hygiene

MDPI

Article

Oral Hygiene Practices and Oral Health Knowledge among Adult Orthodontic Patients: A Best Practice Implementation Project

Antonija Tadin [1,2,*], Marija Badrov [1], Branimira Mikelic Vitasovic [3] and Tina Poklepovic Pericic [4]

[1] Department of Restorative Dental Medicine and Endodontics, School of Medicine, University of Split, 21000 Split, Croatia; mb91802@mefst.hr
[2] Department of Oral and Maxillofacial Surgery, Clinical Hospital Centre Split, 21000 Split, Croatia
[3] Private Dental Clinic, 21000 Split, Croatia; bmikelic@yahoo.com
[4] Department of Prosthodontics, School of Medicine, University of Split, 21000 Split, Croatia; tinapoklepovic@gmail.com
* Correspondence: atadin@mefst.hr; Tel.: +385-98609191; Fax: +385-21557624

Abstract: Orthodontic therapy is associated with a more significant accumulation of dentobacterial plaque and impaired oral hygiene, which increase the risk of developing dental caries and periodontal disease. Therefore, it is crucial to educate orthodontic patients about proper oral hygiene maintenance and oral health before and during treatment. The aim of this pilot study was to implement evidence-based best practices related to oral hygiene in adult orthodontic patients and improve compliance. In addition to evaluating oral hygiene practices, another goal of the project was to assess the knowledge of orthodontic patients regarding oral health. Questionnaires with seven pre- (before) and post-test criteria (90 day after implementation) were developed based on the best evidence available. This project was conducted in a private dental clinic in Split, Croatia, and included 45 patients. The baseline audit showed a gap between clinical practice and the best evidence. Three criteria achieved a high compliance baseline, while after implementation, there were substantial improvements in compliance for all. The everyday use of mouthwash improved from 17.8% at baseline to 66.7% at follow-up, as did the use of interdental aids, which increased from 55.6% to 91.1%. Statistically significant differences were found in the total score for oral health knowledge between the baseline (6.67 ± 1.74) and the follow-up audit (7.78 ± 0.56, $p \leq 0.001$). The strategies developed in this project were effective in providing essential information to adult orthodontic patients and improving compliance with evidence. Guidelines on this topic should be designed to assist orthodontists and patients in maintaining oral health and oral hygiene.

Keywords: evidence-based practice; evidence implementation project; oral health; oral hygiene; orthodontic therapy

Citation: Tadin, A.; Badrov, M.; Mikelic Vitasovic, B.; Poklepovic Pericic, T. Oral Hygiene Practices and Oral Health Knowledge among Adult Orthodontic Patients: A Best Practice Implementation Project. *Hygiene* **2024**, *4*, 221–230. https://doi.org/10.3390/hygiene4020018

Academic Editor: Günter Kampf

Received: 13 April 2024
Revised: 28 April 2024
Accepted: 23 May 2024
Published: 3 June 2024

1. Introduction

Fixed orthodontic therapy can lead to an increased accumulation of dentobacterial plaque and an increase in the number of cariogenic bacteria due to the presence of multiple retention sites such as orthodontic bands, brackets, wires, and acrylic resins. Consequently, this may result in the development of decalcification, dental caries, periodontal disease, halitosis, and teeth staining [1,2]. These adverse effects affect up to 70% of orthodontic patients [2]. To prevent these conditions, the most crucial step is manually removing the plaque using antimicrobial products as an adjunct [3,4].

Providing oral hygiene and dietary instructions, along with continuous advice and monitoring, to the patient at the beginning of treatment with fixed appliances by their orthodontist is essential [5]. Several studies highlight the importance of repeated oral hygiene instructions, initiated at the beginning of treatment, in reducing the plaque index [6,7]. Conversely, a separate study found that repeated instructions, starting six months into treatment, did not yield a clinically significant impact on plaque levels [8].

During treatment with fixed appliances, it is essential for patients to maintain good oral hygiene. This includes brushing their teeth twice daily using fluoride toothpaste. In addition to brushing, orthodontic patients are advised to perform interdental cleaning once a day. As an adjunct to these practices, it is recommended that patients use of mouthwash twice a day [9]. It is also significant to emphasize the importance of adding additional fluoride during treatment, such as using a high-fluoride toothpaste, varnish, gel, or rinse [8]. Patients should receive education regarding the use of manual or electric toothbrushes, interdental and orthodontic brushes, oral hygiene aids, and adjunctive brushing methods [5,10,11].

