



Correlation of Performance Indicators and Productivity of Emergency Departments

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Abstract

Background: Effective manpower is the main factor in success and significant achievement of health organizations.

Objectives: This study was conducted to assess nursing perceptions regarding performance indicators and its correlation with productivity within the emergency departments of hospitals affiliated to Shahid Beheshti University of Medical Sciences in Tehran, Iran, during year 2016.

Methods: This study was conducted by the cross sectional method, during year 2016. In this cross sectional study, the emergency departments of 4 hospitals of Shahid Beheshti University of Medical Sciences in Tehran were assessed. All nurses of emergency departments were selected through Census sampling methods. One of the researchers made a set of questionnaires for the assessment of the performance of nurses and a checklist as a means of productivity indicators to collect the data. Statistical analysis was conducted by the SPSS software version 18 and Pearson correlation test, T test, and analysis of variance (ANOVA).

Results: The performance of the nurses had a positive aptitude with the percentage of the patients, whose condition was determined within 6 hours and the percentage of the remaining patients, whose condition was resolved within 12 hours in the studied hospitals. On the contrary, the performance of the nurses had a negative correlation with average triage duration in the studied hospitals. Moreover, according to Pearson's correlation coefficient, it could be said that the performance of the nurses had a negative correlation with unsuccessful CPR percentage indicator and also with the percentage of discharge against medical advice in the studied hospitals.

Conclusions: According to the results, in order to achieve maximum outputs as productivity, the dimensions of performances needed to be improved. The Kardex evaluation items and shift reception evaluation achieved the lowest scores and need greater attention.

Keywords: Nursing Manpower, Performance, Productivity, Emergency Department

1. Background

In order to influence human resources and their traditional roles, endeavors for the amelioration of human resources is flourishing exponentially (1).

The most important influential factor in productivity and organizational performance is human resources (2). One of the main goals for any organizations, such as health care organizations, is to achieve productivity and human resources that play a vital role in such organizations (3).

Productivity is considered as a factor for measuring efficiency and effectiveness for achieving the desired output (4). Also, hospitals are known as the most expensive and the most costly units in health care and their performances have a great role in success. Today's economic pressures lead to increase of the minimizing cost in health care organizations while making sure that the patients receive

care with the desired quality in a safe environment (5). Human resources play a great role in productivity and performances of hospitals and are the most important assets of any health system (6). Awases showed that improvement of manpower's performance has a significant influence that leads to advancement of the productivity of the health system (7). Among manpowers in the health system, nurses make up the greatest number of employees at hospitals and their performances can influence productivity (8).

The performance among nurses has been evaluated by several studies. According to Helmer and Suver, nurses usually effect productivity and organizational progress more than any other group in the health care system, and a health care organization cannot last without an efficient nursing unit (9). Dehghan Nayeri (2006) also showed that a sufficient number of nurses and their performance ac-

cording to rules and regulations could improve hospital performance and productivity (10). In Holcomb's study, productivity of the nursing unit was defined by the ratio of output (patient care hours per patient day) to input (paid salary and benefit dollars) (11). Awases (2013) showed that a lack of recognition, quality performance outcomes, and an absence of a formal performance appraisal system and poor working conditions influence performance and productivity among the nursing manpower (7). Other studies have shown that different factors and indicators can be used to assess performance and productivity among nurses.

The need for assessing performance and its relationship with productivity is essential. Due to the importance and sensitivity of the working condition at emergency departments, this department should be assessed in terms of nurses performance and productivity (12, 13). In the health care system, performance evaluation and productivity are important issues both at the individual level and also at the national and organizational level (14). Regarding the important role of nursing manpower in hospital performance and productivity and lack of evidences to assess these matters in the hospitals of Iran and especially at emergency departments, conducting such studies is crucial and may lead to improvement in the performance and productivity of these departments.

