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Original Article

Impact of Psychosocial Factors on Occurrence of Medication Errors among Tehran Public Hospitals Nurses by Evaluating the Balance between Effort and Reward

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ABSTRACT

Background: Patient safety and accurate implementation of medication orders are among the essential requirements of par nursing profession. In this regard, it is necessary to determine and prevent factors influencing medications errors. Although many studies have investigated this issue, the effects of psychosocial factors have not been examined thoroughly.

Methods: The present study aimed at investigating the impact of psychosocial factors on nurses' medication errors by evaluating the balance between effort and reward. This cross-sectional descriptive study was conducted in public hospitals of Tehran in 2015. The population of this work consisted of 379 nurses. A multisection questionnaire was used for data collection.

Results: In this research, 29% of participating nurses reported medication errors in 2015. Most frequent errors were related to wrong dosage, drug, and patient. There were significant relationships between medications errors and the stress of imbalance between effort and reward ($p < 0.02$) and job commitment and stress ($p < 0.027$).

Conclusion: It seems that several factors play a role in the occurrence of medication errors, and psychosocial factors play a crucial and major role in this regard. Therefore, it is necessary to investigate these factors in more detail and take them into account in the hospital management.

1. Introduction

Medical errors are one of the most common threats to patient safety. About one of 10 patients was harmed during hospitalization due to medical errors, 7% of them leading to a lethal outcome [1].The incidence of harm due to medical errors had increased from the eighth cause of death in 1999 to the third cause in 2008 [2]. A study released in 2016 found that medical error is the third leading cause of death in the United States, after heart disease and cancer [3]. Therefore, ensuring patient safety is a top priority for medical staff [4].

There are many types of medical error, from minor to major [1]. Medication error is one of the most common types of medical errors and also a source of morbidity and mortality for patients [5]. It is defined as disregarding the status of forming a damage, risk, or any avoidable incidence to occur during the process from medication request to patient monitoring [6]. Medication errors may not only be costly and harmful to a patient's life but also sometimes has irreparable consequences [7,8]. According to the Institute of Medicine, 400,000 cases of avoidable patient injury due to medication errors take place annually in hospitals in the United States. In addition, between 44,000 and 98,000 hospital patients have been estimated to die annually as a result of medication errors [5]. They cost 3.5 billion dollars annually, which is 8,000 dollars for each error [9]. Medication errors cannot only lead to a patient's death but also can increase a patient's length of staying in the hospital and health-care costs [10].They also lead to pharmaceutical failure which in turn may damage the patient's health [11].

It is estimated that an average of 40% of each nurse's time in a hospital would be spent on drug delivery [12]. One of the most common accidents in nursing profession is medications errors [13]. Because the nurse is the main core of health-care providers [14] and

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the last person in the drug delivery chain, she/he is responsible for the occurrence any medication errors [12,15].

Medication errors can occur both as a result of human mistakes and from systemic errors [8]. However, the impact of them on all health-care providers is critical. Human error has been implicated in nearly 80% of adverse events that occur in complex health-care systems. The results of numerous studies have revealed that work stress is associated with the increased risk of mental and physical illness among employees [16–18]. As medical staff, especially nurses, must respond quickly to the needs of patients and families, their job is stressful. Stress influences on the cognitive pattern also reduce an individual's performance [19].

Rapid progresses in the nature of work regarding design, management, organization, and the wider context of work have led to the emergence of a new danger called psychosocial risks [20]. These risks are associated to problems such as work-related stress, violence, bullying, and harassment, all of which have the potential to significantly impact the well-being of the individuals, enterprise, and society [21,22]. Some of psychosocial factors at work are job content, workload, work schedule, work control, environment and equipment, organizational culture and performance, interpersonal communication, role in organization, career development, and home–work interaction [23]. These factors have the potential to cause psychological and physical harm such as work-related stress [24,25]. Work-related stress is the response people may have when presented with work demands and pressures that are not matched to their knowledge and abilities and which challenge their capability to cop [25]. The created stress increases risk of mental and physical illness among staff [16–18]. It may not only reduce the health of staff but also weaken their ability to provide care, therefore, worsening the quality of poorer care and patient health [26]. Issues of work-related stress, depression, and anxiety contributed to an economic burden of over £530 million in the United Kingdom in 2005–2006 [27]. Therefore, identifying and managing psychosocial factors can cause positive outcomes such as improved health, motivation, commitment, productivity, and quality of work [25–28] and probably reduction in medications error and improving patient safety.

