

# Translating and Evaluating Psychometrics Property of Hand Hygiene Questionnaire-Persian Version

Tahereh Najafi Ghezjeljeh <sup>1\*</sup>, Maryam Khosravi <sup>2</sup>, Tahereh Tolouei Pournanjarani <sup>3</sup>

1. School of Nursing and Midwifery, Iran University of Medical Sciences, Tehran, Iran.

2. Children's Medical Center, Tehran University of Medical Sciences, Tehran, Iran.

3. Shohadaye-Hafte Tir Hospital, Iran University of Medical Sciences, Tehran, Iran.

Article info:

Received: 17 Jun. 2014

Accepted: 20 Sept. 2014

## Keywords:

Hand hygiene questionnaire, Hand hygiene knowledge, Hand hygiene belief, Hand hygiene practice, Instrument validity and reliability

## ABSTRACT

**Background:** Since hand hygiene is a key strategy for infection control, considering appropriate instrument for evaluating health care providers' hand hygiene is essential. In this study, translation process and evaluating reliability and validity of hand hygiene questionnaire (HHQ) is described.

**Methods:** HHQ was translated into Persian with combined method. In this cross-sectional study, the questionnaire was given to 60 nursing students in sixth semester. The internal consistency, test-re-test reliability, convergent construct validity of the questionnaire were measured. The data were analyzed by SPSS software, 16th version.

**Results:** The cronbach's alpha of HHQ was 0.80. Intra class correlation coefficient ranged from 0.70-0.85 and standard error of measurement was low. There were no significant statistical differences between test and retest. Also convergent construct validity of HHQ was optimal.

**Conclusion:** The results indicated that validity and reliability of HHQ-Persian version were appropriate and satisfactory. It can be used for nursing students; however, for other health care providers further evaluation is essential.

## 1. Background

**H**and hygiene before and after contact with patients is a key strategy for infection control (Pratt et al. 2007). Hands of health care providers can potentially be infected with pathogens and then can be transmitted to patients, so hand hygiene can reduce infection transmission (Van de Mortel et al. 2010). Nursing students are the future workforce in the healthcare system and training before employment can be one of the important factors in hand hygiene compliance (Barrett et al. 2008). Lymer et al. (2004) also stated that nursing students are in an ideal position to promote hand hygiene, because through sharing proper knowledge and practice of hand hygiene with health care providers they can be an important element in the compliance of hand hygiene. The responsibilities of universities are to pro-

vide infection control training (including hand hygiene) for students in order to maintain safety of patients and students. For this purpose, it is necessary to evaluate students' practice so as to evaluate the effectiveness of training programs and to develop effective interventions to improve infection control and hand hygiene practices (McCarthy et al. 2000).

In Iran most studies were generally focused on hospital infection control and limited studies have specifically examined hand hygiene. Some of studies regarding the hospital infection control had been conducted on medical students (Askarian et al. 2004), as well as nursing and midwifery students (Askarian et al. 2007). One of the problems in the assessment of hand hygiene in different groups of health care providers is providing appropriate instrument for evaluating this concept. In the study which aimed at determining the students' compe-

\* Corresponding Author:

Tahereh Najafi Ghezjeljeh

Address: School of Nursing and Midwifery, Iran University of Medical Sciences, Rashid Yasemi St., Valiasr St., Tehran, Iran

Email: najafi.t@iums.ac.ir

tence in hand hygiene, Cole (2009) used questionnaire and interview; however, the developing process and characteristics of the questionnaire was unknown. Singh et al, (2011) developed a questionnaire with 15 closed-ended items with using the panel of experts. But they did not describe developing process and psychometric evaluation of the questionnaire.

Among the studies have been conducted in Iran, there are some limitations regarding the research instrument and evaluating the actual performance of the individuals. For instance, in the studies of assessing isolation precautions (Askarian et al. 2004), and describing nurses and nursing students' knowledge about infection control (Jokar et al. 2007), the method of evaluating psychometric properties of the instruments was not clear.

