

## Original Article

# Factors Influencing Compliance with Isolation Precautions among Nurses who Work in Turkish Surgical Clinics

Elif KARAHAN<sup>1\*</sup>, Nurten TAŞDEMİR<sup>2</sup>, Sevim ÇELİK<sup>3</sup>

1. Assistant Professor, Department of Nursing, Faculty of Health Sciences, Zonguldak Bulent Ecevit University, TURKEY.
2. Associate Professor, Department of Nursing, Faculty of Health Sciences, Zonguldak Bulent Ecevit University, TURKEY.
3. Professor, Department of Nursing, Faculty of Health Sciences, Zonguldak Bulent Ecevit University, TURKEY.

\* Corresponding author: **Elif KARAHAN**, Department of Nursing, Faculty of Health Sciences, Bulent Ecevit University, Zonguldak, TURKEY. E-mail: elifim67@yahoo.com

## Abstract

**Background:** It is stated that hospital infections violating patient safety constitute an important problem in developed and developing countries all around the world. The aim of this study is to examine the compliance with isolation precautions of nurses working in surgical clinics.

**Methods:** This is a descriptive study. The study was performed with 190 nurses working in surgical clinics. The questionnaire consisted of demographic, infection and isolation questions and the Turkish version of “The Isolation Precautions Compliance Scale” was used.

**Results:** The average score of the nurses' isolation precautions compliance scale is  $70.87 \pm 10.01$ . There was a negatively significant negative correlation between the age of nurses the total duration of the study and the total score of isolation precautions compliance scale. Nurses who received orientation and in-service training on isolation measures had a significantly higher total score on the isolation precautions compliance scale.

**Conclusion:** It was found that nurses had high compliance scores on the isolation measures.

**Keywords:** Compliance with infection precautions, infection, nurses, surgical clinic

## Introduction

Hospital infections are defined as “healthcare-associated infections” (HCAs) that are related to being present at a hospital, and that pose a serious threat to the health of patients, healthcare staff, companions and anyone visiting the hospital (1,2,3). HCAs are the infections that can make the duration of hospital stays longer, increase additional treatment costs and have high morbidity and mortality rates. In developed countries, 5-10% of the patients that were admitted to the hospital developed hospital-acquired infections, while this rate was stated to be over 25% in developing countries. Prevalence of HCAs

in Turkey was reported as 12.5% (4). Bacteria, viruses and fungal parasites are among some of the nosocomial pathogens found. According to the estimates of the World Health Organization (WHO), those infections occur in approximately 15% of hospitalized patients (5). The most commonly observed types of HCAs are urinary tract infections, surgical site infections, catheter-related infections and ventilator-related infections. The occurrence risk of those infections in surgical clinics is increasing due to a number of reasons including prolongation of life expectancy, technological

developments and the process of surgery (6).

The capability to apply isolation precautions and ensure compatibility among health professionals are important in terms of controlling HCAs. The objective in isolation is to prevent the patient that has an epidemiologically important pathogenic microorganism infection/colonization from infecting other patients, healthcare staff and visitors (7). Precautions of isolation include hand washing, usage of personal protective equipment, control of patient wastes, providing special rooms, cleaning the care equipment, cleaning of the environment and sterilization (8).

Compliance of a nurse with infection control precautions, particularly hand hygiene, is quite important in terms of reducing HCAs. The WHO reported that hospital infections increase the duration of a hospital stay by 5 to 10 days. More than 30,000 people die every year due to hospital infections, and these infections constitute a risk factor for the staff and other hospitalized patients (4). Centers for Disease Control and Prevention (CDC) data reported that HCAs develop in nearly 1 out of 25 hospitalized patients at any given time, and those infections cause thousands of deaths and cost billions of dollars in the USA every year (8). It was found in the studies conducted to determine the cost of HCAI in Turkey that there is a 10-day extension in hospitalization, the mortality rate is 17% and there is an incremental cost of more than \$1,500 in costs (9).

The attitudes of healthcare professionals impact not only their own health but the quality of work they do. Therefore, it is important that the members of the healthcare staff gain the necessary

knowledge, skills and attitude towards preventing and managing hospital infections. Increasing the compliance with isolation precautions contributes to the reduction of hospital infections. The present study's objective is to investigate the compliance of nurses working in surgical clinics dealing with isolation precautions.