The vast majority of medical errors results from faulty systems and poorly designed processes versus poor practices or incompetent practitioners [29], and the nature of stress also is mental. To quantify and evaluate the psychosocial effects of working environment, the researchers used theoretical model. There are two models to assess stress caused by psychosocial factors, model of demand–control [30] and effort–reward imbalance (ERI) [31]. The ERI model emphasizes both the effort and the reward structure of work [32]. Efforts represent job demands and/or obligations that are imposed on the employee. Occupational rewards distributed by the employer consist of money, respect, and job security/career opportunities. More specifically, the ERI model claims that work characterized by both high efforts and low rewards represents a reciprocity deficit between "costs" and "gains". This imbalance may cause sustained strain responses. Therefore, working hard without getting an appreciation is an example of a stressful imbalance. In addition, it is assumed that this process will be intensified by overcommitment (a personality characteristic), such that highly overcommitted employees will respond with more strain reactions to an ERI than less overcommitted employees. In fact, the imbalance is caused by giving high efforts and receiving low rewards, which leads to negative emotions and stress. In addition, the ERI model includes an inherent commitment which can strengthen the balance between effort and reward or causes stress independently [31,33,34].

Abundant research has investigated medication errors of nurses in Iranian hospitals, and the results showed that the main reasons behind these errors were working conditions [35], rewriting of prescriptions [36], high working load, few numbers of employees, physical or mental fatigue [37], and by general poll done among nurses. As the ERI model was designed to assess job stress caused by psychosocial factors, and to the best of authors' knowledge, no study has yet investigated the impact of psychosocial factors on medication errors by evaluating the imbalance between effort and reward in Iran. The present study was designed to investigate the impact of psychosocial factors on the occurrence of medication errors among Tehran public hospital nurses by evaluating the balance between effort and reward. The result of this study might help to develop procedures to reduce the rate of such errors and to put in place safeguards to improve staff safety and increase the quality of care.

2. Materials and method

A cross-sectional descriptive analysis method was conducted to investigate the impact of psychosocial factors on the occurrence of medication errors among Tehran public hospitals nurses by evaluating the balance between effort and reward.

2.1. Participants

Between September 2015 and June 2016, nurses working in public hospital in Tehran, Iran, completed a survey about their experiences with medical errors and effort–reward imbalance. The convenience sampling method was used in this study. Of the initial sample of 540 nurses, 90 nurses were ineligible because they had less than one year of work experience or were not clinically active, resulting in 450 eligible participants, 379 (84%) of whom completed surveys.

Selection criteria for participation included the following: nursing graduate, at least one year of work experience, official employment status, treaty, convention or staffing plan, and lack of physical and mental disorders. The exclusion criteria included incomplete questionnaire completion, being treated as results of physical and mental illness and being in a critical condition (death of close relatives, accident, etc.).

2.2. Instruments

A multisection questionnaire was used to collect data. The first section of the questionnaire included demographic information of nurses (age, gender, marital status, critical condition history, and physical activity) and job information (working section, educational level, working shifts, working experience, type of employment, having a secondary job, amount of additional shifts, history of participation in courses relating to medicinal knowledge, and income).

The second section of the questionnaire included some questions about medication errors in the last year. Participants were asked to indicate whether they had ever been personally involved with giving drugs to a wrong patient, giving wrong dose of medication, giving extra unordered medication, lack of drug observation (medication not administered and drug interactions), giving wrong drug, wrong timing of medication administration, or incorrect medication route [38]. In addition, the participants were asked to write the frequency of every incidence.

The third section of the questionnaire was related to psychosocial factors, including a Persian Version of ERI questionnaire [31], which has been translated into Persian [39]. The ERI questionnaire has 23 items, consisted of three categories: "effort" (6 items), "reward" (11 items, including esteem, job promotion, and job security), and "overcommitment" (6 items). Responses to the items of "effort" and "reward" were scored on a 5-point Likert scale, 1 indicating no particularly stressful experience and 5 indicating a very highly stressful experience; but responses to the items of commitment were

