

Hand hygiene compliance and accuracy in a university dental teaching hospital

Journal of International Medical Research

2019, Vol. 47(3) 1195–1201

© The Author(s) 2019

Article reuse guidelines:

sagepub.com/journals-permissions

DOI: 10.1177/0300060518819610

journals.sagepub.com/home/imr



Hsin-Chung Cheng^{1,2}, Bou-Yue Peng^{1,2},
Meei-Liang Lin³ and Sam Li-Sheng Chen⁴ 

Abstract

Objective: This study aimed to evaluate compliance with guidelines on hand hygiene by examining five handwashing categories in postgraduate year (PGY) dentists at a university teaching hospital and to evaluate the accuracy rates of handwashing.

Methods: Through direct observation, trained PGY dentists were monitored throughout their daily care routine of before contact with patients, before using an instrument, after contact with patients, upon direct exposure to patients' fluids, and while touching the patients' surrounding area. Hand hygiene opportunities were considered complete in each category. A total of 16,597 hand hygiene opportunities across 37 individuals were observed from July to October 2012 and from September to October 2013.

Results: The overall handwashing compliance rate was 34.7%. The handwashing compliance rate was higher during work in oral surgery services (92.8%) than during work in general clinical practice (34.2%). The accuracy rate of handwashing was also higher during work in oral surgery services (87.5%) than during work in general clinical practice (51.0%). Similar results were obtained across all five handwashing categories.

Conclusions: Handwashing compliance and accuracy rates are low in PGY dentists. More education and continuous monitoring are suggested to improve handwashing compliance, as well as the correct handwashing procedures for dentists.

Keywords

Handwashing compliance, infection control, hand hygiene opportunity, dentist, oral surgery, general clinical practice

Date received: 25 May 2018; accepted: 23 November 2018

¹School of Dentistry, College of Oral Medicine, Taipei Medical University, Taipei

²Division of Orthodontics, Department of Dentistry, Taipei Medical University Hospital, Taipei

³Nursing Department, Taipei Medical University Hospital, Taipei

⁴School of Oral Hygiene, College of Oral Medicine, Taipei Medical University, Taipei

Corresponding author:

Hsin-Chung Cheng, School of Dentistry, College of Oral Medicine, Taipei Medical University, No. 250 Wuxing St., Xinyi Dist, Taipei 110.

Email: g4808@tmu.edu.tw



Introduction

The hands of dental healthcare workers may serve as a reservoir for pathogens,¹ including multi-resistant strains.² Therefore, hand washing is thought to be one of the most effective practices for preventing transmission of healthcare-associated infection. A few hand hygiene education programs have demonstrated successful infection control.^{3,4} Improving hand hygiene is an essential intervention for achieving patients' safety goals in hospital facilities, including oral healthcare settings.

New approaches to monitoring hand hygiene have been suggested by recent epidemiological studies that include direct observation, self-reporting by healthcare workers, measurement of hand hygiene product use, and electronic methods.⁵ Direct observation has been considered the gold standard method for measuring hand hygiene compliance.⁶ Low hand hygiene compliance remains a major issue in dentistry. Poor hand hygiene compliance by dental healthcare professionals in a dentistry healthcare facility has been reported in previous studies.⁷⁻⁹

Numerous studies have examined adherence to hand hygiene compliance among healthcare workers¹⁰ and dental professionals, including students who had graduated.^{4,7,8} However, information on the differences in hand hygiene compliance by different hospital settings is limited, particularly in oral healthcare settings. Because differences in patients' care might affect hand hygiene requirements, hand hygiene opportunities (HHOs) could vary across various clinical settings. Previous studies have shown that hand hygiene adherence varies by provider and unit type,¹¹⁻¹⁴ but few studies have emphasized hand hygiene compliance of dentists in dental-related units.

Moreover, less attention has been paid to measure inaccurate hand hygiene before and after performing a clinical procedure.

Inaccurate hand hygiene performance might increase the risk of infection even if hand hygiene compliance is high. Therefore, this study aimed to assess the importance of monitoring and measuring global hand hygiene compliance, as well as to assess accurately performed hand hygiene during a series of successive contacts with patients or the surrounding environment in the oral healthcare setting.

Materials and methods

Study design

An observational study was carried out in 37 postgraduate year (PGY) trained dentists within a university hospital's attached dental care unit. Hand hygiene monitoring was performed without the knowledge of infectious professionals among PGY dentists of a university teaching hospital.

