Original Article

Human error and physicians' civil responsibility: a cross-sectional study in Bushehr hospitals

Fatemeh Azizzadeh [1*], Mohammad Chamkouri [2], Batool Gorgin [2], Zahra Montazeri [2], Sedigheh Ghasemi Bedaki [3]

[1] Instructor and Faculty Member, Master of Public Law, Payame Noor University, Tehran, Iran.
[2] Assistant Professor and Faculty Member, Department of Islamic Jurisprudence and Law, Payame Noor University, Tehran, Iran.
[3] Master of Islamic Juriprudence and Law, Payame Noor University, Bushehr, Iran.
Corresponding author and reprints: Fatemeh Azizzadeh, Instructor and Faculty Member, Master of Public Law, Payame Noor University, Tehran, Iran.
Email: fatazizzadeh21@yahoo.com
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Abstract

Background: Medical errors are one of the issues related to civil liability. Medical error is either an unintended action that occurs due to negligence or an operation that does not lead to the desired medical results. The present study aimed to investigate the relationship between human error and physicians' civil responsibility in Bushehr hospitals.

Methodology: This study was applied research which was conducted using a descriptive survey. The statistical population of this research consisted of physicians and nurses working at Bushehr hospitals. Out of the population, 140 individuals were selected using a convenient random sampling technique. An eighteen-item questionnaire was used to collect the data. The reliability of the questionnaire was confirmed using the Cronbach's alpha test was higher than 0.7 for the components under study. Kolmogorov Smirnov test was used to analyze the distribution of data.

Result: There was a direct and significant relationship between nurses' negligence, surgeons' diagnosis failure, factors such as lack of effective communications between the medical staff at the time of delivering the patient to the operating room and other equipment-related errors, nurses' and patients' fatigue (P< 5% for all).

Conclusion: Increase in factors like Nurses' negligence and surgeons' diagnosis failure, Lack of effective communications between the medical staff at the time of delivering the patient to the operating room, lack of patient briefing, other equipment-related errors and Nurses' fatigue, would lead to an increase in the severity of medical errors.

Keywords: Fatigue; Legal; Liability; Malpractice; Medical Errors.

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Introduction

Medical error is one of the most important issues that must be reviewed and discussed from various aspects, such as medical, moral and legal aspect. Naturally, it is nearly impossible for the medical profession to be free of errors and mistakes. Medical error is defined an incidence when there is an omission or commission in planning or execution that leads or could lead to unintended result (1). Communication about errors should be incorporated into all healthcare practice

settings (medical, surgical, in-patient, out-patient), and can be taught to medical students and residents using didactic, role-playing, or simulation methodologies (2).

Aljabari and Kadhim, identified fear of consequences is the most reported barrier worldwide, while work climate/culture is the most reported barrier in the United States (3). Tavassoli Naeini, investigated the French laws on medical errors and guidelines to examine them could be useful for the Iranian health system and help eliminate many of the resulting problems (4). Salamat et al., investigated that nursing managers were required to help nurses report the cases of errors. Moreover, the managers should accurately oversee the prescription of medication, especially intravenous drugs (5).

Masoudi et al., investigated that negligence on the part of the nurses could incur higher costs of treatment for the patient and endanger their health (6). Saremi and Fallah, showed that general, physical, mental exhaustion, reduced activities, and low moral accounted for the highest and lowest rates of medical errors, respectively. Also, a significant relationship was noted between mental exhaustion and the intensity of medical errors. Thus, it was concluded to provide appropriate planning and adopt suitable practices to manage risks in order to reduce negative consequences from exhaustion in treatment environments (7).

Mello et al., has investigated that most studies found no association between measures of malpractice liability risk and health care quality and outcomes. Although gaps in the evidence remain, the available findings suggested that greater tort liability, at least in its current form, was not associated with improved quality of care (8). Oyebode showed 3-16% of hospitalized patients worldwide, suffer from injury as a result of medical intervention, the most common being the adverse effects of drugs (9).

