Rate of Compliance with Infection Control Practices while Taking Dental Radiographs in a Dental Health Care Center, Saudi Arabia

Abstract

**Background:** Infection control guidelines are aimed at preventing cross-contamination in clinical settings. Radiographs are indispensable part of oral diagnosis and assessing prognosis. Strict adherence to infection control protocol while taking dental radiographs are mandatory.

**Aims and Objectives:** To assess the rate of compliance with infection control practices while taking dental radiographs in the dental clinic center of a teaching institution in Saudi Arabia.

**Materials and Methods:** An observational study was undertaken for the infection control practices in the dental radiology wing of a university teaching center in Saudi Arabia. Data were collected from dental faculty, dental assistants, and dental students working in dental clinics. Both pretested questionnaire and by direct observation of infection control practices was used for data collection. Chi-Square test for categorical variables and Independent samples t-test for compare mean self-reported infection control practice scores were used. Binary logistics regression was used to identify the factors influencing participant’s compliance with infection control practices. 

**Results:** 129 participants were included in this study, among those 26 were faculty, 19 were dental auxiliaries and 84 were dental students. On direct observation, the overall compliance rate was 79.5%; Dental auxiliaries have the highest compliance rate (94.5%) followed by dental faculty (88.5%) and students (68.6%). Binomial logistic regression predicted that females had 2.94 times more compliance than male counterparts, which is statistically significant.

**Conclusion:** Students and faculty need continuing dental education programs for reinforcement on infection control practices.

**Keywords:** Dental faculty; dental radiographs; dental students; infection control

Introduction

Infection control is defined as “measures practiced by Health care practitioners to reduce the risks of transmission of infectious agents to patients.”[1] Practicing hand hygiene is an effective primary preventive measure that reduces the infections and cross-transmission of the pathogens.[2] The personal protective equipment like gloves, face mask, head cap, protective eyewear with side shields protects the dental personnel in the dental clinics.[3] Dental radiographs are an essential diagnostic tool in routine dental clinical practice. The X-ray tube head, control panels, and the keyboards attached to the digital system are having high chances of being contaminated with saliva. The intraoral digital image receptors are reusable and cannot be autoclaved.[4] Any improper handling of the sensor within the oral cavity of the patient paves the way for cross-contamination from the dental health care personnel to the patients or vice versa.[4] The use of protective sleeves over the digital sensors and the barriers on the exposed surfaces of intraoral X-ray machines can prevent the infection. However, safe handling of the patients by the professionals plays a vital role in oral radiology.[5] Information about infection control protocols and its compliance by dental personnel enables in the prevention of cross infections in oral radiology. Patients and the dental auxiliaries are often exposed to various microorganisms in dental clinics by either aerosols or blood and saliva.[6] The universal guidelines proposed by the Centers for Disease Control and Prevention are to be followed by all the personnel working in dental clinics.[7] Furthermore, the Ministry of Health in the Kingdom of Saudi Arabia has proposed manual of infection prevention and control.

For reprints contact: WKHUPMEdknow_reprints@wolterskluwer.com

© 2022 Contemporary Clinical Dentistry | Published by Wolters Kluwer - Medknow
in dental settings.\textsuperscript{[5]} Strict adherence to these guidelines is essential to prevent the transmission of infective pathogens during dental procedures to the health-care personnel and patients.\textsuperscript{[9]} According to Da Costa et al., the Questionnaire on Infection Control in Oral Radiology (QICOR) exhibited adequate reliability and validity and it can be used for evaluation of infection control in oral radiology.\textsuperscript{[5]} They also concluded that they were able to identify each step of the radiographic examination that had risk of cross-contamination.\textsuperscript{[9]} Gamoh et al. in their research on the rate of compliance with infection control practices when taking dental X-rays at dental school in Japan concluded that low percentage of correct answers (PCA) were found for three infection control procedures concerning hand hygiene before wearing gloves, protecting film holders and protecting radiography equipment.\textsuperscript{[10]} Several studies have been published on the compliance of infection control practices in dental clinics.\textsuperscript{[11,12]} On the contrary, there is a dearth in the scientific literature pertaining to compliance of infection control practices in oral radiology. Hence, this research was conducted with an objective to assess the rate of compliance with infection control practices while taking dental radiographs in the dental clinic center of a teaching institution in Saudi Arabia.

