International Journal of Dental Research and Allied Sciences
2021, Volume 1, Issue 2, Page No: 39-47

Available online at: www.tsdp.net

ISSN: 3062-3502

Original Article

Croatian Pediatricians' Expertise and Practices in Managing Dental Injuries and Mouthguard Use: A Croatian Survey

Murat Duman[1], İrem Solmaz[1]*, Cemal Kurt[1]

[1]Department of Pediatric Dentistry, Gulhane Faculty of Dentistry, University of Health Sciences, Ankara, Turkey.

***E-mail** ✉ i.solmaz_official@outlook.com

Received: 19 June 2021; **Revised:** 28 September 2021; **Accepted:** 04 October 2021

ABSTRACT

Dental trauma represents one of the most prevalent oral health challenges among children and adolescents. The objective of this research was to assess the knowledge and clinical practices of Croatian pediatricians regarding the management of dental injuries and their awareness of mouthguards as protective devices against such trauma. A cross-sectional survey using a structured questionnaire was conducted among 186 pediatricians, gathering data on demographics, professional experience, and familiarity with dental injury management. The responses were analyzed using Student's t-test or one-way ANOVA followed by Tukey's post hoc test ($p \leq 0.05$).

The overall mean knowledge score for dental trauma management was 3.6 ± 1.53. Better performance was observed among male pediatricians ($p = 0.016$), those who had previously encountered dental trauma ($p = 0.003$), and those with more than 10 years of pediatric experience ($p = 0.027$). Multiple linear regression revealed significant associations between knowledge of emergency management and both the level of healthcare practice ($\beta = -0.254$, $p = 0.002$) and the number of patients treated daily ($\beta = -0.187$, $p = 0.030$). Croatian pediatricians demonstrated limited understanding of first-line management of traumatic dental injuries. Therefore, incorporating formal training modules on dental trauma management into medical and pediatric curricula is strongly recommended.

Keywords: Dental trauma, Mouthguards, Interprofessional care, Pediatric dentistry

How to Cite This Article: Duman M, Solmaz I, Kurt C. Croatian Pediatricians' Expertise and Practices in Managing Dental Injuries and Mouthguard Use: A Croatian Survey. Int J Dent Res Allied Sci. 2021;1(2):39-47. https://doi.org/10.51847/Nh8JftYaaQ

Introduction

Traumatic dental injuries are among the most common orofacial conditions worldwide. Reports estimate that around one-third of preschoolers, one-quarter of school-aged children, and approximately one-third of adults experience some form of dental injury during their lifetime [1–3]. These injuries range from minor enamel fractures to severe damage involving supporting tissues, such as tooth avulsion. Regardless of the extent of injury, such events can profoundly affect a child's function, appearance, speech, and psychological wellbeing [4–6].

Because most dental trauma cases are acute emergencies, prompt and appropriate intervention is critical. Delays in providing initial care can negatively influence the prognosis of the affected tooth. Consequently, accurate diagnosis and immediate management are essential to preserve dental and oral health. Physicians—especially pediatricians—frequently serve as first responders for children lacking access to dental services, and therefore play a vital role in initial management following dental trauma [7].

Given that pediatricians oversee children's overall health, their role in oral health promotion and disease prevention is equally important [8]. Numerous studies and systematic reviews have examined the participation of physicians and pediatricians in children's oral health and evaluated their knowledge, attitudes, and professional behavior. Most of these investigations indicate that medical professionals generally exhibit limited awareness and competence

concerning oral diseases and dental injury management [9–17]. This knowledge gap is largely attributed to insufficient oral health education in medical training programs [8, 12, 14].

Because pediatricians often represent the first point of contact for concerned parents, especially in areas with restricted access to dental specialists, it is crucial that they possess adequate knowledge to manage or appropriately refer such cases. This is particularly relevant for children with developmental disorders, whose caregivers often place greater trust in pediatricians than in general dentists [8, 18].

In Croatia, the number of trained pediatric dentists is very limited—fewer than 50 nationwide—and most practice as general dentists in primary healthcare settings. Only a handful work in secondary or tertiary centers located in Zagreb, Rijeka, and Split. In contrast, there are about 714 pediatricians distributed across all healthcare levels and regions [19]. As a result, children have greater access to pediatricians than to specialized dental professionals. When a dental injury occurs, pediatricians often become the first healthcare providers parents seek, making it essential that they can offer accurate guidance or initial care.

