

## The Relation of Nurses' Workload and Working environment conditions with Safety of Patients Hospitalized in Wards of Tohid and Be'sat Medical Centers of Sanandaj in 2013

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**Abstract:** Security and safety are an important part of nursery care and they bring about responsibility for everyone involved with the task of health care. Different studies have showed that most mistakes about patients have been made by nurses, which is mainly due to heavy workloads, fatigue, occupational stress, insufficient number of nurses relative to number of patients, shortage of time due to number of assigned patients to them, and so on. Therefore, pinpointing consequences of nurses' heavy workloads and working environment conditions and their effect on safety of patients hospitalized in different wards is critically important. **Method:** The study is a descriptive-analytical research. The subjects consisted of 200 nurses working in the wards of Tohid and Be'sat Medical Centers. A simple random method was employed to select the sample. They were required to fill in a questionnaire. Then, after the questionnaire was coded, the collected data were fed into SPSS 18.0 software and descriptive statistics (frequency distribution, mean, variance, standard deviation) and one-side variance analysis test were utilized to analyze them. **Results:** The results of the study showed that 85% of the patients were female and 72% were married. Regarding their age, 49% aged 21-30, 30% aged 31-40, and 21% were over 41 years old. Regarding their work experience, 53.5% had been working for less than 6 years, 20% had worked for 7 years, and 17.5% had been serving for 13 years or more. Sufficiency of number of nurses in each shift was 59%. Regarding team coordination between the manager and the nurses, appropriate communication was 14.1%. And suitable facilities in workplace and training section were 27.5%. Regarding prescription delivery and care, there was the highest mistake frequency of 67.5% and 56.5%, respectively. Generally, only 14.5% of the nurses stated that they had not made mistakes in their services and 58% of them had made at least four mistakes. There was no significant difference between mean of mistakes in different workloads and number of mistakes made by nursery personnel with working environment conditions. **Discussion:** Researchers believe that nurses' workload is the result of nursery standards, the nurses' experience and specialty, the institution's policies and procedures, available equipment, and other individuals' healthcare activities. Regarding prescription delivery and healthcare, there was respectively 67.5% and 56.5% mistake frequencies. And only 14.5% of the nurses had made no mistakes in conducting nursery service. In Harding and Patrick's study, medicine mistakes were related to lack of experience in prescription delivery 42% and heavy workloads and lack of attention 27%. In Nikpeyma's study, 53% of the participants were reported to make at least one medicine mistake. Absorni reported that nurses refused to report their medicine mistakes due to shame, feeling of guilty, and fear of being punished and fired. In our study, there was no significant relation between number of mistakes and workloads. Moreover, the correlation between mean number of nurses' mistakes and working environment conditions was insignificant at  $P=0/7$ . The patients' health is necessary in improving nursery care quality, and all nurses are fully responsible for maintaining the patients' safety in all aspects of healthcare including informing them and their co-workers about probable dangers and the way of tackling them, protecting the patients' safety, and reporting irrelevant events to an authority.

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## Introduction

Since nurses more than anyone else are in contact with patients, clearly aware of their needs, responsible for their 24-hour monitoring, they can protect them in all situations. Number of care duties and responsibilities puts a heavy burden on nurses, which can result in heavy workloads. Nurses are lawfully and morally responsible for healthcare quality provided for the patients [1]. A professional nurse is dynamic and protective, who follows a specific set of moral regulations concerning patients' observation that is hidden in four concepts: practical work, education, management, and research [2]. Work mistakes on patients can occur in every hour of the working shift. The rate of work mistakes can soar when the ward is crowded due to heavy workloads that cause a remarkable increase in fatigue, pain, and stress; and a drop in endurance threshold [3]. Prolonged working hours lead to fatigue as a result of heavy workloads and they consequently cause drowsiness during working shifts, which in turn decreases attention and enhances work mistakes, all of which threaten the patients' safety.

