Original Research

Knowledge, Attitude, and Practices of Dental Undergraduate Students on Infection Control In Dental Clinic During COVID-19 Pandemic - A Cross Sectional Study.

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Abstract:

Objectives: COVID-19 infection transmits through droplets in air. Dental setting can act as potential site for cross-contamination, and hence, calls for strict infection control protocols during dental treatment. Hence, this study was undertaken to assess the knowledge, attitude and practices of dental undergraduate students on infection control during COVID-19 pandemic, so that suitable measures can be undertaken to educate them. **Methods:** A cross-sectional survey was undertaken among 135 clinical year students of Faculty of Dentistry, SEGi University, Malaysia. A questionnaire containing 37 close ended questions pertaining to infection control during the COVID-19 pandemic, was developed and validated at the faculty. The survey was electronically disseminated through google forms. Data was analysed using SPSS version 22. Descriptive statistics and chi-square test were used. $p<0.05$ was considered statistically significant. **Results:** The response rate was 97%. All of our students exhibited adequate knowledge pertaining to COVID-19 infection. About 95% of the students showed positive attitude towards patient triage, use of personal protective equipment, social distancing in clinic, use of high vacuum suction for aerosols. However, about 50% felt stressed to treat patients during this pandemic and only 15% were willing to treat patients. Regarding practices,80% followed correct order of donning, however only 25% did the doffing in correct manner. **Conclusion:** Though our students exhibited good knowledge, there is a need to educate and reinforce right attitude and correct practices pertaining to infection control, for a safe and effective clinical practice in times of such pandemic. The faculty has developed strategies for the same.

Key words: COVID-19, Infection control, Dental clinic, Dental students

Introduction:

COVID-19 is an infectious disease caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). [1] The World Health Organization (WHO) on March 11, 2020, declared the novel coronavirus (COVID-19) outbreak a global pandemic. [2] The measures taken to stop the spread of this disease have included isolation, contact tracing and quarantine, social distancing, hygiene measures, and lockdown. [3-5] The transmissibility of COVID-19 is higher than that of other similar respiratory diseases such as severe acute respiratory syndrome (SARS-CoV) and the Middle East respiratory syndrome coronaviruses (MERS-CoV). [6]

Droplets and aerosols are known to be two major mechanisms of its spread. [1] Droplets released after exhalation, coughing, or sneeze cause airborne contamination. [7] Also, contact with contaminated surfaces and with the eyes, nose, or mouth causes direct contamination. [8]Particles from droplets remain in suspension for a length of time that depends on their size, settling velocity, relative humidity, and airflow in which droplets can spread up to 1 m. [9] In addition, it has been reported that even in the absence of clinical symptoms, the virus can still spread. [10,11] Therefore, health care workers, including dentists, are at high risk for acquiring and transmitting infection within their work environment due to close contact with patients and the instruments they use, such as dental handpieces and scalers that spread droplets, and aerosols of blood and saliva. [7] This calls for a serious control of the spread of infectious disease such COVID-19 in dentistry.

As a consequence of this pandemic, caution in handling patients in the waiting room and during treatment by using personal protective equipment (PPE) has been increased. The interim guidelines of the CDC, and the American Dental Association (ADA) have provided guidelines about the measures for infection control during the new normal period, including required instruments and best practices to prevent the infection transmission. These guidelines include careful patient evaluation and appropriate hand hygiene, donning Personal Protective Equipment (PPE) such as protective eyewear, surgical masks, gloves, caps, face shields, and protective outwear etc. [12-14]

The high risk of COVID-19 infection among dental staff emphasizes their equally important role in preventing and controlling its transmission. Although dental students have learned how to deal with infectious diseases and take preventive measures, the need to be aware of a new protocol adjusted for COVID-19 is of great importance, and this depends on their level of

awareness of the disease. Hence, this study aimed to assess knowledge, perceptions, and attitudes regarding COVID-19 and infection control measures against it among dental students.

Methodology:

This cross-sectional descriptive study was carried out in December 2020, at Faculty of Dentistry, SEGi University, Malaysia. The study involved clinical year students of Year 3,4 and 5. Ethics approval was obtained from institutional ethics committee (SEGiEC/SR/FOD/36/2020-2021). The permissions of the students were obtained before sending the questionnaires. Students who did not want to be part of the survey were excluded.