scored on a 4-point Likert scale. The Cronbach α was 0.61, 0.85, and 0.67, and the data attenuation coefficients were 0.53, 0.85, and 0.67 for effort, reward, and commitment, respectively. The domain of effort with a score range of 6–30 refers to the requirements and needs of the job. Receiving a high score in this domain shows the fact the person put lots of effort for the job and experiences more stress. The reward domain with a score range of 11–55 refers to capability, promotion, and job security. Low scores in this domain show low reward or higher stress. The total score of individuals describes their effort and reward. According to a predefined algorithm, the ratio between the two categories of "effort" and "reward" (weighted by item numbers) was calculated to quantify the degree of mismatch between high cost and low gain [31]. The result of >1 shows an imbalance between reward and effort. Job commitment was investigated using six questions and a score range of 6–24. Question number three was reversed and then the scores were added together. A higher score in this domain shows higher job stress. The score in this domain was categorized into three sections, including low job commitment (6–14), average job commitment (15–17), and high job commitment (18–24). To check for the reliability and validity, 30 nurses were asked to complete the questionnaire in a pilot study with a 10-day interval. The results showed that medication errors, effort, reward, and job commitment had a reliability of 0.85, 0.85, 0.8, and 0.76, respectively. The test–retest stability reliability, as assessed by spearman–brown, resulted in 0.6, 0.93, and 0.73 for effort, reward, and job commitment, respectively.

2.3. Data collection procedures

The survey was approved by the Tabriz University of Medical Sciences Ethics committee (TBZMED.REC.1394.314). Participants gave their implied informed consent by completing an anonymous paper. In addition, they acknowledged their right to withdraw and the fact that data would remain anonymous, transcribed, and used in a deidentified manner for research. Participants were also assured of the confidentiality of the research data, by restricting access and storing them securely. Then, after the questionnaires were distributed among nurses of 16 public hospitals of Tehran, they were asked to complete them.

2.4. Data analysis

Statistical analyses were performed using SPSS (Version 16.0). Initially, all data were described as frequency (percentages) and mean (standard deviation) for categorical and numeric variables, respectively. Data distributions were tested for normality using the Skewness test. The chi-square test and student t test were used to examine the differences in the demographic variables between the two groups. Correlation analysis was performed to assess the relationships among independent variables which finally influenced medication errors. Analysis of variance followed by *post hoc* test was used to identify the factors differentiating among the demographic variables among more than two groups. To investigate the underlying predictors of medication errors, multiple logistic regressions were used. In this analysis, the relationship of each predictor with medication errors was assessed in an adjusted form after adjusting for confounders. Statistical significance was accepted at the 5% level.

3. Results

3.1. Participants characteristics

A total of 379 nurses from several wards of 16 public hospitals in Tehran participated in the study. This sample had a mean age of 31.7 ± 6.4 (male = 33.3 ± 7.8; female = 31.5 ± 6.1), ranging between 22 and 53; the majority participants were female (89%) and married (60.2%). The results of a descriptive study of demographic data showed that 89% of the participants were female. Among the participants, 41.2% were in the age range of 22–29 years with the majority (52.4%) working in rotating shifts. Only 32.5% of the participant nurses were trained in the area of medication (Table 1).

3.2. Medication errors

Based on the analyzed data of 110 nurses, in the last 12 months, the participant nurses had 205 medication errors with a range of 1–7

Table 1
Characteristics of the study participants (n = 379)

Variables	N (%)	Any type of medication errors (%)
Marital status		
Single	158 (41.6)	41 (25.9)
Married	221 (58.3)	69 (31.2)
Age (y)		
22–29	154 (40.6)	47 (30.5)
30–37	155 (40.9)	47 (30.3)
38–45	61 (16.1)	15 (24.6)
46–53	9 (2.4)	1 (11.1)
Work experience (y)		
1–5	183 (48.3)	55 (30.1)
6–12	126 (33.3)	36 (28.6)
13–19	49 (12.9)	15 (30.6)
20–25	21 (05.5)	4 (19.1)
Employment status		
Plan	77 (20.3)	23 (29.9)
Formal	119 (31.4)	42 (35.3)
Treaty	26 (06.9)	9 (34.6)
Deal	157 (41.4)	36 (22.9)
Shifts		
Always morning	50 (13.2)	10 (20.0)
Always afternoon	10 (2.6)	3 (30.0)
Always night	20 (5.3)	3 (15.0)
Morning & afternoon	38 (10.0)	17 (44.7)
Afternoon & night	62 (16.4)	19 (30.6)
Turning	199 (52.5)	58 (29.2)
Wards		
Surgery	90 (23.7)	21 (23.3)
Internal	85 (22.4)	31 (36.5)
Children & toddlers	58 (15.3)	12 (20.7)
CCU	67 (17.7)	22 (32.8)
ICU	79 (20.8)	24 (30.4)
Exercise		
Daily	21 (5.5)	4 (19.1)
2–3 times a week	60 (15.8)	18 (30.0)
2–3 times a month	70 (18.5)	14 (20.0)
No	228 (60.2)	74 (32.5)
Degree		
BS	360 (95.0)	101 (30.6)
MS	19 (5.0)	9 (47.4)
Income (rials)		
13,000,000>	42 (11.1)	15 (35.7)
14,000,000–20,000,000	231 (60.9)	61 (26.4)
21,000,000–27,000,000	91 (24.0)	30 (33.0)
28,000,000>	15 (39.6)	4 (26.7)
Retraining		
Yes	110 (29.0)	37 (30.1)
No	269 (71.0)	73 (28.3)
Secondary job		
Yes	11 (2.9)	4 (36.4)
No	368 (97.1)	106 (28.8)

