

## Original Article

## Operating Room Nurses' Burnout and Safety Applications

**Ummu Yildiz Findik, BSN, MSc, PhD**

Associate Professor, Trakya University Faculty of Health Sciences, Department of Nursing, Edirne, Turkey

**Correspondence:** Ummu Yildiz Findik, Assoc. Prof., Trakya University Faculty of Health Sciences, Department of Nursing, 22030, Edirne, Turkey E-mail. [ummuyildiz@trakya.edu.tr](mailto:ummuyildiz@trakya.edu.tr)**Abstract**

**Aim:** Due to the fact that hospitals contain occupational hazard, operating room nursing has recognized as having a high level of burnout. The purpose of this study was to determine the relationship between employee safety applications and the level of burnout experienced by operating room nurses.

**Methods:** This descriptive study was carried out with 64 operating room nurses employed at three university hospitals and two public hospitals between January 1 and April 30, 2014. The Maslach Burnout Inventory, Employee Safety Measures Form and a personal information form were mailed to nurses as a means to collect data.

**Results:** The following factors were found to increase nurse burnout ( $p < 0.05$ ): stab wounds, an institution's failure to provide health screenings and vaccinations, using radiation without taking precautions, and nurses' failure to feel the support of their managers.

**Conclusions:** In order to reduce operating room nurse burnout, we recommend that precautions should be taken in order to prevent the transmission of infection agents and protection from radiation in operating rooms, and support by the management should be provided to operating room nurses.

**Key words:** burnout, operating room nurse, safety

**Introduction**

According to Maslach (2003), burnout is a psychological syndrome that surfaces as a reaction to long-term exposure to stress-increasing factors in the workplace. It is characterized by physical, emotional, and intellectual burnout, accompanied by symptoms such as a loss of self-respect, chronic fatigue, desperation, and the development of a negative self-concept and negative attitudes toward the affected individual's occupation, colleagues, and life, in general (Sinat & Kutlu, 2009). Burnout, a syndrome that includes emotional exhaustion, depersonalization, and reduced personal competence (Lundstom et al. 2002; Niasar et al., 2013), Emotional exhaustion (EE) refers to sensations of physical overexertion and mental weariness stemming from continuous interactions with other workers and clients,

depersonalization (D) is the development of negative and cynical attitudes about one's clients, reduced personal accomplishment (PA) reflects the tendency to evaluate oneself negatively, particularly with regard to work with clients (Vargas et al. 2014).

Burnout is observed more frequently in occupations that require face-to-face contact with people (e.g., nursing, medical practice, social work, substance-abuse counseling, and teaching) and affects 25% of nurses (Zellmer, 2005). Garrosa et al. (2008) determined that, for nurses, excessive workloads, pain, experiences related to death, conflicting communication, and role confusion contribute to emotional exhaustion and to the lack of personal accomplishment. Piko (2006) determined that problems associated with burnout reduce the efficiency of nurses, cause job dissatisfaction, and obstruct professionalism. It is

accepted that nurse burnout is closely related to the working environment (Wright, 2014).

Because high-risk operating rooms involve occupational hazards, the levels of work stress and burnout in operating room nurses are high, and employees who work in this field are prone to burnout (Circenis, Millere & Deklava, 2011; Niasar et al., 2013). Operating room medical staff are exposed to many potential hazards, including occupational traumatization, work stress, toxic and infectious agents, radiation, noise, anesthetic gases, working late into the night with a few people, working for extended periods in nonphysiological positions, and disturbances in the workplace that threaten the security of staff (Le Moual et al., 2013).

Hazards caused by the operating room environment have a negative effect on nurses' occupational lives, physical and psychological statuses, motivation, and performance (Kitaoka & Masuda, 2013; Laal, 2013; Niasar et al., 2013). Regehr et al. (2004) determined that anxiety and stress among operating room nurses working with organ transplants was high. Khalatbaria, Ghorbanshiroudia & Firouzbakhsha (2013) determined a positive correlation between work stress and burnout. As a result of the review they conducted, Kitaoka & Masuda (2013) reported that excessive workloads and interpersonal conflicts in the workplace are significant factors contributing to burnout.

