



Izvirni znanstveni članek/Original article

## RISK FACTORS FOR DEVELOPMENT OF LOW BACK AND NECK PAIN IN HOSPITAL NURSING PERSONNEL

DEJAVNIKI TVEGANJA ZA POJAV BOLEČINE V VRATNEM IN LEDVENEM  
PREDELU HRBTENICE PRI NEGOVALNEM OSEBJU V BOLNIŠNICI

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**Key words:** musculoskeletal disorders, nursing personnel, work environment, physical activity

### ABSTRACT

**Introduction:** A literature review of the impact of the work environment on the development of back pain identifies nursing personnel as a high-risk professional occupational group. The development of musculoskeletal disorders in personnel exposed to manual patient handling activity (patient lifting, repositioning and transfer) has been recognised as a major risk. Less substantiated data are available, however, on specific physical and psychosocial demands of work as independent risk factors for low back and neck pain respectively.

**Methods:** A cross-sectional study was conducted by using a structured questionnaire and convenience sampling. The sample set comprised hospital nursing personnel from University clinical centre Maribor (n = 575). The data gathered were statistically analysed.

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**Results:** The research results show that the majority of nursing personnel suffer from frequent episodes of low back (79.0%) and neck pain (65.9%). Further analysis established no statistically significant difference among the measured socio-demographic features, work environment and physical activity conducting to the development of either low back or neck pain.

**Discussion and conclusion:** A literature review on spine problems afflicting nursing personnel indicates that pain in the lumbar region is a more common musculoskeletal disorder than the neck pain. The same results were also obtained by the present study. None of the risk factors were established as a predominant predictor for first-time occurrence of low back injuries and the development of either low back or neck pain. The proposed measures to maintain a healthy back and prevent back pain include adequate physical activity, avoidance of sedentary life style habits (like prolonged watching of television) and maintenance of normal body mass index.

**Ključne besede:** mišično-skeletna obolenja, negovalno osebje, delovno okolje, fizična aktivnost

## IZVLEČEK

**Uvod:** Delavci v zdravstveni negi so v literaturi opredeljeni kot zelo tvegana skupina za pojav bolečin v hrbtenici. Kot največja dejavnika tveganja se izpostavljata ročno dvigovanje in premeščanje bremen. Kako posamezni dejavniki tveganja vplivajo na pojav bolečine v določenem predelu hrbtenice, v našem primeru ledveni in vratni, predstavlja v literaturi manj raziskano področje.

**Metode:** Izvedena je bila presečna raziskava z uporabo strukturiranih vprašalnikov in priložnostnim vzorčenjem. Preiskovanci so bili delavci v zdravstveni negi, zaposleni v Univerzitetnem kliničnem centru Maribor ( $n = 575$ ). Zbrani podatki so bili statistično analizirani.

**Rezultati:** V prvi meri so rezultati pokazali, da ima velika večina preiskovancev pogoste težave z bolečino v ledvenem (79,0 %) in vratnem (65,9 %) predelu hrbtenice. V nadaljevanju raziskave pa nobeden izmed preučevanih socialno-demografskih dejavnikov, dejavnikov delovnega okolja in gibalne aktivnosti ni pokazal statistično pomembnega vpliva za pojav ene ali druge vrste bolečine v hrbtenici.

**Diskusija in zaključek:** Izhajajoč iz literature, ki pripisuje bolečini v ledvenem predelu hrbtenice večji zdravstveni problem, naši rezultati za preventivo negovalnega osebja v bolnišnici okvirno priporočajo več rekreacije in športa, manj gledanja televizije in normalen indeks telesne mase. Naša raziskava je potrdila velik zdravstveni problem pri negovalnem osebju v bolnišnici zaradi bolečine v hrbtenici. Primerjava med bolečino v ledvenem in vratnem predelu hrbtenice pa ni pokazala očitnih razlik med preučevanimi dejavniki.

## Introduction

Nursing personnel have a high prevalence of back pain and occupational over-exertion injuries compared with other occupational groups. Health care workers, particularly nurses, have been identified as one of the highest-risk groups for back injuries. Patient handling was the precipitating event in the majority of nursing back injuries, indicating the need for ergonomic intervention (Goldman et al., 2000; Hoogendoorn et al., 1999; Engkvist et al., 1998). The nurses rated patient lifting, transfer and turning as the most physically demanding, requiring constant flexion and extension of the body (Hui et al., 2001; Cromie, Robertson, Best, 2000; Elford Straker, Strauss, 2000). According to Retsas, Pinikahaba (2000) Marras et al., (1999), the unacceptably high rate of back injuries among hospital nurses is caused mainly by manual lifting, transfer and repositioning of patients.

