Original Article

Cross-Sectional Study of Pediatric Dental Services and Referral Patterns Among General Dental Practitioners in Isfahan

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Abstract

Background and Aim: This study assessed dental services provided to children by general dental practitioners in Isfahan and explored factors influencing referrals to pediatric dentists.

Materials and Methods: Using convenience sampling, a cross-sectional study surveyed 252 general dental practitioners in Isfahan. An electronically administered, validated researcher-made questionnaire collected data on demographics, pediatric dental services, reasons for non-provision, and referral determinants. Data were analyzed using Mann-Whitney, Kruskal-Wallis, and chi-squared tests (α=0.05). P-values less than 0.05 will consider statistically significant.

Results: Of the participants, 121 (48%) were female, with an overall mean age of 31.33±6.79 years. Seventy-five percent of general dental practitioners provided dental treatments to children, with a preference for those aged 6-14. Inadequate proficiency in pediatric dentistry emerged as the primary reason for non-provision. Commonly offered services included fissure sealant therapy (58.3%) for permanent teeth in preventive care, tell-show-do technique (55.2%) in behavior management, amalgam restoration of permanent teeth (66.3%) in restorative services, and direct pulp capping of permanent teeth (41.3%) in pulp therapy. Trauma management and space maintenance services were less frequently provided. Key factors influencing referrals included the specialist's reputation (20.8%) and their ability to handle patients effectively (16.6%).

Conclusion: The study reveals that three-fourths of general dental practitioners in Isfahan extend dental services to children. Notably, referrals were significantly influenced by the reputation and patient-handling proficiency of pediatric dentists. In light of these findings, implementation of continuous education programs aiming at augmenting the knowledge and skills of general dental practitioners in the field of pediatric dentistry is recommended.

Key Words: Dentist, pediatric dentistry, pediatric dental care, referral, counseling

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Introduction

Pediatric dentistry goes beyond relying on a specific set of predefined skills and instead involves the comprehensive application of various dental techniques within the domain of children's health and disease [1]. Pediatric

dentists are essential in treating children's primary teeth and addressing their unique oral health needs. They focus on preventing oral diseases like early childhood caries and parafunctional habits. General dental practitioners also have a responsibility to screen, educate, and treat dental issues in children, referring them to pediatric dentists as needed [2]. Treating children can be an incredibly rewarding experience for dentists. With a positive mindset, proper practice, and a suitable environment, pediatric dentistry can become enjoyable for both children and dental professionals. The overarching goal is to deliver safe and high-quality dental services in a child-friendly environment, fostering a positive attitude towards oral health and care. Regardless of their personality, dentists can effectively manage children and contribute to their oral well-being [3].

General dental practitioners face obstacles in providing dental services for children due to factors such as limited knowledge in pediatric dentistry, lack of self-confidence in preventive treatments for children under three years old, and challenges in diagnosing and treating dental problems in very young children [4]. However, general dental practitioners who receive adequate education during their university training have the necessary skills to provide dental treatments for children [5]. It is important to note that the majority of dental personnel are general dental practitioners, whereas pediatric dentists constitute a smaller proportion. As a result, general dental practitioners must play a vital role in meeting the dental needs of children. To address this, it is necessary to increase the number of general dental practitioners who are proficient in providing dental services for children [6].

Numerous studies have examined dental treatments provided by general dental practitioners and referral mechanisms across various dental specialties such as orthodontics, surgery, and periodontics. [7-9]. In the context of pediatric dentistry, globally, much of the research has focused on the availability of early dental care for very young children and the establishment of a dental home [11, 12]. For example, a study conducted in West Virginia found that most general dentists primarily provide care to older children, with limited focus on those aged two years [13]. Another study highlighted that about 90% of general dental practitioners regularly refer children under the age of three to pediatric dentists [5]. In contrast, some research has explored the types of dental services general dentists provide to both younger and older children [6, 14].

