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ORIGINAL ARTICLE

Aesthetic dental practices by dental and prosthodontic practitioners in Riyadh, Saudi Arabia

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KEYWORDS

Aesthetic dentistry;
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Aesthetic posts;
Ceramic veneers;
Electronic shade guides;
Computer-aided design/
Computer aided manufacturing (CAD/CAM) of ceramic crowns

Abstract *Background:* The level of aesthetic requirement in clinical practice has increased over the past decade, and this has made it necessary for dentists to constantly update themselves to meet the existing demand in this field.

Aim: The goal of this study was to assess the practice of aesthetic dentistry at the clinics by general practitioners (GPs) and prosthodontists.

Materials and methods: Self-administered questionnaires were distributed to general practitioners and prosthodontists working in private dental clinics in Riyadh, Saudi Arabia. A total of 250 questionnaires were distributed.

Results: One hundred and thirty-eight questionnaires out of the original two hundred and fifty were completed (55.2%). More prosthodontists were found to be using CAD/CAMs for making ceramic crowns, Ceramic veneers, electronic shade guides and aesthetic posts as compared to GPs. On the other hand, more percentage of GPs (66.1%) ($p < 0.05$) was found to be using all ceramic crowns as compared to prosthodontists (58.9%).

Conclusions: With recent advancements in aesthetic dentistry, many new options are available to enhance the level of aesthetics and enabling more conservative cavity preparations. It is therefore necessary that the clinicians constantly update their skill and knowledge and also incorporate these procedures into their regular clinical practice.

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1. Introduction

The demand for aesthetic dentistry in clinical practice has increased over the past decade [14]. Numerous new procedures

have been innovated that have significantly improved the clinical practice of aesthetic dentistry. There has been a rapid increase in the amount of published research pertaining to aesthetic dentistry. The pace of change with which dentists must cope daily in their practices has also accelerated. Evaluating, adopting, implementing the new procedures, have taken an important role in dental practice. Some of the areas which have emerged in the field of aesthetic dentistry are: aesthetic posts, all ceramic crowns, computer-aided design/computer aided manufacturing (CAD/CAM) of ceramic crowns, ceramic veneers and electronic shade guides.

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The introduction of aesthetic posts has made a great impact on the restoration of endodontically treated teeth. Since their introduction [1,9], technology has modified and further improved post shape and materials; in addition, the use of innovative adhesive systems and cementation techniques has offered the possibility to achieve high level of adhesion within the root canal [6,11,15], producing new posts which ensure dental tissue conservation. The restoration of endodontically treated teeth is a critical step in the success of root canal treatment [2]. Ceramics are replacing metals as materials of choice in dental crowns [19], as well as in other biomechanical prostheses. Dental ceramics are claimed to be the most biocompatible materials used to date for dental restorations [3,26]. The major advantage of ceramic crowns is the aesthetic result.

All-ceramic posterior crowns can be fabricated either as core crowns using CAD/CAM (computer-aided design/computer aided manufacturing) generated copings, which are manually veneered by the laboratory technician or CAD/CAM-generated as full monolithic crowns [5]. Although becoming more popular now, the CAD/CAM concept has been relatively slow in being integrated into practice [7]. The CAD/CAM systems have been used mostly for the manufacturing of prosthetic fixed restorations, such as inlays, onlays, veneers and crowns. The computer and milling processes diminish potential inaccuracies resulting from the hand/laboratory fabrication process [10].

Since their introduction in the early 1980's ceramic veneers have gained wide acceptance as a primary mode of restoration in aesthetic dentistry[23]. Because ceramic veneers are primarily indicated for the improvement of aesthetics, the design of the smile should respect the symmetry and the harmonious arrangement of dento-facial elements [4]. Ceramic veneer is extremely natural looking, stain resistant and very durable [20].

Shade selection is a very crucial step in the success of the definitive restoration. Culpepper [8] found disagreement between dentists in shade matching the same tooth, and individual dentists could not duplicate their shade selections on different days. Traditional shade selection under ideal conditions is a subjective assessment, even among experienced clinicians [8,13,22].

The use of these aesthetic dental procedures among the dentists working in the Riyadh city has not been studied previously. Baseline data are necessary to understand the use of aesthetic dental procedures and the problems faced by the practicing dentist. The goal of this study was to assess the practice of aesthetic dentistry by general practitioners (GPs) and prosthodontists.