Reducing the incidence of musculoskeletal disorders leading to occupational injury and disability is in the focus of several occupational groups in developed and industrially developing countries, including Slovenia. (Jafry, O'Neill, 2000; Buckle, Devereux, 1999).

Takala (1999) reports that in some countries musculoskeletal disorders account for 40% of the costs of workers' compensation. Back pain is the most common and by far the most expensive of all

musculoskeletal disorders (Whiting, Zernicke, 2008). It may lead to a substantial economic burden for the patient, as well as for society in general. Some European countries estimate that annual total costs for back and neck problems correspond to 1% of GNP (Hansson, Hansson, 2005; van Tulder, Koes, Bouter, 1995).

Several studies have confirmed that musculoskeletal disorders result from exposure to mechanical factors (Turk, 2005). Other studies claim that musculoskeletal disorders can be prevented by reducing biomechanical hazards along with work-related stress and other psychosocial factors which constitute non-negligible risks for the development of these conditions (Kerr et al., 2001; Burton et al., 1997). Some research studies explored also the influence of elevated body mass index and obesity on the development of musculoskeletal conditions. The results, though inconclusive, indicate that low body mass index may, however, also present a certain risk in this respect (Smedley et al., 2003; Kerr et al., 2001). Older research included smoking and heavy drinking as factors predicting back diseases (Heliövaara, Knekt, Aromaa, 1987; Bigos et al., 1986; Kelsey et al., 1984). Rubin (2007) and Ferguson, Marras (1997) tried to gain insight into the back problems and establish correlation between the development of chronic back pain by considering the prognostic indicators, such as age, female gender, lower standard of living, lower educational level,

elevated body mass index, smoking, compromised health, physical exertion, repeated movements, forced awkward and static postures, work dissatisfaction, depressive moods, spinal structure of individuals, and visible anomalies. The present research focuses mainly on the socio-demographic features, work environment and physical activity of the respondents. Work satisfaction, morbidity factors, smoking and alcohol consumption were not taken into consideration. The factors studied are presented in the section *Methods*.

Studies of lifetime prevalence of back pain are based on the assumption that symptoms from different parts of the spine are distinctive entities. Recent studies, however, suggest that localized back pain should be seen as part of a general musculoskeletal syndrome and not a site-specific disorder. The relative proportions of individuals who reported to have had back pain varied between 60% and 80% for the two spinal regions (Croft, Papageorgious, McNally, 1997; Mäkelä et al., 1991). The prognostic studies on pain in the cervical area are scarce and the risk factors influencing the development of neck pain have been less investigated (Borghouts et al., 1999). Neck pain is often accompanied by headaches or by radiating complaints in the upper extremity (Coté, Cassidy, Carroll, 2000). Borghouts et al. (1999) reported that the share of costs for neck pain treatment is a few times smaller than for the treatment of low back pain. Accordingly, more research studies have been conducted on low back pain prevention and

treatment (Leboeuf-Yde et al., 2012; Martin et al., 2008).

## Purpose and goals

The purpose of the study was to establish the prevalence of neck and low back pain in nursing personnel. The data on risk factors were collected through literature reviews of the relevant issue. The main goal of the research was to describe and analyse the patterns of reporting neck and low back pain as different entities as well as identifying the strongest predictors of pain in the two spinal regions.

## Methods

### Sample

The sample of this quantitative cross-sectional study represents a cohort of nursing personnel in the Maribor University clinical center. The random sampling method was used to study the issue of work-related back pain and health hazards arising from their working conditions. 661 out of 900 questionnaires distributed among the nursing team members were completed and returned. The response rate was 63.9%. Only 575 questionnaires were finally used and analysed for study purposes. 84.5% of the respondents were female and 15.5% were male, their average age being  $37.5 \pm 8.9$  years. A detailed description of the sample is given in Table 1.