2. Objectives

This study was conducted to assess nursing perceptions about performance indicators and its correlation with productivity at emergency departments of hospitals affiliated to Shahid Beheshti University of Medical Sciences of Tehran, Iran, during year 2016. Productivity was assessed by 5 indicators, grouped as efficiency (3 items) and effectiveness (2 items) indicators.

3. Methods

This study was a cross-sectional research conducted during year 2016 to assess nurses perception about performance indicators and its relationship with productivity. For this study, the emergency departments of 4 hospitals affiliated to Shahid Beheshti University of Medical Sciences were assessed. These 4 emergency departments had 150 nurses. All of these nurses took part in this study using the census sampling method and there were no specific inclusion and exclusion criteria.

A researcher-made questionnaire and a checklist were used to gather data. The questionnaire consisted of 2 parts; the first part was on demographic data (gender,

age, work experience, education, type of employment, and marital status) and the second part was designed to assess perceptions of nurses about performance indicators. In order to design a questionnaire, dimensions of nursing services evaluation in the hospital sections was used. This questionnaire includes 32 questions, which assess the nurses' performance in 8 dimensions (administrative regulations, professional behavior relationships, Kardex evaluation, pharmacotherapy evaluation, venous cure, regarding principles, shift reception evaluation items, and personnel training evaluation). Each dimension had 4 questions. In this research, the scoring of the nurses' performance indicators was done using a 5-point Likert scale. Options of each question consisted of phrase 1, I completely disagree; 2, I disagree; 3, I do not have any idea; 4, I agree; and 5, I completely agree. The range of scoring was distributed from score 1 (the lowest score) for completely disagree to score 5 (the highest rating) for completely agree. Scores less than 2.33 showed a low performance, scores between 2.34 and 3.66 showed medium performance, and scores higher than 3.66 showed high performance. Validity of the questionnaire according to 10 experts and reliability using Cronbach's alpha among 30 participants (0.75) was approved.

In order to assess productivity, a checklist was used. This checklist consisted of 2 parts; including effectiveness and efficiency indicators to assess the productivity. To assess the efficiency of the emergency department the following indicators were used:

- Percentage of patients, whose condition was determined within 6 hours
- Percentage of discharged patients from the emergency department within 12 hours
- The average time of the triage at each triage level, and for assessing the effectiveness the following indicators were used:
 - Percentage of unsuccessful CPR
 - Percentage of discharge against medical advice (15)

The questionnaire was distributed according to ethical considerations. This manuscript was part of the MSc thesis supported by Islamic Azad University, Tehran Science and Research branch, Faculty of Medical Science, and the ethical committee approved the study.

In order to perform the statistical analysis, the SPSS software version 18 was used. Data was analyzed using descriptive (frequency, percent, mean, and standard deviation) and analytical statistics. Kolmogorov-Smirnov test showed normal data. Pearson correlation coefficient, T-test and analysis of variance (ANOVA) at significance level of 0.05 was used.

4. Results

Overall, 150 nurses participated in this study (response rate = 100%). Out of 150 individuals, 99 nurses were female, 67 nurses were aged between 30 and 39 years old, and 132 nurses had bachelor degree of nursing. Mean and SD of performance indicators, according to demographic variables, are shown in [Table 1](#). Being female, younger ages, and less nursing work experience was associated with higher score of performance indicators. Comparison of means in demographic variables showed that performance indicators had a significant difference between individuals of different ages and work experience ($P < 0.05$) ([Table 1](#)).

[Table 2](#) shows the performance of nurses in different dimensions and productivity of emergency department. In terms of performance scores, nurses had a good position in all dimensions ([Table 2](#)).

[Table 3](#) shows the correlation between the nurses' performance and productivity indicators in terms of efficiency and effectiveness. There were significant positive correlations between nurses' performance and the percentage of patients, whose condition was determined within 6 hours and the percentage of the remaining patients that left within 12 hours ($P < 0.05$). There was a significant negative correlation between the nurses' performance and average triage duration at the studied hospitals ($P < 0.05$). There were significant negative correlations between nurses' performance and unsuccessful CPR percentage and the percentage of leaving with the patients' personal responsibility ($P < 0.05$). According to the results, there was a positive and significant correlation between productivity and nurses' performance (P value = 0.004).