CCU, coronary care unit; ICU, intensive care unit.

errors for each participant. The percentage of reported error was 48.2% for one error, 30.9% two errors, 14.5% for three errors, and 6.4% for four errors and more. The types and frequency of medication errors were as follows: wrong dose of medication 65 (31.7%), wrong drug prescription 50 (24.4%), wrong patient 37 (18%), wrong time prescription 33 (16.1%), additional drug prescription 11 (5.4%), wrong route 7 (3.4%), and lack of drug observation 2 (1%).

The study results revealed that night shift nurses had more medication errors than those working in other shifts; however, the difference was not statistically significant. The results of logistic regression test showed that there was a significant relationship between medication errors and employment status ($p < 0.039$). In addition, it was found that wrong drug prescription was more common in the group with 13–19 years of working experience ($p < 0.017$), the surgery ward ($p < 0.023$), and among the female nurses compared with the male nurses ($p < 0.034$). Moreover, the results indicated a statistically significant difference in wrong drug prescription for the age group of 38–45 years ($p < 0.002$) and work experience group of 13–19 years ($p < 0.012$). Nevertheless, the total medication errors did not show any statistically significant relation with none of the demographic factors.

3.3. Effort–reward imbalance

Total scores on the assessment of the balance of effort and reward showed that only 17.7% (n = 67) of nurses had a balance of effort and reward and 82.3% (n = 312) were in the condition of imbalance. Although the results revealed that the total average score of effort and reward was higher in female nurses (19.7 and 27.9, respectively) than in male ones (18.0 and 26.6, respectively), there was no statistically significant relationship between them. The results also showed that there was a significant relationship between marital status (married) and effort–reward imbalance ($p < 0.037$) and that married nurses experienced more stress (86.1%) than single nurses (77.6%).

The highest level of stress as a result of effort–reward imbalance was reported for children ward nurses (96.6%), and the statistical results exposed a significant relationship between them ($p < 0.042$). The results also showed that effort–reward imbalance was higher in nurses with medication errors (31.4%) than other nurses (17.9%) and that there was a significant ($p < 0.027$) relationship between them (Table 2).

The stress of effort–reward imbalance among the nurses displayed a statistically significant relationship with high working load ($p < 0.0001$), job disruption ($p < 0.0001$), high responsibility ($p < 0.0001$), job overtime ($p < 0.0001$), high physical activity ($p < 0.0001$), and mental and physical load of the job compared with the previous years ($p < 0.0001$), lack of satisfying job future ($p < 0.001$), and low income ($p < 0.002$).

The findings also revealed a statistically significant relationship between medication errors with the field of effort and overload ($p < 0.004$), disruption in work ($p < 0.004$), high responsibility ($p < 0.002$), high physical activity ($p < 0.031$), and heavy physical and mental work than the previous years ($p < 0.039$) and in the reward dimension by not receiving a fair deal ($p < 0.024$), lack of hope for career advancement ($p < 0.019$), unfavorable changes ($p < 0.014$), and low income ($p < 0.019$) compared with other nurses.

