

Considering job stress in nurses and its impact on patients safety using statistical methods

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Abstract

A look at stress ranges from myth to history. However it is definite that in an era of change in the today's world, stress or nervous pressure is among the problems encountered in the organizations which endanger physical and psychological health of human resources, exerting considerable expenses on them. Nowadays, human resources envisage numerous and complicated problems in the organizations and institutions which is one of the causes of stress outbreak. Health care workers (HCWs) working in the hospital encounter high risk regarding encountering physical and psychological factors, affecting their fatigue and stress rates, leading to potential adverse consequences in the patients cared. The present study was conducted utilizing SPSS statistical methods considering nurses' job stress affecting patients' health care. The study is a descriptive research done in three hospitals affiliated to Islamic Azad University medical wards from August 2016 to December 2016. When the questionnaire was prepared, its validity and reliability was proved. Statistical population was selected in a cluster random class way consisting of 90 nurses which answered 53 questions. The results demonstrated that staff welfare and support had the top importance on job stress, while decision taking and program participation had the least influence. The principles of respect and business communication, security, job motivation and Justice were in 2nd to 4th rank. Furthermore, there was a meaningful relationship between job stress and job experience, i.e. the increment job stress with increasing job experience. So, we can provide motivation for the nurses by controlling stressors to prevent human errors especially repetitive errors. This leads to safety for patients in health care centers.

Keywords: job stress, patient safety

1. Introduction

Nowadays, human resources in various domestic organizations and institutions face complicated problems one of which is stress [3]. Stress, its causes and consequences has been studied for a long time in medical topics, but its consideration in organizational behavior has been dealt recently and researchers analyzed stress and its consequences in the organizations [4].

It's trivial that stress play role in all people's life who have job which exerts psychological pressure on them in different ways [5]. Job

transformations such as changes in the organization chart, wages and salaries, job improvement, increase or decrease in human resources as well as social transformations all are parameters involved in stress, leading to disturbance, worrying and anxiety. Then, if one is subject to high levels of job stress, this will have an adverse effect on individual's performance and consequently, his family's quality of life [1].

Health care workers [HCWs] working in hospitals are exposed to high risk of physical and psychological outcomes leading to their

fatigue and stress level that finally have adverse effects on patient care [6].

In recent years, health care administrations utilized various methods in order to improve quality and safety of health care structures in numerous countries in which upgrading patients safety was considered along with improving service quality, both emphasize on organization obligation on implementing qualified standards.

Some methods have been implemented in health care centers in order to upgrade staff job motivation which worked for a short period that did not bring the organization to the main goal. It was due to lack of criteria to be selected for implementing as well as no academic prioritization. Therefore, without any analysis on the source of human errors, the potential harms resulting from health care in patients will increase. This will have intolerable consequences for patients.

The purpose of the present research is to recognize stressors in all its aspects including job training and acquaintance with professional tasks, principles of respect and job communication, participation in planning and decision, staff welfare and support, justice as well as job security and motivation. This helps us to remove such obstructions in nursing profession which protects the patients from the potential human errors as much as possible.

Stress in nursing profession is a common problem worldwide which exposes nurses and medical staffs at high levels of risk [2]. Decreasing stress and fatigue through organizational charts to minimize adverse effects in health care staffs are among considerable profits. This will lead to upgrading health care staff quality of life and consequently patient safety [7]. World Health Organization (WHO) and relevant pioneer organizations suggest establishing a comprehensive systematic structure based on patient safety improvement processes for decreasing these outcomes and suitable

responsibility to the injured individuals. This is possible through establishment of supportive patient safety structure and foundation of appropriate organizational mechanisms.

During the survey on the safety status of patients in three hospitals over the past year, 17 cases of patients falling out of bed, 4 cases of pathology samples loss, 25 cases of wrong medication prescription errors, two cases of wrong medication injection, three cases of wrong vaccine injection to infants, more than 10 cases of discharge with personal willingness because of dissatisfaction of hospital health care services, two cases of baby displacement due to the lack of precision in correct identifying the patients and also 32 cases of bedsores have been reported and registered.

A research made by Arimoura et al., (2010) by the title of 'Sleep, Mental Health Status, and Medical Errors among Hospital Nurses in Japan' demonstrated that sleep and mental health status are relatively low in nurses, so, shift work and weak psychological health are among considerable parameters in medical errors [8].