**Materials and Methods**

This study was conducted at a dental teaching hospital, wherein 102 graduate students under the supervision of 44 teaching faculty provide comprehensive dental care for outpatients. This study included all students, faculty, and dental auxiliaries involved in this dental care set up. There are two centralized dental radiography facilities available for rendering dental care. Each radiography facility is equipped with both digital and manual Intra Oral Peri-apical radiographic machines, Panoramic Radiography machines and one facility with cone-beam computed tomography. Bachelor of dentistry program for student participants consists of 6 years i.e., 5 years for subjects and 1 year of internship. Students undergo training for 4 years (3rd year to Internship) before they graduate. Teaching on infection control practices both at the dental unit and radiography room were taught prior to their entry into clinical training and it was reinforced on their 1st day of clinical training. Informed consent from participants to participate in this study was taken 1 month before the study in which purpose, procedures followed and confidentiality was mentioned; date/day of data collection and investigators identity was masked to avoid or minimize bias. Twenty-six out of 44 teaching faculty, 84 out of 102 students, and 19 out of 20 auxiliaries gave consent to participate in this study.

Infection control compliance rates were measured using structured observational method for two consecutive working days. Each person was observed while taking radiographs for patients. Data were collected in a standardized format by two investigators who were dental faculty members. A preliminary training was organized for investigators about recording data, definitions, and chart of care. Intra and inter-examiner reliability of investigators was assessed prior to data collection which has Kappa scores >0.80. After recording data on compliance with infection control practices at the end of the 2nd day, a closed-ended QICOR was given and participants were requested to fill the questionnaire. Data was collected from the participants from March to May 2019 and principle investigator maintained the confidentiality of the data.

**Questionnaire**

The content validity and the criterion validity of the QICOR was tested and reported by Da costa et al. and the same questionnaire was used in this study.\textsuperscript{[5]} The questionnaire included 25-closed ended questions and name/identity of the participants were not included. Each correct answer was given score one or zero for incorrect answer and thus each participant were scored out of 25.

Ethical approval was obtained from the Local body of Bio-Ethics prior to the study with reference number 12-21-5/40 and all the procedures followed in this study were in par with Helsinki’s declaration.

**Statistical analysis**

Data were analyzed with the Statistical Package for the Social Sciences software (IBM SPSS Version 20, Armonk, New York, USA.) Descriptive statistics were calculated initially and PCA for each question among various participant groups was calculated. Chi-Square test was used to test statistical significance. Independent samples t-test to compare mean self-reported infection control practice scores and binary logistics regression to identify the factors influencing participants compliance to infection control practices were used. For all comparisons, $P \leq 0.05$ was considered statistically significant.

**Results**

Among the 129 participants, 84 were students, 26 were teaching faculty and 19 were dental auxiliaries. 73.7% of them were males and 26.3% were female participants [Table 1].

The number and the PCA for each of the affirmation was described in Table 2, statistically significant difference in responses to the use of surgical caps during the radiographic procedure was observed where 76.9% of faculty, 76.1% of students and 68.4% of auxiliaries mentioned that they are using surgical cap while performing radiographs. Among the questions, the question which got least PCA was the use of Goggles while taking X-rays for which 61.5% of faculty, 39.2% of students, and 62.5% of auxiliaries responded which is statistically significant $(P = 0.001)$. The question about frequency of sterilization of the radiograph film-holding device for each patient also got statistically significant different responses $(P = 0.002)$. 

---

**Table 1: Demographic Data**

| Gender | Number | Percentage |
|--------|--------|------------|
| Male   | 96     | 74.3%      |
| Female | 33     | 25.7%      |

**Table 2: Infection Control Practices**

| Procedure                                      | Faculty | Students | Auxiliaries |
|------------------------------------------------|---------|----------|-------------|
| Use of surgical cap                            | 93 (76.9%) | 51 (44.4%) | 52 (61.5%) |
| Use of Goggles                                 | 39 (31.5%) | 12 (10.9%) | 16 (18.4%) |

---

**Table 3: Statistical Analysis**

| Procedure                                      | Test Statistic | $P$-Value |
|------------------------------------------------|---------------|-----------|
| Use of surgical cap                            | t-test        | 0.001     |
| Use of Goggles                                 | t-test        | 0.002     |
Mean self-reported scores out of 25 were compared in Table 3, the mean scores were 23.2 for teaching faculty, 22.7 for dental auxiliaries and 21.8 for students, respectively. The differences between the three participant groups were not statistically significant ($P > 0.05$).