The situation in our country seems not to be better, even if there are no official statistics in this regard. This study aimed to answer the question that can human errors, such as carelessness, fatigue, lack of proper medical equipment, lack of accurate preparations that must be done by the medical staff (i.e. nurses, etc.) be regarded as the reasons for medical errors and thus the civil liability of physicians?

Methods

This study was applied research which was conducted using a descriptive survey.

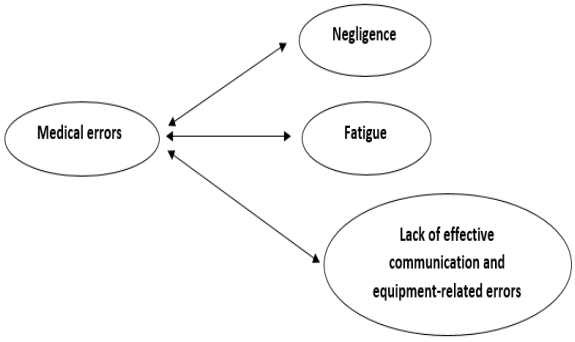
Statistical population and sample

The statistical population of this study consisted of 140 physicians and nurses of Bushehr hospitals during 2015-2016, in which a random sample of 103 physicians and nurses using Morgan table was obtained considering the conditions and some limitations, and following the required instructions, they were asked to study and complete the questionnaires.

Research variables

The main variables in this research was the frequency of medical errors made by physicians, nurses' negligence and surgeons' diagnosis failure, Nurses' fatigue and lack of effective communications between the medical staff at the time of delivering the patient to the operating room, lack of patient briefing and other equipment-related errors.

Conceptual research model



An eighteen-item questionnaire was used to collect the data. Treatment at the time of patient delivery to the operating room and lack of patient justification and other equipment-related errors and questions were related to the nurses' fatigue variable. Each question had five options: (i) strongly disagree, (ii) disagree, (iii) no opinion, (iv) agree, and (v) strongly agree that these 18 items were asked out of 103 people. To examine the reliability of this questionnaire, the Cronbach's alpha test was used. Based on this test, if the Cronbach's alpha coefficient was higher than 0.7, the reliability of the questionnaire would be confirmed.

All participants were aware of aim of the study and accepted to participate in this study. Declaration of Helsinki was the base for ethical issue. Descriptive statistics, Pearson correlation test and regression model were used when appropriate. Kolmogorov Smirnov test was used to analyze the distribution of data. The level of significance was considered 0.05% for the tests in this study.

Results

The findings of the demographic information of the present study indicate that, in terms of gender, most of the participants were women (62.1%). Half of them were in the age range of 35-30 years (52.4%). In terms of marriage, almost half of them were single. In terms of education, near half of them were experts (46.6%), near 18 percent were medical doctors, specialists and subspecialists. There were 85 nurses (82.5%) and 18 doctors (17.5%) (Table 1).

Table 1. Demographic data of studied participants

Variable	Subgroups	Frequency	percent
Gender	Male	39	37.9%
	Female	64	62.1%
Age (years)	20-25	5	4.9%
	25-30	34	33%
	30-35	54	52.4%
	35-40	7	6.8%
	> 40	3	2.9%
Marital status	Single	53	51.5%
	Married	50	48.5%
Education	Associate	17	16.5%
	Bachelor	48	46.6%
	Master	20	19.4%
	Ph.D.	8	7.8%
	Specialist	8	7.8%
	Sub-specialist	2	1.9%
Occupation	Nurse	85	82.5%
	Physician	18	17.5%

Analyzing data distribution

The Kolmogorov-Smirnov test was used to analyze the hypotheses and to select the parametric or non-parametric test to examine the distribution of data.