Patients undergoing orthodontic treatment generally exhibit better oral hygiene habits compared to those not undergoing treatment [12,13]. However, it is crucial to note that despite this, the oral hygiene practices of orthodontic patients are frequently found to be unsatisfactory, particularly towards the end of treatment, as evidenced by numerous scientific studies [14,15]. Achieving and maintaining good oral hygiene habits can be a significant challenge. Success in this area depends on factors such as the type of oral hygiene methods used, the proper technique employed, and the educational and motivational support provided by dental professionals. This support includes oral hygiene and dietary instructions given by dentists and other members of the dental staff [16]. However, a comprehensive regimen of oral hygiene for orthodontic patients is challenging. Currently, there are no clinically available orthodontic guidelines that would standardize oral hygiene education among orthodontic patients [16,17]. The gap between the best available evidence regarding the general principles of oral hygiene in orthodontic patients to prevent dental caries and periodontal disease and its application in practice can be reduced through evidence implementation projects [18–20].

This pilot observational before–after study outlines an implementation project aimed at enhancing oral hygiene practices among adult orthodontic patients through best practice guidelines. The project's primary objectives included conducting an audit of adult orthodontic patients, implementing evidence-based best practices, and assessing the resulting impact on oral hygiene practices and oral health knowledge within this patient population. The specific objectives of the project were (1) to assess the current compliance of orthodontic patients with best practice recommendations for oral hygiene and their knowledge of oral health; (2) to enhance the oral hygiene practices and oral health knowledge of orthodontic patients by implementing evidence-based practice criteria through chair-side education; and (3) to investigate gait changes before and after the implementation of evidence-based oral hygiene best practices in adult orthodontic patients.

2. Materials and Methods

This evidence implementation project (observational before–after study) was conducted using the JBI Practical Application of Clinical Evidence System (JBI-PACES) and Getting Research into Practice (GRiP) audit and feedback tool [21], involving three phases:

1. Establishing a project team and undertaking a baseline audit based on criteria informed by the evidence;
2. Reflecting on the results of the baseline audit and designing and implementing strategies to address noncompliance found in the baseline audit informed by the JBI-GRiP framework;
3. Conducting a follow-up audit to assess the outcomes of the interventions implemented to improve practice and identify future practice issues to be addressed in subsequent audits.

The study protocol was approved by the Ethics Committee of the School of Medicine, University of Split, which also confirmed that the study was in full accordance with ethical principles (Class: 003-08/23-03/0015, No.: 2181-198-03-04-23-0017).

Phase 1 aimed to establish the project team and perform a baseline audit based on evidence-informed criteria. The project team consisted of three members: the project leader and two dentists. The members of the project team were chosen based on their knowledge

and experience. The project leader coordinated the team, planned activities, collected the data, analyzed and reported the data, identified implementation barriers and strategies, monitored progress, assessed the outcomes of the interventions, and disseminated the outcomes and improvements with feedback. The details of the team are presented in Table 1.

Table 1. Team members and their positions, organizations, and roles in the implementation project.

Team Member	Position	Role
Coordinator	Researcher, dentist	Project coordinator. Training. Data analysis and report. Design strategies.
Dentist 1	Dentist	Clinical facilitator. Data collection (audit). Design strategies
Dentist 2	Dentist	Data collection (audit). Design strategies

The baseline audit objective was to analyze the current situation for the adult orthodontic patients' oral hygiene practice and oral health knowledge. Prior to this implementation project, a summary of the best available evidence in collaboration with JBI research staff and the project team lead was developed [22]. On the basis of the JBI evidence summary, seven evidence-based audit criteria were identified (questionnaire in Appendix A). To complete the audit, a Yes/No format checklist was created by the project lead (Table 2). Baseline data were retrospectively collected over 1 month.

Table 2. Audit criteria and the method used to measure compliance.

Audit Criteria	Sample	Method Used to Measure Percentage Compliance with Best Practice
Adults should brush their teeth with fluoride toothpaste. (Grade A)	Baseline: 45 participants Follow-up: 45 participants	Questionnaire—Every patient who answered that they use fluoridated toothpaste considered 'YES'.
Adults should brush their teeth at least twice daily. (Grade A)	Baseline: 45 participants Follow-up: 45 participants	Questionnaire—Every patient who answered that they brush their teeth twice a day or more considered 'YES'.
Adults should use dental floss/interdental brush daily to prevent gingivitis and periodontal disease. (Grade A)	Baseline: 45 participants Follow-up: 45 participants	Questionnaire—Every patient who answered that they use floss on a daily basis to maintain the interdental spaces considered 'YES'.
Adults should receive regular dental check-ups; the timing and frequency depends on their individual needs, risk indicators, and other oral health issues. (Grade A)	Baseline: 45 participants Follow-up: 45 participants	Questionnaire—Every patient who answered that they go every six months for check-up dental examinations for the purpose of prevention considered 'YES'.
Adults at risk of developing dental caries or periodontal disease may benefit from a mouth rinse. (Grade B)	Baseline: 45 participants Follow-up: 45 participants	Questionnaire—Every patient who answered that they use a daily mouth rinse considered 'YES'.
Adults should receive advice regarding oral hygiene, diet, and risks associated with smoking, chewing tobacco, and excessive alcohol consumption (oral health education). (Grade B)	Baseline: 45 participants Follow-up: 45 participants	Questionnaire—Every patient who received education from their dentist regarding oral hygiene and oral health considered 'YES'.
Oral health knowledge. (Grade B)	Baseline: 45 participants Follow-up: 45 participants	Questionnaire (eight questions)—Each respondent who answered 'YES' to the given question received one point for the correct answer.