A questionnaire on the COVID-19 pandemic was prepared by a team of specialists, which included its impacts on the field of dentistry and the protocols and guidelines of infection control regarding the novel coronavirus. The questionnaire was reviewed by three dental specialists experts in infection control and to assess the content and face validity. They checked the questions to ensure they were associated with the topic and effectively captured the variables and added more related questions if necessary. A pilot study was conducted where in the questionnaire was given to a random sample of 10 respondents (graduated students) to assess reliability. The internal consistency of questions was checked by Cronbach's alpha and the value was 0.83. Finally, a 34-item questionnaire was prepared in google forms. The questionnaire was sent to all the dental students of the clinical phase. The questionnaire consisted of two sections, including the demographic part and a section associated with the knowledge and attitude. The demographic data included the following three

Items: age, gender and year of study. The second part of the questionnaire consisted of 31 items : 10 questions pertaining to knowledge such as awareness of COVID-19, the etiology of COVID -19, the mode of transmission; 14 pertaining to attitude such as willingness to treat COVID-19 patients, confidence to treat COVID-19 patients; 10 pertaining to practices such as proper PPE performed before treating patients, correct order of donning and doffing, practice of social distancing. Survey was then disseminated electronically using google forms via email and whats app to the Year 3,4 and 5. Partially-filled questionnaires were excluded from the study.

Data Analysis

Survey data from the google forms was downloaded as Excel , analysed using SPSS version 22 .Descriptive statistics like percentage, mean and standard deviations were used for data interpretation.

Results

The survey was sent to 132 students and the response rate was100%. The students were aged between 21 to 28 years with the mean age of 23.7+ 0.3 years. One third of the participants (33.3%) were males and two thirds were females (66.6%). The participants consisted of Year 3(33.3%), Year 4(40.2%) and Year 5(35%) students.

The results have been presented as pertaining to Knowledge, Attitude and Practices.

A. Knowledge:

Table 1 : knowledge of the participants pertaining to the transmission of the virus in the dental clinic.

Questions	**Yes(%)**	**No(%)**	**Maybe(%)**
Had you heard of COVID-19 disease?	100	0	0
Were you aware it was caused by a virus?	100	0	0
Are you aware that the way of transmission is through air droplets?	100	0	0
Are you aware of all of the most common symptoms seen in a COVID-19 positive patient?	90.2	9.9	0
Do you know that the elderly above 60 years are most affected from the COVID-19 virus?	92.4	6	0
Do you know that people with co-morbidities have higher mortality rates when having the COVID-19 virus?	91.7	0	8.3
Do you believe that it is safe to treat patients in dental clinics?	40.9	25.8	33.3
Are you aware that aerosol generating procedures can spread the virus?	97	2.3	0.8
Do you believe that masks provide 100% protection when facing patients with the virus?	75.8	9.8	14.4

Are you aware of the proper personal protective equipment?	100	0	0

Table 1 showed the knowledge pertaining to COVID-19 transmission and control. 100%of our students had heard about the COVID, the agent causing it and that COVID-19 spreads through droplets in the air. More than 90% of the students were aware of the signs and symptoms, and that the virus had a stronger detrimental health effects on elderly above the age of 60 years and patients with co-morbidities. However, only 40% of our participants believed that it was safe to treat patients during this pandemic . More than 95% of our participants believed that aerosol generating procedures could spread the virus. About 76% felt that masks provided 100% protection when facing patients with the virus . All our participants were aware on the importance on using personal protective equipment when treating the patients.

B. Attitude

Table 2 : Attitude of the participants towards infection control in dental clinic during the pandemic.

