

일 종합병원 근무자의 표준주의지침에 대한 지식과 태도

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Knowledge and Attitude towards Pathogen Transmission Precautions among Healthcare Workers in a General Hospital

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Background: Pathogen-transmission precautions (PTP), including standard precautions, have been introduced to control the transmission of pathogens among patients and healthcare workers. The aim of this study was to assess the level of knowledge regarding PTP and the attitude towards these precautions among healthcare workers in a hospital setting.

Methods: A cross-sectional survey was performed from March to April 2007 using a self-administered questionnaire completed by 235 physicians, 491 nurses, and 117 laboratory technicians working at a large teaching hospital in urban area in Korea.

Results: The overall percentage of correct answers to 13 knowledge-type questions was 66.3%, and the percentage of correct answers differed significantly depending on the profession of the respondents ($P < 0.001$) and exposure to PTP training ($P = 0.003$). The guidelines were the preferred source of information on PTP (57.3%) followed by infection control practitioners (32.0%). The most important obstacles to compliance with PTP guidelines were lack of time (67.5%), forgetfulness (46.8%), lack of knowledge (33.8%), and lack of means (11.0%).

Conclusions: Level of knowledge on the PTP guidelines was low and required improvement. Lack of time was the most important factor reported leading to poor compliance with the PTP guidelines.

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INTRODUCTION

Healthcare-associated infections can be caused by endogenous factors such as oral and intestinal bacteria or by exogenous factors such as doctors, other patients, contaminated medical equipments, and pathogens occurring from other environmental factors in the hospital. To prevent healthcare workers from spreading pathogens related directly or indirectly to exogenous infections, the United

States Centers for Disease Control and Prevention (US CDC) has published several versions of the guidelines for pathogen-transmission precautions (PTP). In the early 1980s, with the advent of the human immunodeficiency virus, the US CDC published a universal set of precautions to prevent the spread of blood-mediated pathogens, and the standard and transmission-based precaution guidelines have also been published and applied since 1996.¹⁾ It has been reported that more than 40% of the infections observed in hospitals can be prevented if 83% of the health professionals complied with the guidelines of PTP.²⁾

Regardless of the suspected state of infection, standard precautions are applicable to all patients attending healthcare facilities and are designed to reduce the spread of

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microorganisms. These specifically include precautions such as hand sterilization; wearing gloves, masks, protective eyewear, face shields, and gowns; solitary or cohort isolation; and safe disposal of wastes. Under transmission-based precautions, airborne precautions against small airborne droplets or dust particles (with diameter less than 5 μm), involve providing isolation wards or wearing protective shields for respiratory safety, inhibiting the spread of contagious diseases. Next, droplet precautions involve preventing the spread of large droplets ($\geq 5 \mu\text{m}$) from the mucous membranes of a patient's nose and mouth to the mucous membranes of others during the coughing, sneezing, talking, or aspirating sputum of patients diagnosed as carriers or those who have clinical diseases. Finally, contact precautions involve reducing the cases of infections caused by direct or indirect contact and include instructions about room isolation, wearing gloves, washing hands, wearing gowns, etc.¹⁾

Though guidelines to prevent pathogen transmission among patients and healthcare workers were available, the implementation of such by healthcare workers seemed poor.²⁻⁵⁾ These findings in foreign countries were similar to those seen in domestic studies.⁶⁾ According to a study surveying the implementation of three precautions (wearing double gloves, wearing protective eyewear, and avoiding recapping of used needles) by operating room nurses working at seven hospitals having more than 500 beds in Busan, only 34.8% reported occasional compliance and none adhered to the guidelines in all cases.⁶⁾