Based on this test, the distribution of data was normal if the Kolmogorov-Smirnov test statistic is higher than 0.5. Table 2, shows the results of this test:

Since the significance level of the aforementioned statistic was higher than 0.05 for all components and the whole questionnaire, it can be argued that the distribution of data was normal. Therefore,

Table 2. Results of the Kolmogorov-Smirnov test in relation to analysis of data distribution

Component	P value
Total	0.072
Fatigue	0.059
Negligence	0.082
Lack of effective communications and equipment-related errors	0.062

parametric tests were used to analyze the research variables. In this study, the Pearson test was used to examine the relationships between the variables.

Analysis of the research hypotheses

Examining the first hypothesis

H_1: There is a direct and effective relationship between nurses' negligence and the surgeon's diagnosis failure and the severity of medical errors.

Table 3 shows the correlation between the variables of negligence and the surgeon's diagnosis failure and the severity of medical errors.

According to Table 3, the coefficient of correlation between the two variables was 82% which is statistically significant (as the significance level was higher than 5%). Thus, it could be confirmed that there was a positive and significant relationship between these two variables.

As shown in Table 3, the first research hypothesis was confirmed using the correlation test. However, the regression test used for a final confirmation of these hypotheses.

Results of the significance of the regression model: According to (Durbin-Watson statistic (1.58), probability of the significance of regression (<0.001), determination coefficient of the model (0751)), which means that this model was able to express 75% of the variations of the independent variables, which is quite desirable. Since the significance level is zero, it could be concluded that there was an effective direct and linear relationship between nurses' negligence and surgeons' diagnosis failure and severity of medical errors. The Durbin-Watson statistic was 1.58, which was between 1.5 and 2.5; therefore, there no issue of self-correlation between the errors of the model. Hence, the first hypothesis was confirmed.

Table 3. Pearson coefficient of correlation between the variables of negligence and the surgeon's diagnosis failure and the severity of medical errors

Statistical indices / Variables	Correlation coefficient
Negligence and physician's failure to diagnose / Severity of the medical error	r = 0.82 Sig = 0.000
Result = P<0.01 – significant	

Examining the second research hypothesis

H_2: There is a direct and effective relationship between factors such as the lack of effective communication between the medical staff at the time of delivery of the patient to the operating room and lack of patient briefing and other equipment-related errors and the severity of medical errors.

Table 4 shows the correlation between the variables of lack of effective communication between the medical staff at the time of delivery of the patient to the operating room and lack of patient briefing and other equipment-related errors and the severity of medical errors.

Results of the significance of the regression model for the second research hypothesis (Durbin-Watson statistic (1.651), Probability of the significance of regression (<0.001), Determination coefficient of the model (0.770)), the coefficient of determination of the model above was 0.770 which means that this model was able to express 77% of the variations of the independent variables, which is quite desirable. Since the significance level is zero, it could be concluded that there was an effective direct and linear relationship between the variables of lack of effective communication between the medical staff at the time of delivery of the patient to the operating room and lack of patient briefing and other equipment-related errors and the severity of medical errors. The

Table 4. Results of the Pearson correlation test for the second research hypothesis

Statistical indices / Variables	Correlation coefficient
Lack of effective communication and equipment-related errors	r = 0.79 Sig = 0.000
Severity of the medical error	
Result = P<0.01 – significant	

Durbin-Watson statistic was 1.651, which was between 1.5 and 2.5; therefore, there no issue of self-correlation between the errors of the model. Given the value of the probability of the significance of the coefficients, it could be concluded the inertia and X2 variable were significant and had to be present in the model. Hence, the first hypothesis was confirmed as well.

Examining the third research hypothesis

H_3: There is a direct and effective relationship between fatigue and the severity of nurses' medical errors.

Table 5 shows the correlation between the variables of nurses' fatigue the severity of medical errors.