In Iran, previous studies have largely focused on specialized treatments delivered by general dental practitioners, particularly in orthodontics and periodontics [15-17]. However, the paucity of research examining the comprehensive range of dental services provided to children by general dentists is critical, as understanding the scope of these services can inform strategies to improve pediatric dental care. To address this gap, the present study was conducted with the aim of evaluating the dental services provided for children by general dental practitioners and their referral patterns to pediatric dentists in Isfahan. Specifically, the study sought to answer the following questions: What types of dental services do general dental practitioners in Isfahan provide to children of different age groups? Additionally, what factors influence the decision of general dental practitioners to refer pediatric patients to specialists?"

Materials and Methods

The research protocol for this study received approval from the Deputy Research Dean at Isfahan University of Medical Sciences, under the ethics code IR.MUIRESEARCH.RCE.1399772. Participation in the study was voluntary. The participants were enrolled in the study with written consent from.

This cross-sectional study involved 252 general dental practitioners in Isfahan, Iran. The sample size for this study was calculated as 252 using Cochran's formula, with a 95% confidence interval (z = 1.96), a probability (p) of 0.5 (to maximize variability), and an error margin (d) of 0.062.

$$n = \frac{z^2_{1-\frac{\alpha}{2}}\, P(1-P)}{d^2}$$

The study enrolled general dental practitioners in Isfahan city during July 2021 who met the inclusion criteria, including having a minimum of one year of working experience and expressing interest in participation. The

exclusion criteria consisted of individuals who were not interested in taking part in the study and those who submitted incomplete questionnaires.

Convenience sampling was employed to select participants for this study. The questionnaires, designed on the Porsline platform, were distributed electronically via SMS and WhatsApp messages until the desired sample size was reached. Prior to participation, a comprehensive explanation of the study was provided to the potential participants, and their informed consent was obtained electronically. The questionnaires were designed to be anonymous, ensuring the confidentiality of the dentists' personal data.

The data collection tool utilized in this study was a researcher-made questionnaire, developed based on a review of relevant literature and reference books [6, 14, 18, 19]. The questionnaire was divided into three sections.

The first section captured demographic information, including age, gender, university of study, and primary location of professional activity. It also included questions about providing dental treatments for children, the distribution of children across different age categories in the respondents' practices, and the reasons for not providing such services.

The second section comprised questions pertaining to various pediatric dentistry procedures in the fields of prevention, behavior management, restoration, pulp therapy, trauma, and space maintainers. It assessed the frequency of performing these procedures in practice using a Likert scale (very often/often, sometimes, rarely/never). Additionally, dentists were asked to indicate their dental school education format (preclinic, clinic, none) and express their opinion on the need for further training using a Likert scale (strongly agree/ agree, moderately agree, not agree).

The final section consisted of tables to evaluate different factors influencing patients' referral to pediatric dentists, such as the specialist's reputation, patient satisfaction, proper management, and familiarity with the specialist. It also included an assessment of appropriate approaches for further dental education, including modifications to the university educational system, workshops, continuous education seminars, and the organization of private courses.

The face and content validity of the questionnaire were evaluated by a panel of 15 experts, including three general dental practitioners, seven pediatric dentists, one community dentistry specialist, two endodontists, and two oral medicine specialists. The evaluation process consisted of two parts: face validity and content validity. In the face validity section, an impact score item was employed. Questions that obtained an impact score below 1.5 were eliminated from the questionnaire. In the content validity section, two measures, namely the Content Validity Index (CVI) and the Content Validity Ratio (CVR), were assessed. The minimum acceptable scores for CVI and CVR were set at 0.79 and 0.49, respectively. As an example, within the pulp therapy services section, certain items such as revascularization, root canal therapy of permanent teeth, and apexification were eliminated based on the evaluation [20].