In Korea, the Occupational Safety and Health Act and the Code of Occupational Health Standards state that healthcare workers should be protected from the health issues caused by pathogenic infections.^{7,8)} US CDC's Guidelines on PTP have been distributed to many hospitals in Korea after being translated by related academic societies to encourage awareness of these guidelines for infection control (IC). According to one study involving 85 hospitals in Korea with more than 300 beds, most of the hospitals had a written form of the guidelines on isolation and precautions and conducted some type of educational program.⁹⁾ However, another study reported that most of the educational programs on IC were held for new healthcare workers for less than one hour, and additional programs were recommended to be taken privately, which could mean that these education programs were not held systematically or repeatedly.⁶⁾ Considering that healthcare workers in hospi-

tals participating in systematic training showed higher knowledge scores for PTP,^{10,11)} we could hypothesize that our knowledge of and attitude about PTP might be low because of a lack of regular education programs for hospital employees. And it would be meaningful to investigate the current level of knowledge and attitude. In addition, according to the previous studies, the knowledge level of PTP was inconsistent in professions such as nurses and physicians.^{10,12,13)} Therefore, we attempted to investigate the current level of knowledge of and attitude towards PTP among healthcare workers including physicians, nurses, and technicians in a domestic hospital.

The specific objectives of this study were 1) to survey the general characteristics and current level of knowledge of and attitude towards PTP of healthcare workers, 2) to compare this current level of knowledge and attitude by general characteristics including profession, and 3) to investigate obstacles to compliance with the guidelines.

METHODS

1. Study participants

A cross-sectional survey with a self-administered questionnaire was used in this study. The participants were recruited from Pusan National University Hospital (PNUH), a university-affiliated tertiary referral hospital located in Busan, Republic of Korea. The hospital is the largest in Busan, with 1081 beds in 2007. The participants were healthcare workers who were involved in direct patient care or handling of specimens. Five hundred and sixty-two physicians (including staff, residents, and interns), 563 registered nurses, and 169 clinical laboratory technicians were invited to complete the questionnaire, and 843 completed questionnaires were returned. The overall response rate was 65.1% with the response rates for physicians, nurses, and clinical laboratory technicians at 41.8%, 87.2%, and 69.3%, respectively.

2. Study instrument

The study instrument was a self-administered questionnaire developed and used by Sax et al.¹²⁾ in the USA. The original questionnaire included 25 questions regarding the characteristics of the participants (7 questions), knowl-

edge of transmission precautions (13 questions), and attitude towards precautions (5 questions).¹²⁾ One of the researchers translated the questionnaire into Korean after obtaining permission from the developer (Sax H). We did not translate the questionnaire back into English as the items were short and simple. We submitted the translated version to two infection control nurses for the lexical and content validation, and also conducted a pilot test with 5 nurses and 2 laboratory technicians for the feasibility of the translated version. From this pilot test, the question on the preferred source of information on PTP as an attitude question was modified because the study hospital did not use intranet as a source of information on PTP. The knowledge section was the same as that in the original questionnaire. After discussing with the research team, we removed the variable 'department' and added 'type of infection control training' in the section on participant characteristics.

The knowledge questions covered the concepts of general PTP, hand hygiene, gloving, gowning, and masking in particular circumstances and measured the answers using a true/false-type scale over a range of 0 to 13 points in total. The attitude questions were about the 'preferred single measure of PTP prevention', perceived knowledge on PTP, preferred method of obtaining information on PTP, future reaction in case of a colleague's noncompliance with PTP, and the most common reasons for noncompliance with PTP guidelines.¹²⁾ Four out of five questions on attitude were measured so as to choose the best answer out of four or five possible answers, and the last question was measured on a 3-point scale (not important, important, very important).

3. Data collection

After receiving ethics approval from the PNUH Institutional Review Board, we contacted the directors of the nursing department and the IC team of the hospital requesting cooperation for the study. With their cooperation, a researcher mailed the survey questionnaires and return envelopes to the directors. The director of the nursing department was responsible for distributing and retrieving the questionnaires from the nurses and the director of the IC team was responsible for distributing and retrieving the questionnaires from the physicians and the clinical laboratory technicians. Data were collected between March and

April 2007.