Questions	**Yes (%)**	**No (%)**	**Maybe (%)**
Do you agree on the importance of taking patient's history on possible COVID-19 exposure?	99.2	0	0.8
Is it important to take patients temperature at the triage before undergoing treatment?	98.5	1.5	0
Should patients be treated on appointment basis only?	87.9	7.6	4.5
Do you think it is important to wear double mask when treating patients?	70.5	15.9	13.6
Is it important for patients to have a preprocedural hand washing before treatment?	94.7	1.5	3.8
Is it important to have a pre-procedural mouth rinse before undergoing any treatment	95.5	1.5	3
Is it important for all patients to have a COVID-19 test before undergoing anything treatment	50	17.4	32.6
Is sanitizer alone sufficient without hand washing to rid the virus?	34.1	55.3	10.6

Do you feel at risk of contacting the infection while working on patients?	92.4	5.3	2.3
Are you stressed to treat patients in clinics?	48.5	8.3	43.2
Are you willing to work in dental clinic during the pandemic?	16.7	53	30.3

Table 2 shows attitude of the students. Majority of our participants (99.2%) agreed on the importance of wearing double masks when treating patients , 98.5% agreed on the importance of checking patient's temperature and 87.9% felt it was important to make an appointment and brief patients before seeing the patients. About 70% agreed on the importance of double masking . About 99% also knew the importance of getting the patients to wash their hands before. Most of our participants (95.5%) believed that preprocedural rinses would help to reduce spread of the COVID-19 virus . However, only 50% of our participants felt that it was necessary for patients to undergo COVID-19 testing before being treated . About 55.3% felt that sanitizer alone was not effective . About 92.4% also felt that that they were at risk of containing the virus when working in clinics.

C. Practices

Table 3: Practices pertaining to infection control during the COVID-19 pandemic

Questions	**Yes(%)**	**No(%)**	**Maybe(%)**
Would you brief patients on the phone prior to treatment?	78.8	11.4	9.8
Would you instruct patients on proper infection control in the dental clinic?	92.4	2.3	5.3
Are you willing to wear complete personal protective equipment before treating any patients?	98.5	1.5	0
Will you wash and sanitize your hands before and after any dental procedure?	98.5	1.5	0
Will you maintain strict social distancing in clinics?	85.6	14.4	0
Would you use high vacuum suction for aerosol generating procedures?	97	3	0
Will you donn and doff in the designated areas ?	99.2	0.8	0
Do you know the orderly sequence to donn before undergoing any dental treatment?	60.6	39.4	0

Do you know the orderly sequence to doff before undergoing any dental treatment?	24.2	75.8	0

Table 3 shows the practices. More than 70% of our participants would brief their patients before appointment with 92.4% giving instructions to their patients on infection controls in clinics . More than 95% agreed to wear strict personal protective equipment when treating patients, practice strict hand washing practices and sanitizing before and after every procedure, use high vacuum suction when carrying out aerosol generating procedures, don and doff in the designated areas before and after dental procedures. However only 60% knew the correct order of donning and doffing.

Discussion:

This study looked into the knowledge of Malaysian dental students about COVID-19 and their attitudes and practices toward treating patients during the pandemic. Dental students in their clinical years are at an increased risk of cross-infection due to the increase of patient contact during their education. Therefore, their knowledge about and attitudes toward standard and extra precautionary measures against COVID-19 are of great importance .Students' knowledge of COVID-19, its symptoms, transmission pathways, transmission control and prevention measures was assessed in this study to identifying the gaps, thus, decreasing the risk and to prepare them for any similar future epidemics. Questionnaire-based studies have been shown to be highly effective in gathering information about dental students' awareness and knowledge of COVID-19, however, careful data collection and interpretation is required.[15] Hence we designed and validated our survey instrument before its use.

Our study results showed that almost all our participants had adequate knowledge towards the nature and transmission of COVID-19 infection in dental clinic. A similar finding was observed in studies conducted among dental students in different parts of the world.[16-19] However, average percentage of knowledge was only about 59.7% in a study conducted in Iran.[20] All our students were aware of the main symptoms of COVID-19, which aids the students in recognizing the threat and taking the necessary precautions during their future dental practice, which is considered a critical part of the virus's management and control. [21] Futhermore, High-speed handpieces have the potential to spread bacteria and viruses to the dentist and dental staff. In this study, 97% of participants were aware of the role of aerosols in viral infection

spread and 97 % said they would use HVE for aerosol generation which further shows their knowledge and carefulness

Similar to other studies [23-25], ours revealed that the majority of the participants were aware of the COVID-19 infection control policies. In a study by Kashif et al, who reported insufficient awareness [26], most of the knowledge gap was associated with donning and doffing PPE procedures. This aspect of his study results are similar to ours, in which only about 60% of our students knew how to donn and doff correctly.

