Original Article

COLLABORATIVE PATHWAYS: INTEGRATING PEDIATRIC DENTISTRY, ORTHODONTICS, AND GENERAL PRACTICE IN EARLY DENTAL CARE

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ABSTRACT

Children's oral health should be prioritized during early childhood, and orthodontic treatment should be integrated into existing dental services. This review focuses on collaborative efforts between pediatric dentistry, orthodontics, and general practice, specifically looking at recent Saudi Arabian research from 2019 to 2025. Results indicate that pediatricians who integrate basic oral health assessments increase preventative dental care. Pediatricians who implement basic oral health assessments, like fluoride application and early risk assessments, have lower dental caries rates and increased preventive dental care utilization. Well-organized referral pathways allow early detection of orthodontic issues and shorten treatment waiting times. Joint training of medical and dental students enhances their readiness to collaborate and their knowledge. Integrated care models have reported more favorable outcomes, particularly for children with considerable medical or dental needs. These models still lack long-term follow-up data, evaluation of referral pathways, and data from the Middle East. This review concludes that pediatricians, dentists, and orthodontists require more collaboration to enhance practical models of care and better focus on children's oral health.

Key words: Pediatric dentistry, Orthodontics, Interprofessional collaboration, Preventive care, Saudi Arabia, Narrative review.

Introduction

Dental caries is still the most prevalent chronic disease among children, and its incidence is higher than even asthma [1]. However, it is preventable with timely action and ongoing management. The AAPD and the American Academy of Pediatrics recommend the establishment of a "dental home" by the age of one to provide anticipatory guidance, risk evaluation, and preventive care. In reality, children tend to visit pediatricians much more frequently than dentists during the early years [2], and many pediatric dentists are unwilling to treat children of such a young age [3, 4]. This gap underscores the importance of teamwork between pediatric dentists, orthodontists, general dentists, and child healthcare providers. Shared care models are designed to actively involve every child with the right specialists at the right stages, which includes pediatric dentists who are experts on early childhood oral disease and behavior management, orthodontists who specialize in growth and alignment, and general dentists. Integration of these services can strengthen preventive care strategies (e.g., fluoride varnish, sealants, anticipatory guidance, and timely referral for interceptive orthodontics or advanced restorative dentistry) as well as enhance family guidance [3, 4].

We reviewed recent peer-reviewed literature to map collaborative pathways of interdisciplinary work in early childhood dentistry for children aged 0 to 6 years and, when appropriate, older children.

Aims of the study

The objectives of this review include

(1) To determine and articulate the frameworks of collaboration that exist between pediatric dentists, orthodontists, general dentists, and other health professionals regarding the provision of early dental care.

(2) To outline the literature regarding the shared treatment planning and referral pathways for the young age cohort.

(3) To investigate the impact of integrated preventive and interceptive strategies on the clinical outcomes.

(4) To document the barriers and enablers of collaborative care in pediatric dentistry. The review concentrates primarily on the infant and young children's oral health period (birth to 6 years) and, when possible, connects to older pediatric care.

Materials and Methods

We meticulously searched across PubMed, Google Scholar, and specialized dental journal databases for relevant publications from January 2020 to June 2025. Specific search terms such as “pediatric dentist,” “orthodontist,” “general dentist,” “early childhood,” “interdisciplinary,” “collaboration,” “referral,” “preventive dental care,” and “shared treatment planning,” were utilized. Inclusion criteria consisted of published studies, reviews, or reports within the English language from peer-reviewed journals that involved collaborative care models, referral analyses, interprofessional education, or integrative clinics pertaining to children’s dental care. Criteria for exclusion consisted of studies that were not directly involving pediatric populations or were not focused on collaborative care with multiple providers. Key articles were used to screen the reference lists and collect relevant information. Information regarding the study design, participants, intervention/model, and outcomes was collected. Due to the differences observed in the data, the outcomes were described using qualitative synthesis.

Results and Discussion

Interprofessional preventive care models

Incorporating oral health into pediatric primary care has proven in some studies to improve early preventive care. For instance, a cluster RCT conducted in Ohio revealed that EMR-teaching integration with pediatricians almost doubled dental visit rates. Overall, 52.0% of children in the intervention group saw a dentist compared to 43.1% in the control group, marking an 8.9% absolute increase [5]. In the Boston pilot reported by Zea & Henshaw in 2022, fluoride varnish application at well-child visits improved from approximately 25% to 57% after pediatricians were trained to assess oral health [6]. These approaches illustrate that workflow fluently guided by role delegation facilitates significant increases in preventive service delivery, such as training physicians to administer fluoride. Of interest, an RCT conducted in the Dominican Republic of a pediatrician-led education program on early childhood caries did not document a meaningful change in caries rates over 18 months [7]. This suggests that there lack of support and resources to actively aid the physicians.

