Workload and its Associated Factors among Nurses in Teaching Hospitals of Shiraz University of Medical Sciences in 2017

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Abstract

Introduction: Workload is one of the most important occupational factors of anxiety. The present study aimed to investigate workload and its associated factors among nurses working in teaching hospitals of Shiraz University of Medical Sciences in Iran.

Methods: This cross-sectional descriptive-analytic study was conducted in 2017. A total of 340 nurses from the hospitals were selected using the stratified random sampling method, and finally 312 individuals were recruited in this study. The data collection instrument included the National Aeronautics and Space Administration Task Load Index. The data were also analyzed through descriptive indices as well as t-test, analysis of variance, Pearson's correlation coefficient, and multiple linear regression. SPSS Software, Version 16, was used to analyze the data at a significance level of 0.05 (α=0.05).

Results: The mean score of workload was 73.47±21.81. The mean scores of the effort rate (79.09±21.81) and frustration and failure level (59.51±30.76) also received the highest and the lowest values, respectively. Moreover, statistically significant relationships were observed between level of education (p=0.03), employment relationships (p=0.001), number of patients under the nurses' monitoring per work shift, and the mean score assigned to workload among nurses (p=0.04, r=0.117).

Conclusion: The workload among nurses examined in this study was reported at a high level. Therefore, managers should implement programs such as motivational incentives and welfare services to moderate the workload in nursing.

Keywords: Workload, Nurses, Hospitals

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Introduction

The nursing profession is considered one of the significant areas for healthcare services so that nurses constitute the highest number among the healthcare personnel; therefore, this profession is extremely important due to abundant and direct relationships with patients (1). Meanwhile, the National Association of Safety Professionals in the United States has introduced nursing at the top of 40 professions with a high incidence of diseases associated with work-related pressures (2, 3). In this regard, workload is recognized as one of the factors affecting the nurses' behavior and performance at work (4). Workload is defined as the total amount of work performed by a person or a group of individuals at a specified time. It is also reported to be at a high level among the nurses and medical personnel in hospitals (5). At the same time, workload is not by itself reduced to physical tasks performed by nurses, but cognitive tasks are also likely to be a complicated part of the nursing profession. The general concept of workload is basically associated with an individual's mental abilities as well as the way that information is received and processed, which finally leads to decisions and actions (5). Within professions such as nursing with their heavy workload, an individual may be affected with lowered efficiency, diminished memory, damage to the thinking process, irritability, early touchiness, as well as loss of learning owing to fatigue and inappropriate schedule (6). Additionally, tired people have a higher chance of choosing risk behaviors like performing short-cut tasks to fulfill their own duties (7). Various studies in this domain have indicated that levels of fatigue and tension in nurses are inversely correlated with their provided quality of nursing care (8).

High workload reported as the main source of stress and job burnout in nursing (9, 10) can also be accompanied by direct or indirect negative consequences for nurses and patients. The direct effects of heavy workload on patient care may be associated with insufficient time to perform care-related tasks that can cause mortality among patients (11). Moreover, motivation and job burnout among nurses can indirectly influence patients' safety through their impact on relationships and reduced job satisfaction (12). Considering that workload is directly linked with one's performance, and an individual's safety and comfort are one of the factors affecting health (9), workload and its effects within organizations have become the main issues of organizational behavior raised in recent decades (13). In this respect, Holden et al. stated that workload was related to not only interruptions in work, inadequate attention, and hasty actions by nurses, but also job burnout (14). In addition, Myny et al. (2012) investigating the factors affecting workload among nurses working in intensive care units identified work-related breaks in the nurses' performance as one of the most important factors creating nursing workload in this division (15). According to the study conducted by Gaba and Lee, evaluation of workload in healthcare providers such as nurses is absolutely critical, since numerous stressful issues might affect the process of managing the high volume of their workload. Furthermore, the high amount of tasks and monitoring requirements of these people can relegate the ways to identify and respond to emergency conditions (5). It should be noted that the nursing personnel are among the groups suffering from high levels of workload on duty. Regarding the fact that the performance of personnel is considered one of the most important factors affecting the

improvement of patient safety and given that heavy workload can have adverse effects on their performance, the current study aimed to evaluate workload and its associated factors among nurses in the teaching hospitals of Shiraz University of Medical Sciences in Iran in 2017.

