

# Perception of dental professionals towards dental management of patients using antithrombotic medications in Saudi Arabia: A cross-sectional survey

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## ABSTRACT

**Objectives:** To assess dental professionals' perception and knowledge about dental management of patients on antithrombotics and determine if the treatment approach is according to the international guidelines. **Methods:** This cross-sectional survey was conducted in Saudi Arabia during January 2014-December 2015 and included licensed dentists and hygienists from different dental institutions and Saudi's annual dental conference attendees. Data were collected by using a self-administered questionnaire, with questions about dental management of patients on antithrombotics. Data analysis was done using Statistical Package for Social Sciences statistical software, version 22. **Results:** Of the 305 participants, 302 completed the survey (dentists: 94.7% and dental hygienists: 5.3%). For traditional antithrombotics, familiarity was higher for Warfarin and Aspirin compared to Clopidogrel. However, for new oral anticoagulants (NOACs), familiarity was significantly less for Rivaroxaban ( $P = 0.042$ ). A significant number of participants responded that they were unsure as to how to treat patients [Enoxaparin ( $P < 0.001$ ), Rivaroxaban ( $P < 0.037$ ), and Dabigatran ( $P < 0.027$ )]. Furthermore, the management of patients on traditional or NOACs was not under guidelines (ranging: 8.2%-42.2%). **Conclusion:** Dental professionals have limited familiarity with antithrombotics, especially NOACs. Therefore, awareness about NOACs and their impact on dental procedures is needed among dentists in primary healthcare settings, to facilitate proper and timely management.

**Keywords:** Anticoagulants, antithrombotic agents, dental hygienist, dentist, new oral anticoagulants (NOACs), Questionnaires

## Introduction

Antithrombotic medications prevent the risk of ischemic stroke and thromboembolism (TE); however, they also lead to an increased risk of bleeding, especially after surgical procedures.<sup>[1,2]</sup>

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Received: 26-03-2020

Revised: 25-04-2020

Accepted: 02-06-2020

Published: 25-08-2020

Some clinicians prefer to discontinue antithrombotic medications before the dental procedure other clinicians suggest continuation to prevent potentially serious medical complications (TE or stroke risk, etc.) that may arise from withholding the medication.<sup>[3,4]</sup>

Several new oral anticoagulants (NOACs) are now widely used.<sup>[5,6]</sup>

Dental management of patients on antithrombotics is a matter of concern, dental professionals need to be aware of antithrombotic therapies, understand their impact on dental treatment and safely manage them.

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**How to cite this article:** AlSheef M, Gray J, Al Radhi S, AlJohani M, Al Johani A, Zaidi AR. Perception of dental professionals towards dental management of patients using antithrombotic medications in Saudi Arabia: A cross-sectional survey. J Family Med Prim Care 2020;9:3898-904.

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Website:  
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DOI:  
10.4103/jfmpc.jfmpc\_473\_20

## Materials and Methods

### Study design and setting

A cross-sectional survey was conducted in Saudi Arabia from January 2014 to December 2015. The study was approved by the Institutional Review Board.

### Participants in survey

The survey participants included licensed dentists and practicing dental hygienists. The survey included participants from different dental institutions and the attendees of the Saudi Dental Society annual conference. Participation was voluntary and they had the autonomy to quit the survey at any stage. The subjects who were not practicing in Saudi Arabia at the time of study or who did not complete the survey form were excluded.

### Survey questionnaire

A close-ended questionnaire (survey form) was formulated in 2014 consisting of four sections. The first section of the questionnaire included questions about the demographics including working duration, nationality, and gender. The second section asked participants about their familiarity with several antithrombotic medications listed in the form. The third section asked participants about the management approach for patients on different anticoagulants. Responder had to “agree” to one of the most appropriate responses by a tick mark. A panel of experts in dentistry, thromboembolism, and research determined the psychometric characteristics (test/re-test reliability) of the back-translated version with the original, which was then piloted on 20 participants and revised for final distribution.

### Data collection

The paper version of survey forms was used to collect the responses of the participants. The questionnaire was filled by the participants based on their knowledge, and no clarification was provided for any doubts regarding the questions. Further, no compensation was offered to the participants to complete the survey. The completed survey forms were collected in person by two dental hygienists. The responses were saved until they were statistically analyzed.