Results of the significance of the regression model for the third research hypothesis (Durbin-Watson statistic (1.753), Probability of the significance of regression (<0.001), Determination coefficient of the model (0.751)), the coefficient of determination of the model above was 0.751 which means that this model was able to express 75% of the variations of the independent variables, which is quite desirable. Since the significance level is zero, it could be concluded that there was an effective direct and linear relationship between the variables of nurses' fatigue and severity of medical errors. The Durbin-Watson statistic was 1.753, which was between 1.5 and 2.5; therefore, there no issue of self-correlation between the errors of the model. Given the value of the probability of the significance of the coefficients, it could be concluded the inertia and X2 variable were significant and had to be present in the model. Therefore, the third hypothesis was also confirmed.

Table 5. Results of the Pearson test for the correlation between nurses' fatigue and severity of medical errors

Statistical indices / Variables	Correlation coefficient
Fatigue	r = 0.83 Sig = 0.000
Severity of the medical error	
Result = P<0.01 – significant	

Discussion

There was a direct and effective relationship between nurses' negligence and the surgeon's diagnosis failure and the severity of medical errors; a direct and effective relationship between factors such as the lack of effective communication between the medical staff at the time of delivery of the patient to the operating room and lack of patient briefing and other equipment-related errors and the severity of medical errors; a direct and effective relationship between fatigue and the severity of nurses' medical errors.

The first hypothesis was confirmed, suggesting that nurses' negligence and improper surgeon's diagnosis could predict 75% of medical errors, with the finding being consistent with those of Masoudi et al., Accuracy, proficiency, and compliance with medical ethics are the minimum expectations of the patient of the treatment personnel, while medical malpractice is a violation of medical care standards which, if committed, the patient will suffer from financial and life problems. Thus, legislation under the civil liability of nurses and physicians could help patients enjoy their rights and prevent medical malpractice. This conclusion is in

line with the advocates of the theory of "Commitment to the outcome," which requires the physician to be held accountable for the patient's health, while medical error does not forfeit the patient from his/her right nor justify the physician's right conducts (6).

Nurses' work experience which represents the RNs not gained control over their work, as care actions influenced by the problematic overcrowded circumstance of the ED environment (7).

The second hypothesis was also confirmed, suggesting that such factors as the absence of an effective relationship between treatment personnel when transferring the patient to the operation room, and failure to fully explain medical proceeding to the patient, as well as some equipment issues could predict 77% of the intensity of medical errors. This finding was consistent with those of Mello et al., The patient who enters the surgery and is fully conscious must be informed about all the measures which are taken, which, if not observed, will amount to omission (8).

On the other hand, the hospital technicians and other treatment units are obligated to periodically review the equipment in the OR and check for the instruments used for the act of surgery. This is while any failure in this regard will hurt the patient and be within the civil liability of the personnel and treatment units, and the patient has the right to ask for compensation.

The third hypothesis was confirmed, stating that nurses' exhaustion predicted 75% of the intensity of medical errors as the finding was in line with those of Saremi and Fallah (7) Today, the feeling of exhaustion accounts for a major part of medical errors. Nurses experience negligence and job burnout due to difficult conditions and are prone to exhaustion. It is thus critical to point out that when a nurse feels exhausted, the reasons for exhaustion should be examined; if the cause of negligence is one of omission, s/he will be held liable and must compensate (10).

However, the legislator has remained silent if the omission arises from force majeure, such as orders from the authorities, etc., as an investigation by treatment unit authorities is advised. Clear and thorough information provision to patients, may be a mechanism for improved patient outcomes including mortality (10).

The findings of the present research differ from those of the previous research because the previous ones investigated the relationship between medical errors and civil liability of nurses and physicians from a legal and jurisprudential perspective, while the current research uses the descriptive-correlational approach to examine the relationship between some factors and medical errors which could help identify those factors and their relation with medical errors, thus reducing medical negligence.