Methods

This study was a cross-sectional descriptive-analytic research conducted in the teaching hospitals of Shiraz University of Medical Sciences in 2017. The study population consisted of nurses working in Namazi Hospital, Shahid Faghihi Hospital, Shahid Khalili Hospital, Shahid Chamran Hospital, Hafez Hospital, Ibn Sina Hospital, Hazrat-e Ali Asghar (AS) Hospital, Shahid Dastgheib Hospital, Zainabiyya Hospital, and Shahid Rajai Hospital. Considering the population examined included 2943 individuals, the sample size was estimated equal to 340 nurses with a confidence level of 95% and an error level of 5%.The given sample size was distributed using the stratified sampling method proportional to size among 10 hospitals, and then the nurses in each hospital were selected by the simple random sampling method based on their personnel code and random numbers (Table 1).The inclusion criteria consisted of at least one year professional work as a nurse, and having physical and psychological health, and those addicted to any kind of drug were excluded from the study.The data collection instrument consisted of a two-part questionnaire. The first part was associated with measuring the underlying and demographic variables of the target group, including age, gender, marital status, level of education, work experience, employment relationships, history of work shift per day, duration of rest after each work shift, number

of shifts per month, and number of patients monitored in each work shift. The second part was concerned with the standardized and specialized questionnaire of the National Aeronautics and Space Administration Task Load Index (NASA-TLX) measuring the levels of workload in nurses. Using a 5-point visual scale from 0 to 100, the NASA-TLX evaluates mental demand, physical demand, temporal demand, overall performance and efficiency, effort rate, and frustration and failure level. Accordingly, the mental demand is related to cognitive activities such as thinking, decision-making, calculating, remembering, and searching, and the physical demand is associated with physical activities such as pushing, pulling, and doing actions. Furthermore, temporal demand is related to time, and overall performance and efficiency are associated with the fulfillment of personal goals. In addition, effort rate is related to energy consumption to do a level of performance, and ultimately frustration and failure level is associated with a sense of insecurity, discouragement, and discomfort (16). Except for the subscale of overall performance in this specialized instrument measured between a good to bad spectrum, the other subscales are evaluated between low and high levels. The minimum score for each subscale is zero, and the maximum score is 100, which are specified by the respondent via marking on the visual scale and determining the number for each one. The mean score for the subscales is reported as workload with a number between 0 and 100 in which the mean scores below 50 are acceptable, and the mean scores above 50 are considered high. The reliability of the given questionnaire was accepted in the study conducted by Mohammadi (17) with a Cronbach's alpha coefficient equal to 0.847. Content validity was also used to confirm its

Validity. During this stage, the validity was ensured through conducting interviews and obtaining opinions of experts and specialists in healthcare services management, including 7 faculty members of Shiraz University of Medical Sciences. To assay the questionnaire reliability, we used Cronbach's alpha method. To this end, a primary sample, including 40 questionnaires, was pre-tested, and then using its data, the reliability was confirmed based on 0.95 Cronbach's alpha. After explaining the research objectives to the participants, the principle of response confidentiality was also emphasized, and then verbal consents were obtained from them; then, the anonymous questionnaires were distributed among nurses. Once the questionnaires were completed and returned, the Kolmogorov Smirnov test was used to determine the type of distribution of different levels of independent variables for dependent variables (workload). The test results showed that the different levels of independent variables score were normal ($P_{Mental\ load}=0.24$, $P_{Physical\ pressure}=0.23$, $P_{Temporal\ pressure}=0.21$, $P_{Efficiency\ \&\ Performance}=0.23$, $P_{Effort}=0.22$, $P_{Frustration\ \&\ Failure}=0.28$). Therefore, parametric tests were used. The data were analyzed through descriptive and inferential statistical methods, Pearson's correlation coefficient, t-test, analysis of variance (ANOVA), and multiple linear regression using the SPSS Software Version 16 by considering a 0.05 significance level of ($\alpha=0.05$).

Table 1: Number of selected nurses according to their hospitals

Hospital	Sample Size	Population
Namazi	121	1047
Shahid Faghihi	56	491
Hazrat-e Ali Asghar	23	197
Shahid Chamran	30	264
Zainabiyya	17	145
Shahid Khalili	9	74
Hafez	14	117
Ibn Sina	8	71
Shahid Rajai	51	441
Shahid Dastgheib	11	96
Total	340	2943

Results

Out of the 340 distributed questionnaires, 312 were completely filled out (attrition rate of 8%). The mean age of the nurses participating in the study was 30.23±6.46 years, and most of them (54.17%) were categorized in the age group below 30 years. The mean score for the history of work experience was 7.23±6.45 years, and the majority of the participants (66.34%) were in the group of below 10 years of work experience. In terms of gender, 86.66% of the participants were women, and the rest were men. Most of the respondents had a bachelor's degree (91.67%); they worked as project workforce (38.78) with a history of 12-hour shifts (41.99), and more than 20 shifts per month (73.40). The number of patients monitored by the majority of the nurses per shift was higher than 3 individuals (84.93), and the duration of the rest time after each shift was 12 hours (64.43%). Table 2 shows the frequency distribution of nurses participating in the present study.