4. Data analysis

The collected data were coded and analyzed using the SPSS Version 18.0 for Windows (SPSS Inc., Chicago, IL, USA). The characteristics of the participants were analyzed using mean and standard deviation values for continuous variables and frequency and percentage values for categorical variables. Knowledge of the guidelines for PTP was analyzed using mean and standard deviation values and the proportion of correct answers for each question. No response or multiple responses was regarded as incorrect answers. The independent *t*-test or one-way analysis of variance was used to analyze the difference in the knowledge of the guidelines for PTP on the basis of patient characteristics. The chi-square test was used to assess the relationship between the percentage of correct answers for each knowledge question and the attitude and profession of the participants. All statistical tests were performed at the 0.05 level of significance for two-tailed tests.

RESULTS

1. General characteristics

The general characteristics of the study participants are summarized in Table 1. There were more female (70%) than males, the average age of the respondents was 32.2 years, and they had been working in their profession for an average of 7.9 years (range, 1-36 years). Approximately 54.1% of the respondents reported that they had undergone some type of IC training, and the 'on-the-department' type training program was the most popular type of training (53.2%). Gender, age, work experience, and exposure to related educational programs were the factors that showed significant difference among the three professions ($P<0.001$). Nurses (72.7%) had significantly more experience in IC-related training than physicians (27.2%) or technicians (29.9%).

2. Knowledge of the pathogen transmission precautions

We summarized the respondents' knowledge on the PTP in Table 2. Out of 13 questions, the average overall number

Table 1. General characteristics of study participants^a

Characteristics		Total (n=843)	Physician (n=235)	Nurse (n=491)	Technician (n=117)	χ^2	P ^b
Gender	Male	253 (30.0)	180 (76.6)	6 (1.2)	67 (57.3)	477.91	<0.001
	Female	590 (70.0)	55 (23.4)	485 (98.8)	50 (42.7)		
Age, y	20-29	433 (51.9)	101 (44.3)	304 (62.0)	28 (24.1)	70.03	<0.001
	30-39	257 (30.8)	88 (38.6)	122 (24.9)	47 (40.6)		
	≥40	144 (17.3)	39 (17.1)	64 (13.1)	41 (35.3)		
	Mean±SD	32.2±7.6	33.4±7.9	30.7±6.8	36.4±8.4		
	Median (range)	5 (1-36)	4 (1-36)	5 (1-31)	10 (1-33)		
Years worked in the profession	<5	366 (44.9)	117 (54.0)	229 (46.9)	20 (18.2)	54.54	<0.001
	5-9	225 (27.6)	50 (23.0)	143 (29.3)	32 (29.1)		
	10-19	128 (15.7)	30 (13.8)	63 (12.9)	35 (31.8)		
	≥20	96 (11.8)	20 (9.2)	53 (10.9)	23 (20.9)		
	Mean±SD	7.9±7.4	7.2±7.5	7.3±6.9	11.6±8.1		
Exposure to IC training	Yes	456 (54.1)	64 (27.2)	357 (72.7)	35 (29.9)	164.33	<0.001
	No	387 (45.9)	171 (72.8)	134 (27.3)	82 (70.1)		
Type of IC training ^c (multiple responses allowed)							
	New employee training	86 (19.1)	21 (33.9)	57 (16.1)	8 (23.5)	11.33	0.003
	On-the-job	178 (39.5)	8 (12.9)	163 (45.9)	7 (20.6)	29.56	<0.001
	On-the-department	240 (53.2)	34 (54.8)	187 (52.7)	19 (55.9)	0.20	0.903

Abbreviation: IC, infection control.

