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Factors Influencing Compliance with Infection Control Practice in Japanese Dentists

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Abstract

Background: In recent years, dentists have more opportunity of treating patients infected with blood-borne pathogens. Although compliance with infection control practice (ICP) in dental practice is required, it is not still sufficiently spread in Japan.

Objective: To identify factors associated with compliance with ICPs in the population of Japanese dentists.

Methods: In a questionnaire-based cross-sectional study in 2009, 2134 dentists in Aichi prefecture, Japan, were surveyed. They were asked for their demographic characteristics, willingness to treat HIV/AIDS patients, and knowledge about universal/standard precautions and ICP.

Results: Many ICP items had significant association with age, specialty for oral surgery, number of patients treated per day, willingness to treat HIV/AIDS patients and knowledge about the universal/standard precautions. In logistic regression model, knowledge about the precautions had significant associations with all ICP items. Among participants with disadvantageous characteristic group for ICP (*ie*, age ≥ 50 years, being general dentist, and treating ≤ 35 patients/day), knowledge about the universal/standard precautions had greater impact on exchanging handpiece for each patient and installing extra-oral vacuum in those with age ≥ 50 years than in those who visited ≤ 35 patient per day.

Conclusion: Knowledge about the meaning of universal/standard precautions is the most significant predictor of compliance with ICPs among Japanese dentists.

Keywords: Infection control, dental; Dentists; Universal precautions; Knowledge; Attitude; HIV; Acquired immunodeficiency syndrome

Introduction

Occupational exposure to blood and body fluids is a serious concern for health care workers (HCWs) and presents a major risk for the transmission of infections such as human immunodeficiency virus (HIV), hepatitis B virus (HBV), and hepatitis C virus (HCV).^{1,2} The

Occupational Safety and Health Administration (OSHA) published its blood-borne pathogens rule in 1991,³ which requires training of all workers at risk, implementation of universal precautions, and monitoring of compliance. In 1996, the US Centers for Disease Control and Prevention (CDC) combined universal precautions with body-substance isolation recommen-

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dations in the “standard precautions,”⁴ and have advised HCWs to practice regular personal hygiene; use protective barriers such as gloves and gown, whenever there is chance of contact with mucous membranes, blood and body fluids of patients; and dispose of sharps, body fluids, and other clinical waste properly.^{5,6} The standard precautions are the basic level of infection control that should be used in the care of all patients. Currently, the standard precaution is routinely taken in clinical practice of developed countries. However, the rate of infection control practice (ICP) in Japan is still lower than that in other developed countries.⁷

There are reports documenting the association between some characteristics of HCWs and adherence to ICPs.⁸⁻¹⁴ Being younger, having specialty in oral surgery, and treating more patients per day were the factors influencing the compliance with ICP. Because ICP is considered one of the health behaviors, the practice of ICP is expected to be associated with attitude and knowledge of HCWs. We therefore, hypothesized that attitude and knowledge concerning infection control may affect the compliance of HCWs with ICP. There are reports on the attitude and knowledge of dentists concerning infection control in several countries.¹⁵⁻²¹ We previously reported the evaluation of attitude and knowledge concerning infection control of dentists in Japan.⁷ Few studies analyzed the correlation between attitude and knowledge, and infection control practice.^{18,22} However, little information is available on the impact of attitudes, and knowledge on ICP in dentists with private practice. We conducted this study to identify factors associated with their compliance with ICP.

Materials and Methods

We studied dentists of Aichi prefecture between August and October 2011. A self-

administered questionnaire was sent to all 3316 directors of private dental offices listed in the Aichi prefecture Dental Association. The questionnaire was accompanied by a letter of endorsement signed by the President of the Aichi prefecture Dental Association and a letter of introduction signed by the research team emphasizing the importance of this study and ensuring the anonymity of the answers. Of 3316 questionnaires distributed 2350 (70.9 %) were returned; 216 subjects were excluded from the analysis because of missing data in their questionnaires.

Dentists were asked to complete the questionnaire. Items of the questionnaire included characteristics of dentists (gender, age, specialty in oral surgery, and the number of patients treated per day); their willingness to treat patients with HIV/AIDS; knowledge about universal/standard precaution; adherence to ICP (*ie*, wearing protective eyewear for treatment, wearing mask for treatment, wearing glove for treatment, exchanging hand-piece for each patient, providing education for preventing infection, preparing office infection control manual, participating in clinical lectures for infection control, HBV immunization, and installing extra-oral vacuum aspiration).

