

Original

Awareness and Related Factor of Hand Hygiene among Nurses Working in Elderly - Care Facilities

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Background: Practice of hand hygiene among healthcare professionals is a basic measure for preventing infections in elderly care facilities. However, the compliance rate among care providers in elderly-care facilities has been reported to be low: 9.3% in an observational study and 63.0 % in a questionnaire survey. Even if knowledge and methods of hand hygiene are offered, it is not possible to enforce it. Our aim was to study nurses's awareness of hand hygiene.

Methods: 255 nurses working in elderly-care facilities completed our hand hygiene questionnaire.

Results: The number of respondent who gave valid answers was 159 (response rate: 62.4%) .

Factor analysis showed that the nurses's awareness of hand hygiene was characterized by motivation for learning, practice of hand hygiene and responsibility. With regard to the path model for practice of hand hygiene that a role model of hand hygiene and desire for learning influenced. Therefore responsibility influenced practice of hand hygiene through the motivation for learning.

Conclusions: The notion that responsibility motivates learning is reflected in the fact that nurses consider continuing education to be an obligation in their profession, and this could presumably be application for educating nurses about infection prevention.

Introduction

CDC (Center for Disease Control and Prevention) and APIC (Association for Professionals in Infection Control and Epidemiology) suggests Infection control in hospitals and elderly care-facilities are based hand hygiene in the manuals^{1, 2)}. However the rate of hand washing associated with each of the following procedures was as follows: disposal of excretion/vomit, 79.8%; diaper changing, 61.9%; feeding assistance, 33.6%³⁾. This indicates low rates of hand hygiene in care-giving activities that require clean hands in elderly-care facilities. Approximately 90% of the residents of elderly-care facilities show a decline in cognitive function⁴⁾, which could be one of the reasons for the prevalence of infections and the difficulty encountered in maintaining hygienic behavior in these residents^{5, 6)}. Care providers act to prevent infections in elderly-care facilities, and nurse account for 80% of all persons responsible for infection-control activities in elderly-care facilities³⁾. Nurses are also expected to perform an educational role for other professionals⁷⁾. Although knowledge and instructions on hand hygiene and specific methods of hand hygiene practice are imparted to the personnel working in medical or welfare facilities to improve hand hygiene, individual motivation is crucial for hand hygiene practices⁸⁾ because, even if knowledge is offered, it is not possible to enforce it^{1, 9-11)}. Moreover, few reports have associated awareness of hand hygiene and hygienic behavior. A report on a research on awareness about hand washing among nurses in charge of inpatient services for the elderly, pointed out that an enhanced sense of responsibility was necessary for implementing hand hygiene practices⁷⁾; however, they did not indicate how an enhanced sense of responsibility was related to hand hygiene practices. On the basis of the above considerations, we aimed to elucidate the challenges involved in increasing nurses' awareness and related factor of hand hygiene in order to prevent infections in elderly-

care facilities.

Definitions: Hand hygiene is not including surgical hand scrub. **Methods**

Subjects: We surveyed 255 nurses serving in 38 elderly-care facilities in Hokkaido-Tohoku, Kanto, Kansai, Chugoku, and Kyushu-Okinawa areas.

Data collection: June 2009 ~ February 2010.

Method: Questionnaires were sent to the participants after consent was obtained from each subject and their facility manager. Participants were given two weeks to answer the questionnaire. A nurse administrator was requested to distribute and collect the questionnaires. We used the questionnaire forms developed by Matsuda.¹²⁾, consisting of 30 verified and validated questions. The questionnaires contained 5 grades of responses, Likert scale from "Strongly disagree" (1) to "Strongly agree" (5), for the participants to choose from. In addition, questions were on various topics, including provision of manuals on hand hygiene for infection prevention, establishment of a consultation station for hand-care products and infections, the existence of a person to demonstrate the proper method of hand hygiene (role model), and the influence of time and work constraints on hand hygiene practices.

Data analysis: Factor analysis was used to test the questions. Unpaired *t*-test was used to test factor scores, attributes and the environment for infection prevention. Multiple regression analysis was used for the explanatory variable for the factor of practicing hand hygiene. The Statistical Package for Social Sciences (SPSS; version 16.0 J) and Amos (version 19.0) package were used for analysis. *P* values less than 0.05 were considered significant. Then, the promax method was applied, assuming the factor structure by assessing the corresponding scree plot and excluding items with factor loadings of less than 0.4. Cronbach's coefficient α was calculated for validating the questionnaire items. Actual numbers were used for the following external variables: age and years of nursing experience; for specialized academic background, the data on the

number of years of school education was applied. The participants were assigned the following grades according to their role/post: staff members, 1; juniors and persons responsible for guiding students, 2; team leaders, 3; assistant head nurse/charge nurse, 4; and head nurse, 5.

