

Working Condition and Job Satisfaction of Nurses as Predicting Factors of the Prevalence of Health care-associated Infections among Elderly Inpatients

Abstract

Background: Health care-Associated Infections (HCAIs) are among the most common adverse events (AEs) that can negatively affect both patients and health systems. The elderly is among patients at high risk for infections. Some controllable risk factors have received less attention in research. Therefore, this study aims to investigate the relationship between prevalence of HCAIs among elderly inpatients, job satisfaction of nurses, and working condition. **Materials and Methods:** This cross-sectional study was conducted on 211 nurses working in hospitals affiliated with Iran University of Medical Sciences, Tehran, in 2021. The data were collected from HCAIs reports by the Nosocomial Infection Control Committee, a demographic questionnaire, the Practice Environment Scale of the Nursing Work Index (PES-NWI), and the Minnesota Satisfaction Questionnaire (MSQ). The data were statistically analyzed using Pearson correlation coefficient, ANOVA, *t*-test, and multiple linear regression (MLR) in SPSS 26. **Results:** The results showed that there was a significant relationship between the PES-NWI and MSQ ($r = 0.68, p < 0.00$). The MLR results indicated that staffing and resource adequacy, nurse participation in hospital affairs, job satisfaction, nursing manager's leadership, and nursing foundations for quality of care are predictive factors that these could explain 78% of the changes in the prevalence of HCAIs and the goodness of fit of the regression model was acceptable [$F_{6,210} = 129.47, p < 0.001$]. **Conclusions:** Since job satisfaction and the work condition could predict HCAIs among the elderly patients, healthcare administrators are recommended to consider these two variables in the development of HCAIs prevention and control programs.

Keywords: Elderly, health care-associated infections, job satisfaction, nurses, working condition

Introduction

Patient safety is the cornerstone of high-quality health care,^[1] and one of the main concerns of healthcare providers is provision of services for patients that do not cause them any harm.^[2] AEs in developing countries are 20 times higher than that of developed countries.^[3] AEs increase the Length of Stay (LOS), cause unfavorable patient output, and impose huge costs on health systems.^[4] The determinants of AEs include healthcare system, factors associated with the healthcare professionals, and nature of the medical sciences.^[3] HCAIs are among the most common AEs in healthcare systems,^[5] and they refer to infections that patients may develop more than 48 hours after receiving healthcare services.^[6] The most prevalent HCAIs are pneumonia, Urinary Tract Infection (UTI), Bloodstream Infection (BSI), and Surgical Site Infection (SSI).^[6]

Elderly patients are more vulnerable to HCAIs^[7,8] because they account for the largest group of people receiving healthcare services.^[9] Moreover, age-related physiological changes, underlying diseases, and type of healthcare services further predispose elderly patients to HCAIs.^[10] The health system providing healthcare services is one of the factors affecting the development of HCAIs. Workplace conditions and job satisfaction are two other factors related to the health system that have attracted less research. A systematic review study on the relationship between working conditions and nursing-dependent patient outcomes indicated that very few studies had focused on HCAIs.^[11] The results of similar review studies also confirm that the relationship between HCAIs and working conditions has been less dealt with in previous studies.^[12-14]

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Fereshteh Rezaie¹,
Farahnaz
Mohammadi-
Shahboulaghi²,
Reza Fadayevatan³,
Mohsen Shati^{4,5},
Gholamreza
Ghaedamini-
Harouni⁶

¹Gerontology Department, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran, ²Iranian Research Center on Aging, Nursing Department, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran, ³Iranian Research Center on Aging, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran, ⁴Mental Health Research Center, Psychosocial Health Research Institute, Tehran, Iran, ⁵Department of Epidemiology, School of Public Health, Iran University of Medical Sciences, Tehran, Iran, ⁶Social Welfare Management Research Center, Social Health Research Institute, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran

Address for correspondence:

Dr. Farahnaz
Mohammadi-Shahboulaghi,
Department of Nursing,
University of Social Welfare
and Rehabilitation Sciences,
Velenjak, Tehran, Iran.
E-mail: f.mohammadi@
uswr.ac.ir

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Job satisfaction of nurses is another factor affecting the development of HCAIs. Boev *et al.*^[15] investigated the relationship between the prevalence of HCAIs and job satisfaction of nurses over a period of 5 years and reported that there was a significant relationship between them. However, the study by Khatatbeh *et al.*^[16] on the relationship of AEs with social support and job satisfaction among nurses showed that HCAIs and medication errors, which are categorized as AEs, had no considerable relationship with any of the effective factors (social support and job satisfaction). Because of the paucity of studies and the contradictory results, further research is needed to better understand the relationships or differences.

