The Hand Hygiene-Related Knowledge, Attitudes, and Self-Reported Practice of Postgraduate Dental Students in Chulalongkorn University

Koolkaew K Pisarnturakit PP** Subbalekha K****

Abstract

Hand hygiene (HH) is one of the fundamental requirements for infection control in health care, including dental treatments. Several studies have found that HH compliance among healthcare workers, including dentists and dental students, is low. However, there is no report regarding HH knowledge, attitudes, and practice of dentists when performing oral surgery. Since oral surgery is one of the sensitive procedures that needs good control of microbial contamination, a good discipline of HH should be emphasized during professional development. The aim of this study was to investigate and compare HH knowledge, attitudes, and self-reported practice between postgraduate dental students (PG) taking a surgical-based (S-PG) and those taking a non-surgical-based clinical practice curriculum (NS-PG). Data collection was performed by distributing the self-administered questionnaire on HH-related knowledge, attitudes, and practice to all PGs of the Faculty of Dentistry, Chulalongkorn University, during March and September 2019. The 176 PGs who returned the questionnaire comprised 68 S-PGs and 108 NS-PGs. A significantly higher number of S-PGs (83.8%) claimed to know the 6 steps of HH (2009 WHO guidelines) than the NS-PGs (63.8%, p=0.007); however, both groups had limited HH knowledge, with an average HH knowledge score ±SD of 7.4±1.5 and 7.8±1.7, respectively (p=0.151). Although all of the PGs had positive attitudes toward HH, S-PGs and NS-PGs had different attitudes, and only one-third of them reported appropriate HH practice. In conclusion, surgical-based clinical training is associated with HH-related attitudes but not with knowledge and self-reported practice. Our findings suggest the need of a strategy to improve HH-related knowledge in all postgraduate dental students in order to achieve sustainable good HH practice.

Keywords: *Attitude/ Knowledge/ Practice/ Postgraduate dental students/ Hand hygiene/ Oral surgery*

Received: *Jan 03,2022*
Revised: *Oct 13, 2022*
Accepted: *Oct 27, 2022*

Introduction

The contaminated hands of healthcare workers (HCWs) are significant infectious agent carriers to patients and objects surrounding the patients. The amount of bacteria that accumulated on HCWs' hands was $3.9x10^4$ - $4.6x10^6$ colony forming units (CFUs)/cm^2 and steadily increased to 4000-fold of this amount within 1 hour if they did not perform appropriate hand hygiene (HH).[1-4] HH performed by hand washing using soap and water or rubbing with an alcohol-based sanitizer decreased the quantity of accumulated bacteria on HCWs' hands. Several studies found that effective HH reduced the infection and contamination rate due to HCWs.[1,2,5-8] Due to its low cost, convenience, and time saving, practicing appropriate HH is a primary measure used to reduce the surgical site infection (SSI) rate.[5,9]

Although HH procedure is simple, but its application by HCWs is a complex and challenge. An observational study found that less than 60% of HCWs performed appropriate HH.[10-12] There are many reasons for insufficient concern about HH among HCWs, such as too many patients, limited time, forgetfulness, lack of hand cleaning agents, skepticism about the value of HH, insufficient programs to support and motivate HH, insufficient knowledge, and negative influence of senior staff

** Residency training student, Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Chulalongkorn University, Bangkok.*
*** Department of Community Dentistry, Faculty of Dentistry, Chulalongkorn University, Bangkok.*
**** Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Chulalongkorn University, Bangkok.*

considered as role models.[1,6,11,13] The more experienced the HCWs were, the less attention they paid to HH.[6] Notably, a study demonstrated that postgraduate dental students (PGs) had lower attitudes and effectiveness related to HH compared with undergraduate dental students.[14] Furthermore, the different HH adherence was reported among medical specialty, general practitioners demonstrated the highest percentage (87%) adherence to HH, while surgeons (36.4%) was the second least after anesthesiologists (23.3%).[1] Unfortunately, there is no report on attitudes or practice toward HH among dental specialty.

Although surgical wounds in the oral cavity are considered clean contaminated wounds, appropriate HH before performing oral surgery is still a mandatory to prevent SSI. A good discipline of HH should be emphasized during professional development, however, there is no report of the attitudes and practice of dental students who studying in the specialty involving oral surgery. The aims of this study were to investigate the HH-related knowledge, attitudes, and self-reported practice of PGs and compare them between PGs studying a surgical-based (S-PG) or a non-surgical-based clinical practice curriculum (NS-PG).

Materials and Methods

Study design This was a cross-sectional study. The HH knowledge, attitudes, and practice were collected using a self-administered questionnaire during March and September 2019.

Location of study The study was performed in the Faculty of Dentistry, Chulalongkorn University (FDCU), Bangkok, Thailand.

Samples All PGs of FDCU were invited to participate. The PGs were divided into 2 groups based on their clinical practice curriculum, surgical-based or non-surgical-based dental procedures. The surgical-based clinical curricula were oral and maxillofacial surgery, periodontology, endodontics, and implantology. The non-surgical based clinical curricula were prosthodontics, operative, pediatrics, geriatrics, oral medicine, and orthodontics.