Ethical considerations: This study was performed with the approval of the Ethics Committee of the Graduate School of Comprehensive Human

Sciences, University of Tsukuba. Participation in this study was voluntary and declining to participate caused no disadvantages for the decliner.

Results

1. Subjects: The number of subjects who provided valid answers was 159 (response rate: 62.4%) (Table 1).

Table1. Subjects

attribute		N=159	
		<i>n</i>	(%)
facility type	geriatric health service facility	89	56.97
	senior citizens' welfare service	70	44.03
gender	male	13	8.18
	female	143	91.82
age	30～39	50	31.45
	40～49	53	33.33
	50～59	46	28.93
	60～64	6	3.77
	65～	4	2.52
duration of experience (year)	～2.9	6	3.77
	3～5	8	5.03
	6～10	29	18.24
	11～15	32	20.13
	16～20	30	18.87
	21～30	43	27.04
	31～35	3	1.89
	36～	8	5.03
qualification	assistant nurse	76	47.80
	registered nurse	82	51.57
	public health nurse	1	0.63
role/post	staff	112	70.44
	junior and persons responsible	4	2.52
	team leader	2	1.26
	assistant head nurse/charge nurse	28	17.61
	head nurse	13	8.18
academic background	high school	24	15.09
	2year junior colleges/special vocational school	80	50.31
	3year junior colleges/special vocational school	50	31.45
	public health nurse school	1	0.63
	university	4	2.52

2. Awareness of hand hygiene: Factor analysis was performed to examine 26 items, which resulted in the determination of 3 factors (Table 2). Factor 1 items mainly included the considerations of the effects of hand hygiene, which was defined as the desire

for learning an effective method of hand hygiene (hereinafter referred to as desire for learning). Factor 2 items involved practice and methods of hand hygiene (hereinafter referred to as practice). Factor 3 items were associated with the responsibility of the nurses

Table2. Factor analysis of the awareness of hand washing

$N = 159$

Question	Factor		
	1	2	3
Factor 1: Desire to learn an effective method of hand washing ($\alpha = .920$)			
I want to assess the degree of contamination when nails grow.	.856	-.126	.083
I want to examine the degree of contamination caused by care or treatment.	.804	-.022	-.020
I want to examine the effect of hand washing.	.788	.115	-.170
I want to assess the degree of contamination when a wound has developed.	.784	-.062	.054
I want to assess the degree of contamination when manicure has been performed.	.732	-.074	.063
I want to receive guidance from a specialist regarding the method of hand washing.	.724	-.041	.025
I want to learn about effective measures to prevent infections.	.705	.236	-.056
I want to know the contents of education for a nurse specialized in infections.	.678	-.072	.145
We should periodically assess elimination of bacteria.	.525	.014	.163
I want to assess the elimination of bacteria while washing my hands.	.461	.246	.128
Factor 2: Practice of hand washing ($\alpha = .876$)			
I wash my hands thoroughly when dealing with elderly people.	-.026	.743	.033
I wash my hands before coming home from work.	-.041	.741	-.097
I wash my hands before having a meal.	-.009	.664	-.137
I wash my hands after administering any treatment or care.	.176	.663	-.298
I wash my hands when working hours end.	-.064	.627	.025
I regularly wash my nails thoroughly.	.091	.626	.125
I have learned the proper way to wash my hands.	.079	.617	-.041
I wash my hands and attention to fingertips and between the fingers while washing.	-.033	.605	.162
I wash my hands soon after they become dirty.	.040	.570	-.025
I wash my hands after blowing my nose.	-.230	.561	.302
I check my hands and nails for any cuts before starting work.	-.039	.429	.304
Factor 3: Responsibility of professionals ($\alpha = .876$)			
I need to be take legal responsibility for infections within the facility.	.041	-.011	.711
Professional staff have a responsibility to implement hand-washing practice.	-.018	.111	.652
I think come to publish the results of hand washing practice.	.159	-.166	.595
Penalties should be imposed for hand washing resulting in low degree of elimination of bacteria.	.123	.017	.501
Elderly people are afraid of developing infections.	.090	.005	.436
Correlation between factors			
	Factor 1	1.000	.308
	Factor 2		1.000
	Factor 3		1.000

Factor extraction method: Principal factor method

Rotation method: Promax rotation with Kaiser normalization

with regard to preventing infections (hereinafter referred to as responsibility).