There were 191 opportunities to check participants’ compliance in following infection control practices while taking dental radiographs. Among these participants adhered to infection control practices in 79.5% of the times and 21.5% of them, they did not [Table 4]. Among the participants’ groups, dental auxiliaries (94.5%) were the best who adhered to infection control practices followed by dental teaching faculty and students. Females among the teaching faculty and students, adhered more to infection control practices than the male counterparts did, which is statistically significant.

Binomial logistic regression to assess the predictors of adherence to infection control practices revealed that females are 2.94 times more likely to adhere to infection control practices compared to male participants which is statistically significant ($P = 0.03$). However, factors such as being teaching faculty/student/auxiliary and self-reported scores were found to be insignificant in contributing the participants’ behavior in adhering to infection control protocols [Table 5].

| Table 1: Participant characteristics | Male (%) | Female (%) | Total (%) |
|-------------------------------------|----------|------------|-----------|
| Teaching faculty                    |          |            |           |
| Lecturer                            | 7 (41)   | 6 (66.6)   | 13 (50)   |
| Assistant professor                 | 9 (53)   | 2 (22.2)   | 11 (42.4) |
| Associate professor                 | 1 (6)    | 0          | 1 (3.8)   |
| Professors                          | 0        | 1 (11.2)   | 1 (3.8)   |
| Total                               | 17 (100) | 9 (100)    | 26 (100)  |
| Dental students                     |          |            |           |
| Third year                          | 17 (23.6)| 12 (100)   | 29 (34.6) |
| Fourth year                         | 15 (20.8)| 0          | 15 (17.8) |
| Fifth year                          | 23 (32)  | 0          | 23 (27.4) |
| Interns                             | 17 (23.6)| 0          | 17 (20.2) |
| Total                               | 72 (100) | 12 (100)   | 84 (100)  |
| Dental assistants                   | 6 (100)  | 13 (100)*  | 19 (100)  |
| Total                               | 95 (73.7)| 34 (26.3)  | 129 (100) |

*P<0.05 for Chi-square test

| Table 2: Number and percentage of correct answers for individual items | Number and percentage of correct reply | Faculty | Students | Auxiliaries | P ($\chi^2$) |
|---------------------------------------------------------------------|---------------------------------------|---------|-----------|-------------|-------------|
| Hand washing before putting on gloves                               | 23 (88.4)                            | 70 (83.3)| 15 (78.9) | 0.652       |
| Hand washing after removing gloves                                  | 24 (92.3)                            | 75 (89.2)| 19 (100)  | 0.839       |
| Radiography receptor used                                           | 24 (92.3)                            | 74 (88) | 17 (89.4) | 0.648       |
| Use of mouth mask during radiographic exposure                       | 22 (84.6)                            | 73 (86.9)| 15 (78.9) | 0.088       |
| Procedure glove use during radiographic exposure                     | 23 (88.4)                            | 70 (83.3)| 17 (89.4) | 0.768       |
| Surgical cap use during radiographic exposure                       | 17 (65.3)                            | 45 (53.5)| 13 (68.4) | 0.012*      |
| Use of medical coat during radiographic exposure                     | 22 (84.6)                            | 76 (90.4)| 16 (84.2) | 0.224       |
| Use of protective goggles while taking X-ray                        | 16 (61.5)                            | 33 (39.2)| 10 (62.5) | 0.001*      |
| Use of over-glove during radiographic exposure                       | 23 (88.4)                            | 74 (88) | 18 (94.7) | 0.188       |
| Use of plastic barrier for film during radiographic exposure         | 24 (92.3)                            | 73 (86.9)| 17 (89.4) | 0.652       |
| Use of plastic barrier on headrest during radiographic exposure      | 23 (88.4)                            | 71 (84.5)| 18 (94.7) | 0.238       |
| Use of plastic barrier on X-ray tubehead (position-indicating device) during radiographic exposure | 23 (88.4) | 70 (83.3) | 18 (94.7) | 0.428 |
| Plastic barrier use in exposure button during radiographic exposure  | 24 (92.3)                            | 65 (77.3)| 18 (94.7) | 0.529       |
| Use of plastic barrier use X-ray controlpanel during radiographic exposure | 22 (84.6) | 63 (75) | 16 (84.2) | 0.892 |
| Frequency of sterilization of the radiographfilm-holding device for each patient | 24 (92.3) | 53 (63) | 17 (89.4) | 0.002* |
| Use of plastic barrier to pack intraoral films                      | 21 (80.7)                            | 71 (84.5)| 17 (89.4) | 0.568       |
| Frequency of disinfection of the exposed film packetsbefore processing | 24 (92.3) | 74 (88) | 16 (84.2) | 0.843 |
| Frequency of performance of infection control procedures on the X-ray tubehead (position-indicating device) for each new patient | 25 (96.1) | 67 (79.7) | 17 (89.4) | 0.122 |
| Frequency of performance of infection control procedures on the X-ray control panel for each new patient | 23 (88.4) | 69 (82.1) | 16 (84.2) | 0.684 |
| Frequency of performance of infection control procedures on the X-ray control panel for each new patient | 22 (84.6) | 71 (84.5) | 16 (84.2) | 0.448 |
| Frequency of performance of infection control procedures for radiographic receptor for each new patient | 23 (88.4) | 67 (79.7) | 17 (89.4) | 0.522 |
| Frequency of patient chair cleaning and/or disinfecting for each new patient | 24 (92.3) | 63 (75) | 15 (78.9) | 0.221 |
| Frequency of X-ray apron cleaning and/or disinfecting for each new patient | 24 (92.3) | 71 (84.5) | 16 (84.2) | 0.464 |
| Frequency of thyroid collar cleaning and/or disinfecting for each new patient | 20 (76.9) | 73 (86.9) | 18 (94.7) | 0.713 |
| Types of disinfectants used to clean the radiography equipment       | 19 (73)                               | 62 (73.8)| 17 (89.4) | 0.003*      |