Questionnaire The questionnaire consisted of 4 parts: 1) demographic data (sex, specialty-based program, working experience, and type of dental treatment they performed for their expenses), 2) HH knowledge, 3) attitudes toward HH, and 4) HH practice. The participants were asked if they knew the 6 HH steps in the 2009 WHO guidelines.[15] HH knowledge was assessed by 13 questions including 8 questions with true/false answer, 5 multiple-choice questions with single best answer. A score of 1 was given to each correct answer, therefore the maximum score was 13. These questions were developed based on the Controlling CDI-Hand hygiene staff survey[16], How-to Guide: Improving Hand Hygiene - A Guide for Improving Practices among Health Care Workers[17] and Yaembut et al.'s study.[14] The content validity was evaluated by 3 faculty members and the Index of Congruence (IOC) was 0.7. The attitudes toward HH were assessed using a 5-scale Likert rating (strongly disagree, disagree, neutral, agree, and strongly agree) to 4 statements: 1) The 6 HH steps in the 2009 WHO guidelines are easy to perform, 2) Performing HH before a surgical procedure can prevent SSIs, 3) Performing HH before a non-surgical procedure prevents microorganism transmission, and 4) Staff and colleagues are role models for appropriate HH. The internal consistency of the HH attitudes items was evaluated and resulted in a 0.79 Cronbach's alpha's coefficient. The self-reported HH practice was assessed by the frequency of performing HH before a surgical procedure (invasive procedure involving gingiva or oral mucosa such as biopsy, periodontal surgery, apical surgery, implant surgery surgical/extraction of tooth, alveolectomy, and torectomy) or non-surgical procedure (no invasion of gingiva or oral mucosa such as taking dental radiographs, placement of removable prosthodontic or orthodontic appliances, shedding of primary teeth, and bleeding from trauma to the lips or oral mucosa) and graded as never (<20%), rarely (20-40%), sometimes (40-60%), often (60-80%) and always (>80%). The single best answer, multiple-choice questions for the HH agent and time they used. The reasons for noncompliance with HH were

also recorded with multiple answers of multiple-choice questions.

Statistical Analysis The data analysis was performed using SPSS® version 22 (IBM Corp., Armonk, New York, USA). The knowledge scores were compared between the S-PG and NS-PG groups by an independent T-test. The One-way ANOVA was used to compare the knowledge scores among S-PGs and NS-PGs who claimed to know and not know the 6 HH steps, and who had trained and not trained HH. The frequency distribution of PGs who had different attitudes and self-reported practice was compared by Chi-square test. A $p<0.05$ was considered significant. Unfortunately, the frequency of some expected values was less than 5; the HH attitudes had to be re-classified into 3 groups: 1) strongly agree, 2) agree, and 3) neutral, disagree, and strongly disagree; also, the frequency of performing HH had to be re-classified into 1) always, 2) often, and 3) sometimes, rarely, and never.

Ethical Consideration This research was approved by the Human Research Ethics Committee of the FDCU on 1st March 2019 (HREC-DCU2019-007).

Results

Demographic data Of the 280 PGs in FDCU, 176 who returned the questionnaire were 68 S-PGs (30 PGs studying oral and maxillofacial surgery, 22 periodontology, 14 endodontic, and 2 implantology). The other 108 respondents were NS-PGs (47 studying prosthodontics, 24 pediatric dentistry, 19 operative dentistry, 7 oral medicine, 7 orthodontics, and 4 geriatric dentistry). The male respondents comprised 32% and 20% of the S-PGs and NS-PGs, respectively. The average working experience was 4.3 years (SD 1.8, range 1-13 years) in the S-PG group and 4.1 years (SD 1.5, range 1-10 years) in the NS-PG group which was not statistically different (p=0.419).

HH Knowledge Overall, the S-PG and NS-PG groups demonstrated similar HH knowledge scores (mean 7.4, SD 1.5, 95%CI 7.0-7.8 and mean 7.8, SD 1.7, 95%CI 7.4-8.0, respectively, p=0.151). The number of PGs who claimed that they knew the 6 HH steps according to the 2009 WHO guidelines was significantly different between S-PGs (83.8%) and NS-PGs (63.8%, p=0.007). However, the knowledge scores among those who claimed to know and not know were the same (mean 7.5, SD 1.4, 95%CI 7.1-7.9, mean 6.9, SD 1.9, 95%CI 5.8-8.0, mean 7.8, SD 1.5, 95%CI 7.4-8.1, and mean 7.9, SD 1.6, 95%CI 7.4-8.4 in the S-PGs who claimed to know, the S-PGs who did not, the NS-PGs who claimed to know, and the NS-PGs who did not, respectively, p=0.203). Forty-four (25%) of all respondents attended a HH training course last year, including 20 S-PGs and 24 NS-PGs. The knowledge scores of the PGs who had recently trained and those who had not, were not different (mean 7.4, SD 1.3, 95%CI 5.7-9.1, mean 7.4, SD 1.6, 95%CI 6.8-8.0, mean 8.3, SD 1.5, 95%CI 5.9-10.7, and mean 7.7, SD 1.5, 95%CI 7.5-7.9 in the S-PGs who had trained HH, the S-PGs who had not, the NS-PGs who had trained, and the NS-PGs who had not, respectively (p=0.111) (Table 1).

