

DOI: 10.21767/1791-809X.100675

Compliance towards Infection Control Practice among Clinical Dental Students, Universiti Sains Malaysia, Malaysia

Siti Sarah Ayub, Mohd Zulkarnain Sinor*, Basaruddin Ahmad and Norazlinaliana Ibrahim

School of Dental Sciences, University Sains Malaysia, Kampus Kesihatan, 16150 Kubang Kerian, Kelantan, Malaysia

Abstract

The purpose of the present study was to assess the compliance of infection control practice among clinical dental students. We used an audit checklist observing dental students in this cross-sectional study involving 80 4th and 5th year dental students at the School of Dental Sciences, Universiti Sains Malaysia. The audit checklist comprised 5 items before treatment, 20 during treatment and 11 after the treatment procedure. Data were analysed with an SPSS IBM version 24 and a comparison was made using the t-test. A P-value <0.05 was considered significant. The mean compliance percentage toward practice was 90.3% (+6.3). Overall, 95.1% of the students had been complying before treatment, 88.7% during treatment and 90% after the treatment procedure. The most non-compliance practices observed were not washing the hands before treatment (56.2%), not wearing PPE and heavy-duty gloves during cleaning procedures (60%) and touching other parts of the body while wearing gloves (20%). Female students and year 4 students are more complying with practicing infection control ($p < 0.05$). The percentage of students comply towards infection control practice was high, but the findings highlight the needs of continued infection control education and monitoring in practices regarding infection control among dental students at the School of Dental Sciences, University Sains Malaysia.

Keywords: Infection control practice; Dental students; Audit checklist

Received: August 20, 2019, **Accepted:** August 30, 2019, **Published:** September 06, 2019

Introduction

Cross infection is a transmission of a microorganism from one person to another that might occur in the dental setup and dental students were at high risk of it [1,2]. The main route of infection reported in the dental clinic is because of the sharp injuries and the most frequent occurrence is because of the needle stick injuries, especially during needle re-capping as much as 75% [3]. Any exposure to body fluids such as blood or saliva, whether it is related to a needle prick, will be exposed dental students to the risk of getting blood-borne diseases such as Hepatitis A, Hepatitis B, and HIV.

Following the emergence of the HIV pandemic in the 1980s, CDC published its first guidelines on infection control practices in dentistry [4]. The guidelines emphasized precautionary measures that need to be taken while operating patients and dental equipment safely. Therefore, all dental students must abide by this guideline to ensure the safety of patients and create a safe working environment. Although the same guidelines have been used around the world, it is worried that compliance with infection control among dental students and dental personnel

are reportedly varied. We should take seriously this alarming situation as the transmission of blood-borne diseases such as HIV, Hepatitis A, and Hepatitis B can be harmful to life [5,6].

In Malaysia, it is the responsibility of all clinical dental students to comply with the Guidelines on Infection Control Practice provided by the Malaysian Dental Council [7]. This compliance can only be achieved if it exposed the students to the rationale behind a necessity to comply with every single infection control measure [8]. In-School of Dental Sciences, Universiti Sains Malaysia; even though Knowledge, Attitude and Practice of Infection Control has been studied previously, it might have some drawbacks as they used a self-administered questionnaire as a tool which may have resulted in an overestimation of the compliance. Therefore, it is important to conduct this study to assess the real practice of infection control among dental students through clinical audits. We hope to result from this study, will encourage the school authority to perform clinical audit regularly on a scheduled basis to ensure the practice of infection control among students is sustainable throughout their career later as has been suggested by Rosen [9].

***Corresponding author:** Mohd Zulkarnain Sinor

✉ zulkarnainsinor@usm.my

School of Dental Sciences, University Sains Malaysia, Kampus Kesihatan, 16150 Kubang Kerian, Kelantan, Malaysia.

Tel: +60199898056

Citation: Ayub SS, Sinor MZ, Ahmad B, Ibrahim N. Compliance towards Infection Control Practice among Clinical Dental Students, Universiti Sains Malaysia, Malaysia. Health Sci J. 2019, 13:5.

Material and Methods

This cross-sectional study was conducted on clinical dental students, School of Dental Sciences, Universiti Sains Malaysia (USM), from 1st January 2019 to 28th April 2019. In the present study, we include all year 4 and year 5, except the repeated student. To determine the percentage of compliance towards infection control practice in the present study, we calculated the sample size using a single proportion formula with $P = 86\%$ by Sukumaran et al. [8] giving a total number of 47 students needed. However, in the present study, the researcher included all available students during the data collection period, which gave 80 students. Once selected, the information such as the student's number, sex, and specialty rotation were recorded, followed by infection control practice observation according to clinical audit checklist.