*P<0.05 for Chi-square test.
Table 3: Participants mean self-reported practice scores about infection control practices while taking dental radiographs

| Category                  | Male  | Female | Overall |
|---------------------------|-------|--------|---------|
| Teaching faculty          |       |        |         |
| Lecturer                  | 23.3  | 23.6   | 23.4    |
| Assistant professor       | 23    | 22.4   | 22.7    |
| Associate professor       | 24    | -      | 24      |
| Professors                | -     | 23     | 23      |
| Overall                   | 23.4* | 23     | 23.2    |
| Dental students           |       |        |         |
| Third year                | 21.2  | 22     | 21.6    |
| Fourth year               | 21.6  | -      | 21.6    |
| Fifth year                | 22.2  | -      | 22.2    |
| Interns                   | 22.1  | -      | 22.1    |
| Overall                   | 21.7* | 22     | 21.8    |
| Dental auxiliaries        |       |        |         |
| Overall                   | 22.8* | 22.6   | 22.7    |
| Overall                   | 22.6* | 22.5   | 22.5    |

*aNonsignificant using independent samples t-test

Table 4: Rate of compliance with infection control practices while taking dental radiographs during two working days

| Category                  | Adhered | Not adhered |
|---------------------------|---------|-------------|
| Teaching faculty          |         |             |
| Male                      | 22 (88) | 3 (12)      |
| Female                    | 9 (90)* | 1 (10)      |
| Overall                   | 31 (88.5) | 4 (11.5) |
| Students                  |         |             |
| Male                      | 56 (67) | 28 (33)     |
| Female                    | 14 (78)* | 4 (22)     |
| Overall                   | 70 (68.6) | 32 (31.4) |
| Dental auxiliaries        |         |             |
| Male                      | 34 (94) | 2 (6)       |
| Female                    | 18 (95) | 1 (5)       |
| Overall                   | 52 (94.5)* | 3 (5.5) |
| Total                     | 152 (79.5)* | 39 (21.5) |

*p ≤ 0.05 for Chi-square test with yates correction

Table 5: Logistic regression model for predictors of infection control practice compliance

| Independent variables | OR   | 95% CI          | P    |
|-----------------------|------|-----------------|------|
| Gender (2)            | 2.94 | 1.78-8.2        | 0.032*|
| Self-reported score   | 0.86 | 0.66-0.92       | 0.461|
| Category (faculty, student and auxiliaries) | 1.02 | 0.98-1.46     | 0.682|

Nagelkerke $R^2$=0.624. *P ≤ 0.05. CI: Confidence interval; OR: Odds ratio

Discussion

The most effective strategy in the prevention of cross infections to dental workers and patients is strict compliance with infection control practices. Radiographs play a vital role in diagnosis, treatment planning, and assessing the prognosis in dentistry and it is necessary to follow infection control measures like any other dental procedure to avoid transmission of microorganisms.