### Statistical analysis

All the data were entered and analyzed through statistical package SPSS 22 (SPSS Inc., Chicago, IL, USA). All categorical variables such as gender, occupations, etc., were presented as numbers and percentages. Chi-square/Fisher’s exact test was used according to whether the cell expected frequency is smaller than 5, and it was applied to determine the significant association between categorical variables. The probability value ( $P$ )  $<0.05$  was considered as statistically significant.

### Ethical considerations

The study was approved by the Institutional Review Board of King Fahad Medical City, Riyadh, Saudi Arabia (Protocol

# RC17-267). The study was conducted by recommendations of the International Conference on Harmonization for Good Clinical Practice (ICH-GCP).

## Results

### Demographic characteristics

Survey questionnaires were distributed to a total of 305 dentists and dental hygienists, of which 302 responders completed the survey (response rate 99.0%). The remaining three participants refused to fill the survey form. Among the responders, 286 (94.7%) were practicing dentists and 16 (5.3%) were dental hygienists from different dental institutions; 176 (58.3%) were males and 126 (41.7%) were females. Majority of respondents [(258; 85.4%) were Saudis of Saudi Arabia while 44 (14.6%) were non-Saudi (which included dental professionals who were attendees at the Saudi Dental Society Conference). More than half of the respondents, that is, 183 (60.3%) had  $\leq 5$  years of clinical experience. The demographic characteristics of the study population have been detailed in Table 1.

### Familiarity of dentists and dental hygienists with antithrombotic medications

Evaluation of the responses showed that both dentists and dental hygienists were not well aware of the medications. More than half of the dentists and dental hygienists [198 (69.2%) and 222 (77.6%) were very familiar with conventional antithrombotic medications namely Warfarin and Aspirin ( $P = 0.433$  and  $P = 0.758$ ), respectively. Similarly, more than half of dental hygienists 10 (62.5%) and 14 (87.5%) also responded to be very familiar with Warfarin and Aspirin ( $P = 0.433$  and  $P = 0.758$ ), respectively. But familiarity for the conventional drug Clopidogrel was less among both dentists and dental hygienists (60; 21% vs. 2; 12.5%).

In regard to familiarity with NOACs, a significantly higher number of dentists and dental hygienists were not familiar at all with Rivaroxaban [181 (63.3%) vs. 9 (56.2%);  $P = 0.042$ ], respectively. Similarly, high number of dentists and dental hygienists were unaware about Dabigatran, [(205 (71.7%) vs. 13 (81.2%);  $P = 0.092$ ] and Apixaban [(162 (63.3%) vs. 10 (83.3%);  $P < 0.027$ ], respectively. The results for familiarity with various antithrombotic drugs have been detailed in Table 2.

**Table 1: Demographics of the study population**

Characteristics	Descriptions	n (%)
Occupation	Dentist	286 (94.7)
	Dental Hygienist	16 (5.3)
Nationality	Saudi	258 (85.4)
	Non-Saudi	44 (14.6)
Gender	Male	176 (58.3)
	Female	126 (41.7)
Years since graduation	Undergraduate Student	27 (8.9)
	0-5 years	183 (60.6)
	6-10 years	44 (14.6)
	>10 years	48 (15.9)