HCAIs not only threaten the patients' health and life but also impose a great financial burden on both the patients and the health system.^[17] It is hence necessary to identify the factors affecting the prevalence of HCAIs to develop more effective preventive interventions. It is also noteworthy that the status and importance of these factors differ in different age groups.^[18-20] Therefore, this study aims to investigate the relationship between prevalence of HCAIs among elderly inpatients, job satisfaction of nurses, and PES-NWI.

Materials and Methods

A cross-sectional, descriptive-correlational study was conducted in September 2021 in two hospitals, which are affiliated with the Iran University of Medical Sciences. The study population consisted of all nurses working in hospitals affiliated with Iran University of Medical Sciences. From among the affiliated general hospitals, two were selected based on purposive sampling (considering greater diversity in inpatient wards). The data were collected depending on the prevalence and pattern of HCAIs over the past six months in different wards such as Intensive Care Unit (ICU), Critical Care Unit (CCU), surgery, respiratory, transplantation, ophthalmology, gynecology, internal medicine, neurology, dermatology, cardiology, gastroenterology, oncology, and endocrinology wards. Then, a list of nurses who worked in these wards was prepared and nurses were randomly selected (based on the desired sample size and the number of nurses working in the selected wards, multiple 3). The sample size was 154 participants based on sample size in regression studies ($N \geq 8k + 50$).^[21] The studied HCAIs included the four common nosocomial infections, that is, pneumonia, UTI, BSI, and SSI, which were diagnosed and recorded by the Nosocomial Infection Control Committee.

The nurses who had at least a bachelor's degree and a minimum two years of clinical experience, and in contact with patients at the same time as sampling, were selected as the participants. Depending on the number of nurses working in each ward, some of them were randomly selected to participate in the research. To this end, a list of the number of nurses in each ward was prepared, and then, one nurse in every three in each ward was randomly selected. If any of the selected nurses was not willing to

participate in the study, he/she would be replaced with another nurse randomly selected from the same ward.

All nurses who met the inclusion criteria were briefed on the research objectives and procedures, and then, a written consent form was obtained from them. Moreover, all participants were assured that their personal information would be kept confidential. The data collection tools were a demographic form, the Practice Environment Scale of the Nursing Work Index (PES-NWI), and the Minnesota Satisfaction Questionnaire (MSQ). The demographic form consisted of questions about age, gender, educational attainment, type of employment contract, and work experience. The data were analyzed using descriptive statistics (mean, frequency, and standard deviation) and statistics such as Pearson correlation coefficient, ANOVA, t-test, and Multiple Linear Regression (MLR) in IBM Corp. Released 2019. IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp.

Ethical considerations

Ethics approval was obtained from the Ethics Committee of the University of Social Welfare and Rehabilitation Sciences (IR.USWR.REC.1398.199). Before conducting the study, the researchers explained the study and its aims to the participants and a written informed consent was obtained from all the participants.

Results

The participants in this study included 211 nurses

Table 1: Frequency and percentage of nurses' categorical variables participant in the study

Variables	n (%)
Gender	
Female	180 (85.30)
Male	31 (14.70)
Education	
Bachelor	196 (92.90)
Master	15 (7.10)
Employment contract	
Official	99 (46.90)
Contractual	33 (15.60)
training	9 (4.30)
Private company	70 (33.20)
MSQ*	
Low	44 (20.90)
Moderate	106 (50.20)
High	61 (28.90)
NWI-PES**	
Favorable	51 (24.20)
Mix	59 (28.00)
Unfavorable	101 (47.90)

*MSQ Minnesota Satisfaction Questionnaire. **PES-NWI Practice Environment Scale of the Nursing Work Index