Under Japan's dental health service system, dentists can establish their own private dental offices offering services in the specialties of dentistry, oral surgery, pedodontics or orthodontics. In terms of specialty in oral surgery, we classified dentists into two groups—“specialist” and “general dentists.” Specialists were dentists who had established private dental offices, had specialty in oral surgery and did relatively difficult oral surgeries as well as restorative treatment and prosthodontic treatment. General dentists were those who had established private dental offices, did not have specialty in oral surgery and mainly did restorative and prosthodontic

Table 1: Characteristics of studied dentists

Variable	n (%)
Gender	
Male	2037 (95.5)
Female	97 (4.5)
Age	
≤49	763 (35.8)
≥50	1371 (64.2)
Specialty for oral surgery	
Specialist	324 (15.2)
General	1810 (84.8)
Number of visits per day	
≤35	1610 (75.4)
≥36	524 (24.6)

treatment, as well as basic oral surgeries such as tooth extraction. The number of patients treated per day was recorded for each private dental office. The dentists were dichotomously categorized according to their age to “49 years or younger” and “50 years or older.” Number of visits was dichotomously categorized as 35 or less visits/day and 36 or more.

Ethical approval for the study was provided by the Aichi prefecture Dental Association. An agreement form that clarified that no direct benefit could be expected for participating in this study and that all data collected were confidential and anonymous was sent to each participant.

To analyze the associations of adherence to ICP with characteristics, willingness to treat HIV/AIDS patients, and knowledge about universal/standard precautions, χ^2 test and logistic regression analysis were used. The dependent variable was following ICPs and the independent variables

were characteristics of participants, and their attitude and knowledge. Statistical analyses were carried out by SPSS® for Windows® ver 12. A p value <0.05 was considered statistically significant.

Results

Characteristics of the surveyed population

The distribution of the participants by characteristics is shown in Table 1. Most of participants were male (95.5%); about 70% aged 50 years or older; 85% were general dentists. Three-fourth of dentists treated 35 or less patients per day.

Table 2 shows the distribution of all participants by their willingness to treat HIV/AIDS patients, knowledge about universal/standard precautions, and adherence to ICP. Only 32.3% of respondents reported willingness to treat HIV-infected patients in their practice. Only 21.4% knew about universal/standard precautions. Regarding ICPs, 97.6% of the dentists wore masks during dental treatment and 87.1% provided education about infection prevention for clinical staff. The least commonly reported ICP was “installing extra-oral vacuum aspiration” (22.6%), followed by “exchanging handpiece in each patient” (27.6%) and “wearing protective eyewear for treatment” (37.0%).

Factors affecting ICP

Table 3 shows the associations between ICPs and dentists' demographic characteristics, willingness to treat HIV-infected patients in their practice, and knowledge about universal/standard precautions. Dentists who treated 36 or more patients per day and those who knew about universal/standard precautions had a higher level of adherence in practicing all items of ICP than others. Specialist had a significantly higher adherence to all items of ICP but “wearing mask” than general-

Table 2: Distribution of the dentists according to some studied variables

Variable	Response	n (%)
Willingness to treat HIV patients?	Agree	694 (32.5)
Knowledge about the universal precautions	Yes	461 (21.4)
Infection control practice: When treating patients do you...		
Always wear protective eyewear?	Yes	790 (37.0)
Always wear mask for treatment?	Yes	2084 (97.7)
Always wear glove for treatment?	Yes	1702 (79.8)
Exchange handpiece for each patient?	Yes	596 (27.9)
Provide education about preventing infection for clinical staff?	Yes	1857 (87.0)
Prepare office infection control manual?	Yes	1348 (63.2)
Usually participate in clinical lecture for infection control?	Yes	1837 (86.1)
HBV immunization (dentist)?	Yes	1432 (67.1)
Installing extra-oral vacuum aspiration?	Yes	481 (22.5)

ist. Those aged 49 years or younger had a higher adherence in six items of ICP (*ie*, wearing mask, glove, handpiece, education, manual, vaccine) than those aged 50 or older. Dentists with willingness to treat HIV/AIDS patients had a significantly higher level of adherence to seven items of ICP (*ie*, wearing glove, handpiece, education, lecture, manual, vaccine, vacuum) than others. Women reported significantly higher rates of wearing glass and providing education and lower rate of wearing mask than men.