Reliability was evaluated using the test-retest method. A subgroup of 20 dentists, who were distinct from the main sample, completed the questionnaire again after two weeks, and the intraclass correlation coefficient (ICC) was calculated. An ICC value greater than 0.7 indicates good reliability for the questionnaire [21]. In this study, ICC was found to be 0.799, with a significance level of 0.05. This indicates a significant correlation between the two tests and confirms the reliability of the questionnaire [22].

The data were analyzed using SPSS software. Descriptive analyses were employed to examine descriptive data, including means, standard deviations, and frequency distributions. Chi-squared tests and Mann-Whitney and Kruskal-Wallis tests were utilized to assess the frequency of main items and their associations with demographic variables such as gender and age. The contingency table method with chi-squared tests was employed to examine the associations between variables within the three columns: frequency of procedures performance, format of dental school education, and opinion regarding the need for further training. The significance level for the study was set at $P<0.05$.

Results

Section 1: Profile of general dental practitioners and their dental services for children

A total of 252 general dental practitioners in Isfahan, Iran, completed the study, yielding a response rate of 63% from the 400 questionnaires distributed. Of the respondents, 48% were female, with a mean age of 31.33 ± 6.79 years and an average time since graduation of 6.9 ± 7.64 years. The majority (96.8%) had graduated from dental schools in Iran, while 3.2% had received their education abroad (Table 1).

Table 1. Demographic and Professional Characteristics of Respondents

Characteristic	Number (n)	Percentage (%)
Total Respondents	252	100%
Gender		
- Female	121	48%
- Male	131	52%
Education Location		
- Graduated in Iran	244	96.8%
- Graduated Abroad	8	3.2%
Primary Professional Location		
- Public Sector Clinics	76	30.2%
- Private Sector Clinics	74	29.4%
- Private Offices of Other Dentists	58	23%
- Own Private Office	44	17.5%

It should be noted that 25% of general dental practitioners did not provide dental treatment services for children and adolescents less than 14 years of age. As a result, 75% of the participants (189 dentists) proceeded to answer the remaining questions on the questionnaire. Table 2 illustrates the reasons provided by the respondents for not offering dental services in this age group. Multiple responses were allowed. The most frequently selected reason (25.5%) for not providing dental services was a lack of necessary dental skills to treat children, while the least frequent reason (1.4%) was deemed to be cost-effectiveness. Additionally, according to Table 3, a majority of the children treated by general dental practitioners in the past 12 months fell within the 6–14 age range (59.2%). The study results indicate that male dentists treated children under 14 years of age more frequently than their female counterparts, with statistical significance (p=0.011).

Section 2: Dental services provided by general dental practitioners for children

Among the various preventive dental care procedures, such as oral hygiene instructions, topical fluoride therapy, examination of infants (0-1 year), examination of children (1-3 years), fissure sealant therapy for primary teeth, fissure sealant therapy for permanent teeth, and dietary counseling, the most commonly performed preventive care procedure was fissure sealant therapy for permanent teeth, accounting for a rate of 58.3%. On the other hand, the examination of infants (0-1 year) was the least frequently performed procedure, accounting for only 3.6% of the cases.

The frequencies of behavior management procedures were as follows: TSD (Tell-Show-Do) (55.2%), positive reinforcement (49.6%), distraction (44.8%), parents' presence (25%), voice control (24.6%), HOM (hand-over-mouth exercise) (12.7%), and the use of stabilization devices (3.2%). In terms of further education, 44% of general dental practitioners expressed the need for additional training in TSD. Additionally, one-fourth of the practitioners felt they required further education in positive reinforcement, distraction, and voice control.