More than 90% of S-PGs and NS-PGs recognized the five moments for HH according to 2009 WHO guidelines; including before and after touching a patient, after body fluid exposure/risk, and before clean/aseptic procedures. A smaller number of S-PGs (64.7%) and NS-PGs (51.8%) give a correct answer for HH should be performed after touching patient surroundings. However, 0.9% of S-PGs and 12% of NS-PGs gave a "TRUE" answer to the statement "HH should be performed after removing gloves". Although more than 70% of both groups recognized that the microorganisms can be transmitted from patients to health care workers if appropriate HH are not performed, only 50% gave a correct answer that the contaminated hands of health care workers are the main pathway of pathogen transmission in health care settings and around 75% did not know that the microorganism on health care worker's hands can multiply under gloves. More than half of them knew that alcohol-based hand rub requires less time than hand washing with soap and water; however, only one third realized that rubbing hands with alcohol-based sanitizer requires an optimal time of 20 seconds for eliminating most pathogens (Table 2).

Table 1 Hand hygiene-related knowledge score.

Conditions	Group				p-value
	S-PG		NS-PG		
All participants					
Number (%)	68 (100)		108 (100)		
Range of score[a]	4-11		1-11		
Mean score±SD	7.4±1.5		7.8±1.7		0.151[b]
95%CI	7.0-7.8		7.4-8.0		
Know the 6 HH steps	yes	no	yes	no	
Number (%)	57 (83.8)	11 (16.2)	69 (63.8)	39 (36.2)	0.007*[c]
Range of score[a]	4-11	2-9	3-10	1-11	
Mean score±SD	7.5±1.4	6.9±1.9	7.8±1.5	7.9±1.6	0.203[d]
95%CI	7.1-7.9	5.8-8.0	7.4-8.1	7.4-8.4	
Recently trained HH	yes	no	yes	no	
Number (%)	20 (29.4)	48 (70.6)	24 (22.2)	84 (77.8)	0.371[c]
Range of score[a]	4-9	2-11	6-10	1-11	
Mean score±SD	7.4±1.3	7.4±1.6	8.3±1.5	7.7±1.5	0.111[d]
95%CI	5.7-9.1	6.8-8.0	5.9-10.7	7.5-7.9	

[a]minimum score = 0, maximum score = 13; [b]Independent T-test; [c]Chi-square test; [d]One-way ANOVA

*Statistically significant: p<0.05

HH = hand hygiene, S-PG = surgical-based clinical practice curriculum postgraduate dental student, NS-PG = non-surgical-based clinical practice curriculum postgraduate dental student

Table 2 The number of participants who answered correctly regarding HH knowledge.

Knowledge statements	Number (%)	
	S-PG (total 68)	NS-PG (total 108)
1. Which of the following situations should HH be performed according to 2009 WHO guidelines (Five moments for HH)?		
1.1 Before entering the dental clinic (False)	19 (27.9%)	52 (48.1%)
1.2 Before touching a patient (True)	63 (92.6%)	101 (93.5%)
1.3 After touching a patient (True)	67 (98.5%)	105 (97.2%)
1.4 After body fluid exposure/risk (True)	66 (97%)	104 (96.3%)
1.5 Before touching patient surroundings (False)	24 (35.3)	35 (32.4%)
1.6 After touching patient surroundings (True)	44 (64.7%)	56 (51.8%)
1.7 Before clean/aseptic procedures (True)	66 (97%)	103 (95.4%)
1.8 After removing gloves (False)	1 (0.9%)	13 (12%)
2. What is the main pathway of pathogen transmission in health care settings? (The contaminated hands of health care workers)	36 (52.5%)	55 (50.9%)
3. Which of the following pathogens can be potentially transmitted from patients to health care workers if appropriate HH are not performed? (All of above: Staphylococcus aureus, Herpes simplex, and Hepatitis B virus)	50 (73.5%)	83 (76.6%)
4. Which of the following statements is true? (The microorganisms on health care worker's hands can multiply under gloves)	16 (23.5%)	30 (27.7%)
5. Which of the following statements regarding alcohol-based hand hygiene is true? (Doing HH with alcohol-based hand rub can remove microorganisms more rapidly than soap and water)	36 (52.9%)	67 (62%)
6. What is the minimal time needed for alcohol-based hand rub to eliminate most pathogens on your hands? (20 seconds)	23 (33.8%)	39 (36.1%)

HH = hand hygiene, S-PG = surgical-based clinical practice curriculum postgraduate dental students, NS-PG = non-surgical-based clinical practice curriculum postgraduate dental students

Attitudes toward HH Approximately 60% of PGs in both groups agreed and strongly agreed that the 6-step HH according to the 2009 WHO guidelines are easy, with no significant difference between the groups (p=0.77). More than 80% of PGs in both groups similarly agreed that performing HH before a non-surgical procedure prevents microorganism transmission (p=0.347). Although more than 90% of PGs agreed or strongly agreed that performing HH prior to surgical procedure could prevent SSIs, a significant difference was found between the groups (p = 0.01). Seventy-eight NS-PGs (72.2%) and 35 S-PGs (51.5%) strongly agreed, while 23 NS-PGs (21.3%) and 29 S-PGs (42.6%) agreed that HH before surgery could prevent SSIs. A significant difference was also found between the groups for the agreement that the faculty and colleagues were role models for appropriate HH (p=0.025). Forty-three NS-PGs (39.8%) and 17 S-PGs (25%) reported neutral, disagreed, and strongly disagreed with this attitude, (Table 3)

Table 3 Hand hygiene-related attitude.