Table 2: Pearson correlation between MSQ and NWI-PES of nurses in study

	MSQ*		Intrinsic factors of MSQ		Extrinsic factors of MSQ	
	r	p	r	p	r	p
NWI-PES**	0.66	<0.001	0.62	<0.001	0.63	<0.001
Nurse participation in hospital affairs	0.59	<0.001	0.58	<0.001	0.53	<0.001
Nursing foundations for quality of care	0.56	<0.001	0.49	<0.001	0.54	<0.001
Nursing manager’s leadership, ability, and support for nurses	0.44	<0.001	0.42	<0.001	0.44	<0.001
Staffing and resource adequacy	0.54	<0.001	0.49	<0.001	0.55	<0.001
Collegial nurse-physician relations	0.51	<0.001	0.48	<0.001	0.53	<0.001

*MSQ Minnesota Satisfaction Questionnaire. **PES-NWI Practice Environment Scale of the Nursing Work Index

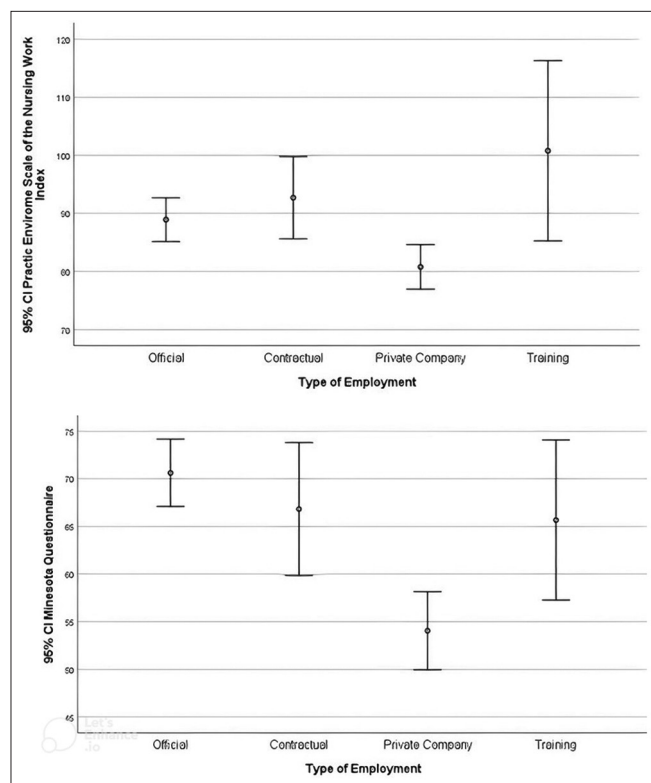


Figure 1: Graph with standard error bars of the relationship between Practice Environment Scale of the Nursing Work Index, Minnesota satisfaction Questionnaire and types of employment in participants

working in two general hospitals in Tehran affiliated with the Iran University of Medical Sciences. The mean age of participants was 35.10 (7.01) years, and their mean work experience was 12.13 (6.70) years. Female nurses accounted for the majority of the study participants. The data showed that 90% of the participants had a bachelor’s degree and most of them were either formally or contractually employed. About half of the participants reported a moderate level of job satisfaction and favorable PES-NWI [Table 1].

The mean (SD) scores for job satisfaction and PES-NWI were 3.16 (0.90) and 2.82 (0.60), respectively. The one-way ANOVA showed that the employment type of nurses had a significant relationship with their mean score for job satisfaction ($F = 12.34, p < 0.001$) and PES-NWI ($F = 5.84, p < 0.001$). The Tukey test and error bar chart demonstrated

Table 3: Pearson correlation between prevalence of HCAI* in elder patient with MSQ and NWI-PES of nurses in study

Independent variables	n	r	p
MSQ**	211	-0.73	<0.001
Intrinsic factors of MSQ	211	-0.69	<0.001
Extrinsic factors of MSQ	211	-0.71	<0.001
NWI-PES***	211	-0.84	<0.001
Nurse participation in hospital affairs	211	-0.75	<0.001
Nursing foundations for quality of care	211	-0.67	<0.001
Nursing manager’s leadership, ability, and support for nurses	211	-0.68	<0.001
Staffing and resource adequacy	211	-0.74	<0.001
Collegial nurse-physician relations	211	-0.60	<0.001

*HCAI Health Care-Associated Infection, **MSQ Minnesota Satisfaction Questionnaire, ***PES-NWI Practice Environment Scale of the Nursing Work Index

that the participants with official, training, and contractual employment were placed in a homogeneous group in which the mean scores were greater than those of the private company employment [Figure 1], considering the homogeneity of variances of PES-NWI ($p = 0.22$) and job satisfaction ($p = 0.35$) and the normal distribution of data.