The inclusion criteria included every patient over 18 years old in fixed orthodontic therapy who agreed to participate in the research. The exclusion criteria included adolescent patients, people with mental or physical impairments, people with chronic illnesses, and pregnant women.

Phase 2 included the design and implementation of strategies to improve practice (Getting Research into Practice). In this phase, we analyzed the baseline audit results and presented them to key stakeholders. From the joint reflection, barriers that created the gap between current and best practices were identified. We discussed and designed strategies to promote the use of best practices and improve compliance. The implementation phase of the designed strategies included face-to-face, chair-side education. Education involved providing verbal and written information, as well as visually demonstrating brushing techniques and the proper use of oral hygiene aids on a model.

Phase 3 included the follow-up audit postimplementation of the change strategy. In the third and last phase, using the same baseline audit methodology, the 90-day follow-up audit was carried out. The data were compared to measure if any improvement in best practice compliance had been reached and to recognize any areas that needed additional focus and improvement.

The statistical analysis was performed with the IBM SPSS 26.0 software (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0., IBM Corp., Armonk, NY, USA). To collect data, the audit form had dichotomous ('Yes', 'No') questions for each criterion's compliance. A descriptive analysis of the quantitative and qualitative variables was performed. The normality of quantitative variables was assessed with a Kolmogorov–Smirnov test. The Mann–Whitney U test was used to assess differences between quantitative variables, while differences between qualitative variables were tested with the chi-square test. The level of statistical significance was set at $p \leq 0.05$.

3. Results

The final sample for the study included 45 orthodontic patients, with the majority being women (n = 33, 73.3%). The participants had a mean age of 26.2 $\pm$ 7.3 years, ranging from 18 to 46 years.

Among the criteria provided by JBI, the best performance was found in the first, second, and sixth criteria. The results of the fourth and fifth criteria presented the lowest compliance rate (Figure 1). Only 20% of the respondents go for regular check-ups with their chosen dentist every six months, and 17.8% of them use mouthwash every day for their oral hygiene. The respondents in the baseline audit demonstrated good overall knowledge about oral health, with a mean score of 6.67 out of 8 (SD = 1.74, minimum 1, maximum 8). However, they had the least knowledge about how fluoride helps prevent tooth decay by making the enamel more resistant to acids produced by bacteria on the tooth surface (64.4% correct responses). Additionally, 55.6% of the respondents were not aware that proper oral hygiene care requires the daily use of dental floss or interdental brushes and a mouthwash in addition to brushing with toothpaste.