3.4. Job commitment

The results of job stress disclosed that around one-third of nurses (27.7%) were in the high stress and high job commitment group. Although the results indicated that female nurses had higher job commitment (19.8) than the males (19), there was no statistically significant relationship between them. The findings also showed that nurses with bachelor degree (15.8) experienced higher stress than nurses with master degree (14.36), with a statistically significant difference. The findings also showed a significant relationship between income level and job commitment ($p < 0.035$), where nurses with average-to-low income (14,000,000-20,000,000 Rials)

Table 2
Distribution of background variables in the total sample and based on job stress factors. (Effort–reward imbalance and job commitment)

Variables	Job stress factor				
	ERI %	JC %			JC score
		Low	Average	High	
Total participants	82.3	35.1	37.2	27.7	
Gender					
Female	84.1*	33.3	37.8	28.8	15.81
Male	73.2	46.3	36.6	17.1	15.09
Marital status					
Single	77.6	37.1	33.6	29.4	15.53
Married	86.1*	33.3	38.9	27.8	15.92
Age					
22–29	80.9	31.6	40.8	27.6	15.80
30–37	85.7	38.1	32	41.2	15.75
38–45	83.6	34.4	42.6	23	15.67
46–53	66.7	22.2	44.4	33.3	16.55
Work experience					
1–5	82.9	32.6	38.3	29.1	15.76
6–12	83.7	39	35	26	15.73
13–19	87.8	28.6	44.9	26.5	15.85
20–25	71.4	33.3	33.3	33.3	16.28
Employment status					
Plan	82.7	26.7	46.7	26.7	15.78
Formal	78.2	41.2	30.3	28.6	15.62
Treaty	84.6	11.5	53.8	34.6	15
Deal	85.3	34	36.5	29.5	15.86
Shifts					
Always morning	79.6	26.5	42.9	30.6	16.26
Always afternoon	90*	30.0	30.0	40.0	16.70
Always night	90	20.0	60.0	20.0	15.65
Morning & afternoon	73.7	36.8	39.5	23.7	15.39
Afternoon & night	85.5	33.9	40.3	25.8	15.69
Rotating	83.2	38.6	33.0	28.4	15.63
Section					
Surgery	81.1	33.3	38.9	27.8	15.88
Internal	78.6	33.3	36.9	29.8	15.91
Children and toddlers	96.6*	25.9	50	24.1	15.84
CCU	80.6	34.3	35.8	29.9	15.07
ICU	78.5	45.6	29.1	25.3	15.89
Degree					
BS	82.2	34.0	37.9	28.1	15.80
MS	84.2	52.6	26.3	21.1	14.36
Income (rials)					
13,000,000>	78.6	33.3	45.2	21.4	15.57
14,000,000–20000000	83.5	31.6	35.9	32.5	16.05*
21,000,000–27,000,000	81.3	40.7	36.3	23.1	15.27
28,000,000>	80.0	53.3	46.7	0	14
Medication errors					
Yes	31.4*	31.8	33.6	34.5	16.30*
No	17.9	36.1	39.0	24.9	15.49
Secondary job					
Yes	72.7	54.5	45.5	0	14.27
No	82.6	34.2	37.2	28.5	15.77

CCU, coronary care unit; ERI, Effort–reward imbalance; ICU, intensive care unit; JC, job commitment.
* Denotes significant differences (P).

experienced more stress (16.05). Furthermore, there was a significant relationship between job stress and job commitment with medication errors ($p < 0.028$) (Table 2).

4. Discussion

This research was conducted mainly to study the impact of psychosocial factors on medication errors by evaluating the balance between effort and reward of nurses in public hospitals of Tehran. The results showed that gender distribution of the participants was in line with results of several studies [37,40–44]. Majority of the participants were categorized into 30-years age group (40.9%), working experience of 1–5 years (48.3%), and rotating shifts (52.4%), which was in line with the findings of Haji Babayi et al [41] but inconsistent with the study of Johari et al [45], where most of the participants had a working experience of 5–10 years (68.8%).

The finding of this study also indicated that the medication errors range was 0–7, which was in line with results of Saleh et al [40]. Most of the medication errors were reported in nurses with working experience less than 5 years which was in line with the results of Nick Peyma and Gholamnejad [37]. In the present study, about one-third of the participants (29%) reported medication errors in the last year. However, Nick Peyma and Gholamnejad reported that 53% of the participants had at least one medication error during their working career [37], and Panjevini showed that only 16.7% of participants had medication errors [46]. In another work, however, Saleh et al [40] reported a medication error score of 1.4 ± 0.2 for each nurse in each working shift. In a study by Musa Rezayi et al, 11 cases of error were reported for each nurse in the last 3 months [42]. The reason for these differences may be related to self-report and different time range applied in their work. It is possible that the participants in this study avoided giving accurate reports regarding their medication errors. Although the results were kept anonymous and secret, some nurses may have evaded giving accurate information as a result of lack of trust, legal issues, or forgetfulness. In addition, owing to busy hours, high job responsibility, and crowded wards, some nurses did not participate in this study, which may affect the number of medication errors.

