

## Original Article

## Infection Control Practices among Dental Professionals in Shiraz Dentistry School, Iran

Mehrdad Askarian MD MPH\*, Ojan Assadian MD DTMH\*\*

**Background:** To assess the level of knowledge, attitude, and practice among Iranian dental healthcare professionals towards standard isolation precautions in Shiraz, Iran.

**Methods:** This study was a cross-sectional survey which was conducted on 152 Iranian dental professionals (faculty and students) from School of Dentistry, Shiraz University of Medical Sciences, Shiraz, Iran. A self-administered questionnaire containing three parts (knowledge, attitude, and practice) was distributed to the participants. After validation of the survey, data were collected and analyzed.

**Results:** The survey was completed by 152 (51.5%) of 295 potential respondents. The mean±SD scores of knowledge, attitude, and practice towards standard isolation precautions were 6.71±0.99, 34.99±4.47, and 4.97±2.17 from the maximum scores of 9, 45, and 9, respectively. In addition, a positive linear correlation was found between the two items of the survey including knowledge-attitude ( $r=0.394$ ,  $P<0.001$ ), and attitude and practice ( $r=0.317$ ,  $P<0.001$ ).

**Conclusion:** Practice of standard isolation precautions is poor among dental professionals in Shiraz University of Medical Sciences. This study showed that knowledge of infection control measures and a positive attitude towards them alone does not have an impact on adherence to recommendations.

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**Keywords:** Attitude • dental health professionals • hepatitis • HIV • infection control

### Introduction

Dental healthcare professionals (DHPs) are at risk of infections caused by various microorganisms such as *Mycobacterium tuberculosis*, hepatitis B and hepatitis C viruses, staphylococci, streptococci, herpes simplex virus types 1, human immunodeficiency virus (HIV), mumps, influenza, and rubella.<sup>1</sup> In the dental setting, there are special circumstances and opportunities able to lead to transmission of such organisms to DHPs. For instance, high-speed dental instruments can create instance, high-speed dental instruments can create

aerosols of water, saliva, and potentially infectious droplets through the air/water irrigation systems which are necessary to prevent pulpal overheating during dental preparation. Therefore, it is appropriate to always use eye/face protection and have adequate suction when using high-speed rotary instruments.

Paramount to the prevention of infectious disease is the strict adherence to universal precautions for all patients.<sup>2</sup> This includes, though not limited to, eye protection with lateral shields, facemask, and protective clothing, which will be laundered on the premises or by appropriate services.<sup>3</sup> In 2003, the Center for Disease Control and Prevention of the United States of America (CDC) updated their guidelines for infection control in dental settings.<sup>4</sup> These guidelines include standard precautions which aim to ensure a safe working environment and prevent potentially transmission of occupational and nosocomial infections among DHPs and their patients.

Standard isolation precautions are designed to

**Authors' affiliations:** \*Department of Community Medicine, Shiraz University of Medical Sciences, Shiraz, Iran, \*\*Department of Hygiene and Medical Microbiology, Medical University Vienna, General Hospital Vienna, Vienna, Austria.

**Corresponding author and reprints:** Mehrdad Askarian MD MPH, Department of Community Medicine, Shiraz Medical School, Shiraz, Iran. P.O. Box: 71345-1737

Fax: +98-711-235-4431, E-mail: askariam@sums.ac.ir

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reduce the risk of acquiring occupational infections from both known and unknown sources in the healthcare setting. Awareness and compliance with these recommendations is crucial for the prevention of occupational and nosocomial infections in healthcare workers, including dental healthcare professionals.<sup>2</sup> The objective of this study was to determine the level of knowledge, attitude, and practice in regard to standard isolation precautions among dentistry students and faculty members of School of Dentistry, Shiraz University of Medical Sciences, Shiraz, southern Iran.