^aValues are presented as N (%) or mean±SD unless otherwise indicated.^bCalculated by chi-square test.^cResponses were collected only from the respondents answering "Yes" to exposure to infection control training.**Table 2.** Level of knowledge on pathogen transmission precautions among participants^a

Characteristics		Number of correct answers	Score on a scale of 100	t or F	P
Total		8.6±2.0	66.3±15.2		
Profession	Physician (a)	8.2±2.0	63.2±15.3	30.95	<0.001 ^b (a≠b≠c) ^c
	Nurse (b)	9.0±1.6	69.5±13.8		
	Technician (c)	7.7±2.1	59.1±16.5		
Years worked in the profession	<5	8.6±2.0	66.4±15.2	1.96	0.119 ^b
	5-9	8.8±1.8	67.4±13.8		
	10-19	8.7±2.0	67.2±15.3		
	≥20	8.2±2.2	63.1±17.0		
Exposure to PTP training	Yes	8.8±1.9	67.7±14.8	-2.97	0.003 ^d
	No	8.4±2.0	64.6±15.5		
Type of PTP training					
New employee training	Yes	8.5±1.9	65.2±14.9	1.70	0.090 ^d
	No	8.9±1.9	68.2±14.8		
On-the-job	Yes	9.0±1.9	69.3±14.9	-1.94	0.053 ^d
	No	8.7±1.9	66.6±14.7		
On-the-department	Yes	8.9±1.8	68.4±14.1	-1.15	0.250 ^d
	No	8.7±2.0	66.8±15.6		

Abbreviation: PTP, pathogen transmission precautions.

^aValues are presented as mean±SD.^bCalculated by one-way analysis of variance.^cAssessed by Tukey's multiple comparison test.^dCalculated by independent t-test.

of correct answers was 8.6, and the average score on a scale of 100 was approximately 66.3 points. For general features, the level of knowledge was significantly associated with the type of profession. Scores for the nurses (69.5 points) were significantly higher than that of the physicians (63.2 points) and technicians (59.1 points) ($P<0.001$). Respondents who had attended a PTP-related education program scored 67.7 points, whereas the mean score of the others was significantly lower (64.6 points) ($P=0.003$).

We summarized the percentage of correct answers among the three professions in Table 3. More than 75% of the respondents provided correct answers for 6 out of 13 questions, and the highest percentage was obtained for question no. 1 ('the most important vehicle in pathogen transmission', 86.6%), followed by question No. 3 ('the main advantage of hand hygiene', 85.4%). The percentage of correct answers of nine out of 13 questions was significantly different by professions. Physicians showed the highest correct answers in 'the main advantage of hand hygiene' (No. 3) and laboratory technicians in 'the indication to use mask in a regular care situation' (No. 6) and 'the basic concept of standard precautions' (No. 9), while nurses showed the highest percentage of correct answers in the other six questions.

Question No. 9 showed the lowest percentage of correct answers ('the basic concept of standard precautions', 30.7%), followed by question No. 8 ('adequate procedures in contact precaution', 45.3%). In question No. 9 (to see whether both washing hands and wearing gloves would be required in cases of bleeding from non-infected and in-

fectured patients), most of the respondents answered that they washed hands for both cases, but wore gloves only in cases involving bleeding from infected patients. In question No. 8 (to assess the measures applied to prevent the spread of multidrug-resistant organisms such as methicillin-resistant *Staphylococcus aureus*), most respondents answered incorrectly by answering that they needed to wear masks.

3. Attitude towards pathogen transmission precautions

We summarized the respondents' attitude towards PTP in Table 4. The majority of the respondents (91.9%) answered that the most effective way of reducing hospital infections was by maintaining hand hygiene. The percentage of correct answers by each group was significantly different, and the nurses showed the highest rate for preferring 'hand hygiene' ($P<0.001$).