Farquharson (2012) published a paper by the title of 'Nursing stress and patient care: real-time investigation of the effect of nursing tasks and demands on psychological stress'. In the aforementioned research a relationship between nurses' tasks and stress psychological measurements were studied in order to assess job stress parameters influencing various aspects. The results can suggest potential alternatives for decreasing nurses' disturbances, improvement of patient care and development of improved methods on job stressors and money-saving on patients care [9].

In 2013, Mollart et al. published a paper by the title of 'Factors that may influence midwives work-related stress and burnout'. They intended to estimate parameters involved in stress assessing midwife stress and job

exhaustion. They questioned all 752 midwives working in two state hospitals in New South Wales. The researchers utilized exhaustion questionnaires to estimate job stress regarding parameters such as shift work, exercise, The results demonstrated that two third of the statistical population have emotional exhaustion, one third have personal success and the last one third have job exhaustion.

Furthermore, statistical analysis indicate that midwife with more job experiences that had more exercise hours, had less job exhaustion [10].

In the previous studies, job stress was evidenced in various health care staff. Moreover, it was proved in some studies that job stressors including insufficient sleep, wages and salaries, staffs mental status affects staff tasks and consequently patients' safety. Nowadays, there are new methods for improving processes among which several options as well as the best modified method based on the organizational criteria can be selected.

The present research was utilized statistical software SPSS in order to assess nurses' job stress influence on patients safety. This will lead to lowering expenses, increasing satisfaction among customers and consequently a healthy society. Furthermore, it was attempted to recognize, study and prioritize all stressors to minimize nurses' stress and lead to improving patients' safety.

2. Materials and methods

The present research conducted utilizing descriptive method to recognize nurses' job stressors and its role on patient's safety. The statistical population consists of 90 nurses working in Boo-'Ali, 'Amiralmomenin and Javaheri hospitals affiliated to medical unit of Tehran Azad university which were selected randomly. The research was conducted from August 2016 to December 2016.

2.1. Recognition of statistical population and the research field

2.1.1. **Phase I:** The hospitals were visited to get a more detailed reconnaissance of the research field. So the physical location of the hospital was inspected to determine such characteristics as room dimensions, coloring, building status,

2.1.2. **Phase II:** harmful physical and chemical parameters of environment were noted in the three aforementioned hospitals. Factors such as light, noise, air quality and ventilation, temperature stress, ray exposure and its spatial location were surveyed.

2.1.3. **Phase III:** staff welfare status in the three hospitals were considered which were rest rooms, nutrition, cultural and sport schedules, health status,

2.1.4. **Phase IV:** All the parameters in the questionnaires were sampled through detailed reconnaissance of the staffs.

2.1.5. **Phase V:** staffs complaint and criticism notes of the staffs during the recent year was studied after getting the permit from the administrations. It was attempted to do the sampling accidentally rather than selective. It is noteworthy that all the visits to the hospitals were associated with interviews with the hospital staffs which supported us with the answers and notes that was reflected in the sessions with the experts and administration staffs to determine given criteria. Based on the questionnaires and regarding the recognition, a comparative study was conducted and a classification was made based on age, sex, experience, job status,

2.1.6. **Phase VI:** in order to have a more detailed sampling, shift work, spouse employment status, residence, education level were also considered. After location visit in 15 times (5 times for each hospital), 30 samples were selected from each hospital. As male and female distribution was not equal, sampling was considered the proportion of male and female. The collection of data was through questionnaires and data extracted from them.

3. Results

Questionnaires were filled by sample people, coded and analyzed through SPSS21. 53 people (58.9%) out of the 90 total sample persons were male while 37 person (41.1%) were female. 20 people (22.2%) were aged below 30, 18 people (20%) aged between 31-35, 20 people (22.2%) aged between 36-40, 15 people (16.7%) aged between 41.45 and finally 17 people (18.9%) aged above 46. The least age among the population was 30 while the most was 52 with an average age of 38.44 and standard deviation of 7.86.

3.1. Descriptive analysis of the variable ‘education’

2.25 of all the population were of pre-bachelor, 75.6% bachelor and 22.2% were master and above. As the assess level of the variable is rank-wise, the educational level is bachelor as the median.

3.2. Descriptive analysis of the variable ‘shift work’:

52 people (57.8%) out of the 90 persons were in irregular shift work, 32 persons (35.6%) in regular shift and 6.7% in fixed working hours. The mode of the variable was on irregular shift work.