5. Discussion

Staff play a remarkable role in the performance of health settings (16) and nursing performance effects the quality of care and safety and finally productivity at emergency departments (17). This study was conducted to assess nurses perceptions of performance indicators and its correlation with productivity at emergency departments of hospitals affiliated to Shahid Beheshti University of Medical Sciences in Tehran, Iran, during year 2016.

According to the results, comparison of mean in demographic variables showed that performance indicators had a significant difference with work experience ($P < 0.05$). Several studies assessed the relationship between demographic variables, such as experience and nurses performance. Jalalinia et al. (2006) showed that there was no relationship between work experience and aspects of nursing performance at the emergency department (18). Azarbarzin (2008) also assessed the relationship between

work experience of nurses and their consideration for the standards of muscular injections at some hospitals in Esfahan. This study showed that there was no significant association between experience and considering the standards of muscle injections (19). In Jalalinia and Azarbarzin's studies the performance of safe injection by nurses was examined and different results of this study may be assumed as different indicators, such as rules and regulation and evaluation of nursing items.

The results of the study showed that there was a significant relationship between nurse's performance and productivity at the emergency department ($P < 0.05$). In terms of productivity, there was a direct and significant relationship between the nurses' performance and determining the patient's condition in 6 hours. None of the emergency care aspects were reasonable and important as well as the ability of the emergency section in determining the patient's condition in a time frame (20). Jafari Sirizi (2017) showed that the presence of resident specialists resulted in a greater percentage of patients disposed during 6 hours, which is compatible with the current results (21). Other studies conducted by Amiresmaili (2015) also showed similar results, which means performance according to standards effect a hospital's output and productivity (22). Rules and regulation and performance according to these lead to better performance for hospital and emergency departments. This dimension may be the reason for the similarity of results with the current results. This factor makes the service more desirable and the reduction of waiting time for accessing services and additional beds will be available for future acceptance due to the reduction of the patients waiting time (23).

In this research, the performance of nurses had a significant and reverse relationship with unsuccessful CPR. The high statistics of CPR during the night shift can be related to personnel shortage and as a result, lack of the proper care of the patients and the lack of timely referral of the patients to the intensive care unit because of the lack of beds. Jafari Sirizi (21) and Hashemi (24) showed similar results while Amiresmaili (22) and Levy (2008) (25) showed that the CPR indicator may not be related to the performance of staff. The CPR success rate depends on many other factors and high performance of nurses may not lead to better output at emergency departments and thus different results are possible.

In this research, there was a significant relationship between the performance of nurses and the triage duration mean as an indicator for productivity. The study's results showed that triage training may be effective on the knowledge of the nurses working at the emergency in general and also their performance in particular. Furthermore, the outcome of this research indicated that there was no sig-

Table 1. Demographic Variables and Relationship with Performance Indicators Among Nurses

Variable	Frequency	Nurses Performance, Mean \pm SD	Significant Level
Gender			0.656 ^a
Female	99	0.72 \pm 3.1	
Male	48	0.69 \pm 3.04	
Age			0.004 ^b
20 - 29	35	0.52 \pm 3.27	
30 - 39	67	0.71 \pm 3	
40 - 49	43	0.13 \pm 3.01	
50 and more	5	0.35 \pm 3.19	
Work experience			0.006 ^b
1 - 10	70	0.61 \pm 3.35	
11 - 20	46	0.61 \pm 3.11	
21 - 30	27	0.91 \pm 2.84	
More than 30 years	5	0.82 \pm 2.93	
Education			0.147 ^a
Bachelor	132	0.49 \pm 2.98	
Master	16	0.77 \pm 3.19	
Type of employment			0.197 ^b
Official	84	0.82 \pm 3.01	
Contractual	53	0.57 \pm 3.08	
Custom-made	6	0.47 \pm 3.37	
Projective	7	0.73 \pm 3.56	
Marital status			0.06 ^a
Single	52	0.66 \pm 3.22	
Married	9	0.76 \pm 3	

^aT test.^bANOVA.

nificant relationship between the individual characteristics of the emergency nurses and their knowledge regarding the triage background. Results of these 2 studies (26, 27) also showed output and performances, which were similar to the current study. Without adequate knowledge, expected performance is not possible.