With regard to the knowledge of PTP, only 6.2% answered that they 'know it well' while most answered that they 'have heard of it' (42.2%) or 'have a vague idea' (38.4%). The self-assessment of knowledge showed significant differences among the different groups, and the nurses were the highest responders (8.6%) to 'know it well' ($P<0.001$). When information on PTP was required, most respondents searched the guidelines (57.3%) or called the IC practitioner (32.0%); but the preferred method was statistically different by profession ($P<0.001$). Most respondents (70.4%) answered that when confronted with a colleague's noncompliance with PTP, they would 'immediately tell him/her to do so'; this tendency was especially high in med-

Table 3. Comparison of knowledge level on pathogen transmission precautions among different professions

Questions	% of correct answer				χ^2	P^a
	Total (n=843)	Physician (n=235)	Nurse (n=491)	Technician (n=117)		
1. The most important vehicle in pathogen transmission	86.6	86.8	90.8	68.4	41.07	<0.001
2. The main purpose of glove use	37.5	40.4	37.5	31.6	2.58	0.275
3. The main profit in hand hygiene	85.4	88.9	86.6	73.5	16.17	<0.001
4. Adequate preventive measures in a complex care situation	79.8	67.2	86.2	78.6	35.45	<0.001
5. Adequate preventive measures in a regular care situation	46.6	39.6	56.8	17.9	63.87	<0.001
6. The indication to use mask in a regular care situation	66.7	57.9	68.6	76.1	13.69	0.001
7. The anticipated timing of isolation precaution	85.3	83.4	87.6	79.5	5.85	0.054
8. Adequate procedures in contact precaution	45.3	33.6	54.0	32.5	35.60	<0.001
9. The basic concept of standard precautions	30.7	36.2	26.3	38.5	11.14	0.004
10. Risk-guided application of a preventive strategy	82.9	74.5	89.4	72.6	35.16	<0.001
11. The ubiquitous risk in body fluids	59.2	62.1	59.7	51.3	3.92	0.141
12. The bidirectional risk of pathogen transmission	83.0	79.1	84.5	84.6	3.50	0.174
13. Environmental risk for immune-suppressed patients	72.5	71.5	75.2	63.2	6.87	0.032

^aCalculated by chi-square test.

Table 4. Attitude towards pathogen transmission precautions among participants^a

Questions	Total (n=843) N (%)	Profession			χ^2	<i>P</i> ^b
		Physician (n=235) N (%)	Nurse (n=491) N (%)	Technician (n=117) N (%)		
Preferred single preventive measure					33.40	<0.001
Mask	15 (1.8)	7 (3.0)	4 (0.8)	4 (3.4)		
Gloves	50 (5.9)	26 (11.1)	12 (2.4)	12 (10.3)		
Hand hygiene	775 (91.9)	201 (85.5)	473 (96.3)	101 (86.3)		
Apron	3 (0.4)	1 (0.4)	2 (0.4)	0 (0.0)		
Self assessment of knowledge on the concept of PTP					97.88	<0.001
Nothing to me	111 (13.2)	46 (19.6)	30 (6.1)	35 (29.9)		
Have heard about it	356 (42.2)	120 (51.1)	183 (37.3)	53 (45.3)		
Know vaguely	324 (38.4)	62 (26.4)	236 (48.1)	26 (22.2)		
Know it well	52 (6.2)	7 (3.0)	42 (8.6)	3 (2.6)		
Preferred source of information on PTP					59.93	<0.001
Hotline	266 (32.0)	85 (36.6)	143 (29.3)	38 (34.5)		
Guidelines	476 (57.3)	100 (43.1)	315 (64.6)	61 (55.4)		
Colleague	44 (5.3)	16 (6.9)	19 (3.9)	9 (8.2)		
Book	44 (5.3)	31 (13.4)	11 (2.3)	2 (1.8)		
Peer action to colleague's noncompliance with PTP					16.16	0.013
Immediately tell him/her to do so	580 (70.4)	143 (61.4)	348 (73.0)	89 (78.1)		
Say nothing	101 (12.3)	41 (17.6)	48 (10.1)	12 (10.5)		
Tell him/her to do so later	141 (17.1)	48 (20.6)	80 (16.8)	13 (11.4)		
Tell his/her superior about it	2 (0.2)	1 (0.4)	1 (0.2)	0 (0.0)		
Obstacles to compliance with guidelines ^c (multiple responses allowed)						
Lack of knowledge	280 (33.8)	87 (37.8)	149 (30.7)	44 (38.6)	4.89	0.087
Forgetfulness	387 (46.8)	141 (61.6)	202 (41.6)	44 (38.9)	28.04	<0.001
Lack of means	91 (11.0)	43 (18.8)	36 (7.4)	12 (10.7)	20.38	<0.001
Lack of time	562 (67.5)	151 (65.9)	361 (73.8)	50 (43.9)	38.24	<0.001

Abbreviation: PTP, pathogen transmission precautions.