We adopted clinical audit checklist used in the present study from the previous study conducted by Sukumaran et al. [8] among dental students in University Malaya (UM), Malaysia. The checklist later was modified to suit the present study's purpose and suitability. An expert validated contents, and we conducted a pilot study on a random sample of students ($n=10$) to calibrate two auditors involved during data collection and assessing the reproducibility of criteria in the checklist.

The results from the pilot study yield a kappa score of $K=0.90$, which showed strong agreement between two auditors. During the data collection time, the students were followed and observed from the preparation time before treatment until treatment completion in one clinical session. The duration of observation was in the range from 1 to 3 hours depending on the case that the student had on that day.

The clinical audit checklist used in the present study had 36 items, divided into three sections; Section A: Before treatment begins (11 items), Section B: During treatment (20 items) and Section C: After treatment completion (11 items). The researcher originally recorded compliance as do not comply, comply, and not applicable based on whether they performed whether the procedure during the session. Each item was then weighted based on the level of importance of the procedure (1=important, 2=very important and 3=highly important) and a percentage of compliance was derived. The present study was approved by the USM ethical committee and consent form was given by the Dean School of Dental Sciences, USM (USM/JEPeM/18110726).

All data were entered, cleaned, and analysed using IBM SPSS version 24. All numerical value was presented in mean and standard deviation (SD) and for categorical variables, frequency and percentage were used. To assess the difference in compliance practice, an independent t-test was used, with the level of significance was set at $P < 0.05$.

Results

The percentages of students comply towards infection control and the frequencies are explained briefly in **Tables 1-4**.

Table 1 Socio-demographic characteristics and specialties posting of dental students ($n=80$).

Variables	Frequency (%)
Gender	
Male	27 (33.8)
Female	53 (66.3)
Year of study	
Year 4	39 (48.8)
Year 5	41 (51.3)
Ethnicity	
Malay	42 (52.5)
Chinese	27 (33.8)
Indian	7 (8.8)
Others	4 (5.0)
Clinical specialties	
Prosthodontics	64 (80)
Conservative Dentistry	2 (2.5)
GDP	7 (8.8)
Oral surgery	7 (8.8)

Table 2 Mean percentage and percentage of compliance of infection control practice ($n=80$).

Section	Mean (SD)
Overall	90.3 (6.28)
Before treatment	95.1 (8.46)
During Treatment	88.7 (9.59)
After treatment completion	90.0 (7.75)

Discussion

In the present study, the researcher focused on the compliance of clinical dental student's base on real-time observation of prospective observation. Every dental student enrolled in the present study was observed throughout their clinical time on that session during data collection day, starting from the time they reached their respective cubicle, preparing to start treatment until they finished the session. This observation has been conducted in the previous study by Sukumaran et al. [8] audited clinical dental students practice in University Malaya (UM) [8,9], and also by Anders et al. [10] observed infection control compliance before and after the Ebola Virus Disease (EVD) screening protocol being mandated in a dental school in New York [10]. However, the difference from Sukumaran et al. [8] study and the present study was on the presentation of the result and data analysis. In UM, the author focused on the difference between year four and year five dental student compliance together with their assistant, towards infection control practice and analysed the variance of difference using Rasch analysis, whereas in this study the researcher focused on the compliance of infection control practice, the audited item and present it in the form of a percentage of compliance and the weighted mean score. Even though, Anders et al. also a study on compliance of infection control, the difference was, the previous study assessed on the breach of policy encounters and also the number of audited items they used as a proxy to measure the policy breach was fewer (12 items) compared to the present study (36 items). A previous study [8,10] were slightly different;

Table 3 Percentage of compliance of infection control for each item (n=80).