Working environment conditions can be categorized into two groups: physical conditions of workplace and emotional ones. Physical conditions include workplace (atmosphere) and equipment utilized by the individuals. Appropriateness of these conditions is one of the initial prerequisites for the individuals' efficiency. Emotional conditions include individuals working together in an environment, friendly relationship between them, and mutual trust between managers and employees, which can affect the quality of the service [5]. Therefore, inappropriate working atmosphere and conditions are the source of mistakes and unfavorable functioning in clinical nursery. As a result, these conditions need to be improved by all means and through considering methods of resolving infrastructural causes [6]. In hospitals with insufficient number of nurses, nurses have to spend less time observing each patient. And in most of these hospitals, personnel like paramedics and servers with lower education are employed in order to compensate the lack of nurses, which results in endangering the patients' health and dropping the healthcare quality [7]. Therefore, among the most important healthcare providers in hospitals are nurses who are directly in contact with patients in different medical wards and they monitor patients' health status and provide them with healthcare service. Various studies have also showed that most mistakes on patients are made by nurses, which are due to heavy workloads, fatigue, occupational stress, insufficient number of nurses relative to patients, and short periods of healthcare because of the large number of assigned patients to them [8]. In a study conducted by

Rothschild *et al* on 391 patients admitted in ICU and CCU wards, 120 cases of nursery mistakes on 79 patients were reported, most of which were related to medicine application and following the doctor's orders [9]. In their study, Aiken *et al* have showed that if nurses are given more patients than the allowed limit, mistake rate and death will increase up to 7% in common surgery procedures. They have also showed that in wards where nurses are required to provide 8 patients with healthcare, workload is 30% heavier than wards where 4-6 patients are assigned to each nurse. This issue can increase patients' death rate [10]. According to Tang's study, there is a correlation between workload increase and patients' insufficient healthcare, which decreases patients' satisfaction [11]. Yang has also showed that workload increase leads to a drop in patients' safety and a rise in danger of falling off the bed, appearance of pressure injuries, and respiratory and urinary infections [12]. Tough working conditions and heavy workloads are considered as factors involved in endangering patients' safety because nurses have to carry out several healthcare services simultaneously and focus on all of them [13]. Studies have showed that nurses who are in difficult working conditions and endure heavy workloads are more worried about their patients' safety. Ad these workloads can have negative effects on the quality of healthcare and the patients' safety [14]. All of these issues are among causes of medical mistakes on patients [15]. One of the most prominent rights is to be safe against dangers and injuries while receiving healthcare service. Yet, medical mistakes are parts of important and crucial challenges in health providing systems all over the world, which threaten all nations. Since the last two decades, the idea that health providing systems is not safe enough and requires improvement has universally been investigated. On the other hand, improvement in patients' safety helps health organizations and healthcare providers identify the danger and find a solution for it. However, there is the fact that rapid and consistent improvement in patients' healthcare will not happen without creating the culture of safety [16]. Safety and security are among essential needs of every individual and an important part of nursery care, which create responsibility for whomever is involved with healthcare. And since nurses are the first in the healthcare team to meet in-danger people, nursery examination plays an important role in specifying a dangerous environment [17]. Therefore, assurance about patients' safety is among the most important issues in health providing systems so as to provide healthcare with acceptable quality [18]. Since ever, a lot of attempts have been carried out in order to reduce medical mistakes made on patients [19]. Nurses play an important role in treating and

observing patients; therefore, they are always facing various challenges in medical systems. Understanding physical and emotional effects of working in these wards seems to be critical, so patients can be provided with optimal and acceptable healthcare. Therefore, the present study was aimed at finding out the consequences of heavy workloads in different wards and their effect on hospitalized patients' safety.