General dentists, despite their broader patient base, must also dedicate appropriate attention to pediatric dental trauma. Barriers such as limited knowledge, inexperience, financial constraints, and challenging patient behavior can hinder effective treatment. Since timely and proper management is critical for preserving an injured tooth, general dentists may refer such cases to a pediatric dental specialist. However, due to the scarcity of these specialists, access to such care can be delayed [20].

Therefore, all healthcare professionals who routinely interact with children—including pediatricians—should receive adequate instruction and training in the prevention and management of dental injuries. The purpose of this study was to evaluate Croatian pediatricians' knowledge and attitudes toward the emergency care of traumatic dental injuries and their awareness of mouthguards as preventive tools.

Materials and Methods

A cross-sectional survey study was conducted to evaluate pediatricians' awareness, attitudes, and practical experience regarding dental trauma and its management. The research took place in April 2018 during the annual Croatian Spring Pediatric School symposium held in Vis, Croatia. Ethical clearance was obtained from the Ethics Committee of the Faculty of Medicine, University of Split, and the investigation adhered strictly to ethical standards, including the Declaration of Helsinki (2008 revision) and the STROBE guidelines for observational research.

The questionnaire provided background information about the project and specified that participation was voluntary, anonymous, and without cost. Eligible participants were licensed pediatricians with a minimum of one year of clinical practice. Exclusion criteria included refusal to participate and retired physicians aged 65 years or older.

The minimum sample size (n = 144) was determined from the total number of pediatricians attending the symposium, applying a 95% confidence level, 5% margin of error, and 50% estimated population proportion.

Following a detailed literature review of studies on physicians' and pediatricians' perspectives on dental trauma, 30 close-ended questions were selected and culturally adapted for the Croatian population [13, 15–17]. Two experts—one in endodontics and another in pediatric dentistry—validated the preliminary version. The original English questionnaire was translated into Croatian and pretested on ten pediatricians, who were not part of the main research. The instrument demonstrated satisfactory reliability, with a Cronbach's alpha of 0.725.

The survey consisted of four sections.

- Section 1 gathered demographic and professional data (age, sex, degree, workplace, duration of practice, working hours per day, and number of daily patients).
- Section 2 assessed knowledge using seven multiple-choice items—six with a single correct response and one allowing multiple correct options but evaluated dichotomously [21]. The cumulative correct responses represented the participant's total knowledge score, with a maximum of seven points. Knowledge levels were graded per Bloom's criteria: good (80–100%, 5.6–7 points), moderate (60–79%, 4.2–5.5 points), and poor (<60%, <4.1 points) [22].
- Section 3 focused on participants' experiences, training, and self-assessed competence in dental trauma management.
- Section 4 addressed attitudes toward mouthguard use.

Statistical processing was done using IBM SPSS Statistics v25 (IBM Corp., Armonk, NY, USA). The Kolmogorov–Smirnov test was employed to verify normality. Quantitative variables were summarized as means ± standard deviations, while percentages and frequencies described qualitative variables. Statistical significance was evaluated using Student's t-test and

one-way ANOVA followed by Tukey's post-hoc test. To control for potential confounders, multiple linear regression was performed to explore the association between independent variables (age, gender, training on dental trauma, exposure to injuries, academic degree) and the knowledge score. The significance threshold was set at $p < 0.05$.

Results and Discussion

A total of 230 questionnaires were handed out during the symposium, and 186 were correctly completed and returned, yielding a response rate of 80%. The participants included 78 males and 108 females, with an average age of 47.2 ± 10.2 years. **Table 1** presents demographic and professional characteristics. Male respondents demonstrated significantly higher knowledge levels regarding dental trauma management than females ($p = 0.016$). Regarding years in practice, pediatricians with 11–20 years of experience had the greatest knowledge compared with both 1–10 years and over 21 years of experience ($p = 0.027$).

Table 1. Demographic and professional characteristics of participants (n = 186).