The most common type of medication error in this study was the wrong dose of medication, which was in line with results of several other studies [37,47–49]. The second common medication error was the wrong prescription, which was in line with results of Tang et al [47]. In the study of Tissot et al, the second common medication error was the wrong time and procedure [48]. According to Barker et al [50], the most common medication errors were the wrong time, forgetfulness, and wrong dosage. The difference in the frequency of different errors in different studies may be due to the differences in organizational and environmental conditions or educational systems.

The results of the present study did not support any significant relationship between pharmaceutical retraining and medication errors, inconsistent with the results of Haji Babayi et al [41] in Iran. This difference may be due to the quality of retraining courses, especially recent courses and need to be examined in recent studies. Therefore, it is necessary to revise course content and improve the quality in pharmaceutical careers. The result of the study also confirmed the presence of no significant relationship between medication errors and age, gender, work experience, academic degree, and a part-time job. This finding is in line with results of Haji Babayi et al [41].

The result of effort–reward balance data revealed that 82% of nurses were subjected to this stress. In addition, it was learned that high working load, work disruption, high responsibility, overtime, high physical activity, increased job difficulty, lack of respect, lack of promotion, hazy career future, and insufficient income are significantly related to the stress arising from the effort–reward imbalance. These findings were in line with results of several studies [51–53]. According to one of these studies [51], groups with insufficient control of the work, interpersonal conflict, job insecurity, organizational issues, and lack of reward may experience more psychosocial stress. In addition, the high working load is one of the main stress-generating sources in the nurses [52], whereas social support from colleagues can reduce a nurse's stress and improve their performance [53]. In addition, in the present study, the majority of nurses were categorized into the average stress group (37.2%), which is consistent with the results of Mehrabi et al [54].

Based on the results of the present study, the highest level of job stress was among the nurses in the morning and afternoon shifts, which was in line with the results of Rocha and De Martino [44]. They indicated that nurses in the morning shift experienced the highest level of job stress. The higher level of stress in the morning shift may be due to a higher working load or higher observation. Moreover, responding to the patient's family and controlling their traffic may be the reasons for high stress in the afternoon shift. The highest level of stress as a result of effort–reward imbalance was reported in the afternoon and night shifts.

Nurses believe that the average level of stress leads to a better performance than high or low levels of stress [53]. However, in the present study, the number of medication errors was fewer in the average stress group than in the other groups, and there was not any statistically significant relationship between job stress levels and medication errors. This finding is inconsistent with that of Suzuki et al [55] who reported that the cognitive health of the nurses due to the work environment stress had a significant relationship with medication errors. In addition, Dugan et al [56] reported a significant relationship between stress level of the nurses and medication errors.

The results from this study indicate the significant relationships of high working load, job disruption, high responsibility, intense physical activity and heavy work, lack of respect, dark career future, unwanted changes, and low income with medication errors. Job stressors and low job control were shown to be risk factors for patient safety [57]. Managers and colleagues support has a great impact on the improvement of a new nurse's job [58]. In addition, high working load and work environment are related to a patient's safety including medication errors [59]. Medication errors also correlated with working hours and overtime [60]. Therefore, based on the findings of the present study, it can be concluded that effort–reward imbalance stress, job stress, and job commitment have significant effects on the medication errors.

Similar to other studies, the present work suffers from some limitations, including the collaboration of nurses in crowded wards (which may increase the level of errors in our reports), self-reported error, recall bias, and reporting bias. In addition, the researchers were not able to collect an equal number of samples from different wards of the hospitals. It seems that with more collaboration, better results could be obtained.

The results of the present study may be useful for other hospitals (private or public hospitals) to overcome such problems. In addition, investigators are recommended applying a refined questionnaire for conducting this type of survey. Moreover, the top authorities of hospitals should develop a habit of providing a good working environment and possible financial aid to the deserving nurses for their valuable medical services to the patients. Nurses should be counseled periodically and motivated toward dedication of their valuable services to the patients, which cannot be measured by any means.

In conclusion, the results of this study revealed an association between various communication factors, management, and organizational issues with medication errors among the nurses. Based

on the acquired results, many factors such as psychosocial factors play a crucial role in the occurrence of medication errors. Therefore, they should be investigated in more detail and be taken into account in the hospital management system.

Conflicts of interest

The authors declare that they have no conflicts of interest to declare.

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