2. Materials and methods

This study used a self-administered questionnaire. The questionnaires were distributed to private dental clinics in Riyadh, Saudi Arabia. Riyadh city was divided into 5 major areas according to the city municipality zones map. A sample size of 100 subjects was considered sufficient for statistical analysis, however in view of the issue of non-respondents, the final sample was fixed at 250. Study sample included general practitioners (GPs) and prosthodontists working in private clinics. Fifty questionnaires were distributed in each of the five zones. Private dental clinics were randomly selected from each zone till the required number of questionnaires per zone was

reached. GPs and prosthodontists working in the clinics were invited to be part of the study and each of them received hand-delivered questionnaires. After one week, the questionnaires were hand-collected from the clinics.

The questionnaire consisted of questions regarding the use of aesthetic posts, ceramic crowns, and use of CAD/CAM for preparing ceramic crowns, ceramic veneers and electronic shade guides. To answer these questions, the respondents had to choose either "Yes" or "No" option. Follow-up questions investigated the reason for not using the specified technique by selecting one or more of the stated choices.

One operator processed all the questionnaires. All statistical analyses were carried out using SPSS 17.0 (Statistical Package for the Social Sciences for Windows; SPSS Inc., Chicago, IL, USA). Chi-square was used to find differences in the practice of aesthetic dentistry between GPs and Prosthodontists. The *P*-value of <0.05 was considered to be statistically significant.

3. Results

One hundred and thirty-eight questionnaires out of the original two hundred and fifty were completed (55.2%). One hundred and twenty-one GPs and seventeen prosthodontists participated in the study. Around 35% of the GPs used esthetic posts as compared to 47% of the prosthodontists (*p* value = 0.35). Higher percentage of GPs (64.5%) was found to be using all ceramic crowns as compared to prosthodontists (58.9%). The difference was not statistically significant (*p* value = 0.84). However, prosthodontists were using more CAD/CAM's for the preparation of all ceramic crowns. Only 1.65% of the GPs used CAD/CAM compared to 17.7% of Prosthodontists (*p* value = 0.03). Similarly, 94.2% of the prosthodontists used ceramic veneers compared to 46.3% of the GPs. This was found to be highly significant with a *p* value of <0.001. There was also a significant difference (*P* value <0.001) in the usage of electronic shade guides. Only 5% of the GP's used shade guides compared to 41.1% of the prosthodontists (Fig. 1).

The most common type of aesthetic post used by GPs was the fibre post. Prosthodontists used more of zirconium post with CAD/CAM. The brands of aesthetic posts used by the GPs and prosthodontists are shown in Fig. 2a. The unavailability and expense of the posts were the most common reasons reported by the dentists who did not use aesthetic posts (Fig. 2b). The most common brand of ceramic crowns used was Empress 2 followed by Empress and Procera systems. Unavailability of ceramic crowns, lack of training and expense of the product were the common reasons reported for not using. Nineteen percent of the GPs did not find any advantage of ceramic crown (Figs. 3a & b). Only two GPs (40%) and three prosthodontists (60%) were using CAD/CAM for making ceramic crowns. The reasons for not using were: unavailability (45% of GPs and 44% of prosthodontists), expensive (11% of GPs and 50% of prosthodontists) and lack of training (37% of GPs and 6% prosthodontist) (Figs. 4a & b). The most common brand of veneers used was: Empress 2, Empress and Procera. The majority of the GPs did not use veneers because of lack of training. Majority of GPs preferred to use the Empress 2 system whereas prosthodontists preferred Procera system for veneers, and unavailability of the product was the