## Methods

This is a descriptive and cross-sectional study. The population of the research consists of nurses working in surgical clinics, intensive care units, emergency care departments and surgery rooms of both the public and university hospitals in Turkey. The hospital clinics are similar to each other in working process, unit levels and organizational structures. The nurses who accepted to participate in the study and who were neither on sick leave nor on casual leave were included in the sample. The sample size was calculated to be 189 in the 370 population with 95% confidence interval and 5% acceptable error. The study sample included 190 nurses.

The researchers collected the data using The Isolation Precautions Compliance Scale and a personal/professional information form was prepared based on the relevant literature. There were five personal information questions and six questions pertaining to the isolation precautions on the personal/professional information form. The Isolation Precautions Compliance Scale which aimed to measure the compliance of healthcare staff to isolation precautions was developed by Tayran in 2009 (10). The validity and reliability studies of the scale were conducted in 2010, and it includes 18 statements. The scale has four sub-dimensions on the way of

transmission, safety of the staff and patients, environmental control, hand hygiene and the use of gloves. Cronbach's alpha value is  $\alpha:0.85$ . The scale is the five-point Likert type scale. The lowest score is 18 and the highest is 90, and as the score increases, the compliance increases accordingly. Cronbach's alpha value for this study was calculated as  $\alpha:0.82$ .

The data was collected through a face-to-face interview method between March and August 2016 by using the personal/professional information form and the Compliance Scale to Isolation Precautions. Written permission of the university's ethical committee and the institutions where the study was going to be carried out was asked for before collecting the data. The researchers provided the nurses with information and explanations about the research and their verbal consent was taken in order to take part in the study. The interviews were carried out by the researchers during visits to each of the hospitals within working hours during appropriate times for the nurses. In both hospitals, the nurses participating in the study completed the forms themselves under the supervision of the researcher and the interviews lasted for 5-10 minutes on average.

SPSS 16.0 statistical software was used in analyzing the data. Frequency and percentage were used in categorical variables; average, standard deviation, and min-max were used to measure continuous variables. T-test for independent variables was used in comparing scale scores of the two independent groups. The one-way ANOVA and Tukey test were used in comparing the scale scores of more than two independent groups. The Pearson correlation analysis was used in the

evaluation of the relationship between scale score and certain variables. The results were evaluated at 95% confidence interval, with  $p<0,05$  significance level.

Written permission was obtained from the hospitals and the Ethical Committee of Human Studies (with the date 02/17/2016 and Protocol No: 100) for the implementation of the research. Written permission was taken from the author by e-mail to use the scale that had validity and reliability in Turkish language. Verbal consent was obtained from the nurses who were informed about the objective of the study and that the data would be used for scientific purposes only.

## Results

The mean age of the nurses is  $30.24 \pm 6.42$  years; 82.1% are female and 17.9% are male; 68.9% have a bachelor's degree. The average professional working years of nurses is  $8.62 \pm 6.38$ ; 65.3% are working in a university hospital and 34.7% are working in a public hospital (**Table 1**).

The Isolation Precautions Compliance Scale total mean score of nurses is  $70.87 \pm 10.01$  (min: 18.00, max: 90.00). The mean score of the scale sub-dimensions are  $22.89 \pm 4.02$  for mode of transmission,  $19.59 \pm 4.17$  for safety of the staff and patients,  $17.74 \pm 2.86$  for environmental control, and  $10.64 \pm 2.50$  for hand hygiene and use of gloves (**Table 2**).

Personal/Professional characteristics and nurses' scores on the isolation precautions compliance scale were compared in this study. It was concluded that there is a weak and negatively significant relationship between the variable of age ( $r=-0.17$ ,  $p=0.01$ ) and the years worked professionally ( $r=-0.14$ ,  $p=0.04$ ) and the compliance scale total score. It was detected that there is no significant

difference between the isolation precautions compliance scale total scores based on gender and education level. It was concluded that the compliance scale total scores of nurses working in university hospitals for isolation precautions are significantly higher ( $t=2.86$ ,  $p=0.00$ ) than those in public hospitals (**Table 3**). It was detected that the compliance scale total scores of nurses receiving in-service/orientation training within the institutions are also significantly higher ( $F=3.17$ ,  $p=0.04$ ).