Characteristic	Category	Total n (%)	Knowledge Score Mean ± SD	p Value
Gender	Male	78 (41.9)	3.9 ± 1.4	0.016 *
	Female	108 (58.1)	3.4 ± 1.6	
Age group (years)	25–35	34 (18.3)	3.1 ± 1.6	0.224
	36–45	46 (24.7)	3.6 ± 1.5	
	46–55	56 (30.1)	3.6 ± 1.5	
	≥55	50 (26.9)	3.8 ± 1.5	
Academic degree	Doctor of Medicine	123 (66.1)	3.5 ± 1.5	0.738
	Master of Science	38 (20.4)	3.6 ± 1.5	
	Doctor of Philosophy	25 (13.4)	3.8 ± 1.7	
Area of practice	Northern Croatia	60 (32.3)	3.5 ± 1.6	0.105
	Eastern Croatia	13 (7.0)	3.9 ± 1.1	
	Southern Croatia	73 (39.2)	3.8 ± 1.5	
	Western Croatia	40 (21.5)	3.2 ± 1.5	
Practice setting	Primary care	92 (49.5)	3.6 ± 1.5	0.086
	Secondary care	43 (23.1)	3.9 ± 1.6	
	Tertiary care	51 (27.4)	3.2 ± 1.4	
Number of years in practice	1–10	78 (41.9)	3.3 ± 1.5 a	0.027 *
	11–20	57 (30.6)	3.9 ± 1.6 a	
	≥21	51 (27.4)	3.6 ± 1.4	
Number of hours worked per workday	1–4	2 (1.1)	2.5 ± 0.7	0.561
	4–8	113 (60.8)	3.6 ± 1.4	
	≥8	71 (38.2)	3.5 ± 1.7	
Number of patients seen in a workday	<10	14 (7.5)	3.7 ± 1.7	0.368
	10–20	112 (60.2)	3.6 ± 1.5	
	21–50	35 (18.8)	3.7 ± 1.5	
	>50	25 (13.4)	3.1 ± 1.7	

Values are given as counts, percentages, or mean ± SD. *Statistical significance assessed by Student's t-test or One-way ANOVA ($p < 0.05$). Superscript lowercase letters indicate differences between groups based on Tukey's post-hoc test (a $p = 0.020$). Abbreviation: SD—standard deviation.

The distribution of correct responses related to tooth injury management at the scene is summarized in **Table 2**. Approximately 60% believed that a primary tooth could be replanted after avulsion. About 67.3% correctly identified the proper handling method for an avulsed permanent tooth before reimplantation. Furthermore, 71% were unaware that a contaminated tooth could be gently rinsed with tap water before replacement. Only 15.1% of respondents recognized

that seeking professional help within 30 minutes after avulsion provides the best outcome.

Table 2. Frequency (%) of pediatricians' responses on emergency management of dental trauma.

Question	Response	Total n (%)
Is replantation possible for a primary tooth that has been knocked out?	No	75 (40.3)
	Unsure	90 (48.4)
	Yes	21 (11.3)
Can a permanent tooth that has been dislodged be replanted?	Yes	110 (59.1)
	Unsure	13 (7.0)
	No	63 (33.9)
How would you grasp a dislodged permanent tooth for replantation?	By the crown	59 (31.7)
	By the root	31 (16.7)
	By the entire tooth	20 (10.8)
	Unsure	74 (39.8)
If a dislodged permanent tooth cannot be replanted immediately, how would you preserve it until reaching a dentist?	Specialized tissue culture medium	16 (8.6)
	Child's saliva (mouth)	8 (4.3)
	Milk	32 (17.2)
	Saline solution	120 (64.5)
	Disinfectant solutions	0 (0)
	Tap water	0 (0)
	Cloth or handkerchief	5 (2.7)
	Alcohol	3 (1.6)
	Ice	2 (1.1)
What is the optimal timeframe to seek professional care for a permanent tooth avulsion?	Immediately, within 30 minutes post-injury	28 (15.1)
	Within several hours	83 (44.6)
	Within one day	45 (24.2)
	The following day	3 (1.6)
	Within a few days	1 (0.5)
	No time limit	2 (1.1)
	Unsure	24 (12.9)
What is the most appropriate immediate action for a dislodged permanent tooth at the injury site?	Rinse with water and place back in socket	54 (29.0)
	Clean with disinfectant and reinsert	16 (8.6)
	Scrub the tooth and place back in socket	85 (45.7)
	Reinsert without cleaning	8 (4.3)
	Unsure	23 (12.4)
Can a fractured tooth fragment be reattached?	Yes	81 (43.6)
	No	55 (29.5)
	Unsure	50 (26.9)

Data are reported as absolute and percentage values. Correct answers are italicized.