^aValues are presented as N (%).^bCalculated by chi-square test.^cN (%) of respondents responded "important" or "very important" for each applicable obstacle.**Table 5.** Level of knowledge on pathogen transmission precautions based on perceptions on obstacles to compliance with PTP guidelines

Obstacles to compliance with PTP guidelines	Level of knowledge on PTP guidelines			
	Mean	SD	F	<i>P</i> ^a
Lack of knowledge			0.98	0.375
Very important	8.3	1.1		
Important	8.5	2.0		
Not important	8.7	2.0		
Forgetfulness			0.27	0.764
Very important	8.9	1.8		
Important	8.6	1.9		
Not important	8.7	2.0		
Lack of means			7.91	<0.001
Very important	5.5	0.7		
Important	8.0	2.1		
Not important	8.7	1.9		
Lack of time			1.70	0.183
Very important	8.8	1.6		
Important	8.7	1.9		
Not important	8.5	2.1		

Abbreviation: PTP, pathogen transmission precautions.

^aCalculated by one-way analysis of variance.

ical technicians (78.1%, $P=0.003$ for other professions).

For important obstacles in complying with the guidelines for PTP, 33.8% selected 'lack of knowledge', 46.8% selected 'forgetfulness', 11.0% selected 'lack of means', and 67.5% selected 'lack of time'. Each group showed significant differences- physicians showed similar percentages for 'lack of time' (61.6%) and 'forgetfulness' (65.9%); technicians showed almost similar percentages for 'lack of knowledge' (38.6%), 'forgetfulness' (38.9%), and 'lack of time' (43.9%); whereas, most of the nurses (73.8%) selected 'lack of time' as an obstacle. The respondents who considered lack of means very important as an obstacle to compliance showed lower levels of knowledge ($P<0.001$) (Table 5). Those with less clinical experience seemed to consider 'lack of time' more seriously; those who had some kind of related training selected 'lack of time' as the most important obstacle (Table 6).

Table 6. Obstacles to guidelines compliance based on years worked in the profession and exposure to PTP training^a

Characteristics	Obstacles to compliance with guidelines (multiple responses allowed)			
	Lack of knowledge	Forgetfulness	Lack of means	Lack of time
Years worked in the profession				
<5	140 (39.0)	184 (51.4)	39 (10.9)	284 (78.5)
5-9	73 (32.7)	109 (48.9)	28 (12.6)	155 (69.2)
10-19	40 (31.5)	50 (39.7)	10 (8.0)	69 (54.3)
≥20	19 (20.7)	30 (32.6)	12 (13.2)	34 (37.4)
χ^2	11.82	13.43	2.14	67.71
P^b	0.008	0.004	0.544	<0.001
Exposure to PTP training				
Yes	129 (28.7)	189 (42.1)	41 (9.1)	316 (70.1)
No	151 (39.7)	198 (52.4)	50 (13.3)	246 (64.6)
χ^2	11.15	8.72	3.62	2.85
P^b	0.001	0.003	0.057	0.091

Abbreviation: PTP, pathogen transmission precautions.

^aValues are presented as N (%)

^bCalculated by chi-square test.