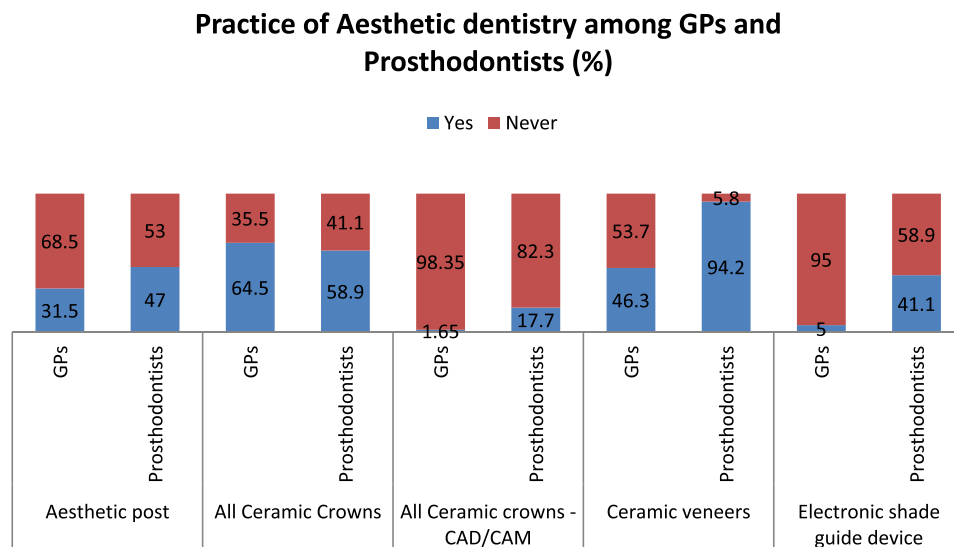


Figure 1 Practice of Aesthetic dentistry among GPs and prosthodontists (%).

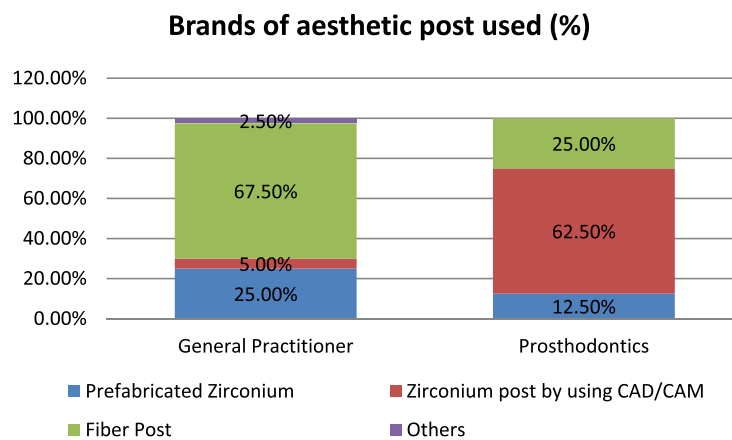


Figure 2a Brands of aesthetic post used (%).

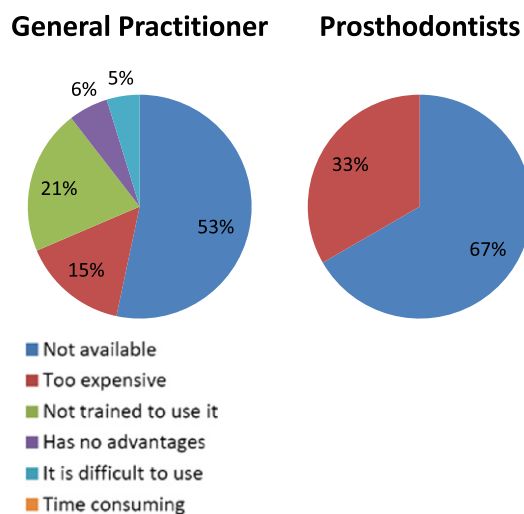


Figure 2b Reasons for not using aesthetic post among GPs and prosthodontists.

reason for not using it (Figs. 5a & b). The GPs and Prosthodontists also sparingly used electronic shade guide. The shade vision device was most commonly used by the prosthodontist. Unavailability of the product (GPs) and time consuming (prosthodontists) were the most commonly cited reasons for not using shade guides (Figs. 6a & b).