n, Number of patients

Table 2: Familiarity of dental professionals with antithrombotic medications

Questions		Dentist n (%)	Dental hygienist n (%)	P
Are you familiar with Warfarin?	Very familiar	198 (69.2)	10 (62.5)	0.433
	Fairly familiar	42 (14.7)	4 (25.0)	
	Some familiarity	22 (7.7)	1 (6.2)	
	Not very familiar	5 (1.7)	1 (6.2)	
	Not familiar at all	19 (6.6)	0 (0.0)	
Are you familiar with Clopidogrel?	Very familiar	60 (21.0)	2 (12.5)	0.774
	Fairly familiar	29 (10.1)	1 (6.2)	
	Some familiarity	34 (11.9)	3 (18.8)	
	Not very familiar	36 (12.6)	3 (18.8)	
	Not familiar at all	127 (44.4)	7 (43.8)	
Are you familiar with Dabigatran?	Very familiar	7 (2.4)	0 (0.0)	0.092
	Fairly familiar	11 (3.8)	0 (0.0)	
	Some familiarity	16 (5.6)	3 (18.8)	
	Not very familiar	47 (16.4)	0 (0.0)	
	Not familiar at all	205 (71.7)	13 (81.2)	
Are you familiar with Apixaban?	Very familiar	31 (12.1)	0 (0.0)	0.241
	Fairly familiar	19 (7.4)	2 (16.7)	
	Some familiarity	12 (4.7)	0 (0.0)	
	Not very familiar	32 (12.5)	0 (0.0)	
	Not familiar at all	162 (63.3)	10 (83.3)	
Are you familiar with Aspirin?	Very familiar	222 (77.6)	14 (87.5)	0.758
	Fairly familiar	20 (7.0)	0 (0.0)	
	Some familiarity	13 (4.5)	1 (6.2)	
	Not very familiar	7 (2.4)	0 (0.0)	
	Not familiar at all	24 (8.4)	1 (6.2)	
Are you familiar with Enoxaparin?	Very familiar	96 (33.6)	7 (43.8)	0.088
	Fairly familiar	37 (12.9)	0 (0.0)	
	Some familiarity	23 (8.0)	4 (25.0)	
	Not very familiar	29 (10.1)	1 (6.2)	
	Not familiar at all	101 (35.3)	4 (25.0)	
Are you familiar with Rivaroxaban?	Very familiar	36 (12.6)	0 (0.0)	0.042
	Fairly familiar	11 (3.8)	0 (0.0)	
	Some familiarity	23 (8.0)	1 (6.2)	
	Not very familiar	35 (12.2)	6 (37.5)	
	Not familiar at all	181 (63.3)	9 (56.2)	

n, Number of patients; P, Probability value

### Perceptions of Dentists and Hygienists about Treating Patients on Antithrombotics

Regarding management of patients who are on a conventional antithrombotic drug, namely, Warfarin, nearly half of the dentists (134; 46.9%) responded that they would not treat the patients while a more than quarter (88; 30.8%) responded that they “would ask for a laboratory test prior to commencement of dental procedure” and less than half (40; 14.0%) will temporarily discontinue the medication. Similarly, four (25.0%) dental hygienists responded that they “would not treat the patients on Warfarin”, while six (37.5%) dental hygienists would suggest “a laboratory test prior to commencement of dental procedure” and six (37.5%) responded to “temporarily discontinued medication” ( $P = 0.071$ ).

For the drug Aspirin, 60 (21.0%) dentists stated “would not treat the patients”, 31 (10.8%) dentists stated “ordered a laboratory test before any dental procedure”, and 87 (30.4%) dentists

would ask patients to “stop their medication before the dental procedure”. Neither dosage adjustment nor laboratory test was assigned by 81 (28.3%) dentists, whereas 27 (9.4%) dentists were unsure about the treatment approach ( $P = 0.163$ ). Likewise, three (18.8%) dental hygienists would not treat the patients while nine (56.2%) dental hygienists would ask patients to stop their medication before the dental procedure and neither dosage adjustment nor laboratory test was assigned by four (25%) dental hygienists ( $P = 0.163$ ).

For newer antithrombotics, Dabigatran, a significantly higher number of dentists (205; 71.7%) and dentist hygienists (11; 68.8%) responded that they are unsure of treating patients ( $P = 0.027$ ). Similarly, for Rivaroxaban, a significantly higher number of dentists (197; 68.9) and dentist hygienist (10; 62.5%) responded to be unsure of treating these patients ( $P = 0.037$ ). The details about perceptions of dental personnel regarding treatment approaches have been detailed in Table 3.