As per the literature search, this is the first study that provides scientific information about the infection control practices while performing dental radiographs reported from Saudi Arabia. Infection control practice information collected in this study is not only from questionnaire but also the detection of infection control practice compliance by validated observers through direct observation, which is currently considered as Gold standard in assessing infection control practices.

While the mean self-reported infection control practice scores and rate of compliance were acceptable, there are differences in the rate of compliance among students, faculty, and auxiliaries. Surprisingly, auxiliaries adhered to infection control protocol the most compared to other two groups. This is similar to the study reported by Gamoh et al. in 2018 from Japan in which dental hygienists had better knowledge and practices in few aspects of infection control practices when taking dental X-rays. In this study, the actual rate of compliance to infection control practices is not related self-reported practice scores. Even though the mean self-reported score for dental faculty was the highest, dental hygienists adhered better than faculty and students in reality. Such disparities in self-reported scores and real practices could be found because data collection was not only limited to the questionnaire, but it was also obtained by direct observation of practices. This enables us to identify the points of utmost importance while conducting a continuing dental education program on infection control practices.

One of the most positive results of the study was that 79.5% of the times infection control practices were followed while taking dental radiographs. Among the participants, females adhered to infection control practices more than males in this study, which is contrast with to findings of the study reported by Gamoh et al. in which male counterparts adhered to infection control practices more than females.

In this study, more than 80% of the respondents mentioned that they have washed their hands before and after putting the Gloves which is higher compared to France (50%).[14] Lebanon (70%),[15] UK (68%) and lesser compared to study conducted in US (88%).[16] Among the responses to the questions, one of the poorest responses was observed for using the surgical cap while taking X-rays. 53.5% of the students, 65.3% of faculty, and 68.4% of the auxiliaries responded positively which is in concurrence to study reported by Da Costa et al. wherein 60.4% of the dental students used surgical caps while taking dental radiographs. This is similar to the study conducted by Alharbi et al. in Riyadh, Saudi Arabia in which around...
one-third of the dental students reported of using Goggles in dental clinics.

The mean self-reported practice scores about infection control practices while taking dental radiographs were highest for the dental faculty (23.2) and least for the dental students (21.8). Among the dental students, the final year dental students scored less compared to other students. A similar observation was reported by da Costa et al.\(^\text{[18]}\) that the final year students had 1.7 times more chances of less adherence to infection control practices. This can be attributed to the fact that students from third and fourth academic years will have more recent training about infection control practices as they have just begun their clinical training. On the contrary, having much heavier patient load among final year students when compared to others can be another influencing factor.

The rate of compliance recorded by direct observation identified that infection control practices were followed in 79.5% of the opportunities and among the participants of the study dental auxiliaries followed the most (94.5%), followed by faculty (88.5%) and least compliance was observed in students group (68.6%).

Among the students, female students are more adhered to infection control practices when compared to male counterparts which are statistically significant. These findings are in contrast with the study reported by Halboub et al.\(^\text{[19]}\) from Yemen in which male students are more adhered to infection control practices than female students. There is no significant association of adherence to infection control practices with gender and age of the participants in the studies reported by and da Costa et al.\(^\text{[18]}\) from Brazil and Al-Maweri et al.\(^\text{[20]}\) from Saudi Arabia.

One of the limitations of this study was the absence of qualitative data that could have provided insights into reasons or barriers for not following certain infection control guidelines while taking dental radiographs. Data collection for future researches on this topic should incorporate group discussions along with closed-ended questions to understand the perceptions of dental students, faculty, and auxiliaries.

Despite these limitations, however, this research provides an overview of infection control practices in Oral and Maxillofacial Radiology about Saudi dental students’, faculty and auxiliaries self-reported practices regarding infection control. Such information will aid in identifying areas of improvement to achieve fullest compliance and revision of present curriculums on infection control.

**Conclusion**

Our study showed an overall good adherence to infection control protocols while performing dental radiography among dental students, dental faculties, and dental auxiliaries in the dental health care center. There are some gaps between self-reported infection control practices and actual compliance, which stresses additional reinforcement and motivation about infection control measures to dental students, faculty, and auxiliaries through seminars and workshops.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.