Hand hygiene questionnaire (HHQ) was developed by Van de Mortel (2009) and was translated in to Greek, Italian and Swedish. Its focus is on assessing knowledge, importance, belief and practice of students regarding hand hygiene.

In the current paper, translating and cross-cultural adaptation of HHQ into Persian is initially reported. Then, evaluating psychometric properties of the questionnaire was discussed.

## 2. Materials & Methods

### Instrumentation

In the current study, HHQ was applied upon obtaining written permission from developer (Van de Mortel 2009). The questionnaire contains 12 multiple choice questions to assess knowledge of hand hygiene. The correct answer is given score 1 and a total score is obtained by summing the results. Students highlighted knowledge about hand hygiene by selecting the appropriate option. In order to assess beliefs about hand hygiene, the 19 items was used. The students were asked to show their opinion about each item on a 6-part Likert scale from zero (never) to 5 (always). The scores of some items (5, 7, 9, 15, 16, 17, 18, and 19) were reversed. The mean total score was calculated to determine the belief about hand hygiene. The three items were used to assess beliefs about the importance of hand hygiene. Students indicated their answer for each item on a 6-point Likert scale from zero (never) to 5 (always). The mean total score was considered as beliefs about hand hygiene importance. For evaluating the practice of hand hygiene, the 14 items on a 5 point Likert scale was used and higher score indicated the maximum performance.

The students were asked to specify their practice on each item on the scale. The mean total score was considered as performance of students regarding hand hygiene.

### Translation Procedure

The HHQ was translated from English into Persian. The combined method (Jones et al. 2001) was used to translate it. In this method, at first the original version of the questionnaire was translated from English into Persian by two translators, then the Persian version was back-translated into English by two other translators. For ensuring that both have the same meaning and are equivalent to the original version, the back-translated version was sent to the developer. Then, in a meeting with translators and researchers, Persian and back-translated versions of the questionnaire were compared with original version.

They reached consensus about the meaning of words and concepts and the Persian version of HHQ was prepared. The HHQ-Persian version was given to six faculty members for receiving their corrective feedback. The questions 11 and 12 were related to knowledge evaluation about hospital infection rates and its costs in developed countries, therefore, they were deleted for adapting the questionnaire according to Iran context. Due to the lack of accurate statistics regarding this issue in Iran, there was not possible to add other questions. Also a question was added to assess information about the use of gloves. Based on the received comments, the questions for assessing knowledge about hand hygiene were modified and all questions were expressed as a fourth choice. According to corrective feedback, most questions were also negatively expressed; most of these questions were modified and expressed positively. The choices of questions were modified according to changes in the question stems. Thus, the questionnaire was ready and its validity and reliability could be checked.

### Psychometric properties

In this study, the content and face validity of the questionnaire was examined. To determine the content validity of the questionnaire, 10 faculty members of nursing reviewed it. To evaluate the face validity of HHQ-Persian version, 20 undergraduate nursing students in 6th semester were selected by convenience sampling and were asked to complete it. They were interviewed in a researcher's room for 10-15 minutes. They were asked about their thoughts and feelings on the possible problems in the questionnaire. They did not mention any problem in completing it. The discrimination and difficulty indexes were calculated. To distinguish between

**Table 1.** Frequency of correct response and discrimination and difficulty indexes of hand hygiene knowledge subscale.

Correct responses (appendix1)	Frequency (%)	Discrimination index	Difficulty index
Before beginning the surgical hand scrub, rings, watches and bracelets should be taken off.	21 (35.00)	0.30	0.35
After paper works	11 (18.30)	0.22	0.19
Before controlling ECG	44 (73.00)	0.67	0.73
Hand hygiene should be performed when entering or exiting the isolation room.	44 (73.00)	0.47	0.73
In health centers, hot water for hand washing should not be used because it increases the risk of skin irritation.	42 (70.00)	0.67	0.70
Before contacting the patient's tools	17 (28.30)	0.28	0.28
The alcoholic cleansers reduce bacteria on hands more effectively.	44 (73.00)	0.44	0.73
Hands should be rubbed for 60 seconds.	44 (73.00)	0.44	0.73
Disposable paper towels	29 (48.30)	0.25	0.48
During patient care if moving from a contaminated area to a clean area of the patient's body, gloves should be replaced.	43 (71.66)	0.40	0.71
Before wearing and after removing gloves, hand washing should be done.	25 (41.70)	0.27	0.41