**Table 3: Perceptions of dentists and hygienists about treating patients on anti-thrombotic medications**

Questions	Description	Dentist n (%)	Dental hygienist n (%)	P
How would you treat patients receiving the medication Warfarin?	Not treat the patient	134 (46.9)	4 (25.0)	0.071
	Order a laboratory test	88 (30.8)	6 (37.5)	
	Ask the patient to temporarily stop their medication	40 (14.0)	6 (37.5)	
	No medication needed nor any lab test	6 (2.1)	0 (0.0)	
	Unsure	18 (6.3)	0 (0.0)	
How would you treat patients receiving the medication Clopidogrel?	Not treat the patient	56 (19.6)	0 (0.0)	0.109
	Order a laboratory test	33 (11.5)	1 (6.2)	
	Ask the patient to temporarily stop their medication	16 (5.6)	1 (6.2)	
	No medication needed nor any lab test	26 (9.1)	4 (25.0)	
	Unsure	155 (54.2)	10 (62.5)	
How would you treat patients receiving the medication Dabigatran?	Not treat the patient	46 (16.1)	0 (0.0)	0.027
	Order a laboratory test	15 (5.2)	2 (12.5)	
	Ask the patient to temporarily stop their medication	8 (2.8)	0 (0.0)	
	No medication needed nor any lab test	12 (4.2)	3 (18.8)	
	Unsure	205 (71.7)	11 (68.8)	
How would you treat patients receiving the medication Apixaban?	Not treat the patient	42 (16.4)	0 (0.0)	0.529
	Order a laboratory test	16 (6.2)	1 (8.3)	
	Ask the patient to temporarily stop their medication	5 (2.0)	0 (0.0)	
	No medication needed nor any lab test	7 (2.7)	0 (0.0)	
	Unsure	186 (72.7)	11 (91.7)	
How would you treat patients receiving the medication Rivaroxaban?	Not treat the patient	42 (14.7)	0 (0.0)	0.037
	Order a laboratory test	18 (6.3)	3 (18.8)	
	Ask the patient to temporarily stop their medication	12 (4.2)	0 (0.0)	
	No medication needed nor any lab test	17 (5.9)	3 (18.8)	
	Unsure	197 (68.9)	10 (62.5)	
How would you treat patients receiving the medication Aspirin?	Not treat the patient	60 (21.0)	3 (18.8)	0.163
	Order a laboratory test	31 (10.8)	0 (0.0)	
	Ask the patient to temporarily stop their medication	87 (30.4)	9 (56.2)	
	No medication needed nor any lab test	81 (28.3)	4 (25.0)	
	Unsure	27 (9.4)	0 (0.0)	
How would you treat patients receiving the medication Enoxaparin?	Not treat the patient	103 (36.0)	5 (31.2)	< 0.001
	Order a laboratory test	49 (17.1)	1 (6.2)	
	Ask the patient to temporarily stop their medication	12 (4.2)	3 (18.8)	
	No medication needed nor any lab test	12 (4.2)	4 (25.0)	
	Unsure	110 (38.5)	3 (18.8)	

n, Number of patients; P, Probability value.

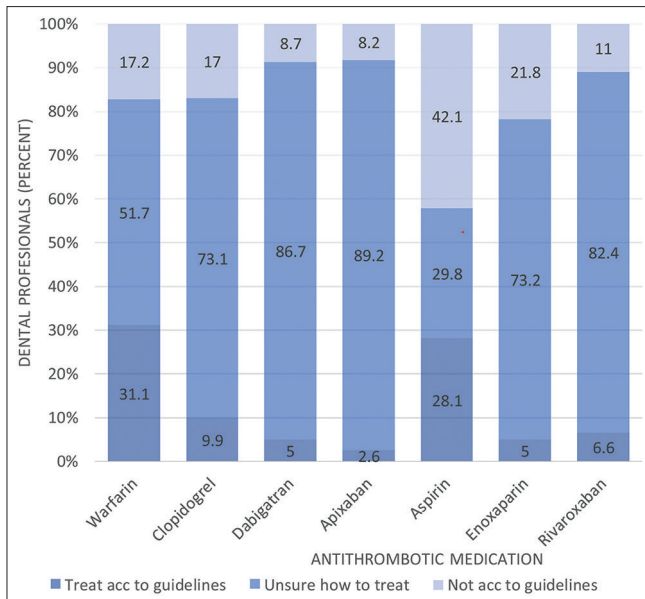
### Treatment management of patients on antithrombotic medications by dental personnel according to guidelines

More than half of the dentists and dental hygienists were unsure as how to treat patients on conventional or new antithrombotics (51.7%-89.2%) except Aspirin, for which 29.8% were unsure. Nearly half of the dental personnel (42.1%) were not treating patients on Aspirin as per the guidelines. Further, 21.8% and 17.1% of dentists and dental hygienists were not treating patients on Enoxaparin and Warfarin according to the guidelines [Figure 1].