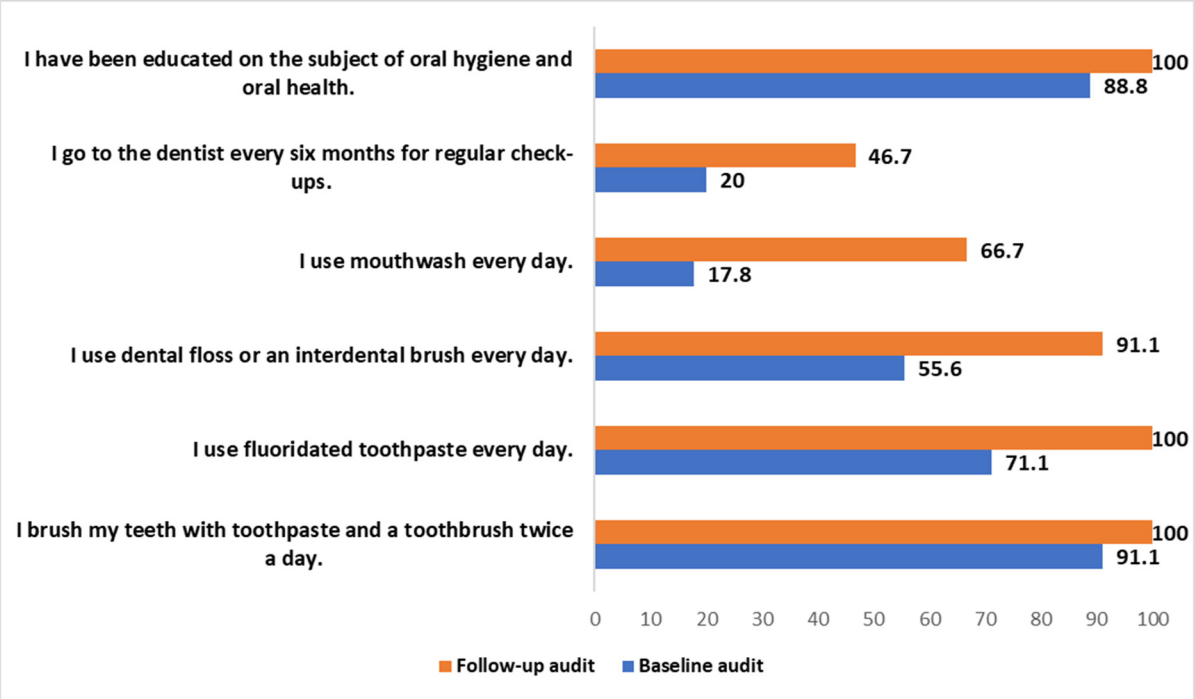

Figure 1. Compliance with the best practice for oral hygiene practice among adult orthodontic patients for audit criteria at baseline and follow-up cycles.

In Phase 2, we identified three barriers to best practice and determined strategies designed to overcome them. We performed this using the GRiP matrix, and we present the identified barriers, strategies, resources, and outcomes in Table 3.

Table 3. Getting Research into Practice matrix.

Barrier	Strategies	Recourses	Outcomes
Orthodontic patients' lack of knowledge about the importance of regular check-ups.	Education—verbal and written information	Evidence-based information, face-to-face meeting	Compliance rate for criterion increasing from 20% to 46.7%.
Lack of daily use of mouthwash by orthodontic patients.	Education—verbal and written information	Evidence-based information, face-to-face meeting	Compliance rate for criterion increasing from 17.8% to 66.7%.
Lack of use of interdental aids by orthodontic patients.	Education—verbal and written information and visual demonstration of brushing techniques and usage of aids for oral hygiene maintenance in a model	Evidence-based information, face-to-face meeting	Compliance rate for criterion increasing from 55.6% to 91.1%.

Following the identification of these barriers, the project team developed an implementation program to overcome the barriers, which consisted of complementary strategies contributing to overcoming the different barriers. A plan with educational and motivational strategies was applied.

In Phase 3, the follow-up compliance with best practices for audit criteria is documented in Figures 1 and 2. There was an improvement in the percentage of compliance with all the tested audit criteria. Criteria one, two, and six were met completely (100%). The results show that the chair-side education of each individual patient had an impact on the improvement of oral hygiene habits. The chi-square test revealed a significant

difference in the responses between the baseline and follow-up audit responses for the following questions: "I use fluoride toothpaste every day" ($p \leq 0.001$), "I use dental floss and interdental brush every day". ($p \leq 0.001$), "I use mouthwash every day" ($p \leq 0.001$), "I have been educated on the subject of oral hygiene and oral health" ($p \leq 0.001$), and "I go to the dentists every six months for regular check-ups" ($p = 0.007$).

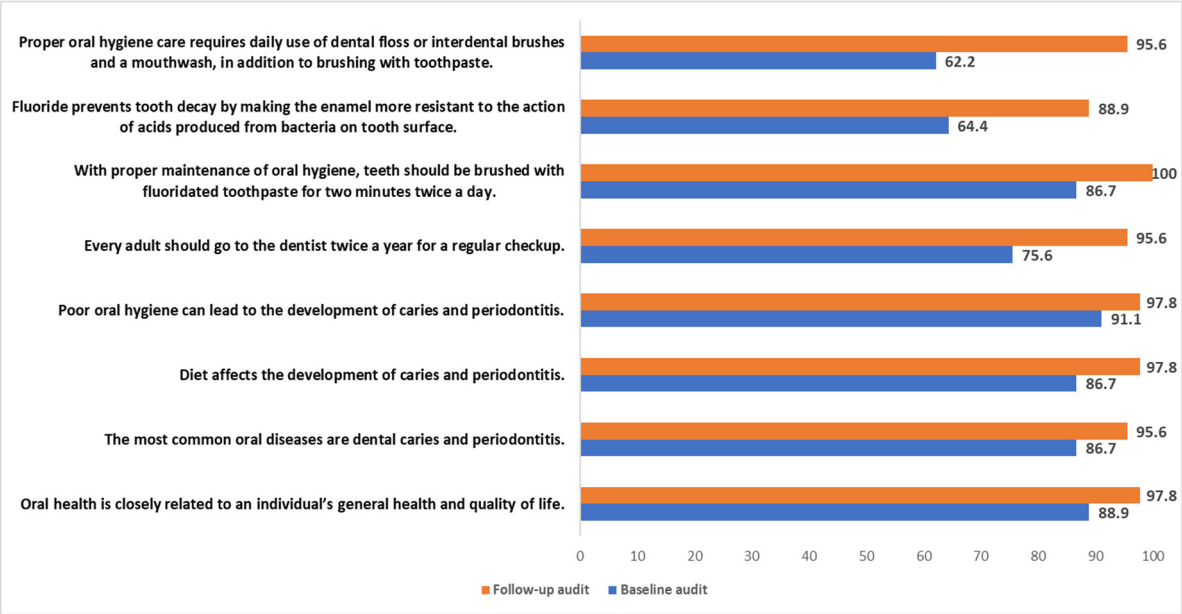

Figure 2. Difference in oral health knowledge between baseline and follow-up cycles among respondents.