Overall, our students had a positive attitude towards adopting various infection control measures during the pandemic. They also exhibited good infection control practices .The results re similar to some studies conducted. [17,18,19] In this study, clinical dental students' attitude towards wearing PPE including mask, gloves, gown, head cap etc was positive. This could be associated with their fear of contacting infection in clinics and hence to limit the spread of infection . These findings agree with those of a previous study, in which most dental residents feared being infected by contact with patients and preferred to follow the standard treatment guidelines about wearing PPE in their practice. [27]

To summarise, dental students in this study are well-informed about the current pandemic and its potential consequences. While returning to practical learning, they feel an ethical obligation to provide safe treatment to their patients and at the same time ensuring their own safety. The only way to ensure a safe environment for both patients and students is to follow the new strict infection control protocols and to have students re-orientated to these protocols on a regular basis.

Conclusions

Our participants had a good understanding of COVID-19 and the precautions that must be taken to provide adequate dental treatment to patients during the pandemic; however, infection control should be emphasized for not just the clinical students but also preclinical students to ensure knowledge and awareness of this pandemic in ensured and never forgotten.

References:

1.Wang L, Wang Y, Ye D, Liu Q. Review of the 2019 novel coronavirus (SARS-CoV-2) based on current evidence. Int J Antimicrob Agents. 2020 Jun;55(6):105948. https://doi.org/10.1016/j.ijantimicag.2020.105948.; Epub ahead of print.

2. Cucinotta D, Vanelli M. WHO Declares COVID-19 a Pandemic. Acta Biomed. 2020;91(1):157–60. https://doi.org/10.23750/abm.v91i1.9397

3.Chen CM, Jyan HW, Chien SC, et al. Containing COVID-19 among 627,386 persons in contact with the diamond princess cruise ship passengers who disembarked in Taiwan: big data analytics. J Med Internet Res. 2020;22(5):e19540.

4. Ferretti L, Wymant C, Kendall M, et al. Quantifying SARS-CoV-2 transmission suggests epidemic control with digital contact tracing. Sci. 2020;368(6491):eabb6936.

5. Muto K, Yamamoto I, Nagasu M, et al. Japanese citizens' behavioral changes and preparedness against COVID-19: An online survey during the early phase of the pandemic. PLOS ONE. 2020;15(6):e0234292

6. Liu Y, Gayle AA, Wilder-Smith A, Rocklöv J. The reproductive number of COVID-19 is higher compared to SARS coronavirus. J Travel Med. 2020;27(2):1-4. https://doi.org/10.1093/jtm/taaa021

7. Peng X, Xu X, Li Y, Cheng L, Zhou X, Ren B. Transmission routes of 2019-nCoV and controls in dental practice. Int J Oral Sci. 2020;12:1–6. doi:10.1038/s41368-020-0075-9 7.

8.Alhazzani W, Møller MH, Arabi YM, et al. Surviving sepsis campaign: guidelines on the management of critically ill adults with Coronavirus Disease 2019 (COVID-19). Intensive Care Med. 2020;46:854–887. doi:10.1007/s00134-020-06022-5

9. Lo Giudice R. The severe acute respiratory syndrome coronavirus-2 (SARS CoV-2) in dentistry. Management of biological risk in dental practice. Int J Environ Res Public Health. 2020;17:3067.doi:10.3390/ijerph17093067

10. Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet.2020;395:497–506. doi:10.1016/S0140-6736(20)30183-5

11. Fallahi HR, Keyhan SO, Zandian D, Kim SG, Cheshmi B. Being a front-line dentist during the Covid-19 pandemic: a literature review.Maxillofac Plast Reconstr Surg. 2020;42:1–9. doi:10.1186/s40902-

020-00256-5

12. World Health Organization. Clinical management of severe acute respiratory infection (SARI) when COVID-19 disease is suspected: Interim guidance 2020. Available from: https://www.who.int/docs/ default-source/coronaviruse/clinical-management-of-novel-cov.pdf [17]