Table 3 presents pediatricians' self-evaluation of their familiarity and hands-on experience with dental trauma. Based on their own assessment, 58.6% of respondents reported having somewhat sufficient but not comprehensive understanding, while 27.4% acknowledged limited knowledge of tooth injuries. The vast majority (94.1%) stated that they had never received formal first-aid instruction on managing dental trauma during medical training or professional work. Those who had encountered dental trauma cases in their clinical practice (3.9 ± 1.4 vs. 3.3 ± 1.5, $p \leq 0.001$) and those who expressed interest in further

education on this topic (3.7 ± 1.4 vs. 3.1 ± 1.7, p = 0.008) achieved notably higher knowledge scores.

Table 3. Pediatricians' self-rated competence and experience concerning dental injuries (n = 186).

Question	Category	Total n (%)	Knowledge Score Mean ± SD	p Value
Self-assessed understanding of dental trauma	Limited	51 (27.4)	3.7 ± 1.7	0.060
	Adequate but partial	109 (58.6)	3.6 ± 1.5	
	Thorough	26 (14.0)	3.7 ± 1.5	
Received training on dental injuries and first aid during academic or professional education	None	175 (94.1)	3.5 ± 1.5	0.351
	Received	11 (5.9)	4.0 ± 1.3	
Interest in future training on dental trauma	Not interested	44 (23.7)	3.0 ± 1.7	0.008 *
	Interested	142 (76.3)	3.7 ± 1.4	
Observed dental trauma	Not observed	103 (55.4)	3.3 ± 1.5	0.003 *
	Observed	83 (44.6)	3.9 ± 1.4	
Observed dental trauma—avulsion	Not observed	110 (59.1)	3.3 ± 1.5	0.001 *
	Observed	76 (40.9)	4.0 ± 1.4	
Observed dental trauma—tooth luxation (lateral luxation, intrusion, extrusion)	Not observed	170 (91.4)	3.7 ± 1.5	0.904
	Observed	16 (8.6)	3.6 ± 1.7	
Observed dental trauma—tooth fracture	Not observed	141 (75.8)	3.5 ± 1.5	0.186
	Observed	45 (24.2)	3.8 ± 1.5	
Self-assessed knowledge of first aid for dental trauma—avulsion	Lacking	83 (44.6)	3.2 ± 1.5	0.001 *
	Possessed	103 (55.4)	3.9 ± 1.4	
Self-assessed knowledge of first aid for dental trauma—tooth luxation	Lacking	179 (96.2)	3.5 ± 1.5	0.216
	Possessed	7 (3.8)	4.3 ± 1.5	
Self-assessed knowledge of first aid for dental trauma—tooth fracture	Lacking	122 (65.6)	3.5 ± 1.5	0.375
	Possessed	64 (34.4)	3.7 ± 1.5	

Figures are given as counts, percentages, or as mean ± SD. *Differences between groups were analyzed by Student's t-test or one-way ANOVA. p-values below 0.05 were considered significant. Abbreviation: SD—standard deviation.

Table 4 outlines pediatricians' awareness regarding the purpose and use of mouthguards. Respondents who were familiar with the function of dental mouthguards had a significantly greater understanding of trauma management (3.9 ± 1.5 vs. 3.2 ± 1.5, p ≤ 0.001). Likewise, pediatricians who advocated mouthguard use among children participating in sports demonstrated higher knowledge levels (3.8 ± 1.54 vs. 3.3 ± 1.5, p = 0.016).

Table 4. Pediatricians' understanding of dental mouthguards (n = 186).

Question	Response	Total n (%)	Knowledge Score Mean ± SD	p Value
Are you aware of the purpose of mouthguards?	Unaware	83 (44.6)	3.1 ± 1.5	0.001 *
	Aware	103 (55.4)	3.9 ± 1.5	
Do you advise patients to use mouthguards?	Do not advise	88 (47.3)	3.3 ± 1.5	0.016 *
	Advise	98 (52.7)	3.8 ± 1.5	
Are you familiar with different types of mouthguards?	Unfamiliar	176 (94.6)	3.6 ± 1.5	0.500
	Familiar	10 (5.4)	3.9 ± 1.4	
Are you aware of the differences between custom-made and store-bought mouthguards?	Unaware	4 (2.2)	2.2 ± 1.5	0.192
	Aware	47 (25.3)	3.7 ± 1.6	
	Unsure	135 (72.6)	3.6 ± 1.5	
To what extent do mouthguards prevent or reduce sports-related dental injuries?	10%	4 (2.2)	3.2 ± 1.5	0.880

	20%	25 (13.4)	3.4 ± 1.5
	40%	91 (48.9)	3.6 ± 1.3
	60%	66 (35.5)	3.6 ± 1.8

Data are reported as totals, percentages, or mean ± SD. *Statistical relevance was examined using Student's t-test or one-way ANOVA. Threshold for significance was $p < 0.05$. Abbreviation: SD—standard deviation.