Infection Control Practice	Yes n (%)	N/A n (%)
Before treatment commences		
Ensured both clean area and working area were clean and tidy	80 (100)	-
Only take instruments that have been properly autoclaved	80 (100)	-
Avoid contamination of sterile instruments	75 (93.8)	-
Ensured that folders were placed in clean area	65 (81.3)	-
Ensured that instruments were placed in working area	79 (98.8)	-
During treatment		
Remove all ornaments and accessories (except wedding band)	76 (95.0)	-
Practiced correct hand hygiene technique/ antiseptic hand rub	35 (43.8)	-
Wore hair cap	52 (65.0)	28(35.0) ^a
Adorned personal protective equipment (PPE) in correct sequence	75 (93.8)	-
Subject wear face shield or goggles	45 (56.3)	27(33.8) ^b
Prepared bib for patient	78 (97.5)	-
Prepared protective eye wear/goggles for patient	72 (90.0)	5(6.3) ^c
Wore gloves throughout treatment	80 (100)	-
Do not touch others part of body while wearing glove	64 (80)	-
Placed used instrument only at working area/swivel table	76 (95.0)	-
Re-capped needle after administered local anaesthesia (LA)	8 (10.0)	72 (90.0) ^d
Disinfect equipment before sharing with next cubicle	16 (20.0)	63 (78.8) ^e
Requested for new instrument if it was accidentally dropped on the floor	1 (1.3)	79 (98.8) ^f
If needed, subject removed PPE before leaving clinic (e.g: to accompany patient to registration counter/toilet break)	29 (36.3)	51 (63.8) ^g
Hung up used gown at proper place before leaving the clinic	44 (55.0)	33 (41.3) ^h
Subject changed to a new pair of gloves if torn during treatment	30 (37.5)	50 (62.5) ⁱ
Dispose used gloves immediately & properly into clinical bin	66 (82.5)	5 (6.30) ^j
Disinfect primary or working impression/ wax for try-in/ prosthesis taken out from patient's mouth	53 (66.3)	23 (28.8) ^k
Placed primary or working impression/ wax for try-in/ prosthesis in proper container before sending to laboratory	54 (67.5)	23 (28.8) ^l
If needed, subject removed glove on one hand when he/she wants to take an additional instrument or a document	73 (91.3)	3 (3.8) ^m
After treatment completion		
Disposed waste according to clinical and non-clinical waste	100%	-
Clean all instrument thoroughly	100%	-
Placed burs into bur container containing disinfectant solution.	44 (55.0)	35 (43.8) ⁿ
Soak the instrument in disinfectant solution	77 (96.3)	-
After soaking, wash instrument wearing PPE and heavy-duty gloves	32 (40.0)	-
Dry instrument with towel	80 (100)	-
Placed instrument into autoclave pouch before autoclaving	80 (100)	-
Clean and disinfect all contaminated area	79 (98.8)	-
Removed PPE following correct sequence	70 (87.5)	-
Practiced correct hand washing /antiseptic hand rub	70 (87.5)	-
Remove PPE before leaving clinic	68 (85.0)	-

^aStudent wore head scarf; ^btreatment did not require goggle (e.g: try in and issue denture, MMR); ^ctreatment did not require goggle (e.g: try in and issue denture, E and D); ^dTreatment did not require local anaesthetic (LA); ^eStudent did not share instruments; ^fNo instrument was dropped; ^gStudent did not leave the clinic during procedures; ^hStudent did not take off their gown during procedures; ⁱGloves did not torn during treatment; ^jstudent did not change to a new glove; ^kTreatment did not involve impression; ^lTreatment did not involve impression; ^mTreatment did not use any burs.

Therefore, comparisons of other studies with the present study should be taken cautiously.

In the present study, we have explored the compliance of every item. Unlike direct comparison between the percentages of compliance in a different group, in this study, the researcher gave a score to every single item practiced and gave the weighted score similar to Likert scale according to the importance of the

item in infection control protocol. Hence, the present study tried to capture in-depth the importance of each item observed and translated it into a weighted score before data analysis. Students with a higher score showed that they have performed the critical steps in infection control practice. The finding from the present study differed slightly from the previous study which captures the Knowledge, Attitude and Practice score [11,12].

Table 4 Factors associated with compliance of infection control (n=80).

Variables	Mean (SD)	Mean difference (95% CI)	t statistics or F(df)	p-value
Gender				
Male	87.9 (7.25)	3.43 (0.56, 6.31)	2.38	0.020*
Female	91.4 (5.44)			
Year of study				
4	93.3 (4.62)	5.9 (3.42, 8.39)	4.74	0.001*
5	87.4 (6.34)			
Ethnicity				
Malay	91.5 (5.85)		1.17 (3.76)	0.330**
Chinese	89.3 (6.95)			
Indian	88.3 (6.60)			
Others	87.7 (4.55)			
Clinical Specialties				
Prosthodontics	90.2 (6.66)		0.208 (3.76)	0.890**
Conservative Dentistry	91.2 (2.16)			
GDP	89.5 (3.70)			
Oral Surgery	91.9 (5.88)			

*Independent t-test, **One-way ANOVA

The mean percentage of overall compliance in the present study was in high categories, which are 90.3% (+6.3). This finding was higher than 86% among dental students in Universiti Malaya [8], 87% compliance recorded among dental students in New York [10] but lower than 94% reported compliance among Canadian dentist [13]. In the present study, we found that female students have better compliance than males ($p=0.020$). It also reported the same finding among dental students in Yemen [2], and among dentist in Taiwan [14]. However, the present finding was contradicting with finding among the Ontario dentist [15]. However, there is no significant difference reported in infection control practice among dental professional in Iran [11]. The inconclusive finding regarding sex role in influencing infection control practice needs further investigation, using a different study design and statistical analysis.