The results of the one-way ANOVA also demonstrated a statistically significant relationship between level of education (p=0.03, F=1.40), employment relationships

(p=0.001, F=2.28), and the mean score of workload. Moreover, the t-test results showed no statistically significant relationship between gender and marital status (p>0.05). The findings of the Pearson's correlation test also suggested that the variables of history of work experience, age, history of shifts, number of shifts per month, and duration of rests after each shift were not significantly correlated with the mean score of workload (p>0.05). However, a statistically significant and direct relationship was observed between the number of patients monitored by the nurses per shift and the mean score of workload (p=0.04, r=117).

Table 2. Frequency distribution of nurses in educational hospitals of Shiraz University of Medical Sciences

Variable	Category	Frequency (Percent)	P-Value
Age(Year)	30< 30-40 >40	169 (54.17) 108 (34.61) 35 (11.21)	0.14
Work experience(year)	10< 10-20 >20	207 (66.34) 92 (29.49) 13 (4.17)	0.21
gender	Man Woman	119 (38.14) 193 (61.86)	0.09
Marital status	Single Married	132 (42.30) 180 (57.70)	
Level of education	Associate Degree Bachelor Masters Doctoral	7 (2.24) 286 (91.67) 16 (5.13) 3 (0.96)	0.03
Employment relationships	Official Contractual bespoke project Corporative	56 (17.95) 65 (20.84) 49 (15.70) 121 (38.78) 21 (6.73)	0.001
History of work shift per day	6 hours 12 hours 18 hours More than 18 hours	88 (28.21) 131 (41.99) 29 (9.29) 64 (20.51)	0.08
Duration of rest after each work shift	12 hours 12-24 24-48	201 (64.43) 96 (30.77) 15 (4.80)	0.11
Number of shifts per month	10< 20-10 >20	45 (14.42) 38 (12.18) 229 (73.40)	0.09
Number of patients monitored in each work shift	2 patients 3 patients >3 patients	33 (10.58) 14 (4.49) 265 (84.93)	0.04
Total	-----	312 (100)	---

The mean score of workload among the nurses and its dimensions was estimated at a high level equal to 73.47±16.75. Considering its dimensions, we assigned the highest mean score to the component of effort rate (79.09±21.81), and the lowest one was related to frustration and failure level (59.51±30.76) (Table 3).

Table 3. Mean and Standard deviation of workload and its dimensions of nurses in the educational hospitals of Shiraz University of Medical Sciences

Dimensions workload	Mean±Standard deviation
Mental load	76.81±25.05
Physical pressure	76.80±24.73
Temporal pressure	76.28±23.10
Efficiency & performance	72.44±24.71
Effort	79.09±21.81
Frustration & failure	59.51±30.76
Total workload	73.47±16.75

Furthermore, the multiple linear regression analysis results to determine the impact of different dimensions of workload and demographic variables on workload among nurses revealed that significant variables included in the model determined using a stepwise approach were physical pressure, temporal pressure, mental load, overall performance and efficiency, effort rate, and frustration and failure level, respectively. Table 3 illustrates the B values related to the effective variables indicating the priority of impact on workload. The given analysis also suggested that the adjusted R for the processed model was equal to 0.84. In other words, 84% of workload changes could be explained by the model variables.

According to the multiple linear regression analysis, the linear equation of the workload score among the nurses in the study was as follows:

$y = 4.21 + 0.43$ Physical pressure + 0.38 Temporal pressure + 0.34 Mental load + 0.25 Efficiency & Performance + 0.27 Effort + 0.24 Frustration &Failure.

Table 4. The variables affecting the workload in the nurses of the educational hospitals of Shiraz University of Medical Sciences based on the linear regression test

Variable	β	Standardized coefficient β	P-value
Physical pressure	0.43	0.24	0.01
Temporal pressure	0.38	0.23	0.01
Mental load	0.34	0.21	0.01
Efficiency & performance	0.25	0.16	0.02
Effort	0.27	0.18	0.01
Frustration & failure	0.24	0.14	0.03