The findings of the present research indicated that there was a significant and reverse relationship between the nurses' performance and the discharge against personal satisfaction. Patient's awareness, which increases probable complications, outpatient treatment plan for these patients, quality of the medical services and treatment improvement, can be helpful in increasing the patients satisfaction (28, 29). Emergency discharge against medical advice has different causes. Studies have reported on relative improvement, lack of confidence in the quality of hospital services, emotional reasons, lack of comfort

(30) and length of hospitalization, feeling of recovery, the tendency to be hospitalized in equipped treatment centers, treatment process refusal, dissatisfaction of the doctor, lack of facilities, and dissatisfaction with service delivery (30, 31).

Assessing the perception of nurses about their performances and its correlation with hospital productivity at emergency departments was the strong point of this study. Direct analysis of performance and productivity was part of the novelty of the present study in the Iranian hospital context. Examining the performances of nursing manpower with standards leads to strong evidences at emergency departments. This issue could be assumed as the weakness of this study. Limitations are mentioned in a separate section below.

Table 2. The Performance of Nurses in Different Dimensions

Variables	Dimensions	Mean \pm SD
Performance indicators	Administrative regulations	3.92 \pm 0.36
	Professional behavior relationships	3.90 \pm 0.60
	Kardex evaluation items	3.79 \pm 0.45
	Pharmacotherapy evaluation items	3.93 \pm 0.45
	Venous cure	3.97 \pm 0.51
	Regarding principles	3.94 \pm 0.57
	Shift reception evaluation items	3.88 \pm 0.41
	Personnel training evaluation	3.98 \pm 0.54
	Total	3.91 \pm 0.39
Productivity	%Patient condition determined in 6 hours	87.38 \pm 9.23
	%Left in 12 hours (%)	89.37 \pm 9.11
	Triage duration (hours)	6.12 \pm 2.12
	%CPR unsuccessful	68.09 \pm 9.52
	%Leaving hospital with the personal responsibility	11.32 \pm 5.36

Table 3. Correlation Between the Nurses Performance and Productivity in Terms of Efficiency and Effectiveness

Variables	Performance	
	Pearson Correlation	Significant Level
Productivity indicators		
Efficiency indicators		
their condition was determined in 6 hours	0.712	0.002
Left in 12 hours	0.734	0.001
Triage duration	-0.512	0.042
Effectiveness indicators		
CPR unsuccessful	-0.599	0.014
Leaving the hospital with personal responsibility	-0.818	0.000
Hospitals productivity	0.560	0.004

5.1. Conclusion

According to the results of this study, there was a positive and significant correlation between the performance of nurses and productivity of the studied hospitals, and different dimensions of nurses performances were at a good level. In order to achieve maximum outputs of productivity, these dimensions need to be improved. Kardex evaluation items and shift reception evaluation items had the lowest scores. Presence of all nurses, control of medical equipment, and proper attention to patients with bad conditions in time of changing shifts may lead to better performances among nurses and effect productivity. On the other hand, proper attention to Kardex and information of patients is necessary for better performance in this dimension. Future studies may assess the exact performances of

nurses and its relationship with productivity at the emergency department.

5.2. Limitations

This study was conducted at 4 hospitals in Tehran city of Iran. Therefore, the findings should be interpreted with caution since the participants were hospital nurses from a particular province of Iran and do not represent all hospital employees in this country. More research in this area is needed before generalizing the study findings.

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