13.Centers for Disease Control and Prevention. CDC recommendation: postpone non-urgent dental procedures, surgeries, and visits 2020. Available from: https://www.cdc.gov/oralhealth/infectioncontrol/ statement-COVID.html

14. The American Dental Association. Coronavirus frequently asked questions 2020. Available from: https://success.ada.org/en/%20practice - management/patients/coronavirus-frequently-asked-questions

15. Sharaf RF, Kabel N. Awareness and knowledge of undergraduate dental students about the signs and symptoms of Corona viral infection (COVID-19), and the required infection control measures to prevent its spread. Bull Natl Res Cent. 2021;45(1):32. doi: 10.1186/s42269-021-00494-1. Epub 2021 Feb 1. PMID: 33551636; PMCID: PMC7848878.

16. Mubayrik A, Dosary S, Alwasil W, AlShanqeeti B, Alkathiri M, Alahmari R, et al. Knowledge and Practice of COVID-19 Infection Control Among Dental Students and Interns: A Cross-Sectional Survey. Adv Med Edu Practice 2021:12 1419–1427.

17. Alawia R, Riad A , Kateeb E. Knowledge and attitudes among dental students about COVID-19 and its precautionary measures: a cross-sectional study.J Oral Med Oral Surg 2021;27:17-22.

18. Syaputra AA , Malik N , Rahardjo A , Maharani DA. Attitudes of Dental Students in Indonesia About Infection Control During the COVID-19 Pandemic Int J Den Med Res 2021;14(3):1112-1116.

19. Ataş O, Talo Yildirim T. Evaluation of knowledge, attitudes, and clinical education of dental students about COVID-19 pandemic. PeerJ 2020; 8e9575

20.Esmaeelinejad M, Mirmohammadkhani M, Naghipour A, Hasanian S, Sara Khorasanian S. Knowledge and attitudes of Iranian dental students regarding infection control during the COVID-19 pandemic. Braz. Oral Res. 2020;34:e121

21.Khader Y, Al Nsour M, Al-Batayneh OB, Saadeh R, Bashier H, Alfaqih M, Al-Azzam S, AlShurman BA. Dentists' Awareness, Perception, and Attitude Regarding COVID-19 and

Infection Control: Cross-Sectional Study Among Jordanian Dentists. JMIR Public Health Surveill. 2020 Apr 9;6(2):e18798. doi: 10.2196/18798. PMID: 32250959; PMCID: PMC7147327.

22. Matys J, Grzech-Leśniak K. Dental Aerosol as a Hazard Risk for Dental Workers. Materials (Basel). 2020 Nov 12;13(22):5109. doi: 10.3390/ma13225109. PMID: 33198307; PMCID: PMC7697028

23. Al-Khalifa KS, AlSheikh R, Al-Swuailem AS. Pandemic preparedness of dentists against coronavirus disease: a Saudi Arabian experience. PLoS One. 2020;15:e0237630. doi:10.1371/journal. pone.0237630

24. Kanaparthi A, Dukkireddy D, Gopalaiah H, Kesary SPR, Katne T, Gantala R. Awareness of COVID 19 pandemic among dental practioners of Telangana state, India: a cross sectional survey. J Oral Biol Craniofac Res. 2020;10:484–489. doi:10.1016/j.jobcr.2020.08.001

25. Zaheer R, Tanveer A, Khan M, Jan A, Awan SZ. Awareness of precautionary measures against Covid-19 in healthcare workers. Pak Armed Forces Med J. 2020;70:S261–S268

26. Kashif M, Fatima I, Ahmed AM, Arshad Ali S, Memon RS, Afzal M, Saeed U, Gul S, Ahmad J, Malik F, Malik M, Ahmed J. Perception, Willingness, Barriers, and Hesitancy Towards COVID-19 Vaccine in Pakistan: Comparison Between Healthcare Workers and General Population. Cureus. 2021 Oct

26. Wu JH, Lee MK, Lee CY et al. The impact of the COVID-19 epidemic on the utilization of dental services and attitudes of dental residents at the emergency department of a medical center in Taiwan. J Dent Sci. 2021;16(3):868–876.