

## STRESS AT WORKPLACE AND OCCUPATIONAL INJURIES

Maja Miškulin<sup>1</sup>, Sanja Kliman<sup>2</sup>, Nika Pavlović<sup>1</sup>, Terezija Berlančić<sup>1</sup>, Želimir Orkić<sup>1</sup>, Ivan Miškulin<sup>1</sup>

<sup>1</sup>Faculty of Medicine Osijek, Josipa Huttlera 4, Osijek, Croatia

<sup>2</sup>General Hospital Pula, Zagrebačka 30, Pula, Croatia

### Summary

Nurses and technicians are, at their primary job of patient care, exposed daily to various physical strains and stressful situations, which is why they are at risk of injury. The aim of this study was to investigate the frequency, type and circumstances of work injuries among nurses and technicians as well as to determine whether there is a connection between the injuries and sociodemographic and socioeconomic characteristics of the participants, as well as the connection between the injuries and the stress level at which the participants are exposed during their work. This cross-sectional study was conducted in April 2017 and included 191 nurses/technicians at the General Hospital Pula. A specially designed questionnaire was used to collect data about their age, gender, qualifications and socioeconomic status as well as the frequency and type of injuries that they had been experienced during stressful situations at work. In the last six months, there were 8.9% of those who experienced work injury. The most common were abdominal injuries, lower back and pelvis injuries, while stabs with the sharp object were the most common type of injury. There was statistically significant connection between the incidence of injuries and the shift work ( $p=0.032$ ) as well as between the injuries and the stress level ( $p=0.046$ ) in the last six months. To reduce the incidence of work injury in the observed population, it is necessary to reduce the shift work, and consequently reduce level of present stress.

**Keywords:** nurses, technicians, stress at work place, occupational injuries, shift work

### Introduction

Stress is the state of the disturbed psycho-physical balance of the organism that requires additional efforts to establish a prior balance (Havelka, 1998). Certain situations that are perceived as a threat to persons own integrity imply stereotypical response to the organism (Ivanović et al., 2016). By studying stressful situations in the workplace, different levels of stress are identified to determine how much of these changes depend on the nature of the assigned task or on the individual's ability to cope with the new situation. Work overload is most often associated with emotional exhaustion, regarding to the feeling of excessive emotional stress and isolation from other people (Fernandez-Castro et al., 2017). According to the EU-OSHA Survey in 2013., more than half of workers in the European Union think stress is a frequent problem at work, while 40% of them think they cannot cope with stress appropriately. Several other European studies point to workers' complaints about workplace stress as a cause of certain health problems. Stress-related disorders are so common that it is estimated how they cause half of the work absence. Stress at workplace can lead to higher rates of injury, job rotation, and poorer health of workers who are less productive (Marcatto et al., 2016). The population of healthcare professionals is exposed in a special way to different and specific stress

situations, resulting in several specific injuries at work. The working life of hospital nurses/technicians determines their condition and functioning at work. Organizational factors are crucial and determine the employee's satisfaction, his possible complaints, ambiguous roles and conflicts, mental disturbances and even the intention to leave (Stab et al., 2016). All health care professionals find ways to adapt and work better with a certain amount of everyday stress at the workplace (Bussing et al., 2017).

Work injuries can be caused by short-term effects of mechanical, chemical and physical hazards, sudden changes in the body's position as well as its sudden overload. Also, as a result of poor working conditions certain occupational diseases may develop (Videc, 2011). Factors affecting the onset of injury can be human, environmental and socioeconomic factors. Human factors include age, gender, specific skills, knowledge and experience, health, emotional profile, as well as alcohol and drugs. Environmental factors include the physical and psychological work environment and work organization, while socioeconomic factors include the standard of the worker himself, possibly a travel to workplace as well as supplementary work. Programs with measures to prevent the occurrence of injuries at workplace should include professional orientation and selection of workers, education, work organization, care for socioeconomic status, technical protection