3. Factors affecting the awareness of hand hygiene: Different factor scores were obtained for the following factors: the nurse's qualifications (hereinafter referred to as qualification) and existence of a role model for hand hygiene (Tables 3, 4). With regard to qualifications, registered nurses showed a

greater sense of responsibility than assistant nurses. Factor analysis revealed no differences between the respondents with valid answers with regard to sex, age, academic background, duration of experience, role/post, the care manager's qualifications (hereinafter referred to as care manager) and other aspects of the infection prevention environment. Multiple regression analysis was initially performed

Table3. Factor score and qualification

qualification	study		practice		responsibility	
	mean±SD	<i>t</i>	mean±SD	<i>t</i>	mean±SD	<i>t</i>
nurse	-.146±1.046	-1.785	.086±1.044	1.050	-.227 ±.863	-3.041**
assistant						
registered nurse	.127±.879		-.075±.852		.198 ±.893	
<i>t</i> -test	** <i>p</i> <.01					

Table4. Factor score and infection prevention environment

N=159							
		desire for learning		practice		responsibility	
	<i>n</i>	mean± SD	<i>t</i>	mean± SD	<i>t</i>	mean± SD	<i>t</i>
Role model of hand hygiene							
Yes	51	.322±1.040	-2.96*	.353±.825	-3.33**	.256±.944	-2.50*
No	108	-.152±.895		-.166±.958		-.121±.859	
Manual for hand hygiene							
Yes	144	-.020±.100	1.3	.040±.926	-0.17	.021±.922	-.900
No	15	.192 ±. 541		-.388±1.087		-.199±.668	
Time for hand hygiene practice							
Yes	131	.059±.979	1.67	.650±.954	1.44	.059±.900	1.800
No	28	-.275±.872		-.233±.890		-.277±.872	
Hand care products							
Yes	103	.080±.959	-.77	.122±.987	-1.02	.037±.975	-.400
No	56	-.044 ±.973		-.066±.922		-.020±.863	
Consultation for infection prevention							
Yes	120	.027±1.001	-.61	-.022±.955	.51	.024±.927	-.600
No	39	-.081±.859		.067±.928		-.074±.824	
<i>t</i> -test						* <i>p</i> <.05	** <i>p</i> <.01

using the backward elimination method on desire for learning, practice, and responsibility as response variables in order to reference subsequently examination of the path model variables (Tables 5-7). The path model was examined using variables obtained in the multiple regression analysis and the t-test of the factor score by the infection prevention environment (Fig.1). Application of

Table 6. multiple analysis set as an objective value practice

	β
manual	.244*
role model	.157**
consultation post	.169
desire for learning	.047**
R	.168
R ²	.146
backward elimination method	* $p<.05$ ** $p<.01$

Table 5. multiple analysis set as an objective value desire for learning

	β
manual	-.130*
practice	.205**
responsibility	.564**
R	.390
R ²	.378
backward elimination method	* $p<.05$ ** $p<.01$

Table 7. multiple analysis set as an objective value responsibility

	β
gender	-.128*
qualification	.188*
role/post	-.143*
care manager	.144
desire for learning	.059**
R	.397
R ²	.378
backward elimination method	* $p<.05$ ** $p<.01$

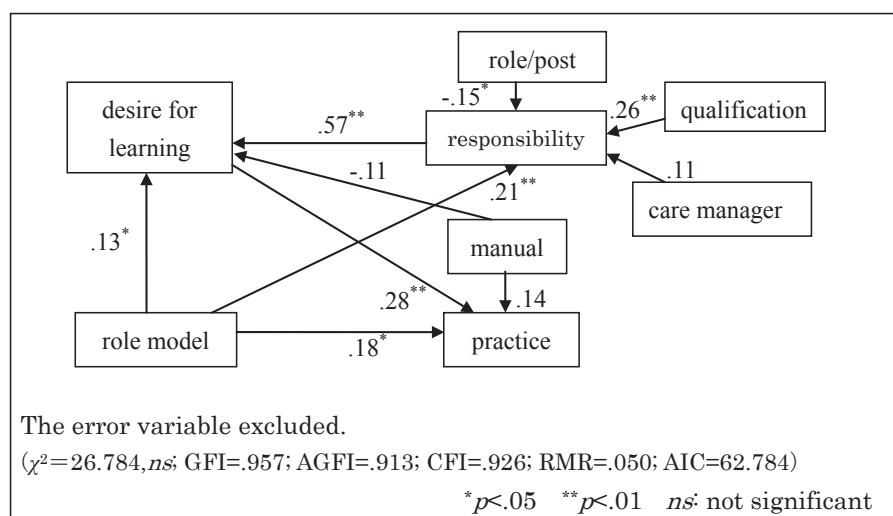


Fig1 Path model of hand hygiene practice

role model significantly affected 3 factors (desire for learning, responsibility, practice). Furthermore, responsibility significant affected the desire for learning, and the desire for learning significantly affected practice. Qualification had positive effects and role/post had negative effects on responsibility.