The PGY dentists were observed for handwashing before and after each clinical procedure during their daily work. This study was intended to assess the correct way for dental professionals to clean their hands and to identify hand hygiene adherence by PGY dentists. The study was certified as exempt from institutional review board review by the Research Ethics Committee of the Taipei Medical University Hospital. Informed consent was also waived.

Setting

The study was performed in a dental care unit within a 700-bed teaching hospital. All dentists and dental assistants work in the Department of Dentistry. Compliance with infection control opportunities in the areas of 50 dental chairs and two oral surgery chairs was investigated. A working committee was responsible for the processes of recruitment, training, and selecting peer auditors. The training program of hand hygiene observers was provided by an

educator from the Infection Control Department and it was conducted before the investigation. Compliance with correct hand hygiene was audited by well-trained peer observers.

Definitions

HHOs were defined according to Your Five Moments for Hand Hygiene strategy, which include before contact with the patient, before aseptic tasks, after body fluid exposure risk, after contact with the patient, and after contact with the patient’s surroundings.¹⁵ In the current study, these moments were categorized into five groups, including before contact with the patient, before using an instrument, after contact with the patient, upon direct exposure to the patient’s fluids, and while touching the area surrounding the patient.

Each HHO was considered complete if handwashing or hand rubbing with alcohol was performed. Infection control compliance in each opportunity of a PGY dentist during clinical procedures was observed by a trained observer. Hand hygiene compliance was calculated as the number of hand hygiene episodes performed per number of opportunities. The accuracy rate was determined by the percentage of actual HHOs in which the infection control procedure was correctly performed in adherence with hand hygiene.

Data collection

Observations were conducted and scheduled in a 3-hour session of a single dental chair room and a dental surgical unit from July to October 2012 and from September to October 2013. For each observation, a standardized form was used to record each interaction between the dentist and patient and the number of HHOs for each interaction. The same observation form was used in 2012 and 2013. A total of 16,597 opportunities for hand hygiene compliance across 37 individuals were observed. No identifying information of the patients was recorded.

Statistical analysis

The data were entered into a web-based database using a data entry form. Descriptive statistics were used to examine the data. Comparison of compliance rates and accuracy rates was performed by using the chi-squared test. All statistical analyses were performed with SAS 9.4 (SAS Institute, Cary, NC, USA).

Results

Compliance with hand hygiene is summarized by category in Table 1. Of 16,597 HHOs, 16,441, 138, and 18 occurred in general clinical practice, oral surgery, and the dental admission ward, respectively. PGY

Table 1. Hand hygiene compliance rate and accuracy rate by PGY dentists as determined by five hand-washing moments (total opportunities: 16,597).

Moment	Not adhered		Adhered		Accuracy	
	n	%	n	%	n	%
	10,837	65.3	5760	34.7	2984	51.8
Before contact with the patient	7707	71.4	3086	28.6	2144	69.5
Before using an instrument	6268	73.8	2224	26.2	1488	66.9
After contact with the patient	5838	71.6	2314	28.4	1000	43.2
Upon direct exposure to the patient’s fluids	5252	71.1	2136	28.9	874	40.9
Touching the area surrounding the patient	3114	68.0	1466	32.0	996	67.9

dentists were 34.7% compliant across the 16,597 HHOs observed.

The category of before contact with the patient had the highest amount of HHOs and a 29% compliance rate was reached. The category of before using an instrument showed the lowest compliance rate (26.2%) among all hand hygiene categories. For categories of HHOs occurring during and after exposure to the patient (after contact with the patient and upon direct exposure to the patient's fluids), the compliance rate was 28%. The highest compliance rate (32%) was observed in the category of touching the area surrounding the patient.

In the category of before contact with the patient, the highest rate of hand hygiene accuracy (69.5%) was observed, and the category of before using an instrument had a 66.9% accuracy rate. The accuracy rate was 67.9% in the category of touching the area surrounding the patient. Notably lower rates of accuracy were observed in the other categories (after contact with the patient and upon direct exposure to the patient's fluids).

Table 2 shows comparison of hand hygiene compliance rates between general clinical practice and oral surgery. Significantly higher hand hygiene compliance rates were observed during oral surgery than in general clinical practice

($P < 0.0001$). Similar findings were found in all five handwashing categories. Handwashing compliance rates of 100% were found in oral surgery in the categories of before using an instrument and upon direct exposure to the patient's fluids.

Table 3 shows comparison of hand hygiene accuracy rates between general clinical practice and oral surgery. The hand hygiene accuracy rate observed in oral surgery was significantly higher than that observed in general clinical practice ($P < 0.0001$). Similar findings were observed in all five handwashing categories.