Also socio-demographic factors, such as age, job experience, marital status, one's educational level or income, and job-related factors (e.g., excessive workloads, the absence of job resources, and a lack of autonomy) have been found to be related to burnout (Malliarou, Moustaka & Konstantinidis, 2008; Maslach, Schaufeli & Leiter, 2001). In operation rooms, determining possible biological, chemical, physical, and psychosocial risks, as well as recognizing their effects and taking precautions, is important for reducing stress and burnout (Aslan & Öntürk, 2011).

Having access to regular health screenings, taking precautions in risky situations (e.g., protection from radiation and the use of safe materials), the reduction/prevention of penetrating stab wounds, and the improvement

of workplace conditions is advised for operating room nurses and for other medical personnel (Banfield, 2014; Lundstom et al., 2002; Türkiye Cumhuriyeti Sağlık Bakanlığı, 2012). However, conforming to these suggestions and the effect they have on the burnout levels of nurses is unknown.

This purpose of this study was to determine the relationship between employee safety applications in operating rooms and the levels of burnout in nurses.

## Methods

### Study Setting and Design

This descriptive study was carried out with operating room nurses employed at three university hospitals and two public hospitals between January 1, 2014 and April 30, 2014.

### Ethical Considerations

Institutions in which the study was carried out, nurses and nursing managers were notified in writing about the purpose and extent of the study.

### Participants

Operating room nurses who were willing to participate in the study and who filled out the data collection forms completely were included in the study. A total of 106 operating room nurses employed at three university hospitals and two public hospitals, and 60% (n = 64) of them agreed to participate in this study.

### Data Collection and Instruments

A personal information form, the "Employee Safety Measures' Form," and the "Maslach Burnout Inventory" were sent to nurses by post and they were used in data collection.

### Personal Information Form

The form included questions about age, education, marital status, number of years employed in the operating room, and the table at which one worked.

### Employee Safety Measures Form

This form was based on the Turkish Ministry of Health regulations on the maintenance of patient and employee safety, as well as on the relevant literature, and included questions about safety measures that need to be taken in order to

maintain employee safety in the operating room (Table 2). All questions in this form, were answered as yes or no by operating room nurses (Türkiye Cumhuriyeti Sağlık Bakanlığı, 2012).

### **Maslach Burnout Inventory**

The Maslach Burnout Inventory (MBI), which was developed by Maslach & Jackson (1981) and translated into Turkish by Ergin (1992), has three subdimensions: emotional exhaustion (EE), desensitization (D), and personal accomplishment (PA). The EE dimension comprises nine items that identify the emotions of the person being consumed by his/her job and are being overdriven. The D dimension consists of five items that identify the individuals acting without considering that they are idiosyncratic beings and devoid of emotion. The PA dimension features eight items that identify one's emotions of sufficiency and overcoming with success.

The inventory, which consists of 22 items in total, is a 5-point Likert-type (having scores varying from 0 to 4) scale. Every item should be answered by choosing one of the five options (never, rarely, occasionally, frequently and always). The Never option receives 0 points, and the Always option receives 4 points. Scores for every subdimension are calculated by adding the scores of the items that are in that dimension. The EE and D dimensions consist of negative statements. The PA subdimension consists of positive statements and is scored inversely. Although the general score of the scale is between 0 and 88, burnout cannot be expressed with a single score since it is a process and contains different functions. With the addition of these scores, scores varying between 0–36 for EE, 0–20 for D, and 0–32 for PA are obtained. Accordingly, a high score shows that EE (low if  $< 16$ ; average if 17–26; high if  $\geq 27$ ) and D (low if  $< 6$ ; average if 7–12; high if  $\geq 13$ ) is high;

higher PA scores indicate that personal accomplishment is low since the scores are calculated after reversing (low if  $> 39$ ; average if 38–32; high if  $< 31$ ). In the Turkish adaptation study carried out by Ergin (1992), Cronbach's alpha coefficients were measured at  $\alpha.83$  for EE,  $\alpha.65$  for D, and  $\alpha.72$  for PA.

### **Data Analysis**

The results were reported as numbers (percentages) and as means \_ standard deviations ( $x$  \_ SD). A *t*-test was used to analyse differences between the means of safety items. The level of statistical significance was set at  $P < 0.05$ .