Figure 1 illustrates the relationship between knowledge levels in dental trauma management and factors such as self-perceived competence, demographic data, and professional attitude. Knowledge scores were positively correlated with first-hand experience managing dental trauma ($\beta = 0.574$, SE = 0.212, $p = 0.008$) and with awareness of mouthguard function ($\beta = 0.883$, SE = 0.223, $p \leq 0.001$).

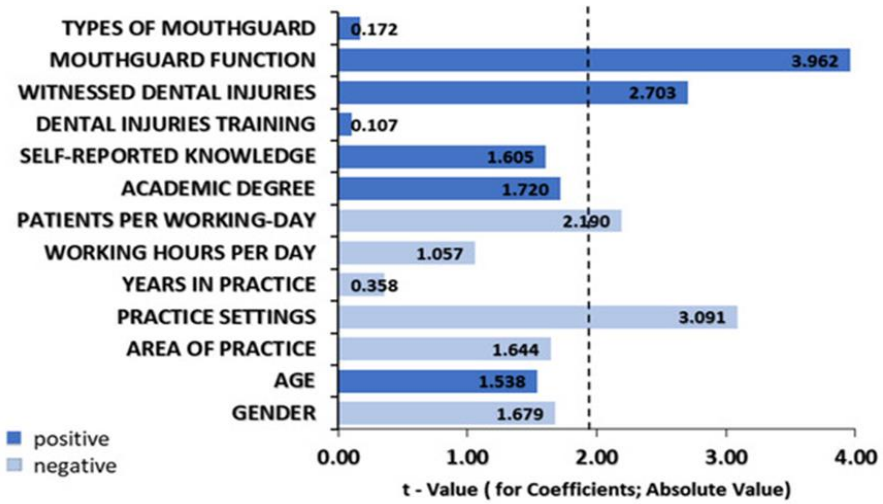

Figure 1. Results of multiple linear regression showing significant predictors of overall dental injury knowledge among pediatricians, including demographic variables and self-evaluated understanding.

The main purpose of this investigation was to analyze pediatricians' preparedness in managing dental emergencies and their familiarity with mouthguards as protective devices. In Croatia, dentists seldom operate in emergency units or hospital settings, making it crucial that pediatricians and general medical doctors are capable of providing immediate care for dental trauma. As emphasized by Flores *et al*. [23], both timely intervention and adequate practitioner skill determine the outcome of a traumatized tooth. Internationally, few studies—and only one domestic study—have examined this issue among Croatian pediatricians [13, 15]. Studies from other countries concerning non-dental medical professionals consistently show that many lack sufficient competence in handling acute dental injuries [13, 14, 17, 23].

In the current research, the mean knowledge score was 3.6 ± 1.5 (range: 0–7). Three participants failed to provide any correct response, while four achieved a full score. These findings correspond with self-assessment results, where 58.6% (n = 109) rated their understanding as adequate but incomplete, and 27.4% (n = 51) admitted insufficient knowledge. Statistically, male pediatricians ($p = 0.016$) and those with 11–20 years of experience ($p = 0.027$; **(Table 1)**) performed better. Although unverified, this could relate to the greater likelihood of males participating in sports, thereby having greater exposure to dental injuries.

Only 5.9% of the surveyed pediatricians had ever attended a course related to dental trauma management. While their scores were higher than untrained participants, the difference was not statistically meaningful ($p = 0.351$).

More than three-quarters (75%) of respondents indicated a desire to expand their knowledge in this area, and this group displayed significantly better results than those who did not show interest ($p = 0.008$). International studies mirror these findings, showing that the majority of medical personnel working in emergency departments have never undergone training in dental trauma management—88% in the UK, 90% in Chile, and 72% in Turkey [24–26]. These results underscore the necessity of a structured educational framework to improve the competency of healthcare professionals who may encounter patients with dental trauma.

The findings of this study revealed no statistically significant differences in pediatricians' knowledge with respect to their academic qualification ($p = 0.738$),

level of healthcare service (p = 0.086), or work environment (p = 0.105). These outcomes align with those reported by Nikolic *et al*. [13], showing similar results between pediatricians working in primary care and those in hospital settings.