Discussion

1. Subjects: Although the study included subjects aged 30 years and older, national surveys revealed that the majority of nurses were in their 40s, followed by those in their 50s, 20s, and 60s accounted for 3% of the studied population, resulting in a higher age composition of subjects in this study. The mean duration of experience in our study was 17.7 years, which was close to the national average of 16.0 years¹³⁾. Furthermore, the values obtained for qualification as assistant nurse and registered nurse were similar to the corresponding values obtained in the national surveys: 42 ~ 46% and 54 ~ 58%.
2. Factors that influenced consideration of hand hygiene: The desire for learning, practice, and responsibility, which were determined through factor analysis, were considered to constitute the awareness of hand hygiene. This has been confirmed in a survey of hand hygiene done on nurses working at inpatient services for elderly people¹²⁾, and the above-mentioned factors were considered important elements influencing the hand hygiene of nurses working in elderly-care facilities. Qualification and role model influenced the awareness of hand hygiene. The greater sense of responsibility in registered nurses than in assistant nurses is attributable to differences between them concerning routine work and legal status. Assistant nurses predominantly perform routine medical procedures, and registered nurses provide guidance/advice/education to staff members and coordinate with other departments^{15, 16)}. In Article 6 of Public-Health Nurse, Midwife, and Nurse Law, an assistant nurse is defined as a person engaged in providing nursing care for sick persons or lying-in women and assisting medical practice under the supervision of a doctor, dentist, or registered nurse¹⁶⁾. The fact that registered nurses are expected to show a greater sense of responsibility than assistant nurses was considered to have a bearing on the above-mentioned. Concerning the role model existence shows a higher value in the desire for learning, practice, and responsibility and was considered to have greater influence on the desire for learning and responsibility as well as the ripple effects of behavior that is expected from models^{17, 18)}. Sixty percent of the nurses consider to supervisors as role models older nurses, more experience and expect them to judge and deal with any situation in a calm, quick, and appropriate manner¹⁹⁾. A head nurse is expected to be a role model and to play an educational role²⁰⁾. Only 32.1% of the respondents in this study had a role model of hand hygiene, suggesting that there is a significant lack of role models. A majority (80.4%) of the persons in charge of infection control in elderly-care facilities are nurses³⁾, which is close to 82.5%, the value obtained from hospitals²¹⁾. Furthermore, while 25.0% of these hospitals had a certified nurse for infection control who had knowledge about infection as prescribed by the Japanese Nursing Association²²⁾, only one nurse was designated for infection control in elderly-care facilities²³⁾. In elderly-care facilities, early decisions for preventing the spread of disease, such as isolation of patients, are made by nurses⁷⁾. However, 12.5% of the nurses reported that they felt it was burdensome to make such judgments due to the absence of doctors¹³⁾. As stated above, although nurses are expected to prevent infections, personnel who met that expectation was guessed to be insufficient. For this reason,

encouraging and securing role models in order to prevent infection in elderly-care facilities is considered an urgent task. The provision of manuals and hand-care products, as well as the establishment of consultation stations, has improved hand hygiene, the availability of these resources in elderly-care facilities is necessary for promoting hand hygiene¹⁶⁾. Although lack of time can be a factor that prevents good hand hygiene practice, it has been suggested that experienced nurses will find a way to practice good hand hygiene despite time constraints²⁴⁾. The mean duration of experience of the respondents in this study is ten years longer than that of the previous study. Therefore, it is possible that they are experienced enough to find a way to practice good hand hygiene.

3. Path model of hand hygiene practice: Role model of hand hygiene directly and indirectly affected practice. The existence of a person who can be a model has been shown to be a factor that facilitates hand hygiene practice in the prevention of infection^{17,18)}, and this was confirmed in this study, as well. Furthermore, since responsibility indirectly affected practice by increasing the desire to learn, it can be considered that the solution to the problem of infection prevention is related to professional ethics. The Japan Nursing Association's code of ethics²³⁾ specifies that nurses should always endeavor to maintain/develop their ability through constant learning as an individual responsibility, and that this is a part of their responsibility as professionals. Since responsibility greatly motivates one to learn, this course should be used for educating the nurses about infection prevention. While qualification had a positive influence on responsibility, role/post had a negative influence and the influence of legal status was significant. Thus, the opportunity to learn how specialized responsibility is related to infection prevention was deemed necessary for

promoting hand hygiene practice.

Conclusion

1. A nurse's awareness of hand hygiene is, probably explained by desire for learning, practice, and responsibility.
2. It was considered necessary to develop and secure human resources with specialized knowledge about hand hygiene and methods of infection prevention in order to promote hand hygiene practice.
3. A path model to practice hand hygiene could be utilized for educating nurses about infection prevention.

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