### **Results**

In this study, the mean age of nurses was  $31.9 \pm 6.7$ , the mean number of years of employment was  $7.32 \pm 6.6$ , and 38% of the nurses worked at tables utilizing applications that comprised mixed surgical procedures. Among the nurses, 48% were married, and 73% had bachelor's degrees (Table 1).

In this study, mean EE scores were  $17,89 \pm 7,039$ , D scores were  $6,328 \pm 2,823$ , and PA scores were  $16,64 \pm 4,172$ .

Among operating room nurses, the failure to take necessary precautions to prevent stab wounds ( $t = -2.914$ ,  $p = 0.005$ ) increased EE; the lack of access to health screenings increased EE ( $t = -4.707$ ,  $p = 0.000$ ) and D ( $t = -2.549$ ,  $p = 0.013$ ); the lack of vaccinations ( $t = -2.590$ ,  $p = 0.012$ ) increased EE; the failure to take precautions in areas where radioactive substances are used increased D ( $t = -2.76$ ,  $p = 0.008$ ); and a failure to feel the support of the senior management increased EE ( $t = -3.233$ ,  $p = 0.002$ ) and D ( $t = -2.682$ ,  $p = 0.009$ ) (Table 2). The PA score was generally high, and a statistical significance with respect to employee safety could not be determined.

**Table 1. Individual variables**

| <b>Individual Variables</b> | <b>n</b>        | <b>%</b> |
|-----------------------------|-----------------|----------|
| <b>Marital Status</b>       |                 |          |
| Single                      | 27              | 42.2     |
| Married                     | 31              | 48.4     |
| Divorced                    | 6               | 9.4      |
| <b>Educational Status</b>   |                 |          |
| Vocational school of health | 3               | 4.7      |
| Associate                   | 11              | 17.2     |
| Undergraduate               | 47              | 73.4     |
| Postgraduate                | 3               | 4.7      |
| <b>Table Worked At</b>      |                 |          |
| All                         | 24              | 37.5     |
| General surgery             | 13              | 20.3     |
| Plastics surgery            | 2               | 3.1      |
| Pediatric surgery           | 2               | 3.1      |
| Obstetric surgery           | 4               | 6.3      |
| Orthopedic-Urology          | 5               | 7.8      |
| Cardiovascular surgery      | 9               | 14.1     |
| Neurosurgery                | 2               | 3.1      |
| Ear, nose, throat surgery   | 2               | 3.1      |
|                             | <b>Avg ± SD</b> |          |
| Age                         | 31.9 ± 6.7      |          |
| Number of years employed    | 7.32 ± 6.65     |          |
| Emotional burnout           | 17,89 ± 7,039   |          |
| Depersonalization           | 6,328 ± 2,823   |          |
| Personal accomplishment     | 16,64 ± 4,172   |          |