Attitudes	Number (%)		p-value[a]
	S-PG	NS-PG	
Six HH steps according to 2009 WHO guidelines are easy to follow.			
Number (%)	57 (100)[b]	69 (100)[b]	
Strongly agree	11 (19.3)	13 (18.8)	0.77
Agree	23 (40.4)	32 (46.4)	
Neutral, agree, strongly disagree	23 (40.4)	24 (34.8)	
Performing HH before surgical procedure prevents SSI.			
Number (%)	68 (100)	108 (100)	
Strongly agree	35 (51.5)	78 (72.2)	0.01*
Agree	29 (42.6)	23 (21.3)	
Neutral, agree, strongly disagree	4 (5.9)	7 (6.5)	
Performing HH before non-surgical procedure prevents micro-organism transmission.			
Number (%)	68 (100)	108 (100)	
Strongly agree	27 (39.7)	48 (44.4)	0.347
Agree	34 (50)	43 (39.8)	
Neutral, agree, strongly disagree	7 (10.3)	17 (15.7)	
Staff and colleagues are role models for appropriate HH.			
Number (%)	68 (100)	108 (100)	
Strongly agree	19 (27.9)	35 (32.4)	0.025*
Agree	32 (47.1)	30 (27.8)	
Neutral, agree, strongly disagree	17 (25)	43 (39.8)	

[a]Chi-square test; [b]Participants who claimed to know the WHO's 6 steps of HH

*Statistically significant: p<0.05

HH = hand hygiene, S-PG = surgical-based clinical practice curriculum postgraduate dental student, NS-PG = non-surgical-based clinical practice curriculum postgraduate dental student

Self-reported HH Practice Even though PGs engaged in surgical-based or non-surgical-based clinical training in the FDCU depending on their curricula, 71 of the 108 NS-PGs regularly performed surgical procedures in private clinical practice for their own expenses, while 3 of the 68 S-PGs did not perform non-surgical procedures. Therefore, 139 (68 S-PGs and 71 NS-PGs) and 173 (65 S-PGs and 108 NS-PGs) out of 176 PGs performed surgical and non-surgical procedures in their real lives, respectively.

HH practice For non-surgical procedures, 41.5% (27/65) of S-PG and 32.4% (35/108) of NS-PG groups always cleaned their hands before performing these procedures. Surprisingly, 1% of NS-PGs reported never cleaning their hands before performing these procedures. For surgical procedures, 39.7% (27/68) of S-PG and 32.4% (23/71) of NS-PG groups always cleaned their hands before performing these procedures. However, no significant differences were found between the groups in HH practice before performing non-surgical or surgical procedures (p=0.574 and p=0.604, respectively) (Table 4).

HH Agents Most PGs (94.1% and 76.1% in the S-PG and NS-PG groups, respectively) used antiseptic soap for HH before performing surgical procedures, while 63.1% S-PGs and 44.9% NS-PGs used antiseptic soap for HH before non-surgical procedures. More PGs used alcohol hand rub for HH before or after performing non-surgical procedures than surgical procedures. No S-PG used only tap water before performing surgical procedures, while 2.8% of NS-PGs did that. However, more PGs in both groups cleaned their hands with only tap water after performing surgical procedures. Moreover, the number of PGs who cleaned their hands with tap water only increased in non-surgical procedures, with more NS-PGs than S-PGs (Table 5).

Table 4 Frequency of hand hygiene in dental procedure.

Type of procedure		Frequency of HH	Number (%)		p-value[a]
			S-PG (total 68)	NS-PG (total 71)	
Surgical procedure (total 139 PGs)	Before	Always	27 (39.7)	23 (32.4)	0.604
		Often	29 (42.7)	36 (50.7)	
		Sometimes, rarely and never	12 (17.6)	12 (16.9)	
	After	Always	41 (60.3)	38 (53.5)	0.722
		Often	22 (32.3)	27 (38)	
		Sometimes, rarely and never	5 (7.4)	6 (8.5)	
			S-PG (total 65)	NS-PG (total 108)	
Non-surgical procedure (total 173 PGs)	Before	Always	27 (41.5)	35 (32.4)	0.574
		Often	26 (40)	54 (50)	
		Sometimes, rarely and never	12 (18.5)	19 (17.6)	
	After	Always	39 (60)	56 (51.9)	0.509
		Often	21 (32.3)	42 (38.9)	
		Sometimes, rarely and never	5 (7.7)	10 (9.2)	

[a]Chi-square test

HH = hand hygiene, S-PG = surgical-based clinical practice curriculum postgraduate dental student, NS-PG = non-surgical-based clinical practice curriculum postgraduate dental student

Appropriate HH according to the 2009 WHO guidelines According to the WHO recommendation, performing HH before surgical procedures with 2-6 min of hand washing with antiseptic soap or 20–30 sec of hand rubbing with alcohol-based agent is appropriate.[15] Based on this recommendation, only 35% (49/139) of the PGs had appropriate HH before surgical procedures, Table 6 However, the number of S-PGs and NS-PGs (39.7% and 31%, respectively) who performed appropriate HH was not significantly different (p=0.069).

Reasons for non-compliance with HH The most common reason for noncompliance with HH was lack of knowledge (56.3%), followed by insufficient scientific data on the advantage of HH (26.1%), and the belief that using gloves replaced the need for HH (18.8%).

Table 5 Hand hygiene agents used in dental procedure.