In the present study, the mean compliance score among year four dental students was significantly higher ($p<0.001$) than year five dental students. This finding concurred with the previous study in Pakistan reported senior dental professional have a lower mean knowledge score, poor attitude and practice in infection control practice score compared to junior dental professional [12]. Our finding showed that the main reason year five students in USM are less likely to comply because they work independently compared to year four having a partner as their assistant. Besides that, fear of not able to complete the clinical requirement on time resulted in them to violate some infection control practices

in dental operatory [16]. However, the present study gave a good impression that year four and five dental students in the School of Dental Sciences, Universiti Sains Malaysia have awareness regarding infection control measures. Another factor that can attribute to good compliance in infection control practice among dental students in the present study might be because of reporting of emerging and re-emerging of infectious diseases that can easily viral in a social platform.

Finding from the present study show that as a general, majority of infection control practice has complied. However, there is still room for improvement in several practices. In reality, it reflects that student's knowledge did not translate into the practice as has been documented by other studies [10,17].

Conclusion

From the present study, we concluded that the percentage of students comply towards infection control practice was high, but the findings highlight the needs of continued infection control education and monitoring in practices regarding infection control among dental students at School of Dental Sciences, University Sains Malaysia.

Acknowledgment

The author would like to express his appreciation to the students involved, the dean of the School of Dental Sciences USM and the Bridging Incentive Grant (Phase 1/2019).

References

- 1 Rahman B, Abraham SB, Alsalami AM, Alkhaja FE, Najem SI (2013) Attitudes and practices of infection control among senior dental students at college of dentistry, University of Sharjah in the United Arab Emirates. *Eur J Dentistry* 7: S15.
- 2 Halboub ES, Al-Maweri SA, Al-Jamaei AA, Tarakji B, Al-Soneidar WA (2015) Knowledge, attitudes, and practice of infection control among dental students at Sana'a University, Yemen. *J Int Oral Health* 7: 15-20.
- 3 Myers JE, Myers R, Wheat ME, Yin MT (2012) Dental students and bloodborne pathogens: occupational exposures, knowledge, and attitudes. *J Den Educ* 76: 479-486.
- 4 <https://www.cdc.gov/mmwr/PDF/rr/rr4208.pdf>
- 5 Younai FS, Murphy DC, Kotelchuck D (2001) Occupational exposures to blood in a dental teaching environment: results of a ten-year surveillance study. *J Den Educ* 65: 436-448
- 6 Sofola OO, Folayan MO, Denloye OO, Okeigbemen SA (2007) Occupational exposure to bloodborne pathogens and management of exposure incidents in Nigerian dental schools. *J Den Educ* 71: 832-837.
- 7 http://ohd.moh.gov.my/v3/images/pdf/infection_control2007.pdf
- 8 Sukumaran P, Pin CW, Hong OZ, Mariam A (2017) An audit of infection control practices amongst dental students in University of Malaya, Malaysia. *Arc Oro Sci* 12: 1-10.
- 9 Rosen R (2000) Improving quality in the changing world of primary care. *BMJ* 321: 551-554.
- 10 Anders PL, Townsend NE, Davis EL, McCall WD (2016) Observed infection control compliance in a dental school: A natural experiment. *Am J of Inf Cont* 44: e153-e156.
- 11 Askarian M, Asadian O (2009) Infection control practices among dental professionals in Shiraz Dentistry School, Iran. *Arch Iran Med* 12: 48-51
- 12 Mohiuddin S, Dawani N (2015) Knowledge, attitude and practice of infection control measures among dental practitioners in public setup of Karachi, Pakistan: cross-sectional survey. *J Dow University Health Sci* 9: 1-2
- 13 McCarthy GM, Koval JJ, MacDonald JK (1999) Compliance with recommended infection control procedures among Canadian dentists: results of a national survey. *Am J Inf Con* 27: 377-384.
- 14 Cheng HC, Su CY, Huang CF, Chuang CY (2012) Changes in compliance with recommended infection control practices and affecting factors among dentists in Taiwan. *J Den Educ* 76: 1684-1690.
- 15 McCarthy GM, MacDonald JK (1996) Gender differences in characteristics, infection control practices, knowledge and attitudes related to HIV among Ontario dentists. *Com Dent Oral Epid* 24: 412-415.
- 16 Rada RE, Johnson-Leong C (2004) Stress, burnout, anxiety and depression among dentists. *J Am Den Assoc* 135: 788-794.
- 17 Oosthuysen J, Potgieter E, Fossey A (2014) Compliance with infection prevention and control in oral health-care facilities: a global perspective. *Int Den J* 64: 297-311.