## Materials and Methods

A cross-sectional survey was conducted between May and November 2003 on all 295 dental faculty and students (those who had clinical training experience and were enrolled in the fourth, fifth, or sixth year of the undergraduate dentistry program at the School of Dentistry, Shiraz University of Medical Sciences). A questionnaire was prepared by an infection control expert, a pediatrician certified in infectious diseases and a psychiatrist. The content validity was assessed by infection control experts from the Iranian national expert group of infection control specialists. It was pretested on a random sample of the target population (n=40) to ensure practicability, validity, and interpretation of responses. The reliability coefficient for the knowledge test using Kuder-Richardson test for reliability<sup>5</sup> was 0.754, and scores for attitude and practices using Cronbach's alpha internal consistency coefficient<sup>6</sup> were 0.755 and 0.789, respectively. After signing an informed consent, the subjects answered the questionnaire. Strict confidentiality for all responses was emphasized. The knowledge, attitude, and practice levels of respondents regarding standard isolation precautions as described by CDC were measured using nine questions for each (Table 1). Knowledge assessment questions had three possible answers (yes, no, and I don't know). One point was given for each correct answer. For all other responses, zero points were assigned. Therefore, the score for knowledge ranged between zero (no correct answers) and nine (all answers correct). Attitude assessment questions had five possible responses (very high, high, intermediate, low, and no importance), where the answer "very high" was given five points and "no importance" received one point. Therefore, the

total score ranged from nine (all questions regarded as "not important") to 45 (all questions regarded as "very important").

For categorical analysis, an answer of "very high" or "high" was regarded as a positive attitude. Practice assessment questions had five possible answers (always, often, sometimes, seldom, and never). One point was allocated to correct and zero points for all other answers. The total scores ranged from zero (no correct answers) to nine (all answers correct).

Statistical analyses for knowledge, attitude, and practice, frequencies together with means and standard deviations (SDs) were computed. Analysis of variance and multiple ranges test (Duncan) were performed to detect differences of knowledge, practice, and attitude between all five groups (faculty members, residents, and students in the fourth to sixth years of education). Spearman's correlation coefficient was applied to compute knowledge-practice, knowledge-attitude, and attitude-practice correlations. A two-sided *P* value of  $\leq 0.05$  was considered statistically significant.

## Results

The response rate was 51.5% (152 of 295). There were no statistical differences between responders and nonresponders regarding their level of education ( $P=0.3$ ), gender ( $P=0.2$ ), and mean age ( $P=0.5$ ). Of 152 responders, 78 (51.3%) were males, 37 were faculty members (24 attending, 13 residents), and 25, 21, and 69 were students in the 6<sup>th</sup>, 5<sup>th</sup>, and 4<sup>th</sup> years of education, respectively. The results showed that less than half of the DHPs (49.6%) had previous formal training (scheduled program with defined course and lesson plan on this subject) on the infection control isolation precautions. Meanwhile, a higher number of DHPs (87.9%) responded that they need additional education regarding standard isolation precautions. The mean $\pm$ SD total respondents' score for knowledge was 6.71 $\pm$ 0.99 (Table 2); scores for attitude and practice were 34.99 $\pm$ 4.47 and 4.97 $\pm$ 2.17, respectively. We observed that scores of knowledge, attitude, and practice did not differ among the five groups. Women had a significantly higher practice score (5.5) than men (4.5) ( $P<0.05$ ).

Table 1 shows the percentage of correct answers to questions on knowledge, practice, and attitude regarding standard infection control

**Table 1.** Questions for assessing knowledge, attitude, and practice of standard infection control measures.

	Knowledge		Attitude		Practice	
	Correct	Incorrect	Very high or high	Null response	Correct	Incorrect
Q1 Washing hands before and after patient care	93.4%	6.6%	92.1%	7.9%	45.4%	54.6%
Q2 Washing hands before and after using gloves	91.4%	8.6%	80.9%	19.1%	32.2%	67.8%
Q3 Washing hands when unwanted contact with blood, body fluids, excretions, and contaminated items had occurred	96.7%	3.3%	96.7%	3.3%	86.8%	13.2%
Q4 Wearing gloves before touching mucous membranes and nonintact skin	98%	2%	96.1%	3.9%	82.9%	17.1%
Q5 Wearing goggles to protect mucous membranes of the eyes during procedures that are likely to generate splashes or sprays of blood and body fluids	97.4%	2.6%	92.8%	7.2%	51.3%	48.7%
Q6 Washing hands with povidone iodine (Betadine) after contact with patients during procedures and activities that are likely to generate splashes or sprays of blood and body fluids	5.9%	94.1%	0.7%	99.3%	38.2%	61.8%
Q7 Wearing a surgical mask to protect nose and mouth during procedures and activities that are likely to generate splashes or sprays of blood and body fluids	94.7%	5.3%	94.1%	5.9%	76.3%	23.7%
Q8 Bending needles before disposal	16.4%	83.6%	4.6%	95.4%	53.9%	46.1%
Q9 Wearing a gown during procedures that are likely to generate splashes or sprays of blood and body fluids	77.6%	22.4%	79.6%	20.4%	30.3%	69.7%