Discussion

In this study, the levels of workload among the nurses working in the teaching hospitals of Shiraz University of Medical Sciences were investigated using this index. The results of this study showed that the overall workload among nurses was very high (73.47±16.75). In this respect, Ferreira et al. in their study also estimated high workload among nurses with a mean score of 69.8±24.1 (18). Moreover, in similar investigations in Brazil, the mean score for workload based on the Nursing Activities Score (NAS) by Ducci et al. was reported equal to 59.8±12.1, and it was 96.24±22.35 in the investigation by Stafseth et al. (19, 20). It should be noted that the differences in workload values in various countries and regions could be associated with the ratio of nurses to patients at each shift, patients' characteristics, type of hospitalized patients, as well as laws and regulations governing the provision of health services. Furthermore, heavy workload was found to disable nurses in providing care appropriately, reducing an effective cooperation between doctors and nurses, and weakening the nurse-patient relationships (21). Additionally, the results of the study by Rahmanian and Ghodrati indicated that the probability of nursing errors could increase following high workload and poor employment conditions (22). Furthermore, Nikpeyma and Gholamnejad in their study acknowledged that heavy workload was a factor contributing to medication errors (23).

The present study results demonstrated that, among the workload dimensions, the highest mean scores were associated with effort rate, mental demand, physical demand, temporal demand, overall performance end efficiency, and frustration and failure level, respectively. Among the workload dimensions, the component of effort rate (70.09±21.81) had the highest mean score. In other words, nurses would consume considerable energy in their profession. Zheng et al. in their investigation also reported the mean score of the effort rate

as the highest score among the workload components (24). The results obtained by Zakerian et al. investigating workload in hospitals similarly showed that the highest score for workload was related to effort rate, which was in line with the present study findings (5). However, Levine et al. in their study examining workload among doctors working in the emergency departments reported that temporal demands had imposed the highest burden on these individuals (25), which was not consistent with the present study results. One reason for this discrepancy was associated with occupational groups (nurses and doctors) examined, which could suffer from various demands considering their conditions and job descriptions in terms of their priorities. The mental demand was also the second factor (based on the mean score) affecting workload among the nurses, which was estimated at a high level. The reason behind this issue was the sensitivity of the nurses' duties in the workplace, leading to difficulty, complexity, and need for rigor in realizing the nurses' job description within hospitals. Furthermore, Zakerian et al. in their study reported the mental demands among nurses at a high level, and it was in the second place in terms of mean scores compared to other workload dimensions (5). Additionally, Safari et al. in their investigation on subjective evaluation of workload among nurses also showed that the mental load on nurses were at a high level (26), which was in line with the present study results. The physical demands among nurses were similarly high as one of the other components of workload. The results of the study by Rafie et al. also indicated that physical demands among nurses with a mean score of 84.51 were at a high level (27); this is in agreement with the present study findings. Furthermore, Baljani et al. in their study examined health

promotion needs, sources of stress, as well as nurses' workplace problems, and reported that the nurses' physical activities were in the areas requiring further attention and improvement (28). Temporal demand, as one of the other workload dimensions, was calculated at a high level revealing the speed of action by nurses in their daily activities. In addition, Safari et al. reported mental demand among nurses with a mean score of 63.56 at a high level (26). However, lower performance demands compared to other workload dimensions suggested that the nurses were satisfied with their performance and their daily activities to achieve their predetermined goals. In this regard, Rouhi et al. considered the effectiveness of establishing appropriate relationships between nursing managers and employees in terms of promotion of efficiency and better performance (29). Finally, the examination of the workload dimensions indicated that frustration and failure level (59.51±30.76) in nurses (expressing the sense of insecurity, frustration, and resentment) received the lowest value, which is consistent with the findings of the investigation by Zheng et al. (24). In this respect, Sarsangi et al. in their study on workload among nurses working in emergency departments showed that the cause of failure and frustration was concerned with the lowest mean score among other workload dimensions (30). Additionally, Malakpour et al. obtained similar results in this domain (9).

The present study results also suggested a significant relationship between workload and the number of patients monitored by nurses on each shift in the sense that when nurses were in charge of care for a number of patients in a work shift, they would suffer from heavy workload. The reason for this issue was that the nurses had assumed more responsibilities for providing services and

maintaining patient health as the number of patients monitored had increased, which could consequently add to demands on them. One of the limitations of this study was the lack of examination of the workload levels among nurses in each department. One of the reasons for this limitation was the large dispersion of the departments within hospitals.

Conclusion

The current study results revealed demonstrated that nursing personnel might suffer from heavy workload while performing their duties, and this issue would have a negative impact on the quality of care provided by this group. Therefore, implementation of effective programs to moderate and reduce the workload among nurses to improve their performance is recommended. In this respect, it seems that managers and decision-makers in the domain of nursing would need to pay sufficient attention to this important and necessary issue and make attempts to lower high levels of workload in this group by considering motivational incentives, providing welfare services, and fulfilling financial needs for nurses. Moreover, holding educational workshops in the domain of familiarization with teamwork and precise definition of job descriptions for nurses in hospitals can be effective in reducing their workload.

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