The frequencies of restorative procedures in descending order were as follows: amalgam restoration of permanent teeth (66.3%), composite resin restorations of permanent teeth (55.6%), PRR (Preventive Resin Restoration) of permanent teeth (55.2%), SSC (Stainless Steel Crown) of primary teeth (45.6%), amalgam restoration of primary teeth (21.4%), composite resin restoration of primary teeth (13.9%), SSC of permanent teeth (12.3%), and restoration of teeth in 1-3-year-old children (9.9%). Among these treatments, almost one-third of dentists believed they needed further education in restorative treatments for primary teeth and composite resin restoration of primary teeth. Additionally, nearly 40% of

Table 2. The frequency distributions of reasons for not providing dental treatments for children by general dentists in Isfahan (n=252)

The reasons for not providing dental services for children	Frequency	Percentage
I do not have the necessary skills in treating children.	74	25.5
I am not interested in providing dental services for children.	67	23
I do not have enough time to treat children.	51	17.5
I am not able to treat uncooperative patients.	49	16.8
The work environment is not suitable and does not have proper facilities to treat children.	27	9.3
Children interfere with my dental services.	19	6.5
It is not cost-effective.	4	1.4

Table 3. The frequency distribution of ages of children, who were treated in the past 12 months by general dentists in Isfahan (n=252)

Children's age	Frequency	Percentage
6–18 months	6	2.4
19 months to 3 years	8	3.2
4–6 years	28	11.1
7–10 years	72	28.6
11–14 years	77	30.6

dentists believed they needed further education in the SSC treatment of both permanent and primary teeth (Table 4).

The frequencies of pulp therapy services provided by the general dental practitioners in the present study were as follows: direct pulp capping of permanent teeth (41.3%), pulpotomy of primary teeth (40.9%), pulpectomy of posterior primary teeth (28.2%), apexogenesis of permanent teeth (16.3%), and pulpectomy of anterior primary teeth (13.5%). Among these dental procedures, the majority of dentists believed they required further education in apexogenesis of permanent teeth (63.1%) and direct pulp capping of permanent teeth (45.2%) (Table 5).

The trauma services assessed in the present study included concussion/subluxation, lateral luxation/extrusion, and intrusion/avulsion. The findings revealed that approximately 40-50% of dentists seldom provided trauma services for children, and a similar percentage of dentists had not received education in trauma services during their preclinic or clinic training.

The section on space maintainer evaluated various types, including removable space maintainer, fixed bilateral space maintainer (TPA (Trans-Palatal Arch) and lingual arch), and unilateral fixed space maintainer (bond & loop). Among these, the unilateral fixed space maintainer was used at a higher rate compared to other similar space maintainers. Approximately half of the dentists in the study rarely provided space maintainer services and had not received any specific instructions or training in this area.

Regarding gender, the study results revealed one significant finding. Female dentists reported significantly higher utilization of the distraction technique in behavior management procedures compared to their male counterparts (p=0.032). However, no significant associations were found between age and the items studied.

The results indicated no significant associations between the frequency of procedure performance and the format of dental school education (p=0.191), between the frequency of procedure performance and the opinion

Table 4. The frequencies (percentages) of restorative procedures provided for children by general dentists in Isfahan (n=252)