Statistically significant differences were found in the total score for oral health knowledge between the baseline (6.67 ± 1.74 out of 8) and the follow-up audit (7.78 ± 0.56, $p \leq 0.001$). The chi-square test revealed a significant difference in the responses between the baseline and follow-up audits for the following statements: "The most common oral diseases are dental caries and periodontitis" ($p = 0.026$), "Diet affects the development of caries and periodontitis" ($p = 0.026$), "With proper maintenance of oral hygiene, teeth should be brushed with fluoridated toothpaste for two minutes twice a day" ($p = 0.026$), "Fluoride prevents tooth decay by making the enamel more resistant to the action of acids produced from bacteria on the tooth surface" ($p = 0.004$), "Proper oral hygiene care requires daily use of dental floss or interdental brushes and mouthwash, in addition to brushing with toothpaste" ($p \leq 0.001$), and "Every adult should go to the dentist twice a year for a regular checkup" ($p = 0.039$). Based on the results of the linear regression analysis, there was no significant association between higher levels of oral health knowledge and the participants' gender (β = 0.516, CI −0.670–1.703, $p = 0.385$) or age (β = −0.047, CI −0.119–0.026, $p = 0.202$).

4. Discussion

Fixed orthodontic treatment has been found to correlate with elevated dentobacterial plaque accumulation, potentially predisposing individuals to decalcification, dental caries, periodontal disease, halitosis, and tooth staining [1,2]. Therefore, employing good oral hygiene practices, including manual plaque removal supplemented by antimicrobial products, constitutes the foremost step in preventing these conditions [3,4]. Research indicates that orthodontic patients often have poor oral hygiene, especially towards the end of treatment, as shown in various scientific investigations, highlighting the challenge of instructing oral hygiene and diet during orthodontic therapy [14,15].

Highlighting the significance of oral health literacy, intricately intertwined with both oral health knowledge and overall oral well-being, is essential. Additionally, both oral

health and orthodontic literacy significantly impact clinical practice. Understanding the baseline levels of orthodontic and oral health literacy within a practice's patient pool is crucial for patient compliance and improving access to care. Evidence suggests that focusing on increasing patient health literacy can enhance patient trust in practitioners, increase referrals, and improve the practice's ability to educate patients about treatment options [23].

To evaluate the improvement in oral hygiene compliance among orthodontic patients, factors such as brushing frequency, usage of fluoride toothpaste, mouthwash, interdental aids, regular check-ups, and oral health knowledge were assessed using a self-reported questionnaire over a period of 90 days (baseline vs. follow-up). The implementation project successfully resulted in improvements in compliance with best practices. At the beginning of the study (baseline audit), only 20% of the participants went for regular six-month check-ups at their selected dentist, and 17.8% of them used mouthwash daily. After implementing the intervention, the number of participants going for a check-up increased to 46.7%. The most notable increase was observed in the percentage of individuals using mouthwash daily, which rose to 66.7%. This is particularly relevant considering that oral mouthwashes have been shown to be effective in controlling cariogenic plaque in patients with fixed orthodontic appliances [24]. After the intervention, all the subjects (100%) reported that they had been educated on the topic of oral hygiene and oral health. They also stated that they used fluoridated toothpaste daily and brushed their teeth twice a day.

Customizing the approach for adult orthodontic patients is essential for effective oral hygiene motivation, addressing individual compliance and treatment-related oral health factors. So far, numerous studies have been conducted that have shown the impact of oral hygiene education on the oral hygiene practices of orthodontic patients. These studies have confirmed that all types of education, including verbal, written, and visual information materials, increase patient motivation and play a crucial role in maintaining proper oral hygiene [6,7,14–16]. Furthermore, oral health education has demonstrated effectiveness in improving oral health knowledge, attitudes, and practices, particularly in the short term. However, in order to achieve long-term success, it is crucial for oral health education to be reiterated and reinforced over time. Continuous and repeated education is essential in maintaining and reinforcing positive oral health behaviors, ultimately leading to sustained improvements in oral health outcomes [25,26].

Although the orthodontic patients initially demonstrated a good level of oral health knowledge, significant improvement was observed following the intervention ($p \leq 0.001$). The findings suggest that the intervention successfully enhanced the oral health knowledge of the participants, indicating the effectiveness of the implemented strategies. One possible explanation for the initially high level of oral health knowledge and oral hygiene practice among the participants could be the fact that the majority of respondents (88.8%) had already received some education on the subject. The improvement in oral health knowledge scores after the intervention was not affected by the demographic characteristics of the study participants. This suggests that factors such as age, gender, and other demographic variables did not significantly influence the effectiveness of the intervention in enhancing oral health knowledge. Consistent outcomes have been documented in other studies as well [26–28].