Approximately 45% of respondents (n = 83) had witnessed dental trauma, most commonly tooth avulsion (n = 76). Participants with such experience demonstrated significantly higher knowledge of trauma management (p = 0.003 and p = 0.001, respectively).

Pediatricians should be adequately prepared to advise parents and caregivers about first-aid measures for avulsed teeth. They must also understand tooth eruption patterns, and how to distinguish primary from permanent teeth, as deciduous teeth should never be replanted [9, 27]. In this study, 40.3% correctly recognized that reimplantation of a primary tooth is not recommended, while 59.1% knew that permanent tooth avulsion requires reimplantation. Furthermore, only 31.7% accurately identified that an avulsed tooth should be held by the crown during reinsertion. In comparison, Nikolic *et al*. [13] reported 60% and 68% correct answers for primary and permanent tooth reimplantation, respectively, and 76% correct for tooth handling. By contrast, less than half of Turkish physicians were aware of the correct reimplantation technique [28]. Although an avulsed tooth contaminated by debris can be rinsed with cold water, only 29% of participants in this study knew this.

The success of tooth reimplantation depends on factors such as storage medium and elapsed time before reinsertion—both of which can influence root resorption and ankylosis risks. If immediate replantation is impossible, the tooth must be kept in an appropriate medium until professional care is available [28, 29]. Nearly all participants (94.6%) correctly identified saline, milk, saliva, or specialized tooth-preservation solutions as suitable storage media, all of which help maintain the vitality of the periodontal ligament. Among them, 64.5% selected saline as the proper medium. In the study by Nikolic *et al*. [13], 54% chose saline, while Chanchala *et al*. [15] reported 90% giving the same response. Though saline is acceptable, it is not ideal due to osmolarity issues [29]. Only 4.3% chose saliva, and 17.2% chose milk.

The timing of reimplantation is crucial for long-term tooth survival. When performed within 30 minutes, the success rate can reach 90%, but after two hours, the chance of retention becomes minimal [28]. Unfortunately, only 15.1% of pediatricians in this research were aware of this critical time frame and the need for urgent dental referral. Comparable findings were observed in the Aren *et al*. [28] survey among Turkish emergency personnel.

Crown fractures are the most common dental injuries affecting permanent teeth [30]. One possible treatment is reattachment of the broken fragment [31]. Pediatricians should recognize this and instruct parents to locate the tooth fragment and store it in a suitable liquid until professional treatment is provided. About 44% of respondents were aware of this practice.

Mouthguards act as protective barriers covering the teeth and adjacent tissues, reducing the impact of sports-related injuries. Multiple designs exist, with custom-made mouthguards offering the best comfort and protection [32]. Their use is recommended for children and adolescents involved in organized sports, particularly contact sports such as football, volleyball, basketball, handball, hockey, and rugby [33]. Most participants reported being aware of the purpose of mouthguards and advising their use during sports, and these individuals also achieved higher dental trauma knowledge scores. Nonetheless, many respondents were unfamiliar with the different types of mouthguards **(Table 4)**.

Overall, the findings indicate that pediatricians' knowledge of dental trauma management remains insufficient, particularly regarding emergency procedures. The data suggest that dental injury treatment receives limited emphasis in training and that formal education on this subject is lacking. In Croatia's five-year pediatric specialization program, residents complete only a one-week rotation in pediatric dentistry at clinical centers. While the field is included in the curriculum, dental trauma management is not among the listed core competencies [34].

Despite this, it is promising that many pediatricians acknowledge these educational gaps and show motivation to improve their competence. Though revising the academic curriculum may be challenging, knowledge enhancement could be achieved through multidisciplinary workshops, postgraduate courses, symposia, and seminars [8, 10]. Previous studies have shown that oral health education programs for pediatricians can significantly improve their knowledge, attitudes, and clinical practices. Training can be strengthened through curriculum updates, evidence-based protocols, print and online resources, and in-service learning opportunities. Furthermore, close collaboration between dental and medical professionals—for example, via joint conferences and case meetings—should be encouraged [35–37]. Pediatricians should also consult evidence-based guidelines for dental trauma management to ensure accurate advice for children and parents. Such

guidelines are intended to provide clear instructions for immediate and urgent dental trauma care [27, 31].

A key strength of this study is that it encompassed pediatricians from all regions of Croatia [13]. It also identified several variables influencing knowledge and preventive behavior regarding dental injuries. The use of a paper-based, self-administered questionnaire and a high response rate were further advantages. The main limitation was the potential selection bias arising from voluntary participation and convenience sampling. Further research should assess pediatricians' knowledge and practices in broader oral health areas, particularly in the prevention of malocclusion and oral disease.