Client-Centered Nursing Care

people with different levels of knowledge, the association of each item with the total score was calculated and the coefficient less than 0.2 was considered as discrimination index (Seif 2006). The difficulty index of each question was calculated by dividing number of correct responses to the total responses. The difficulty index more than 0.75 was considered as low (Seif 2006).

The results show that question 10 (wearing glove before entering and after leaving the patient's room with isolation precaution is necessary) had low discrimination and difficulty indexes. Thus, its stem and choices were altered in order to increase both indexes for question 10. The final format of HHQ-Persian version was prepared.

In this cross-sectional study, the validity and reliability of the questionnaire was evaluated. Through convenience sampling, 60 undergraduate nursing students in 6th semester were selected. Ethical issues such as obtaining verbal informed consent and ensuring the confidentiality of information were considered. Students were asked to complete it. The response time was about 15-20 minutes.

In order to check the reliability and internal consistency, the test - retest method was used. For test-retest, the questionnaire was given to students to be completed again after 7-10 days and the data were statistically analyzed.

Convergent validity was also assessed by examining the correlation between subscales of HHQ-Persian version.

### Statistical Analysis

Data were analyzed by SPSS version 16. A significant level of 0.05 was considered. Descriptive statistics were used to describe variables. For assessing internal consistency, Cronbach's alpha was calculated for different parts and the whole questionnaire. Coefficient equal or greater than 0.7 indicates that the questionnaire has good reliability. The reliability of the scale by excluding each item and item-total scale correlations were performed. The intraclass correlation coefficient (ICC) and standard error of measurement (SEM) were calculated. The ICC greater than 0.6 was considered as good reliability of the questionnaire. Also less SEM is considered as greater reliability (Bruton et al. 2000; Streiner 2008). For comparing test-retest values, paired t-test was used. To examine the convergent validity, Pearson correlation coefficient was used. For questions about hand hygiene knowledge, discrimination and difficulty indexes were calculated.

### 3. Results

In this study, the discrimination and difficulty indexes of knowledge subscale and psychometric properties of HHQ-Persian version were determined. The mean age of

**Table 2.** Mean scores (standard error of measurement), Cronbach's alpha and intraclass correlation coefficient of HHQ-Persian version and its subscales.

Subscales of HHQ		Mean (Standard error of measurement)	Cronbach's alpha	Alpha by excluding each item	Intraclass correlation coefficient (confidence interval 95%)
Importance	Test	4.00 (0.10)	0.70	0.82-0.88	0.78 (0.63-0.87)
	Retest	4.00 (0.11)	0.77		
Belief	Test	4.11 (0.09)	0.74	0.90-0.91	0.70 (0.60-0.81)
	Retest	4.08 (0.08)	0.92		
Practice	Test	4.46 (0.07)	0.90	0.86-0.87	0.85 (0.73-0.91)
	Retest	4.47 (0.06)	0.90		
Total	Test	--	0.80		0.76 (0.65-0.85)
	Retest		0.91		

Client-Centered Nursing Care

participants was  $21.98 \pm 1.72$  and 36 participants (60%) were male.

Discrimination and difficulty indexes of hand hygiene knowledge subscale are presented in Table 1. According to the results, discrimination and difficulty indexes of all the questions are over 0.2 and less than 0.75, respectively. These results represented a reasonable and acceptable discrimination and also indicated difficulty indexes for knowledge subscale.

Cronbach's alpha for subscales (importance, belief and practice of hand hygiene) and the entire questionnaire are reported in Table 2 where alpha greater than 0.70 and the good internal consistency are indicated. Cronbach's alpha changes resulting from the exclusion of each item indicate reliability of subscales. The standard error of measurement of each subscale and total questionnaire were low. The intraclass correlation coefficient of subscales (importance, belief and practice of hand hygiene) was 0.70-0.85 with narrow confidence interval.