4. Discussion

The reason behind the low response rate in the current study has been found to be due to the difficulty involved in engaging GPs in surveys. This was in line with many other studies. Response rates to surveys of general practitioners have ranged from 44–95% [21]. The study by Templeton et al. [30] found that low response rate did not affect the validity of the data collected. In the current study, more prosthodontists were practicing techniques related to aesthetic dentistry when compared to GPs. This could be because prosthodontists are likely to have more exposure and have better training in aesthetic dentistry. Despite the fact that GPs were not regularly

Brands of All ceramic crown used in the clinic (%)

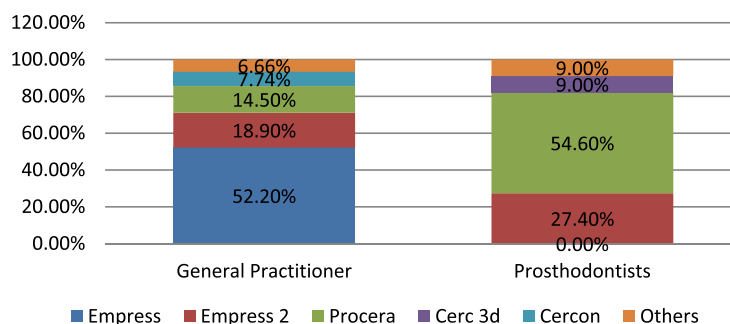
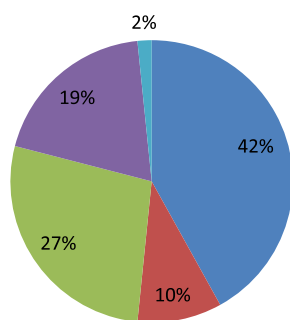
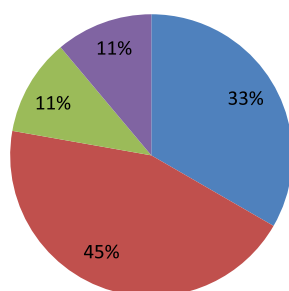


Figure 3a Brands of all ceramic crowns used in the clinic (%).

General Practitioners



Prosthodontists



- Not available
- Too expensive
- Not trained to use it
- Has no advantages
- It is difficult to use
- Time consuming

Figure 3b Reasons for not using all ceramic crowns among GPs and prosthodontists.

practicing many aesthetic dental procedures, it was observed in this study that they used all ceramic crowns more than prosthodontists. Similarly, GPs also matched very closely with prosthodontists in the use of aesthetic posts.

This study helps in understanding the difference in the practice of various aesthetic dental procedures between GPs and Prosthodontists. The use of fibre post was dominated by GPs whereas prosthodontists preferred using zirconium post. The aesthetic posts offer retention without the need for extensive preparation of tooth structure, it may increase resistance form of the tooth preparation to some extent, and it is less time consuming and less expensive than cast restorations, which require multiple appointments[27]. However, it does not increase the strength of the overlying restorative material. It may also increase the chances of perforation into root canal or on the external tooth surface [25]. The long-term results are also not available [16]. This may explain the reasons for the minimal use of aesthetic posts by prosthodontists.

It is important to remember that a conservative approach should be planned for the residual tissue to achieve clinical success of the prosthetic restoration [12,15]. The use of aesthetic posts helps in conserving the residual tissue [28]. Empress was the most common brand of ceramic crowns used by GPs. Usage of all ceramic crowns was less among prosthodontists as most of them felt it is expensive. CEREC was the most

Brands of All ceramic crowns using CAD/CAM (%)

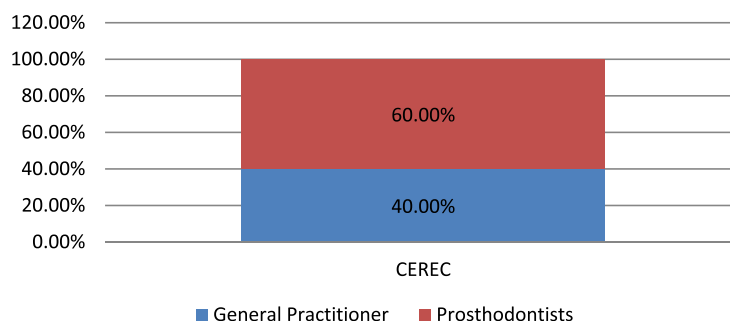


Figure 4a Brand of all ceramic crowns using CAD/CAM (%).