Evidences supports the fact that interventions targeting patient–provider interactions improve population health, patient and provider experience, and costs. Communication skills training leads to improved patient satisfaction and outcomes. The relevant factors to consider in establishing an effective PPR(Patient–Provider Relationship): addressing health care system constraints; incorporating sociocultural factors and the role of gender, age, and chronic illness; and considering the changing role of telehealth on the PPR (11).

As the pandemic continues, these results present an evidence-based framework for leaders to support frontline HCWs through effective crisis communication (12). Care planning, efficient communication, and teamwork are critical to prevent adverse events in anesthesia (13). Risk management comprises identifying problems that may contribute to poor outcomes and

implementing a strategy with tactics to minimize opportunities for failures (14).

Longer shifts, shift patterns including nights, and inadequate recovery time between shifts (quick returns) were associated with poorer sleep, increased sleepiness and increased levels of fatigue. Light exposure and/or light attenuation interventions showed promise but the literature was dominated by small, potentially unrepresentative samples (15). Nurse burnout is an occupational hazard affecting nurses, patients, organizations, and society at large. Nurse burnout is associated with worsening safety and quality of care, decreased patient satisfaction, and nurses' organizational commitment and productivity. Traditionally, burnout is viewed as an individual issue. However, reframing burnout as an organizational and collective phenomenon affords the broader perspective necessary to address nurse burnout (16).

Nurses need to make judgement, consider factors affecting service delivery, and engage in effective communication (17). Resilience indicates the mental processes and behaviors that enable an individual to overcome the potential negative effects of stressors. In order to explore the multiple factors that contribute to physician resilience, the researchers approached the topic from a variety of perspectives, including the current ways of thinking about medical malpractice in the United States, physician resilience and medical errors, and building resilience during postgraduate medical education (18).

The most common tort worldwide is negligence (19). However, an ignorant physician who commits a mistake without obtaining permission to treat a patient is always considered responsible, even if he has been acquitted (20), Education on legal obligations in healthcare related to medical malpractice is insufficient, which has the potential to reduce patient safety. Nurses need to improve their understanding of legal obligations in order to enhance patient safety. However, no easily accessible education program has been developed that covers both the concepts of legal obligations and patient safety (21).

The World Health Organization (WHO) suggested ensuring maximum attention to patient safety (PS) and proposed the establishment and consolidation of scientifically based systems that could improve PS and the quality of health care. Consequently, with the purpose of coordinating, disseminating and accelerating improvements in PS throughout the world, WHO launched the World Alliance for Patient Safety (22).

Today, the feeling of exhaustion accounts for a major part of medical errors. Nurses experience negligence and job burnout due to difficult conditions and are prone to exhaustion. It is thus critical to point out that when a nurse feels exhausted, the reasons for exhaustion should be examined; if the cause of negligence is one of omission, s/he will be held liable and must compensate.

Conclusion

The results of the correlation tests showed that there was a direct and significant relationship between nurses' negligence, surgeons' diagnosis failure, factors such as lack of effective communications between the medical staff at the time of delivering the patient to the operating room and other equipment-related errors, nurses' and patients' fatigue (at the significance level of 5%). Due to this relationship, an increase in these factors would lead to an increase in the severity of medical errors and a decrease in them would lead to a decrease in the severity of medical errors.

Author's contribution

Fatemeh Azizzadeh and Mohammad Chamkouri developed the study concept and design. Batool Gorgin acquired the data.

Zahra Montazeri and Sedigheh Ghasemi Bedaki analyzed and interpreted the data, and wrote the first draft of the manuscript. All authors contributed to the intellectual content, manuscript editing and read and approved the final manuscript.

Conflict of interest

None declared.

Source(s) of support

There was no financial support

Ethical statements

The current study was conducted in accordance with the Declaration of Helsinki, and it was approved by the vice-chancellor of research and technology, to consider ethical issue, the collected data were not revealed to anyone, except for the researchers.

Informed Consent

In this study, the researchers used collected data using innominate questionnaires and the participants entered the study with informed consent.

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