### Discussion

The dental professionals frequently encounter patients with cardiovascular disease (CVD) who are on antithrombotic therapy for the prevention of TE events.<sup>[7]</sup> They are concerned about TE risk on discontinuing these medications before dental procedures and prolonged bleeding risk if continuing them. Several guidelines have proposed the management approaches for such patients but still, no standard management is defined.<sup>[5-10]</sup>

Thus the present survey assessed the familiarity of dental professionals with conventional and newer therapies



**Figure 1:** Dental management of patients receiving antithrombotic medications according to guidelines

antithrombotic medications authorized for use by the Saudi Food and Drug Authority and perception of the dental professionals on dental management of patients with CVD receiving these medications. The survey results showed that dental personnel in our study were highly unfamiliar with antithrombotics, especially for the NOACs. The non-familiarity was significantly high for Rivaroxaban ( $P = 0.042$ ). Evaluation of their perceptions on dental management of the patients on these drugs showed that a significantly high number of participants were unsure of the treatment, especially for those on NOACs [Dabigatran ( $P = 0.027$ ), Rivaroxaban ( $P = 0.037$ ), Enoxaparin ( $P < 0.001$ )]. Furthermore, dental professionals were not treating patients according to the guidelines, the non-adherence to the guidelines was highest for patients on Aspirin (42.1%) followed by Enoxaparin (21.8%) and Warfarin (17.1%).

Literature evidence suggests that awareness and understanding of antithrombotics are scarce and clinical management of such patients is varied.<sup>[1,11,12]</sup> More patients receiving antithrombotic medications are being treated in Primary Care settings which means all dental professionals need to be aware of the latest guidelines and feel confident to treat them.<sup>[13]</sup> In our study, more than half of the dentists and dental hygienists were very familiar with Warfarin (69.2% vs. 62.5%) but only 21% dentists and 12.5% dental hygienists were very familiar with the drug Clopidogrel. However, in an Indian study by Chinnaswami *et al.*, only 43.4% of the dental professionals knew Warfarin and 83.4% were well aware of Clopidogrel.<sup>[1]</sup> In our study, more than half of the dentists and dental hygienists were not at all familiar with the NOACs namely, Dabigatran (71.7% vs. 81.2%), Apixaban (63.3% vs. 83.3%) and Rivaroxaban (63.3% vs. 56.2%). Similar results were reported in a study by Chinnaswami *et al.*, where only 7.1% of dentists were aware of these newer medications.<sup>[1]</sup>

Although Warfarin is associated with high post-operative bleeding risk compared to Aspirin.<sup>[11]</sup> But in our study, more practitioners responded to stop Aspirin compared to Warfarin which could be due to their more exposure to treat the patients on Aspirin than Warfarin.

The Northwest Medicines Information Center guidelines suggest that patients who are on Warfarin therapy and have INR  $<4.0$  can undergo the dental surgical procedures without any dose interruption in primary care.<sup>[10]</sup> Likewise, the British Society of Haematology also recommends assessment of patients' INR 3 days before any treatment procedure for patients on vitamin K antagonists (VKAs), and INR  $<4$  does not require any specific intervention while bleeding risks can be minimized by local hemostatic measures.<sup>[5]</sup> Thus, decisions pertaining to continuation or discontinuation of antithrombotics before any dental surgical procedure should ideally be based on INR status of the patient. However, in our study, we found that nearly half of the dentists (46%) responded that they will not treat the patient on Warfarin, which shows that dental professionals in Saudi Arabia are not following guidelines to treat their patients.

Further, dental management could be rendered without any alterations in antiplatelet medication for patients receiving either aspirin alone or dual antiplatelet therapy (DAPT).<sup>[14]</sup> For patients on aspirin alone, limiting the initial treatment site (namely, only single tooth extraction/subgingival scaling up to three teeth) is recommended, which allows assessment of bleeding before further procedures.<sup>[14]</sup> For the procedures associated with higher bleeding complications, treatment could be rendered in stages along with the use of local hemostatic measures like suturing and packing.<sup>[14]</sup> In our study, 21.0% of dentists responded that they will not treat patients on aspirin while 30.4% dentists responded that they would ask the patient to temporarily stop their medication. A similar study from Saudi Arabia conducted by Shah *et al.* revealed that 77.9% of dentists would ask to stop the antithrombotic medication prior to any surgical procedure like tooth extraction.<sup>[11]</sup> This shows the unawareness of dental professionals in Saudi Arabia about the dental management of CVD patients on Aspirin.

The Scottish Dental Clinical Effectiveness Programme published guidelines in 2015 for managing dental patients on NOACs. The guidelines suggest that patients with low risk of bleeding complications can be treated without any interruption of medication while patients with a higher risk of bleeding complication need to skip or delay their morning dose on the day of dental treatment.<sup>[8]</sup> In the present study, a significantly high number of dentists and dental hygienists were unsure as how to treatment patients on NOACs including Rivaroxaban ( $P = 0.037$ ), Enoxaparin ( $P < 0.001$ ), and Dabigatran ( $P = 0.027$ ).