measures, health education and enlightenment, as well as supervision and prevention measures (Petri & Stipančević, 2005). Compared to other workplaces, healthcare workers have a significantly higher incidence of occupational accidents, injuries and the onset of illness (Tei Tominaga & Nakanishi, 2018). In their everyday work-related medical care process, nurses and technicians use a number of medical devices for diagnostic, operational and therapeutic purposes, and in order to avoid possible injury hazards, they must be familiar with sources of danger and safety at work. Possible burns in the use of devices connected to electricity, the use of toxic chemicals, ionized and nonionised radiation produced by certain devices as well as contact with biological material are only some of the potential dangers present among healthcare professionals. There are also rare injuries while transferring, monitoring and rotation of patients. Physical stresses can also exacerbate some already existing health status of workers such as bone-joint disorders. It is also common to use the needle to extract blood or to apply a specific therapy (Videc, 2011). The highest risk is given to nurses/technicians, surgeons, dentists, pathologists, emergency staff as well as intensive care units for frequent contact with body fluids and tissues which are more exposed to infections (Petri & Stipančević, 2005). In general, injuries to sharp objects and stab incidents are frequent injuries among nurses/ technicians around the world (Loerbroks et al., 2015). This has also been confirmed by the results of the stab incidents survey in Clinical Hospital Dubrava, Croatia, which show that nurses and technicians have the most injuries caused by needles. According to the European Directive 2010/32/EU of 2010., EU Member States are obliged to take preventive measures to prevent injuries to health workers (Delalić et al., 2012). The Directive is also based on the 2013 Ordinance on the Implementation of Protection Measures to Prevent Stronger Injuries (NN 84/2013).

The aim of this study was to investigate the frequency, type and circumstances of work injuries among nurses and technicians as well as to determine whether there is a connection between the injuries and sociodemographic and socioeconomic characteristics of the study participants, as well as the connection between the injuries and the stress level at which the study participants are exposed during their work.

## Participants and Methods

The cross-sectional study that was conducted from April 1<sup>st</sup> 2017 to May 1<sup>st</sup> 2017 in the General Hospital

Pula at the Departments of surgery, internal medicine, anesthesia and intensive care, psychiatry, neurology, otorhinolaryngology, the integrated emergency admissions and the polyclinic and included 191 participants (163 women and 28 men). The described sample of participants included 142 nurses/technicians with high school education, 44 bachelors and 5 masters of nursing care. The average age of all participants was 39.4 years (range 21-64 years). The response rate was 76.4%. The participants filled out a specially designed questionnaire composed of 22 questions. Their age, gender, qualifications, socioeconomic status as well as information about the incidence of possible injuries, the type and the circumstances of these injuries in the workplace were established. Part of the Workplace Stress Questionnaire was developed by Marlin Company, North Haven, CT, USA and the American Institute of Stress in Yonkers, NY, USA, contained eight questions while the answers designated 1 to 5 where 1 denotes never and 5 very often (Aghilinejad et al., 2014).

The normality of data distribution was tested with the Kolmogorov-Smirnov test. The mean values of the continuous variables were expressed by the arithmetic mean and the standard deviation for the normally distributed variables, as well as the median and range for variables that were not distributed normally. Nominal variables were presented by distribution of frequency by groups and by share. The  $\chi^2$ -test was used to determine the difference between the two independent samples. On all statistical analyses, two-sided p-values of 0.05 were considered significant. All collected data were processed using the Statistics for Windows 2010 program (version 10.0, StatSoft Inc., Tulsa, OK).

## Results and Discussion

### *Sociodemographic and socioeconomic characteristics of participants*

The study included a total of 191 participants, 14.7% males, mean age 33.2 years and 85.3% females, mean age 40.5 years. According to the age group there were 30.4% participants aged 20-24 years, 49.2% of those aged 35-49 years and 20.4% of those aged 50-64 years. According to the highest level of education, 74.4% of the participants completed secondary nursing school, 23% of them had bachelor of nursing degree while 2.6% of them had master of nursing degree.

When observing the participants by the place of their employment there were 19.3% of them from the Department of Surgery, 30.3% of them from the

Department of Internal Medicine, 11.5% of them from the Department of Anesthesia and Intensive Care, 7.9% of them from the Department of Neurology, 7.9% of them from Polyclinic, 9.4% of them from Unified Emergency Hospital Admissions Department and 5.8% of them from the Department of Psychiatry. According to self-evaluated economic status, 2.0% of the participants had much worse economic status than average, 4.8% of the participants had slightly worse economic status than average, 71.7% of the participants considered having the average economic status, 19.9% of the participants had slightly better economic status than the average while only 1.6% of the participants stated that they had much better economic status than the average.

According to the established level of stress at the workplace, 8.9% of the participants answered that they have no stress at their workplace, 23.0% responded that they have low stress at their workplace, 38.8 % stated that moderate stress is present at their workplace, 20.4% participants stated they are in serious stress at their workplace, while 8.9% of the participants stated that they are in very high stress at their workplace.

By observing participants according to their associated diseases, there were 30.9% of those who suffered and 69.1% of those who did not suffer from associated diseases. Among all participants there were 74.3% of them who did not take any pharmacotherapy while 25.7% of the participants used at least one drug on a regular basis. Of all participants there were only 26.7% of those who did not work in shifts and 73.3% of those who worked in shifts.