Table 1: *Sample description*

	<i>n = 575</i>	<i>%</i>
<b><i>Gender</i></b>		
Male	89	15.5
Female	486	84.5
<b><i>Educational level</i></b>		
Nurses (with a three-year associate nursing degree program or a four-year university program)	215	37.4
Nursing technician/assistant	360	62.6
	$\bar{X} \pm s$	interval
Age in years	$37.5 \pm 8.9$	20-60

Legend:  $\bar{X}$  - mean value,  $s$  - standard deviation,  $n$  - number

### Description of measuring instrument

The data were collected through a structured questionnaire on work-related back pain, consisting of 40 closed-ended and open-ended questions. The questions addressed the respondents' workload (10), their medical history on back pain (15), their recreational and sports activities (4) and the work environment and work place conditions as perceived by the respondents (11). The remaining questions referred to demographics of survey respondents, including gender, age, education,

body weight and height, occupation, total length of services up to date and the length of present post held.

The questionnaire was designed on the basis of several referential questionnaires used in other studies on back pain (Bot et al., 2004; Trinkoff et al., 2003; Davidson, Keating, 2002; Ando et al., 2000; Fairbank, Pynsent, 2000). The questionnaire was complemented with additional questions concerning positive and negative impacts on the development of back pain, like exercises for back pain prevention, recreational and sports activities, prolonged watching of television and

body mass index (BMI) (Burton et al., 2005; Shehab, Al-Jarallah, 2005; Rainville et al., 2004; Trinkoff et al., 2003; Maher, Latimer, Refshauge, 1999). The latter was calculated by the metric imperial formula, accepting weight measurements in kilograms and height measurements in meters. A BMI of 25 kg/m<sup>2</sup> and over indicates that a subject is outside of a normal weight range – overweight or obese (BMI, 2006).

The total of 12 predictive factors of work environment and working conditions, physical activity, watching television and frequency of back pain episodes were included in testing the reliability of the sample. The method of Cronbach's Alpha coefficient was used to measure the internal consistency or average correlation of items. The obtained coefficient, 0.724, indicates adequate reliability level of the sample (Nunnally, Bernstein, 1994).

#### *Data collection and ethical principles*

The survey was conducted in the years 2007 and 2008. The questionnaire was distributed to the nursing personnel by the head nurses of departments of the Maribor University clinical center. The participation of the respondents was voluntary. The head nurses were available to provide additional information if necessary. The completed questionnaires were returned by post.

The head nurses offered the respondents general information about the purpose of the study and a list of detailed written instructions was attached to each questionnaire. The participation in the study was voluntary, anonymous and confidential. The impersonal nature of questions allowed for anonymity of the participants and the survey avoided enquiry into the personal or emotional life of the participants. Professional discretion and protection of data privacy were secured. The permission for conducting the research in the Maribor University clinical center was granted by the Professional council of nursing (SZN -12-2007, October 12, 2007).

#### *Data analysis*

The first phase of the statistical analysis focused on the description of the sample, which was presented through frequency and percentage distribution, or mean

value and standard deviation for the age of participants, respectively. The numerical factors of age, length of work experience, duration of the present post held and amount of television watched were categorised into two clusters on the basis of mean values. The dependent variables of back pain were also partitioned into two clusters following the frequency report.

After having modified the variable and invariable factors, logistic regression was performed, and for each factor Wald  $\chi^2$ , odds ratio with a 95% confidence interval (CI) and p value for statistical significance were calculated. The statistical analysis was carried out with SPSS 18.0 software version. The calculated statistical significance was determined ( $p < 0.05$ ).

## **Results**

The results of the study indicate a high incidence and prevalence of low back pain in nursing personnel. It is evident from Table 2 that 90.3% of the respondents had a prior history of back pain, nearly 80% of which reported having had several episodes. In order to facilitate the analysis of risk factors, the results obtained were partitioned into two groups – the group with frequent and the group with rare occurrences of pain in the lumbar region. The neck pain, on the other hand, was experienced by 79.8% of the respondents, 65% of which reported having had several episodes, and the remaining 20.2% of the respondents were pain-free. The results also show that the incidence of neck pain is ranked behind low back pain. For the sake of greater transparency of predicting factors, the results obtained were again classified into two groups - the group with frequent and the group with rare occurrences of neck pain.