DISCUSSION

This study was performed to investigate the knowledge and attitude of healthcare workers (physicians, nurses, and technicians) working at a university-affiliated referral hospital in Busan. We used the same PTP questionnaire used by Sax et al.¹²⁾ to investigate the healthcare workers at the University Hospital of Geneva, Switzerland. Thus, we compared our findings with their findings and those of other similar studies. Although the University Hospital of Geneva was a larger general hospital having 2200 beds, it was an acute-care hospital; and, both studies used physicians and nurses as respondents.

The respondents provided correct answers to an average of 8.6 questions representing a score of 66.3 points on a scale of 100, which was quite lower than that of Sax et al.¹²⁾ (9.7 answers correct, 74.6 points). In the study by Sax et al.¹²⁾ participants answering more than 75% of the questions correctly were labeled 'good knowledge', and 55.9% of their respondents showed to have 'good knowledge'. The percentage of respondents with 'good knowledge' in this study was 34.9% including 28.5% physicians, 41.3% nurses, and 20.5% technicians, which showed the relatively lower level of knowledge in our respondents. Although our study (54.1%) had a higher percentage of respondents who had joined IC training programs than the previous study¹²⁾ (nurses 27.9%, physicians 15.1%, and overall 24.5%), we believe that there may have been differences in the quality

of the training given. However, the IC training program held in our hospital for less than one hour and targeting new staff, seemed to review a wide range of topics with very little being taught about the PTP guidelines. In addition, the training programs held in individual departments did not focus exclusively on PTP, and therefore, it was difficult to claim that training for PTP had been provided in a systematic manner. It seems that more systematic PTP training programs should be provided to both new and senior employees.

We did not see consistent results for the knowledge level of PTP among the different professions. Sax et al.¹²⁾ found no significant difference in the multivariate analysis. However, studies by Askarian et al.¹⁰⁾ in Iran and by Kim et al.¹³⁾ in Korea showed that nurses or nursing students showed significantly higher levels of knowledge than physicians or medical students, which was similar to our findings. Considering that nurses had more IC training than physicians but no difference in knowledge in Sax et al.,¹²⁾ the knowledge level of PTP seems to be affected by the frequency and the quality of the training program and not just taking IC training or not.

In our findings, 'the basic concept of standard precautions' showed the lowest proportion of correct answers. This question was also answered poorly (63.2%) in the study by Sax et al.¹²⁾ though the question answered most incorrectly was the 'risk of systemic infection by splashing of a patient's body fluids into the healthcare worker's eye' (47.1%). The proportion of correct answers for these two

questions was not the same in the two studies, but the pattern of answers was similar. The question showing a noticeable difference in the percentage of correct answer was that on the purpose of wearing gloves. The percentage of correct answers was 37.5% in our study and 78.6% in Sax et al.¹²⁾ (78.6%). The 2007 Isolation Guideline suggests wearing gloves to prevent contaminating the hands of healthcare workers whenever exposure to body fluids, mucous membranes, skin wounds, or infectious agents are expected.¹⁴⁾ However, the majority of respondents in our study seemed to misunderstand that gloves were required to protect patients rather than healthcare workers. A low percentage of correct answers on the 'basic concept of standard precautions' was also associated with wearing gloves. The respondents showed that they only wore gloves when taking blood samples from patients diagnosed with hepatitis C, even if they were likely to be exposed to blood during sampling from other patients. This finding might indicate that our respondents misunderstand the basic concept of PTP that they should always wear gloves when they could be exposed to blood. Further training seems to be required for both new and senior employees in these vulnerable areas.

Our findings on the attitude of the respondents to PTP showed that 91.9% agreed with 'the most effective method of reducing in-hospital infections is by washing hands', which was lower than the results (97.6%) of Sax et al.¹²⁾ Physicians and technicians seemed to consider wearing gloves relatively important.

The self-assessment of their knowledge on the concept of PTP show that most of the nurses thought that they 'know vaguely' and most physicians and technicians 'have heard about it', which seemed to be related to their educational. Only 6.2% of our study respondents answered that they 'know it well', which was significantly lower (15.7%) than that of Sax et al.¹²⁾ The subjective evaluation and objective score seem to show good correspondence.