To identify the independent factors affecting dentists adherence to ICP, we used a logistic regression analysis and found similar results earlier found in univariate analysis. The associations of knowledge about universal/standard precautions with all ICPs persisted after adjusting for other confounding variables. Being 49 years old or younger and having specialty had significant negative associations with participat-

ing in clinical lecture for infection control. Other significant associations observed in univariate analysis disappeared after controlling for confounding factors.

Three ICP items (*ie*, wearing glass, exchanging handpiece, installing extra-oral vacuum) that practiced with a frequency of <50% were compared between those who

TAKE-HOME MESSAGE

- The standard precautions are the basic level of infection control that should be used in the care of all patients.
- Knowledge about the universal/standard precautions is the most significant predictor of compliance with ICP.
- Around one-third of studied dentists had willingness to treat HIV/AIDS patients.
- The major concern for health care workers is exposure to blood and body fluids and transmission of infections such as HIV, hepatitis B and C viruses.

Table 3: Factors influencing the adherence to ICP items. Values are adjusted ORs (95% CI).

Variable	Glass	Mask	Glove	Handpiece	Education	Manual	Lecture	Vaccine	Vacuum
Age (Ref: ≥50 years)	1.0 (0.8–1.2)	3.1 (1.3–7.5)	4.2 (3.0–6.0)	1.4 (1.1–1.7)	1.5 (1.1–2.1)	1.1 (0.9–1.4)	0.7 (0.5–0.9)	3.0 (2.4–3.8)	0.9 (0.7–1.1)
Specialty (Ref: generalist)	1.3 (1.0–1.7)	1.7 (0.6–4.8)	1.4 (0.9–2.0)	1.6 (1.2–2.0)	1.8 (1.1–2.8)	1.1 (0.9–1.6)	0.6 (0.4–0.8)	1.6 (1.2–2.2)	1.8 (1.3–2.3)
Number of visits (Ref: ≤35 patients/day)	1.4 (1.2–1.8)	1.8 (0.8–4.4)	2.0 (1.5–2.8)	1.7 (1.4–2.2)	1.6 (1.1–2.3)	1.6 (1.3–2.0)	1.6 (1.2–2.3)	1.3 (1.0–1.6)	1.7 (1.3–2.1)
Willingness to treat HIV patients	1.0 (0.8–1.2)	0.6 (0.3–1.2)	1.1 (0.9–1.4)	1.4 (1.1–1.6)	1.7 (1.2–2.3)	1.5 (1.2–1.8)	1.4 (1.1–1.9)	1.3 (1.0–1.6)	1.2 (0.9–1.5)
Knowledge about the universal/standard precautions	1.7 (1.4–2.2)	3.6 (1.1–11.2)	1.9 (1.4–2.7)	2.2 (1.7–2.8)	2.0 (1.3–3.0)	1.7 (1.3–2.1)	2.0 (1.4–2.9)	1.6 (1.2–2.1)	1.8 (1.4–2.3)

had disadvantageous characteristics (age ≥50 years, being a general dentist, treating ≤35 patients/day) with and without knowledge about universal/standard precautions (Table 4). For wearing glass, the odds ratio was highest for those who had fewer visits. On the contrary, in exchanging handpiece and installing extra-oral vacuum aspiration, the odds ratios were highest for those who aged 50 years or more.

Discussion

Around one-third of studied dentists had willingness to treat HIV/AIDS patients. The rate, however, reported as 15.6% by Aizawa, *et al.*²³ The observed difference may be attributed to the region and the study population of the two studies. The rate in the present study is nevertheless, higher than that in other previous reports,⁷ reflecting an increased in the willingness of dentists to treat patients with AIDS/HIV.

We found that compliance of dentists with ICP was neither complete nor uniform for various ICP items. About 97% of dentists reported wearing mask for their treatment. As wearing mask has been routinely done among Japanese dentists, this result was expected. The rate of “always wearing gloves for treatment” was 80%, although gloves were not routinely worn before. Increased number of patients with infectious disease and more attention to ICP may contribute to the high frequency of wearing gloves, participating in clinical lecture for infection control, and providing education for preventing infection against clinical staff. On the contrary, the rates of exchanging handpiece for each patient, or installing extra-oral vacuum aspiration were lower than 30%. The most possible reason for lower compliance with these ICPs would be financial issues.