A total of 127 respondents reported frequent occurrences of only low back pain or only neck pain. The respondents having experienced pain in both regions ( $n = 353$ ) were excluded from further analysis and so were the respondents with a history of infrequent episodes of pain or no pain at all ( $n = 95$ ). Frequent pain in the lumbar and neck regions was reported by 101 and 26 respondents, respectively. Table 3 shows the relative positive and negative influence of specific factors on the development of pain in either region.

Table 2: *Low back pain and neck pain reports by hospital nursing personnel*

Frequency of report	Lumbar region				Cervical region			
	n	%	total	%	n	%	total	%
never	56	9.7	never or rarely	21.0	116	20.2	never or rarely	34.1
once	30	5.2			39	6.8		
twice	35	6.1			41	7.1		
several times	454	79.0	often	79.0	379	65.9	often	65.9

Legend: n - number, % - percentage

None of the factors have been identified as exerting a statistically significant influence on the development of pain in one of the two regions. Considering the influence of specific factors (Wald  $\chi^2$ ), the results of the study indicate that the respondents' current recreational and sports activities reduce the risk for the development of pain in the lumbar region to a greater extent as compared to the cervical region. On the contrary, the risks are increased by watching television

for two or more hours daily and when the BMI is  $\geq 25$ . Treatment of Category 4 patients (patients with life-threatening conditions who are incapable of performing any activity of daily living) presents the greatest risk for pain development (odds ratio 3.25). The influence of this factor was, however, smaller which is due to the low percentage of these patients treated (3.8% and 11.9%).

Table 3: Influence of risk and preventive factors for development of back pain in hospital nursing personnel

Factor	Back pain (%)		Wald $\chi^2$	Odds ratio	95% CI for odds ratio	P
	Neck (n = 26)	Low back (n = 101)				
Age 40 years or more	46.2	34.7	0.23	1.91	(0.13 – 27.40)	0.632
Female gender	84.6	78.2	0.00	0.99	(0.26 – 3.75)	0.984
Total work experience 20 years and over	46.2	32.7	0.28	0.48	(0.03 – 7.16)	0.598
Work experience at the present post 15 years and over	50.0	36.6	1.04	0.49	(0.12 – 1.93)	0.307
Treatment of category 4 patients	3.8	11.9	1.08	3.25	(0.35 – 29.97)	0.298
Manual lifting and transferring of objects weighing over 10 kg several times a day	46.2	58.4	0.19	1.24	(0.46 – 3.36)	0.666
Unassisted lifting and transfer of heavy burdens	15.4	14.9	0.25	1.42	(0.36 – 5.56)	0.615
Lifting and transfer of heavy burdens with assistive patient-handling devices	11.5	7.9	0.00	1.06	(0.19 – 5.89)	0.945
Mechanical beds assisting in care of bedridden patient	34.6	26.7	0.56	0.68	(0.24 – 1.88)	0.453
Work on computer two or more hours daily	26.9	27.7	0.01	0.96	(0.31 – 2.93)	0.938
Performance of back injury prevention exercises	42.3	41.6	0.49	1.46	(0.51 – 4.17)	0.485
Recreational or sports activities when young	46.2	54.5	0.33	1.35	(0.49 – 3.72)	0.565
Present recreational or sports activities	34.6	24.8	1.81	0.46	(0.15 – 1.43)	0.178
Watching TV for two or more hours daily	42.3	56.4	1.49	1.82	(0.70 – 4.73)	0.222
ITM $\geq 25$	19.2	33.7	1.69	2.21	(0.67 – 7.31)	0.194

Legend: Regression model:  $\chi^2 = 10.831$ , degrees of freedom = 15,  $p = 0.764$ , Nagelkerke  $R^2 = 0.128$   
 CI - confidence interval

## Discussion

The first phase of the research confirmed the literature review findings that musculoskeletal conditions in nursing personnel are prevalent and their impact pervasive. The study participants reported frequent episodes of pain in the lumbar region (nearly 80%) and cervical region (more than 65%). The results of the present study are comparable to other relevant studies identifying nursing personnel as a high-risk professional occupational group for back pain development (60-80%) (Ball, Pike, 2009; Buerhaus et al., 2000). The findings of the research also indicate that the incidence of neck pain is ranked behind low back pain. 20.2% of the participants reported to have experienced back pain as compared to 9.7% of neck pain experience.