Discussion

High compliance of infection control practices is required to prevent transmission of microorganisms between patients and dental workers. A clear understanding of the transmission process through the hands is crucial for success throughout the learning process.⁵ Using recommended infection control practices, we investigated not only dentist's compliance, but also accurate hand hygiene in a university hospital dental clinic in Taiwan. The accuracy of hand hygiene has seldom been addressed in previous studies.¹⁶ This study showed that both compliance and accuracy for hand hygiene were different according to dentist's work location.

Table 2. Hand hygiene compliance rates as determined by five handwashing moments in general clinical practice and oral surgery services

Moment	General clinical practice		Oral surgery		P value
	Adhered/total opportunities	%	Adhered/total opportunities	%	
Total	5628/16,441	34.2	128/138	92.8	<0.0001
Before contact with the patient	3022/10,659	28.4	64/68	94.1	<0.0001
Before using an instrument	2158/8358	25.8	66/66	100.0	<0.0001
After contact with the patient	2282/8076	28.3	28/32	87.5	<0.0001
Upon direct exposure to the patient's fluids	2080/7270	28.6	54/54	100.0	<0.0001
Touching the area surrounding the patient	1446/4534	31.9	18/20	90.0	<0.0001

Table 3. Hand hygiene accuracy rates as determined by five handwashing moments in general clinical practice and oral surgery services.

Moment	General clinical practice		Oral surgery		P value
	Accurate/adhered opportunities	%	Accurate/adhered opportunities	%	
Total	2870/5628	51.0	112/128	87.5	<0.0001
Before contact with the patient	2086/3022	69.0	58/64	90.6	<0.0001
Before an using instrument	1428/2158	66.2	60/66	90.9	<0.0001
After contact with the patient	972/2282	42.6	26/28	92.9	<0.0001
Upon direct exposure to the patient's fluids	830/2080	39.9	44/54	81.5	<0.0001
Touching the area surrounding the patient	976/1446	67.5	18/18	100.0	<0.0001

With particular focus on young PGY dental residents, we applied the guidelines in Your Five Moments of Hand Hygiene from the World Health Organization in a dental healthcare setting to evaluate compliance rates and accuracy rates of handwashing in a dental clinic's teaching hospital. Although the Department of Oral Surgery had a 93% adherence rate to handwashing, the general dental clinic showed an inferior adherence rate (34.2%) compared with previous studies conducted in countries, such as Brazil (approximately 50%)⁷ and Canada (approximately 76.0%).⁴ The lower adherence in the current investigation might be due to the several following reasons. Barriers in handwashing equipment or products used for hand hygiene could be one of the possible reasons for lower compliance of hand hygiene in general dental clinics. This issue should be further explored or improved if these reasons are true. Insufficient intervention using a hand hygiene compliance program is another general problem. Moreover, monitoring for hand hygiene performance is not undertaken routinely as part of quality assurance for patients' safety. Hand hygiene among young dentists was still low in this study, and much improvement is required to keep patients safe from healthcare-associated infections. Further research is required to investigate

problems associated with hand hygiene and to design interventions to improve hand hygiene adherence in the dental healthcare setting. In our study, there was a better compliance rate for handwashing in oral surgery services than in the general dental practice. This finding could be explained in part by the high workload that is usually encountered in oral surgery services. Hugonnet et al.¹² found that patients in the intensive care unit generate a heavy workload and require more frequent hand hygiene than patients in other departments. Another possible explanation is that oral surgery services are associated with a higher proportion of aseptic procedures and risk of body fluid exposure than general dental clinics. Our finding is consistent with previous research in which the rates of HHOs in the intensive care unit were higher than those observed in medical units.¹³

Another interesting observation in our study is that approximately half of the PGY dentists washed their hands incorrectly during their work in general dental clinics. However, the handwashing accuracy rate during work in the department of oral surgery was 87.5%. Because our investigation targeted the same population, the accuracy rate of handwashing should be consistent. The high handwashing accuracy rate in oral surgery services shows that

young dentists are capable of carrying out hand hygiene correctly, but are sometimes reluctant to use the correct method of hand-washing in general dental clinics. Despite the possible reason for lower risks of infection in general dental clinics as mentioned above, dentists need to treat many patients because dental care is covered by nationwide health insurance in Taiwan. Therefore, a tight schedule for visiting patients might cause this phenomenon.

Additionally, this study focused on determining handwashing compliance by using five handwashing categories. In general dental practice, handwashing compliance was higher when dentists were touching the area surrounding the patient, but compliance was lower before dentists used an instrument. The inconsistent compliance rates across different handwashing categories indicate that hand hygiene intervention programs separated by different handwashing categories are required.