Dentists aged 49 years or younger, specialist in oral surgery, and dentists who

Table 4: Association between knowledge about the universal precautions and ICPs in subjects who have disadvantageous characteristics. Values are crude ORs (95% CI). Reference group was those who did not know about the universal precautions.

	Glass	Handpiece	Extra-oral vacuum
Dentists aged ≥50 years	1.7 (1.3–2.4)	2.7 (2.1–3.7)	2.1 (1.6–2.9)
General dentists	1.7 (1.3–2.2)	2.6 (2.0–3.3)	1.9 (1.4–2.4)
Dentists who see visits ≤35 patient per day	1.8 (1.4–2.4)	2.3 (1.8–3.0)	1.7 (1.3–2.3)

treated 36 or more patients per day had higher compliance with ICPs than others, which is in agreement with findings of previous studies.⁷⁻¹³ Gender differences were variable among ICP items. On the contrary, there are reports which demonstrate that female dentists had a better compliance with ICPs in Canada.²⁴ Gender difference in adherence to ICP may depend on nationality. Furthermore, the small population of female dentists in our study may cause such an observation.

In the logistic regression analysis, only knowledge about universal/standard precautions had significant association with all items of ICP. Among the items, knowledge about universal/standard precautions had the largest independent effect on ICP compliance. These results show that having knowledge about universal/standard precautions is the most important factor for compliance with ICP. It is commonly known that acquiring knowledge is one of potential promoting factors for better health behavior. The ICP items included in the questionnaire in the present study are defined or involved in a broad sense in standard precaution.¹⁴ Personal protective equipment for HCWs includes wearing gloves, goggles, and masks. Education of HCWs is also defined in the standard precaution. Exchanging handpiece in each patient is considered to be one of the patient care equipment and instruments/

devices. Extra-oral vacuum aspiration is considered to be one of the environmental measures for avoiding nosocomial infection. Although HBV vaccination is not included in the safe work practices to prevent HBV exposure to blood-borne pathogens, both have a goal to prevent HCWs from infection by common pathogens. Dentists who have knowledge about universal/standard precautions had a higher concern about ICP. It is reasonable that having knowledge about universal/standard precautions gives marked effects on the subjects' compliance with ICP. Cleveland demonstrated that dentists who perceived that following the latest infection control recommendations was extremely important were most likely to implement the recommendations.²⁵ This finding supports our results.

The logistic regression model indicated that knowledge about the universal/standard precautions had a greater impact on the adherence to ICP than the willingness to treat HIV/AIDS patients. A dentist who has insufficient knowledge about ICP cannot prepare enough for treatment of patients with infectious diseases. It is thus important to acquire knowledge about universal/standard precautions for better compliance with ICP. On the other hand, Askarian and Assadian could not find a significant correlation between attitude and knowledge of infection control and

For more information on knowledge, awareness and compliance with universal precautions among health care workers in Jamaica see www.thejoem.com/ijoem/index.php/ijoem/article/view/43



ICP in dentists.¹⁸ Factors other than attitude and knowledge may have impact on the compliance with ICP.

The impacts of having knowledge about universal/standard precaution on the improvement of compliance with handpiece or extra-oral vacuum in dentists with fewer patients were lower than those in older dentists. Dentists with fewer visits per day may consider such ICPs as a financial burden, since fewer patients is linked to smaller income. Other studies have also reported that some dentists see ICPs as a financial burden.^{10,12} On the contrary, older age may not be a substantial hindrance for ICP. Poor compliance with ICP in older dentists may be attributed to their lower knowledge, probably for the great advances in the field of ICP after their graduation. It has been shown that educational intervention in HCWs improved their compliance with ICP.²⁶⁻²⁹ Among the group with disadvantageous characteristics, the biggest effect of education on the compliance with ICPs, was observed in older dentists.

Attitudes and knowledge for the prevention of nosocomial infection, and compliance with ICP are not still sufficient in many countries over the world.^{20,21,30,31} As concluded in these papers, providing correct information for ICP requires implementation of curriculum for dental school and continuing dental education for practicing dentists.

We had some limitations. This study could not measure the association between the overall levels of the attitude and knowledge, and compliance with ICP in the study population. Moreover, other attitude and knowledge items are thought to have an impact on the compliance with ICP. Further studies are needed to find further associations between attitude and knowledge items and adherence to ICP.

Conflicts of Interest: None declared.

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