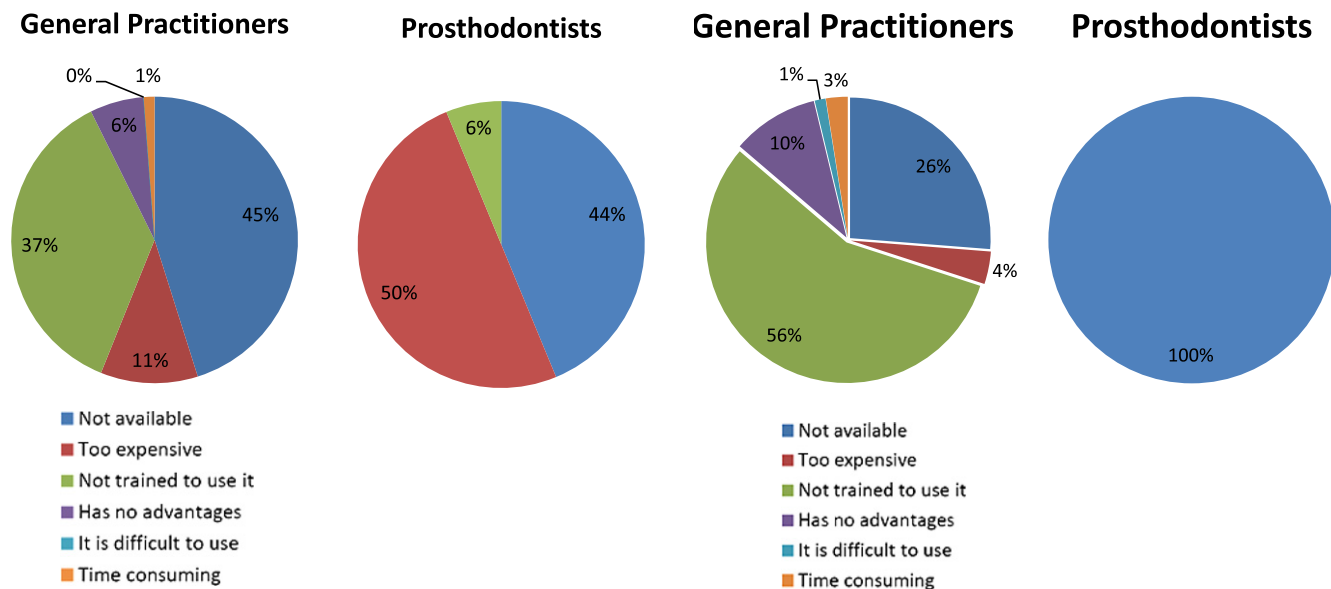


Figure 4b Reasons for not using CAD/CAM for making all ceramic crowns between GPs and prosthodontists.

Figure 5b Reasons for not using veneers among GPs and prosthodontists.

commonly used brand for making ceramic crowns with CAD/CAMs. CAD/CAM technology has used metals such as titanium and titanium alloys, and ceramics such as aluminum oxide or zirconium oxide for the fabrication of implant abutments [29]. The process of preparation is technique sensitive and it requires the removal of considerable amount of sound tooth structure [17]. Excessive wear of opposing tooth may occur if ceramic surface is not properly glazed or polished [18]. These could be the reason for few numbers of prosthodontists using ceramic crowns.

There has already been much success with CAD/CAM systems' producing ceramic restorations [24]. However, this study shows that CAD/CAM is not popular among both GPs and prosthodontists. In-office CAD/CAM helps the dentist to perform more dental procedures, at a faster rate, with more predictable results. However, the cost of in-office CAD/CAM is

a significant deterrent and this could explain the minimal use of this technology by both GPs and specialists alike.

Ceramic veneers are an excellent choice for most patients; however, there are some disadvantages that should be considered. Veneers have a potential to break and it is not a reversible process. Less than 50% of the GPs were using ceramic veneers. This is surprising as the success of treatment with ceramic veneers can be assured on following a defined protocol. Similarly, only few GPs were using electronic shade matching although it has been proven that the shade matching enhances the dentist-ceramist team's ability to aesthetically match metal-ceramic restorations to the natural dentition.

Generally, the most common reason given for not using a particular procedure was its unavailability and expense involved. Most of the GPs felt that they lacked adequate training in the use of shade guides, whereas most of the prosthodontists felt it was time consuming.