### Method

The present study is a descriptive-analytical one that was conducted on 200 nurses employed in different wards of Be'sat and Tohid hospitals, Sanandaj. They filled in the questionnaires voluntarily. For sampling, first, number of personnel was assigned to each shift and nurses were randomly selected in each ward. Require data were collected through a questionnaire whose validity was verified by some professors in a content method. Its reliability was determined by giving it to 20 nurses and applying Cronbach's Alpha (0.86). The questionnaire included: demographic questions, 15 questions on working environment conditions, 11 questions on workloads, and 36 questions on patients' safety. To collect data, first, needed coordination with the authorities of the hospitals and the wards was made. And then, the questionnaires were distributed among the nurses and the paramedics. After the questionnaires were filled out, their completion was checked. Data were analyzed through SPSS 18.0. To do so, descriptive statistics (tables of frequency distribution, mean, variance, and standard deviation) and one-sided analytical variance test were utilized

### Results

The results of the study showed that 85% of the nurses were female and 72% were married. Regarding their age, 49% were 21-30, 30% were 31-40, 21% were 41 or above it. Eighty-six percent had a bachelor's degree and above it, 3.5% had an A.A., and 10.5% had a diploma. Regarding work experience, 53.5% had an under-6-year experience, 20% had an experience of 7-12 years, and 17.5% had an experience of 13 years or more. Moreover, 71% of the nursery personnel worked alternate shifts and 29% had fixed shifts. Regarding their employment state, 10.5% of the participating nurses were project, 30.5% were contract, 31.5% were agreement, and 27.5% were official. Regarding the management of working environment conditions, sufficiency of number of personnel in each shift was 59%. Regarding team coordination, suitable communication between the management and the personnel was 14.1%. And availability of appropriate equipment in the workplace was 27.5%. All of these had the highest percentage of appropriateness (see Table 1). Regarding the personnel's workloads, number of assigned patients to each nurse with 61.5% and cooperation between the personnel with 9.5% were respectively the highest and the lowest appropriate conditions (see Table 2). Frequency distribution of the personnel's mistakes in different nursery services shows that in patients' education service with 76%, in nursery skill with 72%, and vital signs with 62.5%, nurses had made no mistakes.

**Table 1.** Frequency distribution of the nurses' opinions about working environment conditions according to different fields

| Field        | Item   | Yes<br>N (%) | to some extent<br>N (%) | No<br>N (%) |
|--------------|--|--------------|-------------------------|-------------|
| Management   | sufficiency of beds in the ward  | 60 (30)      | 85(42.5)                | 55(27.5)    |
|              | sufficiency of nurses in each shift  | 118(59)      | 68(34)                  | 14(7)       |
|              | appropriateness working hours  | 83(41.5)     | 89((44.5)               | 28(14)      |
|              | enough supervision over healthcare procedures  | 26(13)       | 92(46)                  | 82(41)      |
|              | appropriateness of mistake recording system  | 28(14)       | 87(43.5)                | 85(42.5)    |
|              | appropriate management's handling in case of nursery mistakes                          | 27(13.5)     | 74(37)                  | 99(49.5)    |
| Coordination | appropriate communication between healthcare team members                              | 20(10)       | 84(42)                  | 96(48)      |
|              | appropriate communication between the managers and the personnel                       | 28(14.1)     | 78(39.2)                | 93(46.7)    |
|              | appropriate coworkers' handling in case of nursery mistakes                            | 26(13)       | 91(45.5)                | 83(41.5)    |
| Environment  | suitable working environment conditions (crowded place, stressful, etc)                | 79(39.5)     | 62(31)                  | 59(29.5)    |
|              | appropriate physical conditions (light, temperature, etc)                              | 73(36.5)     | 90(45)                  | 37(18.5)    |
| Education    | educational facilities in the workplace  | 55(27.5)     | 112(56)                 | 33(16.5)    |
|              | access to suitable resources, handouts, and books for nursery information in the wards | 47(23.52)    | 92(46)                  | 61(30.5)    |
|              | managers' sensitivity to education   | 21(10.5)     | 95(47.5)                | 84(42)      |