In all subscales (hand hygiene knowledge, practice, importance and belief), the correlation of each item with the total score was moderate to high. In the hand hygiene

importance subscale, the correlation coefficients were between 0.52 to 0.73. In the hand hygiene belief and practice subscales, the range of correlation coefficients were 0.41-0.70 and 0.45-0.62, respectively, which indicated high correlation between items and good reliability of questionnaire.

Paired t-test results showed that there is statistically no significant difference between test and retest scores of sub-scales (hand hygiene knowledge, practice, importance and belief) (Table 3). Pearson correlation test showed that there was a significant relationship between test and retest scores of hand hygiene knowledge subscale ( $r=0.84$ ,  $P<0.001$ ).

Also, the results indicated that there was a statistically significant and direct correlation between the scores of hand hygiene importance ( $r=0.64$ ,  $P<0.001$ ) and belief ( $r=0.71$ ,  $P<0.001$ ) subscales at test and retest.

Furthermore, the results of Pearson correlation showed that there was a statistically significant correlation between the scores of hand hygiene knowledge, practice, importance and belief subscales (Table 4). The con-

**Table 3.** Mean (SD) scores of HHQ-sub-scales and the results of paired t-test (n=60).

Subscales of HHQ		Mean (Standard deviation)	Paired t-test (P value)
Importance	Test	4.00 (0.79)	0.01 (1.00)
	Retest	4.00 (0.85)	
Belief	Test	4.11 (0.71)	0.32 (0.75)
	Retest	4.08 (0.68)	
Practice	Test	4.46 (0.46)	0.28 (0.78)
	Retest	4.47 (0.52)	
Knowledge	Test	6.42 (1.51)	1.68 (0.10)
	Retest	6.12 (1.69)	

Client-Centered Nursing Care

**Table 4.** Correlation of the scores of hand hygiene knowledge, practice, importance and belief subscales (n=60).

Hand Hygiene subscales	Importance	Belief	Practice	Knowledge
Importance	1			
Belief	0.40*	1		
Practice	0.52**	0.40*	1	
Knowledge	0.41*	0.50**	0.52**	1

\*P value=0.003

\*\*P value&gt;0.001

Client-Centered Nursing Care

vergent validity of the HHQ-Persian version is good enough.

#### 4. Discussion

This study examined the validity and reliability of HHQ-Persian version. According to the results, discrimination indexes of hand hygiene knowledge questions were more than 0.2 and appropriate. The difficulty indexes of hand hygiene knowledge questions were less than 0.75 and good enough.

In this study, the Cronbach's alpha of subscales and the entire questionnaire was more than 0.70, thus internal consistency of the questionnaire and its subscales (hand hygiene importance, belief and practice) were satisfactory. Van de Mortel (2009) in the study of developing and psychometric evaluation of HHQ indicated that the Cronbach's alpha of hand hygiene importance, belief and practice subscales were 0.80, 0.74 and 0.77, respectively. There was not significant differences between the scores of hand hygiene subscales between days, therefore, this implies that HHQ-Persian version has good reliability over time. Van de Mortel (2009) reported that there were no differences between the sets of compared data.

There was high and direct relationship between the scores of hand hygiene knowledge, importance, belief and practice subscales at test and retest. This is indicator of a good reliability of the HHQ-Persian version. The ICC values were high with narrow confidence interval, which implies the reliability of the questionnaire. The SEM of hand hygiene importance, belief and practice subscales was low which indicated good reliability of HHQ-Persian version. Van de Mortel (2009) also reported that test and retest coefficients for the hand hygiene knowledge, importance, belief and practice subscales were 0.85, 0.79 and 0.89, respectively. In the current study, the results indicated good internal consistency and reliability of HHQ-Persian version. Therefore, HHQ-Persian version has the properties of stability and internal consistency. According to the results, there was a significant association between the scores of subscales

with each other. This association indicates the construct validity of the questionnaire.