*Participants due to injury occurrence at workplace*

Over the past six months there were 8.9% of those who experienced work injury. The results obtained for injuries at work in the last six months according to the age group of the participants are shown in Table 1.

**Table 1.** The injuries at the workplace according to the age of participants in the last six months

Injury at workplace	20-34 years of age	35-49 years of age	50-64 years of age	p*
Yes	12,10%	5,30%	12,80%	
No	87,90%	94,70%	87,20%	0,229

\* $\chi$  - test

When observing injured subjects according to the time of injury during the 24 hours, 41.2% of the participants answered that their injury occurred between 7 and 12

a.m., 17.6% of the participants answered that their injury occurred between 1 and 6 p.m., 11.8% of the participants said that they were injured between 7 and 12 p.m., 11.8% of the participants answered that their injury occurred between 0 and 6 a.m. and 17.6% of the participants answered that their injuries occurred several times in different time during the day.

**Table 2.** The injuries at the workplace according to the departments at the General Hospital Pula in the last six months

Department	Number of the participants	Injury present (%)	No injury present(%)	p*
Surgery	37	13,6	86,4	0,419
Internal Medicine	58	10,3	89,7	
Anesthesia and Intensive Care	22	4,6	95,4	
Otorhinolaryngology	15	0	100	
Neurology	15	20	80	
Polyclinic	15	0	100	
Unified Emergency Hospital Admissions	18	5,6	94,4	
Psychiatry	11	9,1	90,9	

\* $\chi$  - test

According to the localization of the suffered injury within six months, 23.5% of the participants suffered from abdominal injuries, lower back and pelvis injuries, 11.8% of them pointed head as most injured, 11.8% of them pointed the ankle and forearm, as well as the wrist and hand injuries as most injured, 17.6% of the participants suffered from the pedal ankle and foot injuries, while 23.5% stated that they were suffering from injuries to several parts of the body.

**Table 3.** The injuries at workplace according to the shift work in the last six months

Shift work	Injury present (%)	No injury present (%)	p*
No	3,9	96,1	0,032
Yes	10,8	89,2	

\* $\chi$  - test

According to the type of the injury, 23.5% stated that it was a sharp object injury, 5.9% said it was cuts, 5.9% said it was striker, 58.8% participants responded that these were some other injuries while 5.9% of the participants indicated that there were more types of injuries. Comparison of injuries in the case of nurses/

technicians in the last six months classified by the Department where they work is shown in Table 2. The Table 3 shows injuries of participants at workplace according to the shift work during the last six months while Table 4 shows the connection of the established levels of stress with respect to work and experience of injury in the past six months among participants.

**Table 4.** Participants according to the levels of stress in relation to work and experience of occupational injury in the last six months

Level of stress	Had no injury (%)	Had an injury (%)	Total (%)	p*
No stress	14 (8,0)	0 (0,0)	14 (7,3)	0,046
Low stress	49 (28,2)	3 (17,6)	52 (27,2)	
Average stress	84 (48,3)	8 (47,1)	92 (48,2)	
Serious stress	18 (10,3)	2 (11,8)	20 (10,5)	
Very high stress	9 (5,2)	4 (23,5)	13 (6,8)	
Total	174 (100,00)	17 (100,00)	191 (100,00)	

\* $\chi^2$  - test

The results of this study indicate the expected data on the various stressors of nurses/technicians in the workplace, on the presence of occupational illnesses within the working environment as well as the frequent injuries that have been shown to be related to their work. Most participants argued how they were exposed to a moderate level of stress, suggesting that potential stress factors in the General Hospital are not over-expressed. It can therefore be concluded that a workplace organization, as one of the major causes of stress in nurses/technicians, is in most cases satisfactory. Comparing the results of this study with the results of the research on occupational diseases of University Hospital Center Zagreb healthcare workers, there is a clear association between stress on the workplace, the health and thus on the working abilities of employees. In Zagreb, 75.0% of nurses/technicians had a pain in the lower back, 24.5% suffered from respiratory disease, 15.0% had elevated blood pressure, 15.0% had hearing problems, 11.0% had a mild mental disorder, 1.0% were obese and 1.0% had diabetes of which 0.3% were insulin dependent (Strapajević, 2015).