**Table 2. The relation between employee safety applications and scale scores**

| Employee safety applications in the operating room   |     | n (%)     | Maslach BI (Mean (SD)) |                   |                         |
|--|-----|-----------|------------------------|-------------------|-------------------------|
|  |     |           | Emotional Burnout      | Depersonalization | Personal Accomplishment |
| There is an employee safety program that strives to protect nurses from hazards.                                     | Yes | 31 (48.4) | 18.61 (7.21)           | 6.41 (2.98)       | 16.58 (4.40)            |
|  | No  | 33 (51.6) | 17.21 (6.90)           | 6.24 (2.70)       | 16.69 (4.01)            |
| Regular health screenings are provided.  | Yes | 35 (54.7) | 14.62 ± 5.82           | 5.54 ± 2.72       | 16.20 ± 4.42            |
|  | No  | 29 (45.3) | 21.82 ± 6.39*          | 7.27 ± 2.68*      | 17.17 ± 3.85            |
| Necessary precautions to prevent stab wounds are taken.  | Yes | 51 (79.7) | 16.66 ± 6.56           | 6.00 ± 2.71       | 16.78 ± 4.37            |
|  | No  | 13 (20.3) | 22.69 ± 7.01*          | 7.61 ± 2.98       | 16.07 ± 3.35            |
| Application with antineoplastic medication and chemicals is carried out in compliance with the "Safe Working Guide." | Yes | 18 (28.1) | 16.61 ± 5.59           | 6.22 ± 2.66       | 16.05 ± 4.26            |
|  | No  | 46 (71.9) | 18.39 ± 2.52           | 6.36 ± 2.90       | 16.86 ± 4.16            |
| Personal protective equipment (e.g., aprons, nonallergic gloves, and goggles) is provided.                           | Yes | 61 (95.3) | 17.68 ± 7.00           | 6.22 ± 2.78       | 16.59 ± 4.24            |
|  | No  | 3 (4.7)   | 22.00 ± 7.93           | 8.33 ± 3.51       | 17.66 ± 2.51            |
| The institution takes necessary precautions to protect employees from patients whose contagion feature is high.      | Yes | 53 (82.8) | 17.35 ± 6.84           | 6.32 ± 2.75       | 16.56 ± 3.88            |
|  | No  | 11 (17.2) | 20.45 ± 7.75           | 6.36 ± 3.26       | 17.00 ± 5.56            |
| Precautions are taken to control and prevent infections in the operating room.                                       | Yes | 57 (89.8) | 17.40 ± 6.81           | 6.15 ± 2.73       | 16.43 ± 3.94            |
|  | No  | 7 (10.9)  | 21.85 ± 8.11           | 7.71 ± 3.35       | 18.28 ± 5.82            |
| Cleaning, disinfection, and sterilization applications are adequate.   | Yes | 55 (85.9) | 18.01 ± 7.14           | 6.43 ± 2.74       | 16.49 ± 3.74            |
|  | No  | 9 (14.1)  | 17.11 ± 6.67           | 5.66 ± 3.35       | 17.55 ± 6.42            |
| Necessary precautions are taken in areas where radioactive substances are used.                                      | Yes | 29 (45.3) | 16.10 ± 6.77           | 5.31 ± 2.56       | 15.89 ± 4.08            |
|  | No  | 35 (54.7) | 19.37 ± 7.00           | 7.17 ± 2.78*      | 17.25 ± 4.20            |
| Vaccinations are administered by the infection control committee.  | Yes | 40 (62.5) | 16.20 ± 6.57           | 5.92 ± 2.50       | 16.90 ± 4.40            |
|  | No  | 24 (37.5) | 20.70 ± 7.01*          | 7.00 ± 3.23       | 16.20 ± 3.79            |
| Safety measures (color-coding application) against physical assault, sexual abuse, and violence are applied.         | Yes | 47 (73.4) | 17.02 ± 6.95           | 6.00 ± 2.68       | 16.43 ± 4.43            |
|  | No  | 17 (26.6) | 20.35 ± 7.08           | 7.29 ± 3.11       | 17.58 ± 3.08            |
| There is an arrangement that makes operating room nurses feel the support of the senior management.                  | Yes | 30 (46.9) | 15.06 ± 5.84           | 5.36 ± 2.23       | 16.26 ± 4.37            |
|  | No  | 34 (53.1) | 20.38 ± 7.13*          | 7.17 ± 3.03*      | 16.97 ± 4.02            |
| Accommodations for handicapped employees are made.   | Yes | 14 (21.9) | 16.42 ± 5.76           | 5.92 ± 2.40       | 16.57 ± 3.91            |
|  | No  | 50 (78.1) | 18.30 ± 7.35           | 6.44 ± 2.94       | 16.66 ± 4.27            |
| Employee safety education is provided to operating room nurses.  | Yes | 40 (62.5) | 17.70 ± 6.75           | 6.40 ± 2.70       | 16.42 ± 3.71            |
|  | No  | 24 (37.5) | 18.20 ± 7.63           | 6.20 ± 3.06       | 17.00 ± 4.90            |

\*p &lt; 0.05; t: t-test

## Discussion

In this study, which was carried out to determine employee safety applications and the effect they have on the burnout levels operating room nurses, it was determined that the levels of EE were average, the levels of D were low, and the levels of PA were high. Similar results were attained in previous studies that have investigated the burnout levels of nurses. In a study by Niasar et al. (2013) which investigated burnout in operating room nurses, it was determined that 50.6–96.5% of the participants experienced EE, 63.5–89.3% experienced D, and 10% experienced a lack of PA. Moustaka et al. (2009) determined the work-related burnout levels of nurses to be on an average level. Circenis et al. (2011) investigated levels of burnout, depression, and anxiety in surgical and operating room nurses and found that 46% of the participants demonstrated EE, 40% demonstrated D, and 42% demonstrated decreased PA. The results of the studies indicated that operating room nurses experience varying levels of burnout. It is accepted that operating room nursing is a very stressful field of nursing and that burnout is a common phenomenon in this field (Niasar et al., 2013).