Restorative procedures	Frequency of performance of the procedure in practice			Format of dental school education				Opinion regarding further training		
	Very often/ often	Sometimes	Rarely/ Never	Preclinic	Clinic	Preclinic and clinic	None	strongly agree/agree	moderately agree	not agree
Restorative procedures for 1–3 year-old children	25 (9.9%)	50 (19.8%)	114 (45.2%)	18 (7.1%)	47 (18.7%)	8 (3.2%)	116 (46.0%)	89 (35.3%)	81 (32.1%)	19 (7.5%)
Amalgam restoration of primary teeth	54 (21.4%)	82 (32.5%)	53 (21.0%)	10 (4.0%)	74 (29.4%)	70 (27.8%)	35 (13.9%)	65 (25.8%)	95 (37.7%)	29 (11.5%)
Composite resin restoration of primary teeth	35 (13.9%)	78 (31.0%)	76 (30.2%)	8 (3.2%)	65 (25.8%)	71 (28.2%)	45 (17.9%)	93 (36.9%)	83 (32.9%)	13 (5.2%)
SSC for primary teeth	115 (45.6%)	41 (16.3%)	33 (13.1%)	10 (4.0%)	61 (24.2%)	104 (41.3%)	14 (5.6%)	103 (40.9%)	67 (26.6%)	19 (7.5%)
Amalgam restoration of permanent teeth	167 (66.3%)	11 (4.4%)	11 (4.4%)	21 (8.3%)	51 (20.2%)	115 (45.6%)	2 (8.0%)	66 (26.2%)	72 (28.6%)	51 (20.2%)
Composite resin restoration of permanent teeth	140 (55.6%)	32 (12.7%)	17 (6.7%)	10 (4.0%)	57 (22.6%)	111 (44.0%)	11 (4.4%)	73 (29.0%)	77 (30.6%)	39 (15.5%)
Preventive resin restoration (PRR) of permanent teeth	139 (55.2%)	39 (15.5%)	11 (4.4%)	30 (11.9%)	57 (22.6%)	98 (38.9%)	4 (1.6%)	52 (20.6%)	63 (25.0%)	74 (29.4%)
SSC for permanent teeth	31 (12.3%)	23 (9.1%)	135 (53.6%)	8 (3.2%)	83 (32.9%)	61 (24.2%)	37 (14.7%)	117 (46.4%)	44 (17.5%)	28 (11.1%)

Table 5. The frequencies (percentages) of pulp therapy procedures provided for children by general dentists in Isfahan (n=252)

Pulp therapy procedure	Frequency of performance of the procedure in practice			Format of dental school education				Opinion regarding further training		
	Very often/ often	Sometimes	Rarely/ Never	Preclinic	Clinic	Preclinic/ Clinic	None	strongly agree/ agree	moderately agree	not agree
Primary tooth pulpotomy	103 (40.9%)	69 (27.4%)	17 (6.7%)	11 (4.4%)	82 (32.5%)	95 (37.7%)	1 (4.0%)	89 (35.3%)	73 (29.0%)	27 (10.7%)
Anterior primary tooth pulpectomy	34 (13.5%)	75 (29.8%)	80 (31.7%)	18 (7.1%)	81 (32.1%)	84 (33.3%)	6 (2.4%)	100 (39.7%)	81 (32.1%)	8 (3.2%)
Posterior primary tooth pulpectomy	71 (28.2%)	80 (31.7%)	38 (15.1%)	7 (2.8%)	98 (38.9%)	75 (29.8%)	9 (3.6%)	97 (38.5%)	78 (31.0%)	14 (5.6%)
Direct pulp capping of permanent tooth	104 (41.3%)	68 (27.0%)	17 (6.7%)	6 (2.4%)	119 (47.2%)	49 (19.4%)	15 (6.0%)	114 (45.2%)	37 (14.7%)	38 (15.1%)
Apexogenesis of permanent tooth	41 (16.3%)	24 (9.5%)	124 (49.2%)	5 (2.0%)	41 (16.3%)	20 (7.9%)	123 (48.8%)	159 (63.1%)	20 (7.9%)	10 (4.0%)

regarding a need for further training (p= 0.201), and between the format of dental school education and the opinion regarding a need for further training in each row of pediatric dentistry procedures (p= 0.135).

Section 3: Referral priorities and the need for further education among general dental practitioners

In this section, where subjects could only choose one option, the most significant criteria for referring a child patient to a pediatric dentist for continued treatment were as follows: the specialist's reputation (20.8%), the specialist's proper handling of patients (16.6%), reasonable treatment costs compared to other specialists (15.6%), patients' satisfaction and previous favorable experience (15.3%), the specialist's attention to patient's oral hygiene (13.7%), and the possibility of easy communication with the specialist and their proper responsiveness (9.9%).