According to the findings of the current study, the validity and reliability of HHQ-Persian version and its subscales, including hand hygiene knowledge, importance, belief and practice, were appropriate and satisfactory. It can be used in clinical settings and evaluating nursing students. Also it can be used in comparative researches across culture. However, for other groups of health care providers, it needs further research.

#### Conflict of interest

The authors declare that they have no conflict of interest.

#### Acknowledgments

The authors would like to thank the Faculty of Nursing at Iran University of Medical Sciences in Iran for their support.

#### References

- Askarian, M, Honarvar, B, Tabatabaee, HR & Assadian, O 2004, ['Knowledge, practice and attitude towards standard isolation precautions in Iranian medical students' (Persian)], *Journal of Hospital Infection*, vol. 58, pp. 292-296.
- Askarian, M, Memish, ZA & Khan, AA 2007, ['Knowledge, practice, and attitude among Iranian nurses, midwives, and students regarding standard isolation precautions' (Persian)], *Infection Control & Hospital Epidemiology*, vol. 28 no. 2, pp. 241-244.
- Barrett, R & Randle, J 2008, 'Hand hygiene practices: nursing students' perceptions', *Journal of Clinical Nursing*, vol. 17, no. 14, pp. 1851-1857.
- Bruton, A, Conway, JH & Holgate, ST 2000. 'Reliability: what is it and how is it measured?' *Physiotherapy*, vol. 86, no. 2, pp. 94-99.

- Cole, M 2009, 'Exploring the hand hygiene competence of student nurses: a case of flawed self-assessment', *Nurse Education Today*, vol. 29, no. 4, pp. 380-388.
- Joekar, F, Taheri & Azbarmi, Z 2007, ['Comparing knowledge of nurses and nursing students about hospital infections' (Persian)], *Iranian Journal of Infectious Diseases and Tropical Medicine*, vol. 12, no. 37, pp. 83-86.
- Jones, Ps, Lee, Jw, Phillips, LR, Zhang, XE & Jaceldo, KB 2001, 'An adaptation of Brislin's translation model for cross-cultural research', *Nursing Research*, vol. 50, no. 5, pp. 300-304.
- Lymmer, UB, Richt, B & Isaksson, B 2004, 'Blood exposure: factors promoting healthcare workers' compliance with guidelines in connection with risk', *Journal of Clinical Nursing*, vol. 13, no. 5, pp. 547-554.
- McCarthy, GM & Britton, JE 2000, 'A survey of final-year dental, medical and nursing students: occupational injuries and infection control', *Journal of the Canadian Dental Association*, vol. 66, no. 10, pp. 561-565.
- Pratt, RJ, Pellowe, CM, Wilson, JA, Loveday, HP, Harper, PJ & Jones, SR, et al 2007, 'Epic2: National evidence based guidelines for preventing health care associated infections in the NHS hospitals in England', *Journal of Hospital Infection*, vol. 65(Supplement 1), pp. S1-S64.
- Seif, A 2006, [*Educational measurement, assessment and evaluation* (Persian)], Davaran Publication, Tehran, Iran.
- Singh, A, Purohit, BM, Bhambal, A, Saxena, S, Singh, S & Gupta, A 2011, 'Knowledge, attitudes, and practice regarding infection control measures among dental students in central India', *Journal of Dental Education*, vol. 75, no. 3, pp. 421-427.
- Streiner, D & Norman, G, 2008, *Health measurement scales: a practical guide to their development and use*, 4<sup>th</sup> edn, Oxford University Press, Oxford, UK.
- Van de Mortel, TF 2009, 'Development of a questionnaire to assess health care students' hand hygiene knowledge, beliefs and practices', *Australian Journal of Advanced Nursing*, vol. 26, no. 3, pp. 9-16.
- Van de Mortel, TF, Apostolopoulou, E & Petrikos, G 2010, 'A comparison of the hand hygiene knowledge, beliefs, and practices of Greek nursing and medical students', *American Journal of Infection Control*, vol. 38, no. 3, pp. 75-77.