Conclusion

Although Croatian pediatricians demonstrated limited understanding of dental injury management, it is encouraging that they are aware of their shortcomings and eager to learn more. Continued professional education and interdisciplinary cooperation are essential to ensure that dental trauma is promptly identified and appropriately treated across healthcare settings.

Acknowledgments: None

Conflict of Interest: None

Financial Support: None

Ethics Statement: None

References

1. Glendor U. Epidemiology of traumatic dental injuries: a 12-year review of the literature. Dent Traumatol. 2008;24(6):603–11.
2. Glendor U, Halling A, Andersson L, Eilert-Petersson E. Incidence of traumatic tooth injuries in children and adolescents in the county of Vastmanland, Sweden. Swed Dent J. 1996;20(1–2):15–28.
3. Cotti E, Mereu M, Lusso D. Regenerative treatment of an immature, traumatized tooth with apical periodontitis: report of a case. J Endod. 2008;34(5):611–6.
4. Bakland LK, Andreasen JO. Examination of the dentally traumatized patient. J Calif Dent Assoc. 1996;24(1):35–7,40–4.
5. El-Kalla IH, Shalan HM, Bakr RA. Impact of dental trauma on quality of life among 11–14 years schoolchildren. Contemp Clin Dent. 2017;8(4):538–44.
6. Kaczmarek U, Gozdowski D, Olczak-Kowalczyk D. Prevalence of traumatic dental injuries in Polish 15-year-olds. Dent Med Probl. 2019;56(4):365–71.
7. Yigit Y, Helvacioglu-Yigit D, Kan B, Ilgen C, Yilmaz S. Dentofacial traumatic injuries: a survey of knowledge and attitudes among emergency medicine physicians in Turkey. Dent Traumatol. 2019;35(1):20–6.
8. Krol DM. Educating pediatricians on children's oral health: past, present, and future. Pediatrics. 2004;113(5):e487–92.
9. Alrashdi M, Limaki ME, Alrashidi A. Oral health knowledge gaps and their impact on the role of pediatricians: a multicentric study. Int J Environ Res Public Health. 2021;18(19):10237.
10. Hadjipanayis A, Grossman Z, Del Torso S, Michailidou K, Van Esso D, Cauwels R. Oral health training, knowledge, attitudes and practices of primary care paediatricians: a European survey. Eur J Pediatr. 2018;177(5):675–81.
11. Dickson-Swift V, Kenny A, Gussy M, McCarthy C, Bracksley-O'Grady S. The knowledge and practice of pediatricians in children's oral health: a scoping review. BMC Oral Health. 2020;20(1):211.
12. Tewari N, Jonna I, Mathur VP, Goel S, Ritwik P, Rahul M, et al. Global status of knowledge for the prevention and emergency management of traumatic dental injuries among non-dental healthcare professionals: a systematic review and meta-analysis. Injury. 2021;52(8):2025–37.
13. Nikolic H, Ivancic Jokic N, Bakarcic D, Hrvatin S, Jakljevic N. Knowledge about emergency procedure in case of dental trauma among paediatricians in Croatia. Eur J Paediatr Dent. 2018;19(4):277–81.
14. Yeng T, O'Sullivan AJ, Shulruf B. Medical doctors' knowledge of dental trauma management: a review. Dent Traumatol. 2020;36(2):100–7.
15. Chanchala HP, Shanbhog R, Ravi MD, Raju V. Pediatrician's perspectives on dental trauma management: a cross-sectional survey. J Indian Assoc Public Health Dent. 2016;14(4):419–23.
16. Bahammam LA. Knowledge and attitude of emergency physician about the emergency management of tooth avulsion. BMC Oral Health. 2018;18(1):57.
17. Ulusoy AT, Onder H, Cetin B, Kaya S. Knowledge of medical hospital emergency physicians about