Type of procedure		HH agents	Number (%)	
			S-PG (total 68)	NS-PG (total 71)
Surgical procedure (total 139 PGs)	Before	Antiseptic soap	64 (94.1)	54 (76.1)
		Non-antimicrobial soap	3 (4.4)	15 (21.1)
		Alcohol hand rub	1 (1.5)	0 (0)
		Tap water	0 (0)	2 (2.8)
	After	Antiseptic soap	59 (86.8)	50 (70.4)
		Non-antimicrobial soap	5 (7.4)	13 (18.3)
		Alcohol hand rub	1 (1.5)	0 (0)
		Tap water	3 (4.4)	8 (11.3)
			S-PG (total 65)	NS-PG (total 108)[a]
Non-surgical procedure (total 173 PGs)	Before	Antiseptic soap	41 (63.1)	48 (44.9)
		Non-antimicrobial soap	16 (24.6)	37 (34.6)
		Alcohol hand rub	2 (3.1)	2 (1.9)
		Tap water	6 (9.2)	20 (18.7)
	After	Antiseptic soap	42 (64.6)	36 (33.3)
		Non-antimicrobial soap	17 (26.2)	45 (41.7)
		Alcohol hand rub	1 (1.5)	1 (0.9)
		Tap water	5 (7.7)	26 (24.1)

HH = hand hygiene, S-PG = surgical-based clinical practice curriculum postgraduate dental student, NS-PG = non-surgical-based clinical practice curriculum postgraduate dental student

[a]A NS-PG who claimed of never washing hands before performing non-surgical procedure was excluded.

Table 6 Agent and time used for hand hygiene before performing surgical procedure.

Group	HH agents	Time (min)		
		<2	2-6	>6
Number of S-PG (%), total 68	Antiseptic soap	38 (55.9)	26 (38.2)	0 (0)
	Non-antiseptic soap	3 (4.4)	0 (0)	0 (0)
	Alcohol hand rub	1 (1.5)	0 (0)	0 (0)
	Tap water	0 (0)	0 (0)	0 (0)
Number of NS-PG (%), total 71	Antiseptic soap	32 (45.1)	22 (31.0)	0 (0)
	Non-antiseptic soap	12 (16.9)	2 (2.8)	1(1.4)
	Alcohol hand rub	0 (0)	0 (0)	0 (0)
	Tap water	2 (2.8)	0 (0)	0 (0)

HH = hand hygiene, S-PG = surgical-based clinical practice curriculum postgraduate dental student, NS-PG = non-surgical-based clinical practice curriculum postgraduate dental student

Discussion

This study investigated PGs' HH-related knowledge, attitudes, and self-reported practice and compared them between surgical-based and non-surgical-based clinical curricula. Despite the higher percentage of S-PGs self-reported to know the 6 HH steps according to the 2009 WHO guidelines than the NS-PGs, the HH knowledge scores were quite low with no difference between the groups. Some of S-PGs and NS-PGs did not know the recommendations "five moments for HH" according to the 2009 WHO. The least known moment for HH was after touching the patient's surroundings. Similar results were found in the studies of Walaszek. Moreover, the HH compliance according to the 2009 WHO guidelines in medical students, intern, and physicians was insufficient. The lowest HH compliance was 1% after touching patient's surroundings.[19] Similar to our study, HCWs knew and performed HH more frequently after touching a patient and after body fluid exposure risk than before touching a patient.[20-22] These findings suggested the need of emphasis of proper HH. Moreover, the knowledge scores of the recently HH-trained PGs and those who did not were quite low and were not different among groups. Accordingly, one-third of the general practice dentists in the New York State and nursing and medical students in Rome had limited knowledge of HH.[23,24]An interview in medical students reported of despite the familiarity with HH, their knowledge was 'very vague'. Some students had attended an infection control lecture and did not think the lecture was not effectively delivering the message around HH. All students thought that HH teaching in the medical school was inadequate.[25]

Most of the PGs in this study had positive attitudes toward HH. More than 85% of participants agreed and strongly agreed that HH prevents micro-organism transmission. Similarly, more than 90% of general practice dentists agreed and strongly agreed that HH prevents infection spread.[23] However, despite the fact that more than 90% of participants agreed that performing HH before surgical procedures prevents SSI, the lower percentage of the S-PGs than the NS-PGs who strongly agreed is hard to explain and needs further investigation. The possible explanation of more NS-PGs than S-PGs perceiving that their faculty and colleagues were not role models for appropriate HH might be that proper HH was not emphasized in the non-surgical clinical training.

The self-reported HH practice of the PGs in this study were not consistent with their attitudes. According to the 2009 WHO guidelines, only one-third of them had an appropriate HH before surgical procedures. Although a higher percentage of the S-PGs complied with the HH practice compared with the NS-PGs, less than half of them always cleaned their hands before surgical and non-surgical procedures. Similar results were found in the studies of Yaembut *et al.*[14] and de Amorim-Finzi *et al.*[26] Regarding to the reports from previous studies that good HH knowledge led to good HH behaviors,[8, 23, 27] this finding might be due to insufficient HH knowledge as reported by the respondents. Moreover, the other reasons for HH non-compliance reported by our respondents were not recognizing the advantages of HH and the inaccurate perception that using gloves replaced the need for HH. These findings highlighted that knowledge is a key for appropriate HH practice. Feedback from medical students suggested that HH teaching activities should be compulsory and repeated at every stage of their curricula.[25] Proper HH can be emphasized in e-learning, posters, self-learning module, practical demonstration, feedback from assessment, information campaigns or combination multimodal strategy to sustain the HH knowledge.[15, 28,29]

Although WHO and the Centers for Disease Control and Prevention state that alcohol-based hand

rub requires less time and equipment (such as a washing sink and clean towels), provides a longer anti-microorganism effect, and increase HH compliance,[1, 15, 27,30,31] very few PGs used an alcohol-based hand rub. Similar to the studies of Myers *et al.* [23] and de Amorim-Finzi *et al.,*[26] the most commonly used agent HH was antiseptic soap for both surgical and non-surgical procedures. This finding may be due to the availability and accessibility of a sink and antiseptic soap in almost all dental units.