In the last section, where dentists were asked to select the best approach for further education, considering deficiencies in educational programs, the following options were chosen: holding workshops by universities (29.1%), private educational courses in pediatric dentistry (28%), educational seminars for dentists (25.9%), and changes in the educational curriculum of the university (16.9%).

Discussion

The present study aimed to evaluate the dental services provided for children and the referral patterns to pediatric dentists by general dental practitioners in Isfahan. Our findings revealed that a significant proportion, three-fourths, of the general dental practitioners in Isfahan actively provided dental services for children. Furthermore, these practitioners exhibited a higher interest in treating children within the age range of 6-14 years. Among the factors influencing patients' referral to a pediatric dentist, the reputation and proper management of the specialist emerged as the most important considerations.

The study findings revealed that three-fourths of the general dental practitioners in Isfahan provide dental services for children, which aligns with the results of previous studies, including the study conducted by Jafari et al. in Iran [23]. In studies conducted by Seals et al. in the United States [6], Arjoum et al. [24], and Barker et al. [14], it was found that over 90% of general dental practitioners provided dental services for children. The variation in results across different studies may be attributed to differences in the evaluated communities. For example, a study in the U.S. found that dentists working in rural areas had limited referral options, which meant they had to provide treatments themselves [6]. However, in the present study, the general dental practitioners had convenient access to pediatric dentists, which led some of them to believe that they did not need to provide dental treatments for children.

According to the findings of the present study, it was observed that general dental practitioners in Isfahan predominantly provide dental services to children and adolescents aged 6-14 years (59.2%). On the other hand, there is a limited provision of dental services for children aged 6-18 months (2.4%). These findings align with previous studies, indicating that general dental practitioners tend to be more interested in treating older children and that only a small number of them provide dental services for children in the 6-18 month age range [6, 14]. For children aged 6-18 months, crucial dental services extend beyond oral hygiene education, dietary instructions, and fluoride therapy. Key aspects include early dental examinations, preventive measures like sealants, guidance for parents on teething support, assessment of feeding habits (e.g., breastfeeding practices), monitoring growth and development of primary teeth, early intervention for habits (e.g., thumb-sucking), education on injury prevention, addressing developmental enamel defects, and establishing a dental home for consistent care. Gang et al. suggest that the lower interest in treating very young children could be attributed to the challenges associated with managing their behavior, their uncooperativeness, and potential issues with insurance reimbursement [12].

The present study revealed that 25% of general dental practitioners in Isfahan expressed a lack of interest in treating children. They cited reasons such as insufficient skills, limited time availability, and a general lack of interest in treating child patients. These findings are consistent with studies conducted by Seals et al. [6] and Barker et al. [14], where inappropriate treatment settings for children and a lack of interest were also identified as reasons for not providing dental treatments for children.

Previous studies have also indicated that the examination of infants and children aged 1-3 years was not satisfactory, which aligns with the general lack of interest among dentists in treating very young children and the insufficient training received during their university education in this regard. The limited number of dentists conducting oral examinations for infants and very young children aligns with the low presence of this age group in their practices. Additionally, while fissure sealant therapy was found to be the most commonly performed preventive measure in the present study, its frequency was relatively lower compared to similar studies [6, 14]. In a study conducted by Jafari et al. in Iran, it was found that 37.2% of general dental practitioners provided fluoride therapy for children when necessary [23]. This rate is lower compared to other studies where approximately 80% of general dental practitioners reported carrying out fluoride therapy [6, 14], indicating a lower rate of fluoride therapy in Iran. Given the importance of fluoride in preventing dental caries, it is crucial to enhance the emphasis on this procedure in dental education curricula and continuous education programs [23]. By increasing awareness among dentists about the significance of fluoride therapy, its implementation can be improved to promote better oral health outcomes.