the first-aid management of traumatic tooth avulsion. Int J Paediatr Dent. 2012;22(3):211–6.
18. Goyal A, Nishant A, Morankar R, Gauba K, Jaiswal M. Awareness among pediatricians regarding oral health care in children including those with special health care needs: a cross-sectional survey. J Fam Med Prim Care. 2020;9(8):4151–5.
19. Croatian Institute of Public Health. Croatian Health Statistics Yearbook 2019. Zagreb: Croatian Institute of Public Health; 2020. Available from: https://www.hzjz.hr/wp-content/uploads/2021/02/Ljetopis_Yearbook_2019.pdf. Accessed 27 Nov 2021.
20. Yeng T, Parashos P. Dentists' management of dental injuries and dental trauma in Australia: a review. Dent Traumatol. 2008;24(3):268–71.
21. Domnich A, Panatto D, Arata L, Bevilacqua I, Apprato L, Gasparini R, et al. Impact of different scoring algorithms applied to multiple-mark survey items on outcome assessment: an in-field study on health-related knowledge. J Prev Med Hyg. 2015;56(4):E162–71.
22. Bloom BS. Learning for mastery. Instruction and curriculum. Regional education laboratory for the Carolinas and Virginia. Eval Comment. 1968;1(2):1–12.
23. Flores MT, Malmgren B, Andersson L, Andreasen JO, Bakland LK, Barnett F, et al. Guidelines for the management of traumatic dental injuries. III. Primary teeth. Dent Traumatol. 2007;23(4):196–202.
24. Needleman HL, Stucenski K, Forbes PW, Chen Q, Stack AM. Massachusetts emergency departments' resources and physicians' knowledge of management of traumatic dental injuries. Dent Traumatol. 2013;29(4):272–9.
25. Trivedy C, Kodate N, Ross A, Al-Rawi H, Jaiganesh T, Harris T, et al. The attitudes and awareness of emergency department physicians towards the management of common dentofacial emergencies. Dent Traumatol. 2012;28(2):121–6.
26. Diaz J, Bustos L, Herrera S, Sepulveda J. Knowledge of the management of paediatric dental traumas by non-dental professionals in emergency rooms in South Araucania, Temuco, Chile. Dent Traumatol. 2009;25(6):611–9.
27. Fouad AF, Abbott PV, Tsilingaridis G, Cohenca N, Lauridsen E, Bourguignon C, et al. International association of dental traumatology guidelines for the management of traumatic dental injuries: 2. Avulsion of permanent teeth. Dent Traumatol. 2020;36(4):331–42.
28. Aren A, Erdem AP, Aren G, Şahin ZD, Güney Tolgay C, Çayırcı M, et al. Importance of knowledge of the management of traumatic dental injuries in emergency departments. Ulus Travma Acil Cerrahi Derg. 2018;24(2):136–44.
29. Adnan S, Lone MM, Khan FR, Hussain SM, Nagi SE. Which is the most recommended medium for the storage and transport of avulsed teeth? A systematic review. Dent Traumatol. 2018;34(2):59–70.
30. Krishna A, Malur MH, Swapna DV, Benjamin S, Deepak CA. Traumatic dental injury—an enigma for adolescents: a series of case reports. Case Rep Dent. 2012;2012(1):756526.
31. Bourguignon C, Cohenca N, Lauridsen E, Flores MT, O'Connell AC, Day PF, et al. International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 1. Fractures and luxations. Dent Traumatol. 2020;36(4):314–30.
32. Green JI. The role of mouthguards in preventing and reducing sports-related trauma. Prim Dent J. 2017;6(1):27–34.
33. Fernandes LM, Neto JCL, Lima TFR, Magno MB, Santiago BM, Cavalcanti YW, et al. The use of mouthguards and prevalence of dento-alveolar trauma among athletes: a systematic review and meta-analysis. Dent Traumatol. 2019;35(1):54–72.
34. Ministry of Health and Social Welfare of the Republic of Croatia. Rulebook on specialist training of doctor of medicine Addendum II. Pediatrician. Zagreb: Narodne Novine; 2011. Available from: https://narodne-novine.nn.hr/clanci/sluzbeni/full/2011_09_100_2057.html. Accessed 30 Apr 2021.
35. Douglass AB, Douglass JM, Krol DM. Educating paediatricians and family physicians in children's oral health. Acad Pediatr. 2009;9(6):452–6.
36. Herndon JB, Tomar SL, Catalanotto FA. Effect of training paediatricians and family physicians in early childhood caries prevention. J Pediatr. 2015;166(4):1055–61.
37. Alshunaiber R, Alzaid H, Meaigel S, Aldeeri A, Adlan A. Early childhood caries and infant's oral health: pediatricians' and family physicians' practice, knowledge and attitude in Riyadh city, Saudi Arabia. Saudi Dent J. 2019;31(Suppl 1):S96–S105.