From this study it can also be concluded that a quarter of injuries are related to sharp objects, while other injuries have not been specifically classified. The analysis of the educational status and the age-group regarding the injury shows that the number of

reported injuries at workplace by nurses/technicians is consequently jeopardized by their professional education and supervision. It was found that the greatest number of injuries was caused by strains during physical activity. The results of this study have shown that there was no statistically significant association between the time of injury and the frequency of injury, which cannot be considered relevant with regard to the extremely small sample. No statistically significant connection between the type of Department in the General Hospital Pula and the frequency of injuries has been demonstrated. The descriptive results show the greatest number of injuries into the psychiatric division, which is not too much due to the relatively small number of employees in that Department and compared to the Department of Internal Medicine. In the case of professional exposure during professional activities, hospital staff is at a high risk of hospital infections such as Hepatitis B (HBV), Hepatitis C (HCV) and Human Immunodeficiency Virus (HIV) (Obad et al., 2012). Most of the injuries listed in this study are just stab incidents. Due to the daily exposure of healthcare workers to different stressful situations, self-protection strategies should be introduced to help reduce tension. The study on this issue conducted in Clinical Hospital Dubrava in 2012, at the Institute for Traumatology and Orthopedics and Primary Health Care in the County of Zagreb showed that subjects used the balance while the physical self-defense was least used for these purposes. The most important factors in the strategy of reducing stress are the level of education of health professionals and the factors of the workplace. Therefore, it can be concluded from this study that employee training is an important factor in reducing stress and also the potential for injuries at work (Koščak et al., 2013).

From limitations in this study, it should certainly be emphasized the possibility of voluntary participation, which is why the response was not higher. Some employees may not have had time to participate because of a larger volume of work; some did not participate because of personal attitudes and some because of limited time to complete the questionnaire, which ultimately resulted in a smaller number of participants. The limit can also be found in self-assessment or objectivity of the participants.

Work organization is certainly one of the most significant causes of injuries in the workplace of nurses/technicians, whereby those who work in shifts are more vulnerable to injuries. Too little educated workers is also highlighted as a problem in the Croatian health care system and everyday

unplanned and unexpected situations, the pressure of deadlines, inadequate income, poor communication and disrupted interpersonal relationships.

## Conclusion

Injuries at workplace are common in nurses/technicians in General Hospital Pula. Most common injuries are the abdominal, lower back and pelvis injuries. According to the type of the injury, the majority of them were sharp object injuries. The study has shown that the injuries of nurses/technicians are not related to their age and location of their work while a significant association is found between the injury and the level of stress that injured nurses/technicians had at their workplaces. The study also suggests the necessity of reduction of overload work in order to reduce the level of stress and thus reduce the incidence of possible injury at workplace in the observed population.

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## STRES NA RADNOM MJESTU I OZLJEDE NA RADU

Maja Miškulin<sup>1\*</sup>, Sanja Kliman<sup>2</sup>, Nika Pavlović<sup>1</sup>, Terezija Berlančić<sup>1</sup>, Želimir Orkić<sup>1</sup>, Ivan Miškulin<sup>1</sup>

<sup>1</sup>Medicinski fakultet Osijek, Josipa Huttlera 4, Osijek, Hrvatska

<sup>2</sup>Opća bolnica Pula, Zagrebačka 30, Pula, Hrvatska

### Sažetak

Medicinske sestre i tehničari su pri svom osnovnom poslu skrbi i njege bolesnika, svakodnevno izloženi raznim fizičkim naprežanjima i stresnim situacijama zbog čega im prijete opasnost od ozljeda. Cilj ovog istraživanja bio je ispitati učestalost, vrstu i okolnosti nastanka ozljeda na radu među medicinskim sestrama i tehničarima kao i utvrditi postoji li povezanost nastalih ozljeda sa sociodemografskim i socioekonomskim obilježjima ispitanika te povezanost između nastanka ozljeda i razine stresa kojoj su ispitanici izloženi na radnom mjestu. Ovo presječno istraživanje provedeno je u travnju 2017. godine, a uključilo je 191 medicinsku sestru/tehničara u Općoj bolnici Pula. Posebno osmišljenim anketnim upitnikom je utvrđena dob, spol, stručna sprema te socioekonomski status ispitanika kao i učestalost te vrsta ozljeda nastalih u stresnim situacijama na poslu. Unazad šest mjeseci bilo je 8,9% onih koji su doživjeli ozljedu na radu. Najčešće su bile ozljede trbuha, donjeg dijela leđa i zdjelice, a ubodi oštrim predmetom navedeni su kao najčešća vrsta ozljede. Postojala je značajna povezanost učestalosti ozljeda sa smjenskim radom ( $p=0,032$ ) tako i s razinom stresa ( $p=0,046$ ) u posljednjih šest mjeseci. Za smanjenje učestalosti ozljeda na radu u promatranoj populaciji nužno je smanjenje smjenskog rada čime se ujedno smanjuje i razina prisutnog stresa.

**Ključne riječi:** medicinske sestre, medicinski tehničari, stres na radnom mjestu, ozljede na radu, smjenski rad