Table 2. Frequency distribution of the participating nurses' view about workload

| Item   | Yes<br>N (%) | to some extent<br>N (%) | No<br>N (%) |
|--|--------------|-------------------------|-------------|
| appropriate ration of nurses to patients                           | 121(60.5)    | 57(28.5)                | 22(11)      |
| appropriateness of nursery service according to patient number     | 113(56.5)    | 58(29)                  | 29(14.5)    |
| cooperation between coworkers in related shifts                    | 19(9.5)      | 86(43)                  | 95(47.5)    |
| sufficiency of assigned patients to each nurse                     | 123(61.5)    | 56(28)                  | 21(10.5)    |
| appropriateness of number of nigh shifts per month                 | 78(39)       | 84(42)                  | 38(19)      |
| appropriateness of compulsory overtime hours per month             | 92(46)       | 78(39)                  | 30(15)      |
| appropriateness of responsibilities out of nursery assigned duties | 88(44)       | 83(41.5)                | 29(14.5)    |
| availability of patients' accompanying relatives                   | 44(22)       | 88(44)                  | 68(34)      |
| appropriateness of number of patients with severe health state     | 94(47)       | 84(42)                  | 22(11)      |
| appropriateness of discharge and admission procedures              | 64(32)       | 107(53.5)               | 29(14.5)    |
| appropriate responding various needs of patients' families         | 53(26.5)     | 104(52)                 | 43(21.5)    |

Table 3. Relative frequency distribution of daily mistakes in workplace n service groups made by participating personnel

| Service group                  | Number              |     | Percentage |
|--------------------------------|---------------------|-----|------------|
| drug therapy and serum therapy | flawless            | 80  | 40         |
|                                | one case            | 41  | 20.5       |
|                                | two cases           | 34  | 17         |
|                                | three cases         | 20  | 10         |
|                                | four cases and more | 25  | 12.5       |
| prescription delivery          | flawless            | 65  | 32.5       |
|                                | one case            | 75  | 37.5       |
|                                | two cases or more   | 60  | 30         |
| healthcare                     | flawless            | 87  | 43.5       |
|                                | one case            | 40  | 20         |
|                                | two cases           | 20  | 10         |
|                                | three cases         | 20  | 10         |
|                                | four cases and more | 33  | 16.5       |
| vital signs                    | flawless            | 125 | 62.5       |
|                                | one case            | 40  | 20         |
|                                | two cases and more  | 35  | 17.5       |
| reporting                      | flawless            | 125 | 62.5       |
|                                | one case            | 40  | 20         |
|                                | two cases and more  | 35  | 17.5       |
| patients' education            | flawless            | 152 | 76         |
|                                | one case and more   | 48  | 24         |
| nursery skill                  | flawless            | 144 | 72         |
|                                | one case            | 16  | 8          |
|                                | two cases and more  | 40  | 20         |
| all items                      | flawless            | 29  | 14.5       |
|                                | one case            | 13  | 6.5        |
|                                | two cases           | 17  | 8.5        |
|                                | three cases         | 24  | 12         |
|                                | four cases and more | 117 | 58.5       |

However, prescription delivery and healthcare service respectively contained the highest degree of mistake frequencies of 67.5% and 56.5%. In general, only 14.5% of the nurses stated that they had made no mistakes in carrying out their service. And 58.5% of them had made at least 4 mistakes.

Table 4. Comparing mean number of mistakes by nursery personnel according to workload and working environment conditions

| variable           |                    | frequency | mean and SD | F    | P    |
|--------------------|--------------------|-----------|-------------|------|------|
| workload           | inappropriate      | 86        | 5.63±5.20   | 2.02 | 0.13 |
|                    | partly appropriate | 94        | 7.26±6.28   |      |      |
|                    | appropriate        | 17        | 7.59±6.50   |      |      |
| working conditions | inappropriate      | 33        | 6.0±5.96    | 2.62 | 0.07 |
|                    | partly appropriate | 123       | 7.27±5.86   |      |      |
|                    | appropriate        | 41        | 4.95±5.65   |      |      |

Data analysis showed that there was no significant difference between the mean of mistakes in different workloads ( $P=0.13$ ). In addition, results showed that there was no significant difference between nursery personnel's mistakes and working environment conditions ( $P=0.07$ ) (see Table 4).