In the evaluation of the problems that nurses experience and the practices they apply for isolation precautions, it was concluded that they mostly apply contact isolation at 92.6% and are able to spare an isolation room at a rate of 51.6%. When making decisions on the application of isolation in the case of tough pathogenic microorganism reproduction, they apply to the chief nurse at a rate of 58.9% and 43.7% of the nurses received training on isolation precautions within the scope of in-service training/orientation at their institution of employment. Regarding the evaluation of the problems faced in the application process of isolation precautions, 45.3% of the problem was that the staff did not comply with isolation precautions and 43.2% of the problem was that there were insufficient protective equipment/materials. Of the participants, 79.5% noted that rewarding the staff, 70% increasing surveillance and 40% increasing the awareness for isolation precautions by would make a positive impact on the facilitation of compliance with isolation precautions (**Table 4**).

## Discussion

One of the responsibilities of healthcare professionals in preventing HCAs is to

comply with isolation precautions. Isolation Precautions Compliance Scale total mean score of the nurses is determined as  $70.87 \pm 10.01$ , and this led the researchers to believe that the compliance of the nurses taking isolation precautions is at a good level. The similar studies conducted in Turkey also found that the compliance of nurses taking isolation precautions is also at a good level (11,12,13). It is reported that nurses comply better to hand hygiene than other healthcare professionals (14). Suliman detected that a majority of the nurses are well-informed about isolation precautions, and the rate of sufficient compliance is 65% (15). The studies in the literature that were conducted through observation and video recording for the evaluation of compliance found that nurses did not maintain sufficient compliance with isolation precautions (16,17,18). The study conducted by Allen demonstrated that executing a package program including an education program, creating a multi-disciplinary quality enhancement team, monitoring compliance and giving feedback significantly facilitated the compliance of healthcare professionals to isolation precautions (19).

This study revealed that there is a weak and negative correlation between age, years worked professionally and isolation precautions. Furthermore, the level of education is not significant when looking at the difference between isolation precautions and compliance. The literature discussed that the compliance with isolation precautions increases as the period of professional work increases; individuals with bachelor degrees have a higher level of compliance with isolation precautions than those with a lower level of education (11,13,15,20). Demir et al.

detected that newly graduated medical staff gave more accurate answers to the questions regarding hand hygiene (21). That study allows us to think that high compliance with isolation precautions of nurses who have little professional experience might stem from being more willing to apply the knowledge learned during an educational period. It was detected that the isolation precautions compliance scale total scores of nurses receiving in-service/orientation training who were oriented to isolation precautions are significantly higher. The studies reported that the rate of nurses receiving trainings about infections was high (11,12). The research results indicated that compliance with isolation precautions increase and infections decrease thanks to the training program (19,22). The Centers for Disease Control and Prevention indicated that periodic trainings on the prevention of infections should be supplied within the institution to all medical staff, patient care attendants, students, and temporary workers (8). This study also found that the institutions give importance to training in preventing infections from spreading, and nurses are sensitive about participating in these trainings.

This study concluded that the compliance with the isolation precautions of nurses working in university hospitals is significantly higher than nurses in public hospitals. University hospitals are medical institutions that not only provide people with general health services but also offer training services and perform research activities with specific health purposes (12,18). It is very important to prevent infection in all institutions providing health services.

The nurses are the healthcare professionals that most commonly make contact with

hospitalized patients. Therefore, nurses play quite a remarkable role in and make a great contribution to the prevention of hospital infections (23). This study indicated that nurses frequently take the advice of their clinical chief nurse in making decisions regarding which isolation method shall be applied and it has been found that they mostly apply contact isolation. The studies on preventing hospital infections are carried out by an infection control team, and full compliance of all medical staff is what is desired (23,24,25). Providing the coordination and cooperation between medical staff, particularly the Infection Control Team, is essential for running the right applications. It was reported that HCAs could be reduced by 33% in the countries where protection and control precautions are sufficiently applied (9). This study demonstrated that the problems with the application of isolation precautions were; the lack of materials and the deficient compliance of other medical staff and patients to isolation precautions. It is stated that the absence of financial opportunities, lack of training and insufficient awareness cause hospital infections to occur (3,23,25,26).

The nurses in this study stated that rewarding the staff and increasing the surveillance to facilitate compliance with isolation precautions will positively influence the team. It is emphasized that it was important to comply with all protection and control precautions, especially well-organized infrastructure, provide a sufficient number of nurses and medical staff, provide surveillance, training, and wash hands to prevent HCAs (9,27).