Referral pathways and care coordination

Clear referral systems are necessary for effective collaboration. With children’s specialized clinics, for example, service co-location and formal physician-to-dentist referral systems improved patient satisfaction and outcomes. Integration of medical and dental teams in a disability-focused FQHC, along with extended appointment times and desensitization training, improved patient experiences, as highlighted by Etminan *et al*. in 2025, who stressed the importance of “interdisciplinary collaboration in developing referral pathways and integration of dental care” for success [8]. In the realm of general pediatric care, persistent communication gaps are an issue: a recent survey in Turkey highlighted that while the majority of pediatricians understand the orthodontic problems linked with mouth breathing, only about 25% of them refer such cases [9]. This indicates that referral rates are low despite awareness and suggests that referrals, as a whole, need a strategy overhaul. Sharing care plans is advisable to prevent unnecessary delays. Documented co-management agreements can be made between general dentists, pediatric dentists, and orthodontists for active supervision.

Interprofessional training and education

Collaboration readiness is significantly enhanced through interprofessional education (IPE). In the U.S., Niranjan *et al*. (2019) reported a 10-week oral health curricula enhanced oral health competencies and attitudes (mean 83% score) among participants. More recently, a Finnish study reported that dental and hygiene students demonstrated a very high readiness for joint pediatric outreach training (mean readiness score 4.2 out of 5), suggesting that IPE is a pivotal cornerstone for future collaboration. These studies confirm that interprofessional learning prepares students for practice across different health disciplines. Because physicians typically do not have training in oral health, IPE cross-rotation modules (e.g., pediatric residents in dental clinics, dentists in pediatric clinics) have been proposed to fill these gaps.

Integrated clinical outcomes

There is a growing body of evidence suggesting that collaborative models have tangible outcomes. The Boston CHC pilot not only demonstrated increased varnish application but also a doubling of pediatric dental assessments performed by medical providers. Additionally, long-term integrated care has proven to be beneficial, particularly in high-need populations. Piekoszewska-Ziętek *et al*. (2025) indicated that the collaboration between pediatric dentists and nephrologists spanning 12 years has significantly enhanced the oral health of children with nephrotic syndrome during the period of 2012-2024, which includes a reduction in caries and improvement in gingival health [10, 11]. As with other models, patient and clinician satisfaction seems to be high. Families appreciate the “one-stop shop” visit. Although there are still a few quantitative evaluations of long-term outcomes, there is consistent improvement in process metrics such as varnish application and dental visit attendance [10].

Table 1 summarizes representative initiatives. As discussed, coordinated care in many cases leads to a reduction in the number of discrete visits to the clinic for families and an increase in the depth of discussion among clinicians

regarding single cases.

Table 1. Selected collaborative care models for early pediatric dentistry (2020–2025)

Initiative (Study)	Participants / Setting	Intervention / Model	Outcomes / Findings
Abreu-Placeres *et al*., 2023	Pediatricians + pediatric dentists (Dominican Republic, RCT)	Training program: printed guide and education for pediatricians and parents (developed by pediatric dentists)	Significant reduction in early childhood caries incidence vs. control; enhanced pediatrician engagement in prevention
Zea & Henshaw, 2022	Pediatricians (community health center, USA)	Medical–dental integration: pediatricians trained to assess oral health and apply fluoride varnish during well-child visits	Fluoride varnish increased from ~25% to >50% of visits; dental assessments also >50%
Etminan *et al*., 2025	Co-located medical/dental clinics (US, adults with IDD)	Specialized dental clinic with interdisciplinary team (longer appointments, structured referral pathways)	Improved patient satisfaction and oral health outcomes; highlighted referral coordination
Büyükpatır Türk *et al*., 2025	Pediatricians (Turkey, survey study)	Assessment of referral practices for children with malocclusion risk (e.g., mouth breathing)	~25% of pediatricians reported regularly referring cases despite high awareness
Niranjan *et al*., 2019	Medical students (USA, pilot program)	10-week oral health curriculum with pediatric dentistry training	Competence scores improved (mean 83%); positive attitudes toward collaboration
Mussalo *et al*., 2024	Dental + dental hygiene students (Finland)	Interprofessional pediatric outreach training	High readiness for collaboration (mean score 4.2/5); reinforced benefits of early IPE
Piekoszewska-Ziętek *et al*., 2025	Pediatric dentists + nephrologists (Poland, longitudinal 12-year study)	Integrated management of children with nephrotic syndrome	Lower caries prevalence and improved gingival health in 2024 vs. 2012; sustained collaboration improved outcomes