### Discussion

In our study, most of the participants (49%) aged 21-30. Moreover, 86% of them had a bachelor's degree or more than this. Providing human resource and its correct management is among major issues within hospitals [20]. Functional expenses decrease as the number of experienced nurses increases [21]. In the current study, a maximum of 53.3% of the nurses have less than 6 years of work experience. And a high percentage (31.5%) had a contract state of employment. In their study, Tang *et al* reported that 86.1% of medicine mistakes were due to the personnel's inconsideration, 37.5% as a result of heavy workloads, and 37.5% because of new personnel [11]. Most of the participants (36%) had a work experience of 1-5 years and 61% worked



alternate shifts. Half of the participants (50%) were working in wards with more than 20 beds. And 47% of them were officially employed, 27% were contract, and 26% were project[2]. In this study, 71% of the personnel were working alternate shifts. Al-Salam believes that heavy workloads cause occupational fatigue and lack of strength [23]. Almost two-third of the nurses' time was devoted to indirect observation and only one-third of their time they observed patients directly [24]. Regarding working environment conditions, 59% of the participants believed that number of nurses in wards was enough. In Dehghan Nayeri's study, participants believed that number of personnel could affect their efficiency and healthcare activities. While providing human resources in order to prevent lack or surplus of workforce, a systematic method should be utilized [20]. According to a qualitative study conducted by Lundstrom *et al* (2002) on organizational and environmental factors affecting personnel's health and patients' safety, the effect of nurses' satisfaction, health, and safety on the patients' sufficient healthcare was measured. According to the results of their study, working fatigue resulted from stress and heavy workloads can influence the patients' safety and lead to a decrease in the nurses' confidence. Stress can result from failure to carry out responsibilities inhibited by heavy workloads. Based on the results, nurses with high levels of stress resulted from heavy workloads were less adaptive and had less occupational satisfaction [16].

In the current study, 14.1% of the participants declared that the relationship between the management and the personnel was appropriate. Nurses can function successfully in all stages provided that the managers support and encourage them [23]. Regarding the availability of educational equipment in the workplace, 27.5% of the nurses believed that there was appropriate equipment. Modifying work laws, improving management, and increasing number of workforce enhance quality and safety of nursery work [25]. The most prominent cause of medicine mistakes made by the personnel was reported to be lack of sufficient information to understand medicine orders (42%), heavy workloads and lack of attention (27%) [26]. Scholars believe that nurses' workload results from nursery standards, their specialty and experience, the policies and procedures followed by the institution, available equipment, and other individuals' healthcare activities [27]. In the current study, 61.5% of the participants believed that the number of the assigned patients to each nurse was appropriate. In a study conducted by Lundstrom *et al*, working fatigue from heavy workloads was reported to be effective in the patients' safety [16]. Regarding the cooperation