The failure to take necessary precautions to prevent stab wounds increases emotional burnout. Moreover, perioperative nurses are more prone to penetrating stab wounds (Clarke, 2007). Cho et al. (2013) who investigated penetrating stab wounds and affecting factors, determined that 70.4% of the nurses experienced penetrating stab wounds and that carrying sharp objects with unsafe carriers, insufficient work experience, and an unfavorable working environment with a shortage of employees and resources increased the possibility of penetrating stab wounds. Smith et al. (2006) determined that nurses who work under a high degree of mental pressure were 1.75 times more at risk for being wounded with contaminated tools. Aholaakko (2011) determined that nurses' stress related to aseptic applications vary from motivation to burnout. The results show that there is an interaction between penetrating stab wounds and the feeling of burnout. Taking precautions to prevent penetrating stab wounds will reduce burnout among operating room nurses (Kitaoka &

Masuda, 2013).

The lack of regular health screenings increases depersonalization, and the failure of an infection "control committee" to provide vaccinations increases emotional exhaustion (Table 2). Among employees who work at units with a high risk of disease contamination, it is important for the institution to provide health screenings and vaccinations to make employees feel safe and well. In a study by Günüşen and Üstün (2008), which investigated the factors that affect burnout in nurses, it was determined that benefiting from healthcare services protects one from burnout. Azizpour et al. (2013) determined that the fear of getting infected by patients carrying HIV and hepatitis B was high. It should be determined that employees who are not vaccinated for hepatitis B are not infected via annual health screenings, and that undergoing screening tests and vaccination is advised for beginners (Lundstom et al., 2002). It should be ensured that those suspected of carrying, or those known to be carrying, HIV and hepatitis B do not participate in risky applications (Infection Prevention and Control Committee, 2013). Exposure to contagious diseases and a lack of screening and vaccinations for operating room nurses have a negative effect on burnout levels.

The failure to take protective measures in areas where radioactive substances are used increases D. Operating room nurses are exposed to radiation more than other healthcare personnel. This situation can result in thyroid diseases, skin problems, and cancer. Thus, the increasing stress during applications that include radioactive matter also increases burnout. Mehlman and DiPasquale (1997), determined that the doses received by employees who were 70 cm away from the radiation source were high, whereas the doses received by employees who were 91 cm away from the radiation source were quite low. For this reason, protective measures, such as the preservation of radiosensitive cells, keeping a distance between the employee and the radiation source, reducing the duration of exposure, and the use of dosimetry, is advised (Banfield, 2014; Radiation Protection Guidance For Hospital Staff, 2010)

It was determined that EE and D were more common among operating room nurses who did

not feel the support of senior management (Table 2).

Previous studies have yielded similar results. Vahey et al. (2004) determined that burnout levels were low in nurses who worked in fully staffed areas and who were well-supported with respect to patient care. These studies have shown that the behaviors of managers are related to stress and burnout and that supportive and contributive managers help to reduce workplace stress and in turn help to decrease burnout (Hamaideh & Ammouri, 2011; Van Bogaert et al., 2013). Wright (2014) reported that it is important to meet the demands of nurses and to support them in order to reduce workplace stress. Lundstrom et al. (2002) stated that creating a positive workplace environment affects the adaptation of safety applications, while Epp (2009) determined that manager nurses have an important role in reducing burnout by creating a supportive work environment. Stewart (2009) stated that the education of manager nurses results in the reduction of burnout in nurses. The results of previous studies show that manager nurses are important in terms of the experience of burnout among operating room nurses.

### Limitations

Nurses who participated in this research have worked in different institutions and under different operating room conditions. Create differences of information regarding the application of safety measures may have influenced the research results. Research can be repeated in only one hospital with more operating room nurses.