## Conflict of interest

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

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## Tables

**Table 1.** Distribution of Nurses' Demographic and Professional Characteristics

Characteristics	X ± SD	
Age	30.24 ± 6.42	
Years of Working Professionally	8.62 ± 6.38	
	n	%
<b>Gender</b>		
Female	156	82.1
Male	34	17.9
<b>Education Level</b>		
Vocational Health High School	47	24.7
Bachelor's Degree	131	68.9
Postgraduate Degree	12	6.3
<b>Hospital of Employment</b>		
University Hospital	124	65.3
Public Hospital	66	34.7

**Table 2.** Compliance Scale Averages of Nurses for Isolation Precautions

Scale Dimensions	X±SD
Mode of Transmission	22.89 ± 4.02
Safety of the Staff and Patients	19.59 ± 4.17
Environmental Control	17.74 ± 2.86
Hand Hygiene, Use of Gloves	10.64 ± 2.50
Compliance Scale Total Mean Score for Isolation Precautions	70.87 ± 10.01

**Table 3.** Comparison of Nurses' Demographic/Professional Characteristics and Mean Scale Scores

Characteristics	Mean Scores of Scale Sub-Dimensions				Mean Score of Total Scale
	Mode of Transmission	Safety of the Staff and Patients	Environmental Control	Hand Hygiene-Use of Gloves	
Age (30.24 ±6.42)	22.89±4.02	19.59±4.17	17.74±2.86	10.64±2.50	70.87±10.01
<b>r</b> <b>p</b>	-0.13 0.06	-0.08 0.24	-0.17 0.01	-0.14 0.05	-0.17 0.01*
Years of Working Professionally (8.62±6.38)	22.89±4.02	19.59±4.17	17.74±2.86	10.64±2.50	70.87±10.01
<b>r</b> <b>p</b>	-1.16 0.02*	-0.04 0.53	-0.14 0.05	-0.09 0.19	-0.14 0.04*
<b>Gender</b>					
Female	22.94±4.10	19.64±3.91	17.81±2.85	10.55±2.56	70.96±10.02
Male	22.64±3.69	19.35±5.26	17.44±2.93	11.02±2.19	70.47±10.07
<b>t</b> <b>p</b>	0.00 0.98	3.77 0.05	0.46 0.49	1.74 0.18	0.37 0.54
<b>Education Level</b>					
Vocational Health High School	22.68±4.54	20.42±4.48	18.14±2.15	10.89±2.46	72.14±9.29
Bachelor's D.	22.92±3.96	19.44±4.15	17.60±3.12	10.57±2.59	70.54±10.49
Postgraduate D.	23.41±2.27	18.00±2.21	17.75±2.26	10.41±1.50	69.58±7.02



<b>f</b>	<b>p</b>	0.16	0.84	1.91	0.15	0.62	0.53	0.33	0.71	0.55	0.57
<b>Hospital of Employment</b>											
Uni. Hospital		23.48±3.37		20.11±4.64		18.04±2.66		10.72±2.51		72.37±9.64	
Public Hospital		21.78±4.85		18.62±2.87		17.18±3.14		10.48±2.49		68.07±10.16	
<b>t</b>	<b>p</b>	2.81	0.00	2.37	0.01	2.00	0.04	0.63	0.52	2.86	0.00

\*p&lt;0.05

**Table 4.** Distribution of the Problems and Applications of Nurses Related to Isolation Precautions

	<b>n</b>	<b>%</b>
<b>Applied Isolation Type</b>		
Contact isolation	176	92.6
Close contact isolation	9	4.7
High risk patient isolation	3	1.6
Inhalation isolation	21	11.1
Droplet isolation	12	6.3
<b>Separating Isolation Room</b>		
Yes	98	51.6
No	50	26.3
Sometimes	42	22.1
<b>First Person Consulted for Isolation Application</b>		
Chief nurse	112	58.9
Physician in charge	30	15.8
Control committee for hospital-acquired infections	48	25.3
<b>Receiving Training about Isolation Precautions</b>		
During undergraduate education	71	37.4
During orientation/in-service training	83	43.7
Certificate programs/conventions	36	18.9
<b>Experienced Problems Related to Isolation Precautions*</b>		
Maladaptation of the staff to isolation precautions	86	45.3
Maladaptation of patient to isolation precautions	69	36.3
Insufficient protective equipment/materials	82	43.2
Insufficiency of institutional standards	54	28.4
<b>Factors Believed to Facilitate the Compliance with Isolation Precautions*</b>		
Rewarding the staff	151	79.5
Conducting more inspections	133	70.0
Increasing awareness	76	40.0

\*Multiple responses were given.