This study had several limitations that should be acknowledged. Firstly, the sample size was relatively small, and all patients were from one private specialist orthodontic practice, which may limit the generalizability of the findings to a larger population. It would be beneficial to conduct a study with a larger number of participants, including individuals before they have gone through the placement of orthodontic braces and following them throughout the entire duration of the therapy. This would provide a more comprehensive understanding of oral hygiene practices and oral health knowledge among orthodontic patients. Another limitation of the study was the use of convenience sampling for participant recruitment. This sampling method may introduce bias and limit the elimination of confounding factors in the study. Additionally, the study acknowledged the possibility of

social desirability bias. Participants may have provided answers that they believed would be viewed favorably by others, potentially influencing the accuracy of their responses.

It is crucial to recognize the importance of oral hygiene in maintaining overall oral health. As oral health significantly impacts individuals, it is imperative to educate the entire community about oral hygiene practices and their significance in promoting oral health [3,5–7]. This prevention program for orthodontic patients aims to reduce complications, promote better oral health outcomes, and shorten treatment times. By educating patients on proper oral hygiene, it empowers them to care for their teeth and braces effectively, resulting in fewer emergencies and a more efficient treatment process. Additionally, it instills lifelong oral hygiene habits, contributing to long-term dental wellness and potentially reducing the need for extensive dental interventions later in life [16,25]. The findings of this study provide a valuable resource for practitioners seeking to enhance their approach to motivating orthodontic patients regarding oral hygiene and broader oral health maintenance. Furthermore, these findings emphasize the necessity for additional research to explore underlying factors and develop effective interventions, ultimately improving oral health practices among orthodontic patients.

This study has several limitations. First, it is a pilot study conducted with a limited sample, and the follow-up period was short. Increasing the sample size and extending the follow-up period would provide more robust findings, particularly regarding the sustainability of improved oral hygiene habits over time. In addition, future research could investigate different intervention methods, such as written instructions in the form of booklets, video instructions, or verbal instructions, to evaluate their comparative effectiveness in promoting compliance with oral hygiene practices among orthodontic patients. Such research would contribute to a more comprehensive understanding of the most effective educational strategies in this context and support the development of tailored interventions for optimal oral health outcomes.

5. Conclusions

The introduction of in-office patient education during fixed orthodontic treatment resulted in an improvement in compliance with oral hygiene practices. After the intervention, the audit criteria were fully met, underlining the effectiveness of the educational approach. In addition, a significant increase in oral health knowledge was observed among the participants from the pre-audit to the post-audit stages, indicating a positive change in attitudes and behaviors related to oral hygiene. These results emphasize the central role of education in promoting positive oral hygiene habits in orthodontic patients. The strategies implemented in this study effectively conveyed important information to adult orthodontic patients and ultimately promoted better adherence to evidence-based guidelines. Future initiatives should focus on developing guidelines that assist orthodontists and patients alike in maintaining optimal oral health and hygiene throughout treatment.

Author Contributions: Conceptualization, A.T., B.M.V. and T.P.P.; methodology, A.T. and T.P.P.; validation, A.T. and T.P.P.; investigation, A.T. and B.M.V.; resources, A.T., M.B. and T.P.P.; writing—original draft preparation, A.T., M.B., B.M.V. and T.P.P.; writing—review and editing, A.T., M.B., B.M.V. and T.P.P.; supervision, A.T. and T.P.P.; project administration, A.T. and T.P.P. All authors have read and agreed to the published version of the manuscript.

Funding: ERASMUS+ project—Evidence implementation in clinical practice. Project reference: 2020-1-DE01-KA203-005669.

Institutional Review Board Statement: The protocol of the study was approved by the Institutional Review Board, School of Medicine, University of Split, Croatia. The study was conducted in accordance with the Helsinki Declaration of 1975, as revised in 2013.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Data supporting the findings of this study are available upon request from the corresponding author.

Conflicts of Interest: The authors report no conflicts of interest.