### Conclusions

Operating room nurses experience an average level of burnout. It was found out that a lack of precautions in preventing the transmission of infection agents, the failure to take protective measures in areas where radioactive matter is used, and a lack of support from management increase burnout. In order to reduce operating room nurse burnout, we recommend that precautions be taken to prevent the transmission of infection agents in operating rooms. In addition management should provide support to operating room nurses.

### References

- Aholaakko, T.K. (2011). Reducing surgical nurses' aseptic practice-related stress. *Journal of Clinical Nursing*, 20(23-24): 3339-3350.
- Aslan, F.E. & Öntürk, Z.K. (2011). Safe operating room environment; biological, chemical, physical and psychosocial risks, effects and precautions. *Maltepe University Journal of Nursing Science and Ar*, 4(1): 133-140.
- Azizpour, Y., Shohani, M., Sayehmiri, K. & Kikhavani, S. (2013). A survey on the associated factors of stress among operating room personnel. *Thrita Journal of Medical Sciences*, 2(3): 19-23.
- Banfield CM. Radiation Safety in the Operating Room. Retrieved from <http://www.wolfxray.com/images/Radiation%20Safety%20Article%20Dr%20Banfield.pdf> Accessed 24 November 2014.
- Cho, E., Lee, H., Choi, M., Park, S.H., Yoo, I.Y. & Aiken, L.H. (2013). Factors associated with needlestick and sharp injuries among hospital nurses: a cross-sectional questionnaire survey. *International Journal of Nursing Studies*, 50(8):1025-1032.
- Circenis, K., Millere, I. & Deklava, L. (2011). Stress-related psychological disorders among surgical are nurses in Latvia. *Review of Global Medicine And Healthcare Research (RGMHR)*, 2(2): 131-138.
- Clarke, S.P. (2007). Hospital work environments, nurse characteristics, and sharps injuries. *Am J Infect Control*, 35(5): 302-309.
- Epp, K. (2009). Burnout in critical care nurses: a literature review. *Dynamics*, 23(4): 25-31.
- Ergin, C. (1992). Burnout in Doctors and Nurses and The Application of Maslach Burnout Inventory National Psychology Congress and Publication of Turkish Psychological Association, Ankara, 1992.
- Garrosa, E., Moreno-Jimenez, B., Liang, Y. & Gonzalez, J.L. (2008). The relationship between socio-demographic variables, job stressors, burnout, and hardy personality in nurses: an exploratory study. *International Journal of Nursing Studies*, 45(3): 418-427.
- Günüşen, N. & Üstün, B. (2008). Determining the level of burnout in nurses working at a university hospital and affecting factors. *Ataturk University Journal of Nursing School*, 11(4): 48-58.
- Hamaideh, S.H. & Ammouri, A. (2011). Comparing Jordanian nurses' job stressors in stressful and non stressful clinical areas. *Contemporary Nurse*, 37(2): 173-187.
- Infection Prevention and Control Committee, Infection Prevention and Control Practice in the Operating Department. 2013. Retrieved from <http://www.newcastle-hospitals.org.uk/downloads/policies/Infection%20>