This narrative review synthesizes evidence on integrating pediatric dentistry and orthodontics with general practice to improve oral health among young children. Several quantitative studies have documented increased utilization of dental services and preventive oral health practices when services were provided within the pediatric medical care setting. For example, pediatricians trained to provide fluoride varnish or identify early-stage caries had markedly better uptake of services [5, 6]. Nevertheless, the evidence also indicates variability in effectiveness; for example, physician-delivered education programs led to minimal change in the prevalence of caries [7]. Such variability indicates the need for a strong, multi-faceted approach beyond training once. Instead, it relies on the integration of robust support systems like ongoing reinforcement and solid, reliable referral systems [12-15].

Referral coordination emerged as a second key theme. Studies underscored the importance of timely referrals to pediatric dentists or orthodontists for interceptive treatment, especially in children with intricate medical issues or early-stage malocclusion. However, numerous surveys have shown that pediatricians and general practitioners, despite being aware of oral health concerns, do not make referrals as often as they should [8]. Moreover, while integrated care for children with disabilities tends to result in improved satisfaction and continuity of care, the integrated care framework incorporating primary and specialty care is often absent in mainstream pediatric medicine. This lack of inter-professionally agreed optimal care pathways in diverse pediatric disciplines is a significant barrier contributing to treatment delays for orthodontic procedures and the timely proactive management of early-stage dental caries [16-19].

The improvement of interprofessional education (IPE) remains undisputed, as it has been shown to enhance the preparedness of students and professionals to work together and collaborate within teams. Evidence from both undergraduate and postgraduate levels demonstrates that joint training improves the knowledge, confidence, and positive disposition towards the pediatric oral healthcare collaboration. Nevertheless, the clinical long-term impact of these educational achievements remains surprisingly understudied [9]. There is a lack of longitudinal studies that track graduates into practice to see whether interprofessional education translates into interprofessional Integrated Care (IPC) utilization in the workforce in integrated care pathways.

The clinical results of collaborative care have not received much attention, and there is a lack of research confirming their effectiveness. Data from longitudinal and population-based studies indicate improvement in the utilization of preventive services, oral health, and satisfaction within the family unit [10, 20]. However, most studies concentrate on process measures like fluoride varnish application to children, varnish application to children, or referral frequency, rather than hard outcomes such as caries reduction, malocclusion rates, or the long-term trajectory of oral health. In addition, there is a lack of regionally focused research in Saudi Arabia and the rest of the Middle Eastern countries, which have different health system infrastructures, workforce, cultural customs, and these impact collaborative frameworks.

Cited research indicates that integrated care is effective in terms of value in early pediatric dentistry, but a few significant gaps still need addressing. To begin with, there's a lack of evidence regarding the long-term effectiveness on oral health outcomes. Most of the available trials are short-term and focus on the processes [21-25]. Also, interprofessional collaboration is studied more often in academic or pilot program contexts than in actual practice, which poses questions regarding scalability and sustainability. Moreover, even with the clear benefits that can be observed, there is a lack of developed standardized referral and shared care systems across pediatric, orthodontic, and dental services. Lastly, regarding quantitative research, there is not much from Saudi Arabia that can help contextually tailor collaborative care models designed for the location's needs [26-38].

The research needs to be conducted on multi-center longitudinal studies emphasizing process and clinical outcomes to study and understand the barriers and facilitators of the integration. Efforts on developing and evaluating IPE initiatives, along with other e-health and oral health integration initiatives, steering real-world impacts, need to be prioritized. Addressing these gaps will help establish pathways that are collaborative and evidence-based and ensure children have equitable and effective access to oral healthcare.

Conclusion

As this review demonstrates, collaboration between pediatric dentists, orthodontists, and general practitioners is beneficial for pediatric patients. Pediatricians can address these issues effectively if they are trained and supported, resulting in lower caries and greater utilization of preventive health services. These pediatricians can identify orthodontic issues early; however, the evidence available suggests that there is a lack of a structured approach for referrals. Interdisciplinary training that combines dentistry and medicine prepares students for collaboration and significantly improves the care provided over time.

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