Dental healthcare professionals need to demonstrate adherence to good hand hygiene practices during all aspects of a patient's care. Particularly, we should pay more attention to well-performed hand-washing in general dental clinical practice. Monitoring by direct or electronic observations should be undertaken routinely as a part of quality assurance for patients' safety. Hand hygiene training campaigns and compliance programs should be conducted early in dental training and more frequently during PGYs for dental healthcare personnel.

There are several limitations in our study. First, investigations were performed during certain periods. The time of day in clinical practice was also not recorded. Therefore, we cannot determine potential time or seasonal variations in HHOs. Second, inter-rater reliability was not assessed in this study. Third, our data were collected at a single site. Therefore, our results might not be applicable to

other hospitals. More research is required to validate our results in different specialized care areas.

Conclusion

In conclusion, handwashing compliance and accuracy rates for PGY dentists are low. Handwashing compliance and accuracy rates are highly dependent on the location of work of the PGY dentists. Procedures for monitoring compliance are required in the dental healthcare setting. More education is required to improve compliance, with particular emphasis on correct hand-washing procedures.

Declaration of conflicting interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This study was supported by the Ministry of Health and Welfare, Taiwan (DOH101-DC-1205, hDOH102-DC-1509)

ORCID iD

Sam Li-Sheng Chen  <http://orcid.org/0000-0001-9750-3015>

References

1. Cook HA, Cimiotti JP, Della-Latta P, et al. Antimicrobial resistance patterns of colonizing flora on nurses' hands in the neonatal intensive care unit. *Am J Infect Control* 2007; 35: 231–236.
2. Henderson DK. Managing methicillin-resistant staphylococci: a paradigm for preventing nosocomial transmission of resistant organisms. *Am J Infect Control* 2006; 34: S46–S54.

3. Braun BI, Kusek L and Larson E. Measuring adherence to hand hygiene guidelines: a field survey for examples of effective practices. *Am J Infect Control* 2009; 37: 282–288.
4. McCarthy GM, Koval JJ and MacDonald JK. Compliance with recommended infection control procedures among Canadian dentists: results of a national survey. *Am J Infect Control* 1999; 27: 377–384.
5. Pittet D, Allegranzi B, Sax H, et al. Evidence-based model for hand transmission during patient care and the role of improved practices. *Lancet Infect Dis* 2006; 6: 641–652.
6. Haas JP and Larson EL. Measurement of compliance with hand hygiene. *J Hosp Infect* 2007; 66: 6e14.
7. Gershon RR, Karkashian C, Vlahov D, et al. Correlates of infection control practices in dentistry. *Am J Infect Control* 1998; 26: 29–34.
8. de Amorim-Finzi MB, Cury MV, Costa CR, et al. Rate of compliance with hand hygiene by dental healthcare personnel (DHCP) within a dentistry healthcare first aid facility. *Eur J Dent* 2010; 4: 233–237.
9. Mahida N. Hand hygiene compliance: are we kidding ourselves? *J Hosp Infect* 2016; 92: 307–308.
10. Nicholson AM, Tennant IA, Martin AC, et al. Hand hygiene compliance by health care workers at a teaching hospital, Kingston, Jamaica. *J Infect Dev Ctries* 2016; 10: 1088–1092.
11. Larson EL, Albrecht S and O’Keefe M. Hand hygiene behavior in a pediatric emergency department and a pediatric intensive care unit: comparison of use of 2 dispenser systems. *Am J Crit Care* 2005; 14: 304–312.
12. Scheithauer S, Haefner H, Schwanz T, et al. Compliance with hand hygiene on surgical, medical, and neurologic intensive care units: direct observation versus calculated disinfectant usage. *Am J Infect Control* 2009; 37: 835–841.
13. Hugonnet S, Perneger TV and Pittet D. Alcohol-based handrub improves compliance with hand hygiene in intensive care units. *Arch Intern Med* 2002; 162: 1037–1043.
14. Han A, Conway LJ, Moore C, et al. Unit-specific rates of hand hygiene opportunities in an acute-care hospital. *Infect Control Hosp Epidemiol* 2017; 38: 411–416.
15. Sax H, Allegranzi B, Uçkay I, et al. ‘My five moments for hand hygiene’: a user-centred design approach to understand, train, monitor and report hand hygiene. *J Hosp Infect* 2007; 67: 9e21.
16. The Joint Commission. Measuring hand hygiene adherence: overcoming the challenges. Joint Commission; Oakbrook Terrace, IL: 2009.