3.3. Descriptive analysis of the variable ‘experience’:

40 people (44.4%) had less than 10 years’ experience, 37 people (41.2%) had experiences between 11-20 years and 13 people (14.4%) with experiences more than 21 years. The least job experienced person in the population was 3 years while the most 28 years. The mean job experience was 13.65 and 6.81 standard deviation.

When the population descriptive data were analyzed, the professional questions were analyzed. The results such as mean and standard deviation of the variables are shown in the table 1.4. It is noteworthy that high scores indicate high job satisfaction and low stress. Training and acquaintance with job task had parameters of 10 subset and 50 scores, respect principles and job communication had

10 parameters and 50 scores, participation in programming had 5 subset and 25 scores, staff welfare parameters had 17 subset and 85 scores, justice with 6 subset and 30scores and job security and motivation with 5 subsets and 25 scores.

Table 3.1 mean and standard deviation of the scores of the variables

Characteristics/variables	Min score	Max Score	Mean	Standard deviation
Training and acquaintance with job tasks	17	43	33.48	6.12
Principles of respect and communication	26	49	36.76	6.38
Participation in planning	5	23	13.74	4.63
Staff welfare and support	32	66	46.37	10.90
Justice	6	24	16.42	4.95
Job security and motivation	5	21	12.77	4.73
Job stress	131	211	159.53	20.38

3.4. Kolmogorov-Smirnov test:

As most of the statistical tests such as Pearson correlation matrix analysis are based on the normal distribution of selective sample, we utilized Kolmogorov-Smirnov test to ensure normal distribution of the data before following the statistical methods. The results of the test for the dependent variables are shown in Table 3.2.

Table 3.2 results of Kolmogorov-Smirnov test for the main variables

	Z in K-S test	SHG meaningfulness level	result
Training and acquaintance with job tasks	0.922	0.363	Normal
Principles of respect and communication	1.57	0.136	Normal
Participation in planning	1.27	0.076	Normal
Staff welfare and support	1.930	0.352	Normal
Justice	1.20	0.112	Normal
Job security and motivation	1.47	0.263	Normal
Job stress	1.46	0.270	Normal

According to table 3.2, it can be distinguished that meaningfulness of Kolmogorov-Smirnov

test for all the major variables is more than error level (5%). So, zero hypothesis is confirmed at 5% error level indicating normal distribution of variables.

First hypothesis: there is a meaningful relationship between job task and stress. Correlation coefficient is negative (0.177) among training and acquaintance with job tasks and job stress. Increasing training and acquaintance with job tasks decreases job stress and vice versa. Regarding significance of 0.096 which is more than 0.05, H_0 can be confirmed and H_1 can be neglected with higher levels of confidence (95%). Therefore, the first hypothesis which indicates the relationship between training, acquaintance with job tasks and job stress is not correct.

Second hypothesis: There is a meaningful relationship between respect-communication and job stress. There is a negative correlation (0.291) between respect-communication and job stress and vice versa. As the significance is 0.005 which is less than 0.01, H_1 can be approved with more than 99% confidence, so H_0 is rejected. Therefore, the second hypothesis is approved which indicates relationship between respect-communication and job stress.

Third hypothesis: There is a meaningful relationship between programming-decision taking and job stress. A negative correlation between participation in programming-decision taking and job stress (0.625) indicates decrease in job stress with increasing in participation in programming-decision taking and vice-versa. As 0.005 significance is less than 0.01, H_1 can be approved and H_0 can be rejected with more than 99% confidence. So the third hypothesis can be confirmed on relationship between participation in programming-decision taking and job stress.

Fourth hypothesis: There is a meaningful relationship between staff welfare and support and job stress. A negative correlation between staff welfare and support and job stress (0.689) indicates decrease in job stress with

increasing in participation in programming-decision taking and vice-versa. As the significance is less than 0.01, H_1 can be approved and H_0 can be rejected. Therefore, the fourth hypothesis which expresses the relationship between staff welfare and support and job stress is confirmed.

Fifth hypothesis: There is a meaningful relationship between justice and job stress. There is a negative correlation between staff welfare and support and job stress which is 0.697. This means that increasing justice decreases job stress and vice-versa. Significance less than 0.01 confirms H_1 hypothesis and rejects H_0 with more than 99% confidence.