between the personnel, 95.5% of the participants believed in the least level of cooperation. In Pazargadi's study, nurses employed in hospitals emphasized on the importance of cooperation between doctors and other members of healthcare system, i.e., nurses [28]. Regarding the mistakes, the highest frequency of flawlessness was related to education service 76%, carrying out nursery skills 72%, and recording vital signs 62.5%. In Tang's study, causes of medicine mistakes were reported as: the personnel's inconsideration 86.1%, heavy workloads 37.5%, and new personnel 37.5% [11]. Nowadays, more than 20 thousand medicines exist all over the world [12]. Regarding prescription delivery and care, there was the highest mistake frequency of 67.5% and 56.5%, respectively. And only 14.5% of the nurses stated that they had not made mistakes in their services and 58% of them had made at least four mistakes. In Harding and Patrick's study, medicine mistakes were related to lack of experience in prescription delivery 42% and heavy workloads and lack of attention 27% [26]. Medicine mistakes are preventable phenomena which can result in taking wrong medicine and hurting the patients although these medicines are in the healthcare personnel and the patients' hands [22]. According to the conducted studies, the highest level of mistake was 78% occurring at the time of medicine delivery which is related to the nurses' performance [29]. Medicine mistakes can have bad and fatal consequences [30]. Moreover, 58.5% of the nurses had made at least 4 mistakes in doing nursery services. In Nikpeyma's study, 53% of the participants were reported to make at least one medicine mistake [22]. In another study, the most common medicine mistakes were respectively related to lack of medicine delivery (43%), medicine delivery in a wrong time (20%), wrong medicine dose (15%) [26]. In a qualitative study, lack of enough time and heavy workloads while conducting nursery interferences inhibited precise patients' observation; therefore, nurses had to admit the patients quickly without spending enough time on them. The results of that study showed that heavy workloads could have dangerous effects on patients' safety and they got stressed while being examined [2]. Inappropriate workloads cause fatigue and bad sleeping and create a wrong concept about the working environment among the personnel [31]. Our study proved no significant difference between the mean number of mistakes in different workloads. The results of a study showed that there was a correlation between overtime service and the patients' deterioration, medical and medicine mistakes, personnel's satisfaction reduction and the patients' complaints [21]. In a study, 37% of the investigated individuals referred to heavy workloads

and inappropriate organization of human resource [32]. In another study, inappropriate workloads (47.1%) were also introduced as the most important nurses' mistakes negatively affecting the nurses' views about the organizational atmosphere [22].

There was no significant relation between number of nurses' mistakes and working environment conditions ( $P=0.7$ ). Weak communication and lack of correct supervision by the managers result in workload increase, feeling of loneliness, and separation from the managers [33].

Nurses need to know medicines and their correct prescription in order to prevent probable dangers and side effects as a result of medicine mistakes [34]. Following the principles of medicine delivery can reduce number of mistakes [17-35]. In the present study, the results show that 40% of wrong medicine and 20.5% of wrong doses were delivered to the patients. In Balas's study, a minimum of 30% of the nurses were reported to make at least one mistake [36-37]. According to the results of Nikpeyma's study, 53% of the participants were reported to make at least one medicine mistake [22]. Medicine is delivered to the patients after four stages: doctor's prescription, writing the prescription, receiving the medicine from the drugstore [38]. In a study conducted to spot nursery medicine mistakes, 8 groups of nurses were asked about the reasons for such mistakes and they stated that 86.1% of medicine mistakes were due to the personnel's inconsideration, 37.5% as a result of heavy workloads, and 37.5% because of new personnel. Most situations involved mistakes included: resolving other issues while giving the medicine to the patients (34 individuals), preparing the medicine without rechecking it (31 individuals), and low work experience (31 individuals) which endangered the patients' safety [11]. In other studies, most mistakes (87%) were reported to occur while delivering the medicine by the nurses [29]. In the present study, 48% of the nurses considered the relationship among the healthcare team as inappropriate. In another study, 120 cases of nursery mistakes on 79 patients were reported, most of which were related to medicine application and following the doctor's orders [9]. Absorni reported that nurses refused to report their medicine mistakes due to shame, feeling of guilty, and fear of being punished and fired [39]. However, there is no exact statistics. In this study, 56.5% of the participants stated that nursery service relative to the number of hospitalized patients was appropriate. In Tang's study, it was reported that 40% of the nurses' time was devoted to medicine delivery [11]. Nurses do not observe the patients individually or separately; however, they work in complex organizations where there is a high level of demand on them [40]. In the

present study, 61.5% of the participants believed that the number of assigned patients to each nurse was appropriate. Provision of human resource is an organized procedure which is based on a deep logic and specifies precise number and type of require workforce in order to equip an institution with standard healthcare [41]. Researchers believe that appropriate communication between coworkers causes respect, support, and willingness to increase [42]. Patient's health is necessary to improve the quality of nursery healthcare. And all nurses are crucially responsible for maintaining the patients' safety in all aspects including informing the patients and their co-workers about probable dangers and the way of tackling them, protecting the patients' safety, and reporting irrelevant events to an authority.

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