomes worldwide. Qualitative research methods are increasingly recognized for their value in un-


  

derstanding patient and caregiver perspectives. Incorporating qualitative insights into clinical practice can enhance patient-centered care and inform the development of more effective communication and treatment strategies. The implementation of evidence-based practices remains a challenge in pediatric dentistry. Bridging the gap between research and clinical application requires ongoing education and training for dental professionals, ensuring they are equipped to apply the latest scientific findings in their practice [43].

In conclusion, the field of pediatric dentistry is evolving rapidly, driven by technological innovations, a focus on minimally invasive techniques, and a commitment to personalized and preventive care. Continued research and collaboration among clinicians, researchers, and policymakers are essential to address current challenges and shape the future of pediatric oral health.

The Journal of Clinical Pediatric Dentistry over the past year has tried to give its contribution to clinical research in pediatric dentistry by going through all the above mentioned topics. Laboratory studies, clinical trials, literature reviews and case reports have been published (Contributions 1 to 148). My personal profound thanks go to the entire editorial board, to the authors, to the reviewers and most of all to the readers, recipients of what research produces and true stimulus for researchers to give their best.

## Availability of Data and Materials

The data are contained within this article.

## Author contributions

AS—performed conceptualization, data extraction and wrote the text. Author read and approved the final manuscript.

## Ethics approval and consent to participate

Not applicable.

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## Conflict of interest

The author declares no conflict of interest. Andrea Scribante is serving as the Editor in Chief of this journal.

## List of Contributions

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