Sixth hypothesis: There is a meaningful relationship between job security and motivation and job stress. Negative correlation (0.757) between these parameters indicates job stress decreases with increasing job security and motivation and vice-versa. As the significance is less than 0.01, H_1 hypothesis is approved and H_0 is rejected with more than 99% confidence.

Seventh hypothesis: The variables of respect-communication, participation in programming and decision, staff welfare and support, justice as well as job security and motivation are all involved in job stress. After calculating correlation coefficient, determination coefficient, modified coefficient and error, it can be expressed that there is a correlation with job stress with the variables respect-communication, participation in programming and decision, staff welfare and support, justice as well as job security and motivation (0.961). The modifier is 0.923 and the modifying coefficient is 0.918 i.e. 92%, in other words, 92% of the job stress variation is specified through this variable and other variations (8%) is as a result of other variables. Furthermore, significance test of determination coefficient (F) indicates whether the determination coefficient is significant. Then, F is the average regression variance to the average

remnant variance which equals 200.97 and 0 significance of 99% confidence. Therefore, the modified coefficient is statistically significant.

3.5. The variable affecting on the stress:

The regression coefficient of principles of respect and job communication is 1.155. The standardized regression coefficient was estimated 0.361 for the variable and 10.68 for t test. It is meaningful regarding 0 significance and 99% confidence.

The regression coefficient of participation in programming and decision taking is 0.547. The standardized regression coefficient was estimated 0.124 for the variable and 2.92 for t test. It is meaningful regarding 0 significance and 99% confidence.

The regression coefficient of staff welfare and support is 0.853. The standardized regression coefficient was estimated 0.456 for the variable and 12.53 for t test. It is meaningful regarding 0 significance and 99% confidence.

The regression coefficient of staff justice is 1.137. The standardized regression coefficient was estimated 0.276 for the variable and 6.76 for t test. It is meaningful regarding 0 significance and 99% confidence.

The regression coefficient of job security and motivation is 1.32. The standardized regression coefficient was estimated 0.308 for the variable and 6.72 for t test. It is meaningful regarding 0 significance and 99% confidence.

The assessment of the share and involvement in each independent variable in the specification of dependent variables (job stress) should be done utilizing beta values. These values are standardized and provide the determination of relative share of each variable. Staff welfare and support is the most important variable and are of the most shares, followed by respect-communication, job security and motivation, justice, participation in programming and decision taking.

Table 3.3 Standardized and unstandardized regression coefficient affecting job stress

Model	Unstandardized coefficient		standardized coefficient	T test	significance
	b	Standard deviation	B value		
Constant	34.429	5.028		6.847	0.04
Principles of respect-communication	1.155	0.108	0.361	10.685	0
participation in programming and decision taking	0.547	0.187	0.124	2.928	0
Staff welfare and support	0.853	0.068	0.456	12.537	0
justice	1.137	0.167	0.276	6.797	0
job security and motivation	1.325	0.213	0.308	6.217	0

Standardized regression equation:

$$R = \alpha + \beta X_1 + \beta X_2 + \dots + \beta X_n$$

$$R = 34.42 + 0.361 (\text{Principles of respect-communication}) + 0.124 (\text{participation in programming and decision taking}) + 0.456 (\text{Staff welfare and support}) + 0.276 (\text{justice}) + 0.308 (\text{job security and motivation})$$

According to standardized regression equation, it can be distinguished that staff welfare and support have the most influence on the job stress, the participation in programming and decision taking has the least role.

First hypothesis: There is a meaningful relationship between job stress and experience.

According to table 4.4, job stress was less in 10%, medium in 45% and high in 45% of statistical population with less than 10 years' experience. The case was 43% of medium stress and 56.8% of high stress in 11-20 years job experience. In staffs with more than 20 years, 46.3% had low levels of stress, 38.5% of medium stress and 15.4% with high levels of stress. K^2 was 22.23 with 0 significance which was less than 0.01. It can be said that there is a significant relationship between job stress and job experience. In other words, staff with more experiences had less job stress. Moreover, F coefficient is 0.497 which indicates medium relationship between these

two variables. So, H_1 can be approved with 95% confidence and H_0 is rejected.