- Control/InfectionControlTheatres201308.pdf  
Accessed 24 November 2014.
- Khalatbaria, J., Ghorbanshiroudia, S. & Firouzbakhsha, M. (2013). Correlation of job stress, job satisfaction, job motivation and burnout and feeling stress. *Procedia - Social and Behavioral Sciences*, 84: 860 – 863.
- Kitaoka, K. & Masuda, S. (2013). Academic report on burnout among Japanese nurses. *Japan Journal of Nursing Science*, 10(2):273-279. doi: 10.1111/j.1742-7924.2012.00221.x.
- Laal, M. (2013). Job stress management in nurses. *Procedia - Social and Behavioral Science*, 84, 437-442.
- Le Moual, N., Varraso, R., Zock, J.P., Henneberger, P., Speizer, F.E., Kauffmann, F. & Camargo, C.A. Jr. (2013). Are operating room nurses at higher risk of severe persistent asthma? the nurses' health study. *American College of Occupational and Environmental Medicine*, 55(8): 973-977.
- Lundstom, T., Pugliese, G., Bartley, J., Cox, J. & Guither, C. (2002). Organizational and environmental factors that affect worker health and safety and patient outcomes. *Am J Infect Control*, 30(2):93-106.
- Malliarou, M.M., Moustaka, E.C. & Konstantinidis, T.C. (2008). Burnout of nursing personnel in a regional university hospital. *Health Science Journal*, 2(3): 142-152.
- Maslach, C. (2003). Job burnout: new directions in research and intervention. *Current Directions in Psychological Science*, 12(5): 189-192.
- Maslach, C. & Jackson, S.E. (1981). The measurement of experienced burnout. *Journal of Occupational Behaviour*, 2: 99-113.
- Maslach, C., Schaufeli, W.B. & Leiter, M.P. (2001). Job Burnout. *Annual Review of Psychology*, 52(1): 397-422.
- Mehlman, C.T. & DiPasquale, T.G. (1997). Radiation exposure to the orthopaedic surgical team during fluoroscopy: "how far away is far enough?" *Journal of Orthopaedic Trauma*, 11(6): 392-398.
- Moustaka, E., Malliarou, M., Sarafis, P., Konstantinidis, T. & Manolidou, Z. (2009). Burnout in nursing personnel in a regional university hospital. *Balkan Military Medical Review*, 12(1): 1-7.
- Niasar, N.K., Kharam, T.Z., Koohbor, M. & Aghaziarati, M. (2013). Professional burnout and the affecting factors in operating room nurses in Qom teaching hospitals. *Jentashapir J Health Res*, 4(4): 305-314.
- Piko, B.F. (2006). Burnout, role conflict, job satisfaction and psychosocial health among Hungarian health care staff: a questionnaire survey. *International Journal of Nursing Studies*, 43(3): 311-318.
- Radiation Protection Guidance For Hospital Staff. 2010. Retrieved from [https://web.stanford.edu/dept/EHS/prod/researchlab/radlaser/Hospital\\_Guidance\\_document.pdf](https://web.stanford.edu/dept/EHS/prod/researchlab/radlaser/Hospital_Guidance_document.pdf)  
Accessed 24 November 2014.
- Regehr, C., Kjerulf, M., Popova, S.R. & Baker, A.J. (2004). Trauma and tribulation: the experiences and attitudes of operating room nurses working with organ donors. *Journal of Clinical Nursing*, 13(4): 430-437.
- Sinat, Ö., & Kutlu, Y. (2009). Burnout in the nurses working at psychiatry clinics. *Florence Nightingale Journal of Nursing*, 17(3): 174-183.
- Smith, D.R., Mihashi, M., Adachi, Y., Nakashima, Y. & Ishitake, T. (2006). Epidemiology of needlestick and sharps injuries among nurses in a Japanese teaching hospital. *Journal of Hospital Infection*, 64(1), 44-49.
- Stewart, K.L. (2009). Nurse Managers' Knowledge of Staff Nurse Burnout (thesis). Cullowhee: Western Carolina Univ.
- Republic of Turkey Ministry of Health, Employee Safety Circular]. 2012. Retrieved from <http://www.saglik.gov.tr/TR/belge/1-15642/calis-an-guvenligi-genelgesi.html?vurgu=%C3%A7a%C4%B1%C5%9Fan+g%C3%BCvenli%C4%9Fi> Accessed 20 June 2014.
- Vahey, D.C., Aiken, L.H., Sloane, D.M., Clarke, S.P. & Vargas, D. (2004). Nurse burnout and patient satisfaction. *Medical Care*, 42(2): 57-66.
- Van Bogaert, P., Kowalski, C., Weeks, S.M., Van Heusden, D. & Clarke, S.P. (2013). The relationship between nurse practice environment, nurse work characteristics, burnout and job outcome and quality of nursing care: a cross-sectional survey. *International Journal of Nursing Studies*, 50(12): 1667-1677.
- Vargas C, Cañadas GA, Aguayo R, Fernández R, Fuente E.(2014) Which occupational risk factors are associated with burnout in nursing? A meta-analytic study. *International Journal of Clinical and Health Psychology*, (2014) 14: 28-38
- Wright, K. (2014). Alleviating stress in the workplace: advice for nurses. *Nursing Standard*, 28(20): 37-42.
- Zellmer, D.D. (2005). Teaching to prevent burnout in the helping professions. *Analytic Teaching*, 24(1): 20-25.