The present study revealed that the dental management of the patients on Aspirin was not carried out in accordance with the guidelines by 42% of dental professionals. Varied practices (not as recommended in guidelines) were also followed for

managing patients on other medications. Similar results have been reported in a study by Shah *et al.*, which showed that only a small percent of dentists (17.8%) followed the guidelines in Saudi Arabia.<sup>[11]</sup> In an Indian survey, around 92.9% of dental professionals felt a need to have a clinical practice guideline in the Indian scenario.<sup>[1]</sup> Another recent study of dentists in France found that dentists' practices were 'highly variable'.<sup>[13]</sup> In another survey of dentists, although 71% considered themselves to be knowledgeable about recent antithrombotic regulations but it transpired that only 47% of these were actually following current regulations, showing a huge gap in perceived knowledge.<sup>[15]</sup> Thus the fact cannot be denied that dentists and dental hygienists in Saudi Arabia need to increase their knowledge of guidelines and current evidence-based literature. Gaps in the knowledge and therapeutic approach followed by dental professionals in Saudi Arabia for dental treatment of patients on antithrombotic therapy need to be focused upon and resolved. The dental practitioners need to at least have a bird's eye view for recent advancements and protocols to bridge the gap. Furthermore, dentists should also consider other factors such as resources available with them able to control any emergency bleeding situation.<sup>[1]</sup>

Lack of knowledge about current evidence-based guidelines is causing a great delay in the dental treatment of the patients on antithrombotic medication. It results in poor utilization of resources not only among the dental professionals but also inefficient utilization of physicians' time as they must respond to patient and dental practitioner's inquiries.<sup>[1,16]</sup> Attempts should be made for better understanding of treatment approaches and following them in practice by dental professionals in Saudi Arabia. Continuing education programs can greatly help to bridge this gap. Further, dental practitioners should attempt to collaborate with medical practitioners for a better treatment option in daycare without causing any undue risk to the patient. Prospective audits can help to make dentists aware of current guidelines. As undergraduate students have less practical knowledge about the management of patients with comorbid conditions, this can be added to their curriculum to prevent the unawareness and uncertainty about treatment approaches.

The small sample size was the limitation of the study. Surveying a large population could help better understand the current knowledge and practices of dental professionals in Saudi Arabia. Further, a large percentage of dental professionals in our study had less experience in dental practice (<5 years). Validation of the study could have been better if a large portion of the population had better experiences with vivid medical cases present in the current clinical scenario.

In conclusion, many patients are now receiving the newer types of antithrombotic medications by not only specialists but also Primary Care physicians, as the dental professionals appear to have disparities in knowledge the prescribing physician needs also to be able to guide the dental professional as to their recommendations for medication management according to standardized guidelines. The present study highlights the knowledge and clinical practice gap for dental management of patients on antithrombotic therapy. Updating knowledge

of dental professionals on NOACs and making them aware of clinical practice guidelines is the need of an hour for the adequate dental management of patients on antithrombotics.

**As many patients are now receiving new antithrombotic medications and are being treated in Primary Care settings, all dental professionals need to be aware of the latest guidelines to prevent unnecessary delay from referral to higher specialized centers.**

## Acknowledgments

The authors would like to thank and acknowledge King Fahad Medical City (KFMC) and their Research Office for the tremendous support and IRB of KFMC for ethical approval of the study. The authors would also like to thank hygienist Alhanouf Alsarhan and Najla Alshathrai for their tireless efforts in data collection and preservation. The authors also acknowledge the assistance of Turacoz healthcare solutions (www.turacoz.com) for editing the manuscript.

## Financial support and sponsorship

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

## Conflicts of interest

There are no conflicts of interest.

## Notes

### Authors' contribution

All the authors equally contributed to the conduct of the study and preparation of the manuscript.

### Ethics approval and consent to participate

A self-explanatory letter of invitation to participate was presented to each of the participants. All participants had given informed consents for their participation in the research presented in this manuscript with full knowledge of the possible risks and benefits of participation. Participants consented by ticking "agree", indicating their agreement to provide their feedback for this research study. The study was approved by the Institutional Review Board of King Fahad Medical City, Riyadh, Saudi Arabia (Protocol # RC15-355). The study was conducted under recommendations of the International Conference on Harmonization for Good Clinical Practice (ICH-GCP).

### Availability of data and material

All data generated or analyzed during this study are included in this published article [and its supplementary information files].

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