precautions. For knowledge, the frequency of correct answers was lowest for question 6 ["hands should be washed with povidone iodine (Betadine) after contact with patients during procedures and activities that are likely to generate splashes or sprays of blood and body fluids"], and was highest for question 4 ("wearing gloves before touching mucous membranes and nonintact skin"). For attitude and practice the highest scores were seen for question 3 ("washing hands after unwanted contact with blood, body fluids, excretions, and contaminated items"). The minimum correct scores for attitude and practice were found for questions 6 and 9, respectively. Except for questions 6 and 8, the frequencies of correct answers were higher for knowledge and attitude than practice.

In total, we found a linear positive correlation

between knowledge and attitude ( $\rho=0.39$ ,  $P<0.01$ ) and attitude and practice ( $\rho=0.31$ ,  $P<0.01$ ) (Table 3).

## Discussion

Our study showed a generally poor adherence to standard isolation precautions among DHPs of Shiraz. While the level of knowledge and attitude was acceptable, the compliance was poor. These results were also found in other studies.<sup>7-12</sup> The discrepancy between knowledge and attitude could be due to inadequate supply of personal protective equipment, carelessness, improper disposal of medical waste, and belief that practice of standard precautions may interfere with patient care.<sup>13,14</sup> McCarthy and McDonald conducted a study in 1997 on general Canadian dentists and

**Table 2.** Mean (SD) score of knowledge, attitude, and practice of standard precautions in subgroups of the Shiraz University DHPs.

Group	Subgroups	Knowledge*	Attitude**	Practice*
		Mean (SD) score	Mean (SD) score	Mean (SD) score
Faculty member	Attending	6.75 (0.79)	35.08 (3.78)	5.79 (2.04)
	Resident	6.76 (1.01)	35.00 (2.79)	5.07 (1.38)
Student	6 <sup>th</sup> year	6.64 (1.52)	35.12 (6.09)	4.84 (2.01)
	5 <sup>th</sup> year	6.76 (0.7)	33.28 (6.22)	4.80 (2.11)
	4 <sup>th</sup> year	6.71 (0.9)	35.43 (3.56)	4.76 (2.39)
<b>Total</b>		<b>6.71 (0.99)</b>	<b>34.99 (4.47)</b>	<b>4.97 (2.17)</b>

\*Maximum score=9; \*\*Maximum score=45.

**Table 3.** Spearman's correlation coefficients ( $\rho$ ) between knowledge-attitude (K-A), knowledge-practice (K-P), and attitude-practice (A-P) scores regarding standard precautions in subgroups of Shiraz University DHPs.

Groups	Subgroups	K-A	K-P	A-P
Faculty member	Attending	0.586**	0.369	0.390
	Resident	0.764**	0.014	-0.108
Student	6 <sup>th</sup> year	0.588**	-0.087	0.416*
	5 <sup>th</sup> year	0.028	-0.201	0.567**
	4 <sup>th</sup> year	0.303*	0.232	0.222
<b>Total</b>		<b>0.394**</b>	<b>0.113</b>	<b>0.317**</b>

\* $P < 0.05$ ; \*\* $P < 0.01$ 

found that some predictors of the use of recommended infection control procedures were age <40 years, lack of concern regarding increased personal risk, or costs of infection control procedures.<sup>15</sup> We found that half of the DHPs (50.4%) had not received previous standard precaution training and that more than 85% were supposed to be educated. These findings emphasized the importance of continues training for infection control.

Although linear correlations between knowledge-attitude and attitude-practice were observed, no correlation was found between levels of knowledge and practice. One of the limitations to this study was the method for assessing the practice of the precaution. We could not supervise the responders' practice and, therefore, had to rely on their subjective self-assessment. Therefore, the responses might have not accurately reflected the true knowledge and attitude in practice and, therefore, the reported level of practice might be even lower than the real level.

Our study showed that only having knowledge of infection control measures and a positive attitude towards them does not guaranty adherence to the guidelines. The results demonstrated that practice of standard isolation precautions is poor among DHPs in the Shiraz University of Medical Sciences. An educational program on infection control isolation precaution for all healthcare workers, especially DHPs and supplying the facilities to allow compliance with infection control policies are necessary to reduce infectious hazards among not only DHPs but also their patients.

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