**References**

1. Ibrahim NK, Alwafi HA, Sangooif SO, Turkistani AK, Alattas BM. Cross-infection and infection control in dentistry: Knowledge, attitude and practice of patients attended dental clinics in King Abdulaziz University Hospital, Jeddah, Saudi Arabia. J Infect Public Health 2017;10:438-45.

2. Oosthuysen J, Potgieter E, Fossey A. Compliance with infection prevention and control in oral health-care facilities: A global perspective. Int Dent J 2014;64:297-311.

3. Rachael E. Infection prevention and control in dental practice: Adopted by the general assembly: September 2019, San Francisco, United States of America original version adopted by the general assembly: September 2009, Singapore, Singapore. Int Dent J 2020;70:17-8.

4. White SC, Pharoah MJ. Quality assurance and infection control. In: Oral radiology principles and interpretation. White SC, Pharoah MJ, editors. 8th ed. St. Louis: Mosby; 2014. p. 250-8.

5. Da Costa ED, Pinelli C, da Silva Tagliaferro EP, Corrente JE, Ambrosano GM. Development and validation of a questionnaire to evaluate infection control in oral radiology. Dentomaxillofac Radiol 2017;46:20160338.

6. Mutters NT, Hägge U, Hagenfeld D, Hellwig E, Frank U. Compliance with infection control practices in an university hospital dental clinic. GMS Hyg Infect Control 2014;9:Doc18.

7. Centre for Disease Control, Infection Prevention & Control in Dental Settings; 2019. Available from: http://www.cdc.gov/OralHealth/infectioncontrol/index.html. [Last accessed on: 2020 Jun 26].

8. Manual of Infection Prevention & Control in Dental Settings, second edition 2018. Available from: https://www.moh.gov.sa/Ministry/MediaCenter/Publications/Documents/2018-11-22-005.pdf. [Last accessed on 2019 Nov 12].

9. Gumru B, Tarcin B, Idman E. Cross-contamination and infection control in intraoral digital imaging: A comprehensive review. Oral Radiol 2020;49:23-30.

10. Gamoh S, Akiyama H, Maruyama H, Ohshita N, Nakayama M, Matsumoto K, et al. Compliance with infection control practices when taking dental x-rays: Survey of a Japanese dental school. Clin Exp Dent Res 2018;4:158-66.

11. Alharbi G, Shono N, Alballaa L, Aloufi A. Knowledge, attitude and compliance of infection control guidelines among dental faculty members and students in KSU. BMC Oral Health 2019;19:7.

12. Haridi HK, Al-Ammar AS, Al-Mansour MI. Compliance with infection control standard precautions guidelines: A survey among dental healthcare workers in Hail Region, Saudi Arabia. J Infect Prev 2016;17:268-76.

13. Mahasneh AM, Alakhras M, Khabour OF, Al-Sa’di AG, Al-Mousa DS. Practices of infection control among dental care providers: A cross sectional study. Clin Cosmet Investig Dent 2020;12:281-9.
14. Thivichon-Prince B, Barsotti O, Girard R, Morrier JJ. Hand hygiene practices in a dental teaching center: Measures and improve. Eur J Dent 2014;8:481-6.

15. Dagher J, Sfeir C, Abdallah A, Majzoub Z. Infection control measures in private dental clinics in Lebanon. Int J Dent 2017;2017:5057248.

16. Westall JO, Dickinson C. Compliance with occupational exposure risk management procedures in a dental school setting. Br Dent J 2017;222:859-63.

17. Anders PL, Townsend NE, Davis EL, McCall WD Jr. Observed infection control compliance in a dental school: A natural experiment. Am J Infect Control 2016;44:e153-6.

18. Da Costa ED, da Costa AD, Lima CA, Possobon RF, Ambrosano GM. The assessment of adherence to infection control in oral radiology using newly developed and validated questionnaire (QICOR). Dentomaxillofac Radiol 2018;47:20170437.

19. Halboub ES, Al-Maweri SA, Al-Jamaei AA, Tarakji B, Al-Soneidar WA. Knowledge, attitudes, and practice of infection control among dental students at Sana’a University, Yemen. J Int Oral Health 2015;7:15-9.

20. Al-Maweri SA, Tarakji B, Shugaa-Addin B, Al-Shamiri HM, Alaizari NA, AlMasri O. Infection control: Knowledge and compliance among Saudi undergraduate dental students. GMS Hyg Infect Control 2015;10:Doc10.