Most respondents preferred searching for guidelines or calling the IC team to obtain information on PTP. The majority of respondents in the study by Sax et al.¹²⁾ would call the IC team. This difference may be because the guidelines are placed in every department of the hospital and can be accessed easily whenever needed. This would mean that the Hospital Infection Control Guidelines should be easily accessible to everyone. However, as reported by Jeong et al.,⁶⁾ most of the guidelines provided in hospitals are modified

versions of those provided by pharmaceutical companies, and therefore, the actual users of the guidelines (physicians or nurses) rarely participate in the process of development.

'Lack of time' was most frequently selected as an obstacle for adhering to the PTP guidelines in our study. This finding was consistent with that of another study conducted in a hospital of another country to investigate the obstacles or non-adherence to standard precautions.¹⁵⁾ Respondents from groups of different professions showed different tendencies- nurses chose 'lack of time' as the most important factor while physicians and technicians thought factors such as 'lack of knowledge' and 'forgetfulness' also played a similar level of importance. These findings seem to be related to the limited experience of physicians and technicians with PTP-related educational programs compared to nurses. 'Lack of means' was relatively less important as an obstacle in complying with guidelines but it was related to lower level of knowledge of PTP. Though it is difficult to explain this finding exactly, insufficient knowledge seems to hinder the effective use of means. Further studies are needed to investigate what means they feel are insufficient and if their support towards a lack of means would decrease as the knowledge on PTP increases.

Although PTP guidelines are essential for IC in hospitals, it seems difficult to expect proper adherence to these guidelines without adequate knowledge and attitude. Therefore, based on this study, each hospital should provide more systematic IC training programs to more effectively manage hospital infections. In particular, participation from technicians and physicians (who had showed poor attendance to educational programs) needs to be encouraged.

It is very meaningful to investigate the knowledge of and attitude towards PTP among healthcare workers and to analyze the current levels of practice and the problems in Korea, and, finally, to make suggestions for improving the present situation. However, this study also has limitations. Because we recruited our participants from a large general hospital, it would be difficult to generalize our findings to medium-sized healthcare facilities. Considering that most hospital IC programs in South Korea have been centered in large hospitals with more than 300 beds and in tertiary-care general hospitals,^{16,17)} the knowledge of and attitude towards PTP among healthcare workers at medium-sized hospitals or long-term care facilities could be different. In addition, we did not have 100% participation and the over-

all response rate was different by professions.

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요 약

연구배경: 의료기관에 표준주의지침을 포함한 병원체전파주의지침이 도입되어 적용되고 있다. 이 연구는 일개 종합병원 내 보건의료인을 대상으로 병원체전파주의지침에 대한 지식과 태도를 조사하기 위하여 실시되었다.

방법: 자가보고형 설문조사로 부산시내 일개 종합병원에 근무 중인 235명의 의사, 491명의 간호사, 117 의료기사가 참여하였고, 자료수집은 2007년 3월에서 4월까지 실시되었다.

결과: 총 13개 지식을 묻는 문항에서 정답률은 66.3%였으며, 이는 직종($P<0.001$)과 과거 병원체전파주의지침 교육이수($P=0.003$)에 따라 통계적으로 유의한 차이를 보였다. 병원체전파주의지침에 대한 정보원은 감염관리지침(57.3%)이 가장 많았고 다음으로 감염관리실과의 전화통화(32.0%)였다. 병원체전파주의지침 준수를 방해하는 요인으로 '중요 또는 매우 중요'한 것은 시간 부족(67.5%), 잊어버려서(46.8%), 지식부족(33.8%), 물품 부족(11.0%)의 순이었다.

결론: 병원체전파주의지침에 대한 지식은 낮아 개선이 필요하였으며, 시간부족은 병원체전파주의지침의 준수를 방해하는 가장 중요한 요인이었다.

중심단어: 지식, 태도, 병원체전파, 감염, 표준주의지침

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