The general dental practitioners in Isfahan demonstrated a preference for using less aggressive behavior management techniques during dental procedures for children. The most commonly employed techniques were TSD and positive reinforcement, while techniques such as HOM exercise and protective stabilization were utilized by a small percentage of dentists. Protective Stabilization proves essential in specific scenarios, especially when sedation or general anesthesia isn't viable, playing a vital role for pre-cooperative children, those who are uncooperative, and individuals with special needs [25]. Dentists seem to respond predictably to these trends, increasingly exhibiting hesitation in employing Hand-Over-Mouth. As the landscape of behavior management continues to evolve, it becomes crucial for dental professionals to embrace approaches aligned with ethical standards and responsive to evolving societal expectations. These findings are consistent with previous studies [6, 14] and align with the research conducted by Razeghi et al.[26], which indicated that non-aversive behavior guidance techniques received higher acceptability scores compared to aversive techniques like immobilization and HOM. Aminabadi et al. [27] suggest that nearly half of the children who are referred to hospitals for dental treatments under general anesthesia could be effectively managed by general dental practitioners using behavior management techniques. Therefore, it is possible that inappropriate referrals are primarily attributable to dentists' insufficient knowledge, skill, and patience.

In the present study, the restorative services most commonly provided were the restoration of permanent teeth, including amalgam restoration (66.3%), composite resin restoration (55.6%), and PRR (55.2%). These findings align with the observation that general dental practitioners showed more interest in treating children over the age of six. Moreover, a higher percentage of general dental practitioners (45.6%) in the present study provided SSC treatment for child patients compared to previous studies (15-17%) [6, 14]. The use of SSCs for restoring primary teeth with moderate to severe destruction is considered a standard treatment, and pediatric dentists often consider it one of the most commonly used dental treatments for children [6, 14]. Shelton's study also revealed that pediatric dentists exhibited greater interest in using SSCs to treat carious teeth compared to general dental

practitioners. By enhancing the education and access to continuous education programs for general dental practitioners, their utilization of SSCs can be increased [28].

The present study found that a small percentage of dentists performed apexogenesis (16.3%) and pulpectomy procedures on primary teeth. Specifically, 13.5% of dentists performed pulpectomy on anterior primary teeth, while 28.2% performed pulpectomy on posterior primary teeth. Additionally, less than half of the participants (40.9%) carried out pulpotomy procedures on primary teeth. Properly performing these pulp therapy procedures and providing appropriate final restorations are essential for maintaining the health and longevity of primary teeth in child patients [29].

In the present study, a small percentage of general dental practitioners reported offering trauma services in most cases and always. Specifically, the provided trauma services included avulsion (7.1%), intrusion and lateral luxation (12.7%), and concussion and mobility (14.7%). These findings differ from a study by Ravicomar in Europe [30], which reported higher percentages for avulsion (65%), intrusion (53%), lateral displacement (36%), and concussion and subluxation (53%). The lower rate of providing trauma services in our study could be attributed to a lack of sufficient education and training during dental school. Many studies have highlighted the inadequate emergency treatment received by dental trauma patients worldwide, often due to dentists' lack of competency, limited knowledge, and limited experience in managing dental trauma cases. Given the complexity and long-term care required for dental trauma, many dentists prefer to refer such cases to specialists [31].

The results of this study regarding space maintainer services in pediatric dentistry align with previous findings, including a study by Jafari et al. in Tabriz [32] , which reported a similar percentage of dentists (around 5.76%) interested in providing space maintainer services. The low frequency of providing space maintainer services among general dental practitioners can be attributed to factors such as a lack of continuous study of reference textbooks, limited sensitivity to the importance of space maintainers, and the tendency to refer such cases to pediatric dentists. Addressing these issues would require proper training of dental students during their university education and potential modifications to the educational curricula [23]. By enhancing the training and knowledge of general dental practitioners, it is possible to reduce the number of referrals to pediatric dentists and increase their capability to provide space maintainer services [33, 34]. Modifying educational curricula to emphasize the importance and techniques of space maintainers could be a valuable approach in achieving this goal.