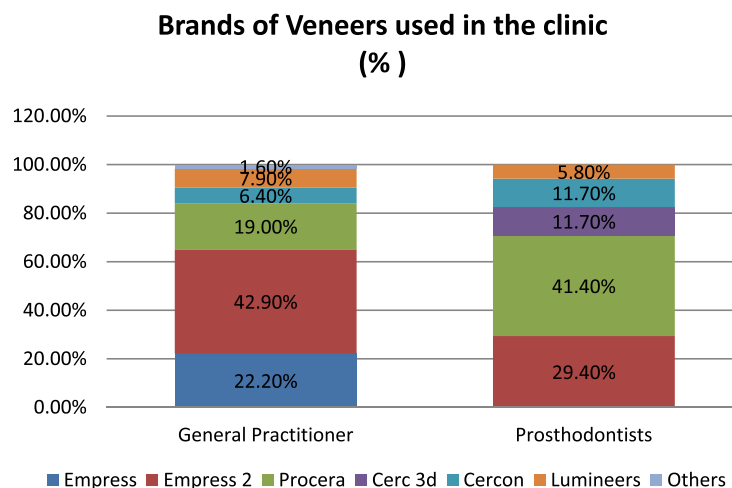


Figure 5a Brands of veneers used in the clinic (%).

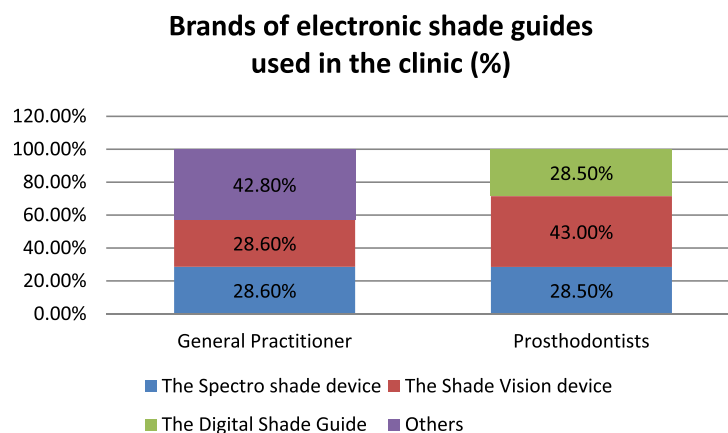


Figure 6a Brands of electronic shade guides used in the clinic (%).

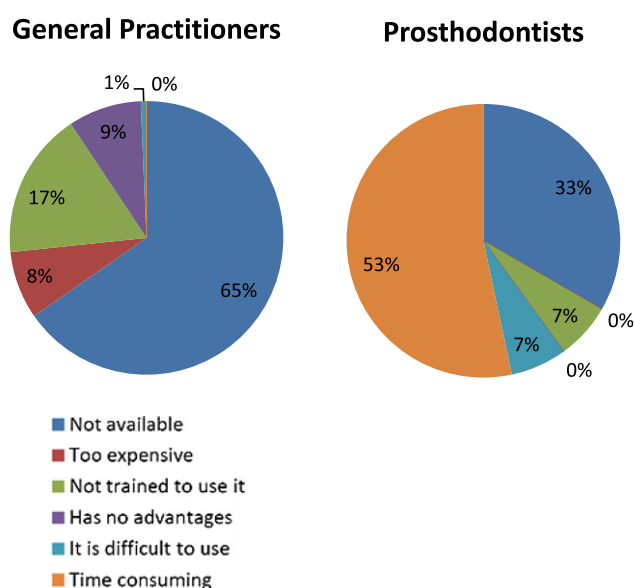


Figure 6b Reasons for not using the shade guides among GPs and prosthodontists.

It seems logical to assume that the adoption of newer aesthetic dental procedures will increase with the introduction of more specialized training activities that aim at familiarizing the dentists with the use and advantage of new procedures. Introducing the aesthetic procedure in the dental school curriculum and having more training will help the new dentists to be more confident in applying aesthetic dentistry; also, having more training on aesthetic dentistry can increase the practice among dentist and also minimize iatrogenic failures.

5. Conclusion

The results of this study show the difference between the GPs and specialists in adopting new aesthetic dental procedures. It also shows the various factors that influence the acceptance of a new procedure among GPs and specialists. With recent

advancements in aesthetic dentistry, many new options are available to enhance the level of aesthetics while also enabling more conservative cavity preparations and promoting reinforcement of the remaining tooth structure. The use of these new procedures is likely to continue to expand at an exponential rate of development in the future.

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