Appendix A. Questionnaire

Q1. Gender:	☐ Male		☐ Female
Q2. Age (years):			
Q3. Are you brushing your teeth twice a day or more (toothpaste and toothbrush)?	☐ Yes		☐ No
Q4. Are you using fluoridated toothpaste daily?	☐ Yes		☐ No
Q5. Are you using dental floss/interdental brush daily to prevent gingivitis and periodontal disease?	☐ Yes		☐ No
Q6. Are you going for regular dental checkups every six months?	☐ Yes		☐ No
Q7. Are you using mouthwash daily?	☐ Yes		☐ No
Q8. Have you been educated by your dentist about oral hygiene, diet and the risks associated with smoking, chewing tobacco and excessive alcohol consumption?	☐ Yes		☐ No
Q9. Please mark the answer you find correct.			
Oral health is closely related to an individual's general health and quality of life.	☐ Yes	☐ No	☐ I do not know
The most common oral diseases are dental caries and periodontitis.	☐ Yes	☐ No	☐ I do not know
Diet affects the development of caries and periodontitis.	☐ Yes	☐ No	☐ I do not know
Poor oral hygiene can lead to the development of caries and periodontitis.	☐ Yes	☐ No	☐ I do not know
Every adult should go to the dentist twice a year for a regular checkup.	☐ Yes	☐ No	☐ I do not know
With proper maintenance of oral hygiene, teeth should be brushed with fluoridated toothpaste for two minutes twice a day.	☐ Yes	☐ No	☐ I do not know
Fluoride prevents tooth decay by making the enamel more resistant to the action of acids produced from bacteria on tooth surface.	☐ Yes	☐ No	☐ I do not know
Proper oral hygiene care requires daily use of dental floss or interdental brushes and a mouthwash, in addition to brushing with toothpaste.	☐ Yes	☐ No	☐ I do not know

References

1. Thanetchaloempong, W.; Koontongkaew, S.; Utispan, K. Fixed Orthodontic Treatment Increases Cariogenicity and Virulence Gene Expression in Dental Biofilm. *J. Clin. Med.* **2022**, *11*, 5860. [CrossRef] [PubMed]
2. Hadler-Olsen, S.; Sandvik, K.; El-Agroudi, M.A.; Ogaard, B. The incidence of caries and white spot lesions in orthodontically treated adolescents with a comprehensive caries prophylactic regimen—A prospective study. *Eur. J. Orthod.* **2012**, *34*, 633–639. [CrossRef] [PubMed]
3. Walsh, L.J.; Healey, D.L. Prevention and caries risk management in teenage and orthodontic patients. *Aust. Dent. J.* **2019**, *64*, S37–S45. [CrossRef] [PubMed]
4. Travess, H.; Roberts-Harry, D.; Sandy, J. Orthodontics. Part 6: Risks in orthodontic treatment. *Br. Dent. J.* **2004**, *196*, 71–77. [CrossRef] [PubMed]
5. Aljohani, S.R.; Alsaggaf, D.H. Adherence to Dietary Advice and Oral Hygiene Practices Among Orthodontic Patients. *Patient Prefer. Adherence* **2020**, *14*, 1991–2000. [CrossRef] [PubMed]
6. Marini, I.; Bortolotti, F.; Parenti, S.I.; Gatto, M.R.; Bonetti, G.A. Combined effects of repeated oral hygiene motivation and type of toothbrush on orthodontic patients: A blind randomized clinical trial. *Angle Orthod.* **2014**, *84*, 896–901. [CrossRef] [PubMed]
7. Peng, Y.; Wu, R.; Qu, W.; Wu, W.; Chen, J.; Fang, J.; Chen, Y.; Farella, M.; Mei, L. Effect of visual method vs plaque disclosure in enhancing oral hygiene in adolescents and young adults: A single-blind randomized controlled trial. *Am. J. Orthod. Dentofac. Orthop.* **2014**, *145*, 280–286. [CrossRef] [PubMed]
8. van der Kaaij, N.C.W. Preventie van wittevleklaesies die ontstaan tijdens een behandeling met vaste orthodontische apparatuur [Prevention of white spot lesion formation during treatment with fixed orthodontic appliances]. *Ned. Tijdsch. Tandheelkd.* **2020**, *127*, 699–704. (In Dutch) [CrossRef]
9. Sawai, D.S.; Singh, P.; Tushar; Dogra, M.; Sultana, R.; Khan, S.A. Perception, awareness, and practice among patients seeking orthodontic treatment toward maintenance of periodontal health and factors affecting the same among patients visiting dental clinics in Patna. *J. Fam. Med. Prim. Care* **2019**, *8*, 3695–3699. [CrossRef]
10. Matić, S.; Ivanović, M.; Nikolić, P. Evaluation of a prevention programme efficiency for patients with fixed orthodontic appliances. *Vojnosanit. Pregl.* **2011**, *68*, 214–219. [CrossRef]
11. Guo, J.; Li, L.; Guan, G.; Bennani, F.; Mei, L. Oral health knowledge and practice among orthodontic clients in China and New Zealand. *Can. J. Dent. Hyg.* **2020**, *54*, 124–132. [PubMed]