Table 3.4 Relationship between job stress and experience

Experience		Stress status			Total
		low	medium	high	
<10 years	Number	4	18	18	40
	Percentage	10%	45%	45%	100%
11-20 years	Number	0	16	21	37
	Percentage	0%	43.2%	56.8%	100%
> 20 years	Number	6	5	2	13
	Percentage	46.2%	38.5%	15.4%	100%
Total		10	39	41	90
		11.1	43.3	45.6	100%
Statistics		K ²		F	significance
		22.23		0.497	0

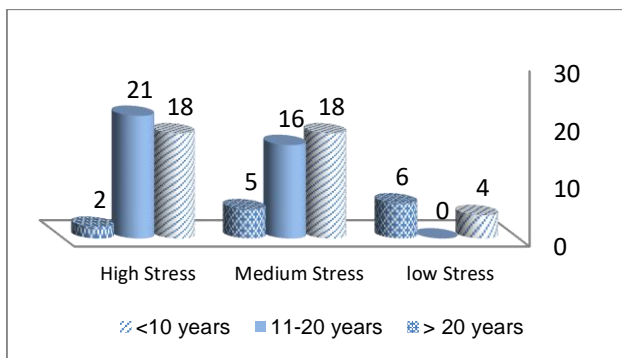


Fig. 1 The relationship between job stress and experience

Second hypothesis: There is a significant relationship between job stress and education. According to table 3.5, job stress was low in all the staff with less than bachelor education. In the staff with bachelor degree, 5.9% had low stress, 51.5% had medium levels of stress and 42.6% had high levels of stress. In the staff with master degree or even higher level, 30% had low stress, 20% had medium stress and 50% had high stress. K^2 is 14.25 with 0.007 significance which was less than 0.01. In other words, staff with higher level of education had higher job stress. Φ coefficient is 0.398 which indicate that the relationship between these two variables is of medium degree. H_1 can be approved at 95% confidence and H_0 is rejected.

Table 3.5 Relationship between job stress and education

Education		Stress status			Total
		low	medium	high	
Lower than bachelor	Number	2	0	0	2
	Percentage	100%	0%	0%	100%
Bachelor	Number	4	35	29	68
	Percentage	5.9%	51.5%	42.6%	100%
Master or more	Number	6	4	10	20
	Percentage	30%	20%	50%	100%
Total		10	39	41	90
		11.1%	43.3%	45.6%	100%
Statistics		K ²		F	significance
		14.25		0.398	0.007

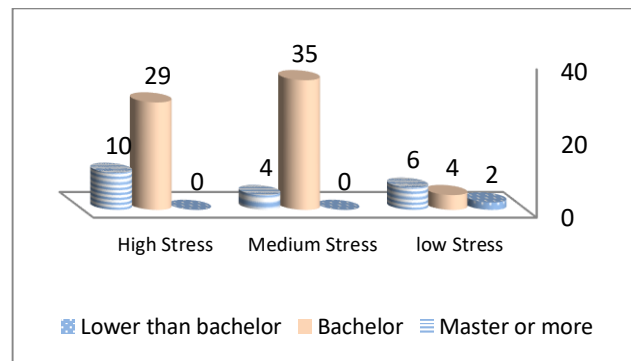


Fig.2 The relationship of job stress with education

4. Conclusions

As the parameters outside of the job environment considerably affects the individual's stress, job problems are the most prevalent stressors [11]. Lazarus and Levalo considered the role of emotions important due to quick reaction to stressors in job stress [12]. Researches by Giorgi et al., Pasadkov et al., Guilbola et al. demonstrate that heavy tasks (both in quantity and intensity), low control (job autonomy, extent of decisioning), lack of support from managers and colleagues (difference among colleagues, managers and organization), ambiguity and contradictions () all are highly involved job stress [13, 14]. The result of the research demonstrated that the variable staff welfare and support has the most influence on the job stress, while the variable participation in programming and decision taking has the least effect. Principles of respect and communication, job security and motivation and justice are among the second to fourth rank. There is also a meaningful relationship between job stress

and experience, i.e. job stress increases with increasing experience. It is likely that the staff expectation increases with increasing experience which reduces job motivation and increases job stress if is not met by the administration. There is also a meaningful relationship between job stress and education. So, staffs with higher levels of education are subject to higher risks of stress. Controlling stressors, nurses' motivations are provided. This will prevent human errors especially repeated ones that provides the patients with a safer conditions in health care centers.

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