The present study revealed that among the various factors influencing patients' referral to a pediatric dentist, the reputation and effective management of the pediatric dentist were the most important. Conversely, factors such as gratitude for the referral and a short waiting list were deemed less significant. These findings underscore the crucial role of a pediatric dentist's expertise and patient management skills in driving referrals for counseling or treatment.

In terms of improving educational programs for dentists, the study participants expressed the belief that modifying the university educational curriculum would be the most effective approach. They perceived continuing education programs and seminars as less impactful, possibly due to the associated cost. These insights suggest the need to prioritize curriculum enhancements in dental education to better equip dentists with the necessary knowledge and skills, while also considering the feasibility and accessibility of continuing education initiatives.

The current study, which included an ample sample size, was the first in Iran to thoroughly evaluate the extent of general dentists' involvement in pediatric dentistry and their referral patterns.. However, it had certain limitations. Firstly, the study focused exclusively on general dentists practicing in Isfahan. As a result, the findings may not be fully representative of the entire country, given the

potential regional variations in dental practices and referral patterns. Secondly, there was a potential for nonresponse bias, which could have impacted the results. Nonresponse bias occurs when the individuals who choose not to participate in the study differ in significant ways from those who do participate, potentially skewing the data and affecting the generalizability of the findings. Although a reasonable response rate was achieved, the characteristics of non-responders were not accounted for. This omission could introduce bias, as the non-responders might have different demographic or professional characteristics compared to the respondents. For instance, non-responders might include dentists with different levels of experience, practice settings, or attitudes towards pediatric dentistry, which could influence the overall findings of the study. Addressing this limitation in future research could provide a more comprehensive understanding of the general dentists' involvement in pediatric dentistry and their referral practices. Additionally, the use of convenience sampling may have introduced selection bias, as the sample might not have been representative of the broader population of general dentists. Despite these limitations, valuable insights into the provision of dental services for children and the referral patterns in Isfahan were provided by our study. These findings highlighted important trends and challenges in pediatric dental care within this region. Moreover, a foundational step for future research on a national scale was established by this study, aiming to develop a comprehensive understanding of pediatric dental practices and referral behaviors across Iran Future research should aim to include a broader sample of dentists from various cities through random sampling, which would provide more representative national data. Additionally, analyzing data from dental records rather than relying solely on self-reported information would offer a more accurate assessment of actual practice patterns. Further studies should also examine the curricula of dental schools, focusing on the practical training provided in pediatric dentistry, to evaluate how well it prepares students for treating young patients.

In light of these findings, implementation of continuous education programs designed to enhance the knowledge and skills of general dental practitioners is recommended in pediatric dentistry, focusing on both practical and theoretical aspects to better prepare them for the unique challenges of treating young patients. Additionally, it is crucial to prioritize the enhancement of training programs for dentistry students by developing comprehensive workshops that address gaps in pediatric dentistry education. These initiatives should be supported by policy changes that mandate regular updates to the curriculum, ensuring alignment with the latest advancements in pediatric dental care and ultimately improving the quality of care provided to young patients.

Conclusion

The present revealed that approximately 25% of general dental practitioners in Isfahan do not provide dental services for child patients. Trauma services were found to be infrequently provided, even though they often require urgent attention. The study also identified the pediatric dentist's reputation and effective patient management as significant factors influencing patient referrals to pediatric dentists.

Disclaimers

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The contributing authors have no potential conflict of interest.

Ethical Issues

The research protocol for this study received approval from the Deputy Research Dean at Isfahan University of Medical Sciences, under the ethics code IR.MUIRESEARCH.RCE.1399772.

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Authors' contributions:

Study concept and design: Z. E., and N. L.; analysis and interpretation of data: Z. E., and N. L.; drafting of the manuscript: N. L.; critical revision of the manuscript for important intellectual content: Z. E., and N. L.; statistical analysis: Z. E.

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