This study surveyed the HH in PGs because it might reflect what they will perform in their future clinical practice. The appropriate attitudes and knowledge of HH should be cultivated at the beginning of their training and should be periodically re-emphasized to assure treatment quality and safety of the patients, healthcare personnel, and the environment. When young dentists develop the correct mindset, they can retain the appropriate practice and be good role models for the next generation.

The limitation of this study was the unequal sampling distribution in both groups of PGs that was due to the limited number of students in each specialty program. The participants were from a single academic center; however, this center is the largest and provides the most variety of postgraduate dental programs and numbers in Thailand. Therefore, the results of this study could represent the data of PGs in Thailand. Moreover, because we could not inspect the real practice of the respondents' HH, the results of this study were based the respondent's self-reporting. Many studies found that the self-reported questionnaire produced overreporting and inflation of HH compliance compared to the observation of actual behavior by socially desirable responding effect.[32-34] However, our study did not collect personal identifiable information from a respondents so any potential of socially desirable responding effect might be minimize in this study. Moreover, there might be some nonresponse bias from the low response rate which may be due to a lack of incentive.

Regarding the questionnaire used in this study, the 5-scale Likert rating resulted in a gray zone in which we could not clearly distinguish "strongly agree" from "agree" or "strongly disagree" from "disagree"; also, neutral could not provide informative data. The 2-point scales (agree or disagree) might be more suitable for this kind of study.

Conclusion

PGs had positive attitudes toward HH; however, they had limited knowledge and inappropriate self-reported HH practice. Although surgical-based clinical training affected some HH-related attitudes, it did not impact knowledge and self-reported practice. The findings from our study suggest the need for an effective HH education program in order to increase the understanding of HH, promote HH compliance, and strengthen good HH habits.

References

1. Pittet D, Simon A, Hugonnet S, Pessoa-Silva CL, Sauvan V, Perneger TV. Hand hygiene among physicians: performance, beliefs, and perceptions. Ann Intern Med 2004;141(1):1-8.
2. Pittet D, Allegranzi B, Sax H, Dharan S, Pessoa-Silva CL, Donaldson L, et al. Evidence-based model for hand transmission during patient care and the role of improved practices. Lancet Infect Dis 2006;6 (10):641-52.
3. Miller C. Infection control and management of hazardous materials for the dental team. 5th ed. Missouri: Mosby; 2013.70-106.
4. Leyden JJ, McGinley KJ, Nordstrom KM, Webster GF. Skin microflora. J Invest Dermatol 1987;88(3): 65-72.
5. Pittet D, Hugonnet S, Harbarth S, Mourouga P, Sauvan V, Touveneau S, et al. Effectiveness of a hospital-wide programme to improve compliance with hand hygiene. Infection Control Programme. Lancet 2000;356(9238): 1307-12.