Based on the data obtained from the MSQ, most participants were highly dissatisfied with working conditions mean (SD) 1.75 (0.85) and salaries mean (SD) 2.11 (0.94). The highest mean scores obtained on the subscales of PES-NWI were related to nursing foundations for quality of care mean (SD) 2.85 (0.90) and nurse participation in hospital affairs mean (SD) 2.80 (0.55).

The highest prevalence of HCAs was reported from the intensive care unit mean (SD) 33.18 (6.00), respiratory ward mean (SD) 23.61 (4.31), and surgery ward mean (SD) 15.44 (4.00). The results showed no significant relationship between gender ($t_{209} = 0.74, p = 0.46$) and educational attainment ($F_2 = 0.016, p = 0.90$) of the participants and the prevalence of HCAs. However, there was a significant relationship between job satisfaction and the PES-NWI ($r = 0.687, p < 0.001$), and significant relationships were also found between all the subscales [Table 2].

The results of the Pearson correlation test indicated that there was a significant relationship between higher

Table 4: Evaluation of predictors of health care-associated infection in elder patients using stepwise regression analysis

	<i>b</i>	Std. Error	β	<i>t</i>	<i>p</i>	Collinearity Statistics	
						Tolerance	Variance Inflation Factor (VIF)
(Constant)	54.24	1.84		29.42	<0.001		
Staffing and Resource Adequacy	-2.14	0.49	-0.21	-4.32	<0.001	0.43	2.34
Nurse Participation in Hospital Affairs	-2.44	0.61	-0.20	-3.97	<0.001	0.40	2.49
Extrinsic MSQ*	-0.348	0.08	-0.20	-4.13	<0.001	0.42	2.40
Nurse Manager, Leadership, and Support of Nurses	-2.53	0.57	-0.19	-4.45	<0.001	0.52	1.92
Intrinsic MSQ	-0.17	0.04	-0.19	-4.02	<0.001	0.43	2.32
Nursing Foundations of Quality Care	-2.11	0.87	-0.11	-2.44	0.016	0.52	1.92

$F_{6,210}=129.47$, $P<0.001$, $R=0.89$, $R^2=0.79$, Adjusted $R^2=0.78$, DW: 1.98. *MSQ Minnesota Satisfaction Questionnaire

prevalence of HCAs and job satisfaction (and their intrinsic and extrinsic factors) and the PES-NWI (and its subscales) [Table 3].

After controlling for “job satisfaction,” there was a significant relationship between the PES-NWI and prevalence of HCAs ($r = -0.69$, $p < 0.001$). Moreover, there was a moderate relationship between job satisfaction and prevalence of HCAs ($r = -0.44$, $p < 0.001$), after controlling for “PES-NWI.”

The relationships of the prevalence of HCAs with job satisfaction and PES-NWI were examined by using the stepwise linear regression analysis, and all regression assumptions were tested. Based on the case wise diagnostics table, the outliers were reported to account for 4.7% of the whole data at the 95% confidence level. The independence of measurement errors was also established (DW = 1.98), and the collinearity assumption was also tested by using the variance inflation factor and the tolerance index [Table 4].

The regression analysis results demonstrated the significant relationship of the prevalence of HCAs with the PES-NWI (and subscales of staffing and resource adequacy and nursing manager’s leadership) and intrinsic and extrinsic factors of job satisfaction [Table 4]. It can be generally concluded that the variables added to the research model could explain 78% of the changes in the prevalence of HCAs, and the goodness of fit of the regression model was acceptable [$F_{6,210}=129.47$, $p < 0.001$].

Discussion

Many factors contribute to the prevalence of HCAs. The study results showed that the prevalence of HCAs had a significant relationship with the PES-NWI and job satisfaction of nurses. Among the subscales of PES-NWI, staffing and resource adequacy, nurse participation in hospital affairs, nursing manager’s leadership, ability and support of nurses and nursing foundations for quality of care exhibited a greater effect on the prevalence of HCAs and were among the reasons for nurses to evaluate their

workplace as unfavorable. In another study conducted in Iran, staffing inadequacy was reported as a factor affecting the development of HCAs.^[22] Staffing and resource inadequacy has been also shown as an effective factor causing AEs and one of the main reasons for dissatisfaction with the work environment in other countries.^[13,14] It can be hence concluded that health systems around the world should try to solve problems of clinical work environments in order to provide safe healthcare services for patients.^[23]