12. Inquimbert, C.; Clement, C.; Couatarmanach, A.; Tramini, P.; Bourgeois, D.; Carrouel, F. Oral Hygiene Practices and Knowledge among Adolescents Aged between 15 and 17 Years Old during Fixed Orthodontic Treatment: Multicentre Study Conducted in France. *Int. J. Environ. Res. Public Health* **2022**, *19*, 2316. [CrossRef] [PubMed]
13. Petrauskiene, S.; Wanczewska, N.; Slabsinskiene, E.; Zemgulyte, G. Self-Reported Changes in Oral Hygiene Habits among Adolescents Receiving Orthodontic Treatment. *Dent. J.* **2019**, *7*, 96. [CrossRef] [PubMed]
14. Farhadifard, H.; Soheilifar, S.; Farhadian, M.; Kokabi, H.; Bakhshaei, A. Orthodontic patients' oral hygiene compliance by utilizing a smartphone application (Brush DJ): A randomized clinical trial. *BDJ Open* **2020**, *6*, 24. [CrossRef]
15. Huang, J.; Yao, Y.; Jiang, J.; Li, C. Effects of motivational methods on oral hygiene of orthodontic patients: A systematic review and meta-analysis. *Medicine* **2018**, *97*, e13182. [CrossRef] [PubMed]
16. Le Fouler, A.; Jeanne, S.; Sorel, O.; Brézulier, D. How effective are three methods of teaching oral hygiene for adolescents undergoing orthodontic treatment? The MAHO protocol: An RCT comparing visual, auditory and kinesthetic methods. *Trials* **2021**, *22*, 144. [CrossRef] [PubMed]
17. Derks, A.; Kuijpers-Jagtman, A.M.; Frencken, J.E.; Van't Hof, M.A.; Katsaros, C. Caries preventive measures used in orthodontic practices: An evidence-based decision? *Am. J. Orthod. Dentofac. Orthop.* **2007**, *132*, 165–170. [CrossRef]
18. Cardoso, A.F.; Ribeiro, L.E.; Santos, T.; Pinto, M.; Rocha, C.; Magalhães, J.; Augusto, B.; Santos, D.; Duque, F.M.; Fernandes, B.L.; et al. Oral Hygiene in Patients with Stroke: A Best Practice Implementation Project Protocol. *Nurs. Rep.* **2023**, *13*, 148–156. [CrossRef] [PubMed]
19. Ozlu, F.C.; Aktunc, E.; Yilmaz, H.; Karadeniz, E.I. Effectiveness of three different types of educational methods on implementation of proper oral hygiene behaviour prior to orthodontic treatment. *Dent. Press J. Orthod.* **2021**, *26*, e2119248. [CrossRef]
20. Thickett, E.; Newton, J.T. Using written material to support recall of orthodontic information: A comparison of three methods. *Angle Orthod.* **2006**, *76*, 243–250. [CrossRef]
21. Porritt, K.; McArthur, A.; Lockwood, C.; Munn, Z. (Eds.) JBI Handbook for Evidence Implementation: JBI; 2020. Available online: https://implementationmanual.jbi.global (accessed on 13 April 2024).
22. Porritt, K. Evidence Summary. Oral Hygiene in Adults: General Principles. Joanna Briggs Inst. EBP Database JBI@Ovid. 2022. Available online: https://jbi.global/ebp (accessed on 13 April 2024).
23. McCarlie, V.W., Jr.; Phillips, M.E.; Price, B.D.; Taylor, P.B.; Eckert, G.J.; Stewart, K.T. Orthodontic and Oral Health Literacy in Adults. *PLoS ONE* **2022**, *17*, e0273328. [CrossRef] [PubMed]
24. Pithon, M.M.; Sant'Anna, L.I.; Baião, F.C.; dos Santos, R.L.; Coqueiro, R.S.; Maia, L.C. Assessment of the effectiveness of mouthwashes in reducing cariogenic biofilm in orthodontic patients: A systematic review. *J. Dent.* **2015**, *43*, 297–308. [CrossRef] [PubMed]
25. Nakre, P.D.; Harikiran, A.G. Effectiveness of oral health education programs: A systematic review. *J. Int. Soc. Prev. Community Dent.* **2013**, *3*, 103–115. [CrossRef] [PubMed]
26. Konstantopoulou, K.; Kossioni, A.; Karkazis, H.; Polyzois, G. Implementation and evaluation of an oral health education programme for caregivers in nursing homes. *Spec. Care Dent.* **2021**, *41*, 154–163. [CrossRef] [PubMed]
27. Fazli, M.; Yazdani, R.; Mohebbi, S.Z.; Shamshiri, A.R. Oral health literacy and socio-demographics as determinants of oral health status and preventive behavior measures in participants of a pre-marriage counseling program. *PLoS ONE* **2021**, *16*, e0258810. [CrossRef]
28. Firmino, R.T.; Martins, C.C.; Faria, L.D.S.; Martins Paiva, S.; Granville-Garcia, A.F.; Fraiz, F.C.; Ferreira, F.M. Association of oral health literacy with oral health behaviors, perception, knowledge, and dental treatment related outcomes: A systematic review and meta-analysis. *J. Public Health Dent.* **2018**, *78*, 231–245. [CrossRef]