6. Graf K, Ott E, Vonberg RP, Kuehn C, Schilling T, Haverich A, et al. Surgical site infections--economic consequences for the health care system. Langenbecks Arch Surg 2011; 396(4):453-9.
7. Lam BC, Lee J, Lau YL. Hand hygiene practices in a neonatal intensive care unit: a multimodal intervention and impact on nosocomial infection. Pediatrics 2004;114(5):565-71.
8. MacDonald A, Dinah F, MacKenzie D, Wilson A. Performance feedback of hand hygiene, using alcohol gel as the skin decontaminant, reduces the number of inpatients newly affected by MRSA and antibiotic costs. J Hosp Infect 2004;56(1):56-63.
9. Boyce JM, Pittet D, Healthcare Infection Control Practices Advisory C, Force HSAIHHT. Guideline for hand hygiene in health-care settings. Recommendations of the healthcare infection control practices advisory committee and the HICPAC/SHEA/APIC/IDSA hand hygiene task force. society for healthcare epidemiology of america/association for professionals in infection control/infectious diseases society of america. MMWR Recomm Rep 2002;51(RR-16):1-45
10. Graf K, Chaberny IF, Vonberg RP. Beliefs about hand hygiene: a survey in medical students in their first clinical year. Am J Infect Control 2011;39(10):885-8.
11. Patarakul K, Tan-Khum A, Kanha S, Padungpean D, Jaichaiyapum OO. Cross-sectional survey of hand-hygiene compliance and attitudes of health care workers and visitors in the intensive care units at King Chulalongkorn Memorial Hospital. J Med Assoc Thai 2005;88(4):S287-93.
12. Eckmanns T, Bessert J, Behnke M, Gastmeier P, Ruden H. Compliance with antiseptic hand rub use in intensive care units: the Hawthorne effect. Infect Control Hosp Epidemiol 2006;27(9):931-4.
13. Pittet D, Dharan S, Touveneau S, Sauvan V, Perneger TV. Bacterial contamination of the hands of hospital staff during routine patient care. Arch Intern Med 1999;159(8):821-6.
14. Yaembut N, Ampornaramveth RS, Pisarnturakit PP, Subbalekha K. Dental Student Hand Hygiene Decreased with Increased Clinical Experience. J Surg Educ 2016;73(3): 400-8.
15. World Health Organization. WHO Guidelines on Hand Hygiene in Health Care: First global patient safety challenge clean care is safer care. Geneva: WHO press;2009 [cited 2018 May 6]. Available from: https://www.who.int/publications/i/item/9789241597906 .
16. Minnesota Hospital Association [Internet]. Controlling CDI-Hand hygiene staff surveyControlling CDI-Hand hygiene staff survey; c2020 [cited 2018 Nov 16]. Available from:https://www.mnhospitals.org/Portals/0/Documents/ptsafety/ControllingCDI/4Controlling%20CDI%20-%20Hand%20Hygiene%20Perceptions%20Staff%20Survey.pdf
17. Institute for Healthcare Improvement [Internet]. How-to Guide: Improving Hand Hygiene A Guide for Improving Practices among Health Care Workers; c2021[updated 2006 Apr; cited 2018 Nov 20]. Available from:http://www. ihi. org/resources/Pages/Tools/HowtoGuide ImprovingHandHygiene.aspx
18. Walaszek M, Kolpa M, Wolak Z, Rozanska A, Wojkowska-Mach J. Assessment of medical staff's knowledge concerning the "five moments for hand hygiene". Nursing Problems/Problemy Pielęgniarstwa 2019;27(3):155-61.
19. Walaszek M, Kolpa M, Wolak Z, Rozanska A, Wojkowska-Mach J. Poor hand hygiene procedure compliance among polish medical students and physicians-the result of an ineffective education basis or the impact of organizational culture? Int J Environ Res Public Health 2017;14(9):1026.
20. Cambil-Martin J, Fernandez-Prada M, Gonzalez-Cabrera J, Rodriguez-Lopez C, Almaraz-Gomez A, Lana-Perez A, et al. Comparison of knowledge, attitudes and hand hygiene behavioral intention in medical and nursing students. J Prev Med Hyg. 2020;61(1):E9-E14.

21. Teesing GR, Erasmus V, Nieboer D, Petrignani M, Koopmans MPG, Vos MC, et al. Increased hand hygiene compliance in nursing homes after a multimodal intervention: A cluster randomized controlled trial (HANDSOME). Infect Control Hosp Epidemiol. 2020;41(10):1169-77.
22. Boyce JM. Hand Hygiene, an Update. Infect Dis Clin North Am 2021;35(3):553-73.
23. Myers R, Larson E, Cheng B, Schwartz A, Da Silva K, Kunzel C. Hand hygiene among general practice dentists: a survey of knowledge, attitudes and practices. J Am Dent Assoc 2008;139(7):948-57.
24. van De Mortel TF, Kermode S, Progano T, Sansoni J. A comparison of the hand hygiene knowledge, beliefs and practices of Italian nursing and medical students. J Adv Nurs 2012;68(3):569-79.
25. Kaur R, Razee H, Seale H. Development and appraisal of a hand hygiene teaching approach for medical students: a qualitative study. J Infect Prev 2016;17(4):162-8.
26. de Amorim-Finzi MB, Cury MV, Costa CR, Dos Santos AC, de Melo GB. Rate of compliance with hand hygiene by dental healthcare personnel (DHCP) within a dentistry healthcare first aid facility**.** Eur J Dent 2010;4(3):233-7.
27. Allegranzi B, Pittet D. Role of hand hygiene in healthcare-associated infection prevention. J Hosp Infect 2009;73(4):305-15.
28. Mathai E, Allegranzi B, Seto WH, Chraiti MN, Sax H, Larson E, et al. Educating healthcare workers to optimal hand hygiene practices: addressing the need. Infection 2010;38(5):349-56.
29. Mu X, Xu Y, Yang T, Zhang J, Wang C, Liu W, et al. Improving hand hygiene compliance among healthcare workers: an intervention study in a Hospital in Guizhou Province, China. Braz J Infect Dis 2016;20(5):413-8.
30. Hugonnet S, Perneger TV, Pittet D. Alcohol-based handrub improves compliance with hand hygiene in intensive care units. Arch Intern Med 2002; 162(9): 1037-43.
31. Maury E, Alzieu M, Baudel JL, Haram N, Barbut F, Guidet B, *et al*. Availability of an alcohol solution can improve hand disinfection compliance in an intensive care unit. Am J Respir Crit Care Med 2000;162(1):324-32
32. Diefenbacher S, Pfattheicher S, Keller J. On the role of habit in self-reported and observed hand hygiene behavior. Appl Psychol Health Well Being. 2020; 12(1):125-43.
33. Kiprotich K, Wang H, Kaminga AC, Kessi M. Observed and self-reported hand hygiene compliance and associated factors among healthcare workers at a county referral hospital in Kenya. Scientific African. 2021;14:e00984
34. Handiyani H, Ikegawa M, Hariyati Rr TS, Ito M, Amirulloh F. The determinant factor of nurse's hand hygiene adherence in Indonesia. Enferm Cli 2019; 29(S2):257-61

Corresponding Author

Keskanya Subbalekha
Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Chulalongkorn University
Patumwan, Bangkok 10330.
Tel. : +66 87 364 5544
E-mail : skeskanya@gmail.com