Among the dimensions of PES-NWI, “nursing foundations for quality of care” and “nurse participation in hospital affairs” received the highest scores. This can be attributed to the implementation of the clinical governance and accreditation model in Iran’s health system since 2009 to improve the quality of clinical care,^[24] and the items related to these two dimensions are among the requirements of the clinical environment in Iran. In addition, following the further introduction of new technologies to clinical settings, there is a need to measure them as part of nurses’ work environment. Go *et al.*^[25] (2016) added “technology” as a new dimension to the PES-NWI; it is necessary to further measure this new dimension based on how much technology is involved in the provision of healthcare services.

The study results also suggested a significant relationship between job satisfaction and the prevalence of HCAs, which is consistent with the findings of Boev *et al.*^[15] but inconsistent with those of Khatatbeh *et al.*^[16] This discrepancy can be attributed to differences in reporting of HCAs; Khatatbeh *et al.* stated that HCAs were reported by nurses, which is prone to bias because of the fear of reporting and its subsequent punishment, whereas the Nosocomial Infection Control Committee was responsible for reporting of HCAs in the study conducted by Boev *et al.*

Consistent with most previous studies conducted in Iran,^[26,27] job satisfaction levels of nurses were moderate

and high in this research. Moreover, similar to other studies, working conditions and salary were the main causes of job dissatisfaction among nurses.^[26-28]

Nurses' job satisfaction with the type of private company employment contract was reported less than other groups, which is consistent with the results of some previous studies.^[29,30] This may be due to job insecurity and lower payments in this type of employment. A solution to this problem is to offer a uniform plan of salaries and benefits to all nurses.

The study findings on the relationship between age and job satisfaction were also consistent with the findings of some other studies.^[27,29] This can be attributed to the employment type because most nurses have been hired based on contractual employment, whereas older and more experienced ones are regular employees. Asghari states that this relationship may be due to the lower experience of young nurses; however, they find a more realistic view of their job over time or they enjoy their jobs more as they become more accustomed to their working conditions.^[29]

The study results also demonstrated a relationship between the PES-NWI and job satisfaction. Since a few studies have been conducted on this subject,^[31] it is necessary to carry out further studies on larger samples in different clinical settings.

The highest prevalence of HCAIs was observed in the intensive care unit (ICU) followed by respiratory and surgery wards. Since the hospitals were tackling the fourth and fifth waves of the COVID-19 pandemic during data collection and the uses of hospital wards were changed due to the allocation of beds to patients with this infection, it is not possible to interpret the reports on the prevalence of HCAIs in each ward. However, the wards in which more beds were occupied by COVID-19 patients reported a higher prevalence of HCAIs.

Since this research was a cross-sectional study and the participants were selected from only two general hospitals, the study findings cannot be generalized to other hospitals and nurses. In addition, the data collection stage of this study coincided with the fourth and fifth waves of the COVID-19 pandemic in Iran when most hospital wards were occupied specifically or periodically by COVID-19 patients. This issue may have limited generalizability of the results to times when COVID-19 pandemic does not exist. However, the study showed that the HCAIs have relationship with working conditions and job satisfaction but more researches are needed to confirm or find the reasons for rejection.

Conclusion

Since the study findings suggested that were significant relationships between the prevalence of HCAIs and job satisfaction of nurses and PES-NWI, these relationships

should be taken into account as an important point. Moreover, it is necessary to provide adequate staff and resources and improve "nursing manager's leadership, ability, and support of nurses" to upgrade the working conditions of nurses and reduce the prevalence of HCAIs. The results can be also used by managers and decision-makers to develop more effective plans and programs for preventing and controlling HCAIs.

Based on the study results, it is necessary to make appropriate financial and welfare management decisions for nurses in order to reduce their dissatisfaction with their payments and working conditions, especially in the case of those who are employed contractually.

Since the results and limitations of each study can pave the way for future research, the authors recommend that future studies develop appropriate interventions and make changes in in PES-NWI and job satisfaction of nurses to investigate the relationships between the prevalence of HCAIs and PES-NWI and job satisfaction to determine the degree to which these two variables influence the prevalence of HCAIs. Moreover, as few studies have been conducted on nosocomial infections in elderly patients, it is recommended that extensive research be conducted on this subject.

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Conflicts of interest

Nothing to declare.

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