ความรู้ ทัศนคติ และกิจวัตรของสุขอนามัยมือของนิสิตทันตแพทย์หลังปริญญาในจุฬาลงกรณ์มหาวิทยาลัย

กฤติกา กูลแก้ว ผกาภรณ์ พันธุวดี พิศาลธุรกิจ** เกศกัญญา สัพพะเลข****

บทคัดย่อ

สุขอนามัยมือเป็นขั้นตอนพื้นฐานสำหรับควบคุมการติดเชื้อในการรักษาทางการแพทย์และการรักษาทางทันตกรรม การศึกษาจำนวนมากพบว่าบุคลากรทางการแพทย์รวมถึงทันตแพทย์และนักเรียนทันตแพทย์มีการดูแลสุขอนามัยมือค่อนข้างน้อย นอกจากนี้ยังไม่มีการศึกษาความรู้ ทัศนคติ และกิจวัตรของสุขอนามัยมือของทันตแพทย์ต่องานศัลยกรรมในช่องปากซึ่งเป็นหัตถการที่ต้องควบคุมการปนเปื้อนของจุลชีพเป็นอย่างดี การมีวินัยต่อสุขอนามัยมือควรได้รับการเน้นย้ำในระหว่างการพัฒนาทักษะวิชาชีพ งานวิจัยนี้จึงจัดทำขึ้นเพื่อศึกษาความรู้ ทัศนคติ และกิจวัตรของสุขอนามัยมือของนิสิตทันตแพทย์หลังปริญญา และเปรียบเทียบระหว่างนิสิตหลักสูตรที่เน้นงานศัลยกรรมช่องปากและหลักสูตรที่ไม่เน้นงานศัลยกรรมช่องปาก โดยการส่งแบบสอบถามชนิดที่อาสาสมัครเป็นผู้ตอบเองไปยังนิสิตทันตแพทย์หลังปริญญาที่กำลังศึกษาอยู่ในคณะทันตแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย ทำการเก็บข้อมูลระหว่างเดือนมีนาคมถึงเดือนกันยายน พ.ศ. 2562 ในจำนวนนิสิตที่ตอบแบบสอบถามกลับมา 176 คน เป็นนิสิตหลักสูตรที่เน้นงานศัลยกรรม 68 คนและหลักสูตรที่ไม่เน้นงานศัลยกรรม 108 คน นิสิตหลักสูตรที่เน้นงานศัลยกรรมร้อยละ 83.8 ตอบว่ารู้จัก 6 ขั้นตอนของการดูแลสุขอนามัยมือตามคำแนะนำขององค์การอนามัยโลก ค.ศ. 2009 ซึ่งมีสัดส่วนมากกว่านิสิตหลักสูตรที่ไม่เน้นงานศัลยกรรมอย่างมีนัยสำคัญ (ร้อยละ 63.8, p=0.007) คะแนนความรู้ต่อสุขอนามัยมือของนิสิตทั้งสองกลุ่มค่อนข้างน้อยและไม่แตกต่างกัน โดยมีค่าเฉลี่ย±ค่าเบี่ยงเบนมาตรฐานเท่ากับ 7.4±1.5 และ 7.8±1.7 ตามลำดับ (p=0.151) ถึงแม้ว่านิสิตทั้งสองกลุ่มมีทัศนคติที่ดีต่อการดูแลสุขอนามัยมือ แต่นิสิตทั้งสองกลุ่มมีทัศนคติบางประการที่แตกต่างกัน และมีเพียงหนึ่งในสามเท่านั้นที่รายงานกิจวัตรของสุขอนามัยมือที่ถูกต้อง โดยสรุปการศึกษานี้พบว่าหลักสูตรที่เน้นงานศัลยกรรมมีผลต่อทัศนคติ แต่ไม่มีผลต่อความรู้และกิจวัตรของสุขอนามัยมือ ผลการศึกษานี้ชี้ให้เห็นถึงความจำเป็นในการจัดทำมาตรการในการส่งเสริมให้นิสิตทันตแพทย์หลังปริญญามีความรู้ด้านสุขอนามัยมือดีขึ้น เพื่อทำให้มีสุขอนามัยมือที่ดีอย่างยั่งยืนในการประกอบวิชาชีพทันตแพทย์

คำไขรหัส: *ทัศนคติ/ ความรู้/ กิจวัตร/ นิสิตทันตแพทย์หลังปริญญา/ สุขอนามัยมือ/ ศัลยกรรมช่องปาก*

ผู้รับผิดชอบบทความ

เกศกัญญา สัพพะเลข
ภาควิชาศัลยศาสตร์ คณะทันตแพทยศาสตร์
จุฬาลงกรณ์มหาวิทยาลัย
ปทุมวัน กรุงเทพฯ 10330
โทรศัพท์ : 087 364 5544
จดหมายอิเล็กทรอนิกส์ : skeskanya@gmail.com

** ทันตแพทย์ประจำบ้านสาขาศัลยศาสตร์ช่องปากและแม็กซิลโลเฟเชียล คณะทันตแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย กรุงเทพฯ*
*** ภาควิชาทันตกรรมชุมชน คณะทันตแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย กรุงเทพฯ*
**** ภาควิชาศัลยศาสตร์ คณะทันตแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย กรุงเทพฯ*