The literature review identified several factors that increase the risk of developing back pain. The aim of the study was to determine which, if any, of these risk factors is statistically significant for the development of pain in the neck or lumbar region, respectively. According to literature review results, the issue has not yet been explored. Results of the present study yield no clear-cut answers as to the statistically significant risk factors responsible for the development of pain in either of the regions specifically. In other words, none of the factors analysed determines higher risks for either neck or back pain. The analysis identifies only a greater liability of some factors to affect the prevalence of either neck or low back pain, which

could only be confirmed with research on a larger sample of the population. The size of the research sample is discussed in the section dealing with research limitations. Physical exercise/fitness, BMI  $\geq 25$ , and sedentary life style habits (prolonged watching of television) have been identified as having critical positive or negative impact on back pain. Low back pain is largely recognised as a considerable public health problem, a significant economic burden and the cause of much personal hardship (Wenig et al., 2009; Borghouts et al., 1999). The proposed measures to maintain a healthy back and prevent back pain therefore encompass adequate physical activity, avoidance of sedentary life style habits (like prolonged watching of television) and maintenance of a normal body mass index.

The literature reviewed in the investigation of back pain area attributes the above three factors only minor significance. The crucial problem in nursing are the physical demands such as forced awkward postures, repositioning and heavy lifting (Trinkoff et al., 2003; Elford, Straker, Strauss, 2000; Zhuang et al., 1999). It follows that patient handling tasks that involve reaching and pulling are the most important target for risk reduction strategies. A risk factor included in the analysis was manual lifting and repositioning of burdens weighing more than ten kilograms several times a day. It was reported to be associated with back pain (but not exclusively low back pain) by approximately 50% of the respondents. The literature reviewed emphasises patient handling as being principally related to low-back injuries and pain which was also the primary assumption of the present research (Warming et al., 2009; Zhuang et al., 1999). The results obtained indicate, however, that manual patient handling tasks may not have detrimental effects solely on the lower back. Only one-tenth of respondents reported that their lifting and repositioning of patients is supported by assistive devices. In clinical practice such devices are seldom used for a number of reasons, such as time pressure and architectural barriers (Berčan et al., 2010; Videman et al., 2005; Engkvist et al., 1995). Along with lifting and repositioning of burdens, other factors contribute to musculoskeletal disorders, especially sitting in an improper position, and obesity which adds a heavy burden on the musculoskeletal system.

#### *Research limitations*

The literature review indicates that several hospitals worldwide share similar problems as to work design, workforce management and stressful work environments, Slovenia being no exception. Time shortage, psychophysical stress, and several other factors have been associated with back pain and injury in nursing personnel (Videman et al., 2005; Smedley et al., 2003; Aiken et al., 2001; Hollingdale, Warin, 1997). For practical reasons, the research is limited to

the nursing workforce in the University clinical centre Maribor, which covers all areas of the health care spectrum, thus rendering the sample representative of and comparable to other relevant studies.

In evaluation of the study, the fact that a small number of the respondents  $n = 27$  (4.7%) out of 575 reported a history of frequent episodes of only neck pain, without concurrent low back pain, has to be taken into consideration. The small number of such cases is probably the reason for not having established the expected statistically significant risk factors for pain in either region of the spine.

The data were collected through a questionnaire, which was designed specifically for the purpose of this study. There is a possibility that the cluster of back pain risk factors is not conclusive, especially in concern to work environment/conditions. The questionnaire was not pilot tested for validity and reliability as it was assumed that the respondents were familiar with the research issue. The question also arises as to the choice of the sampling method when considering different respondents' physical workload and working conditions. The sample of 40% of the nursing workforce from the University clinical centre Maribor renders the study nonetheless representative.

#### *Suggestions for future research*

The present study has certain limitations that need to be taken into account when considering its contributions. The research findings established no definite risk or preventive factors for the development of pain in the cervical or lumbar region, respectively. The proposed avenue of future research is a detailed analysis of nursing tasks and physical demands on the basis of which specific factors inducing musculoskeletal disorder in the neck and low back region could be identified.

#### **Conclusion**

The research findings confirm that back pain in the nursing personnel of the University clinical centre Maribor presents a significant health issue. The neck and low back pain occurrences share similar patterns of risk factors and no independent and distinct factor could be associated with the pain in either region. The major predictors of musculoskeletal disorders identified are daily manual lifting, repositioning and transfer of heavy burdens, which apply equally for both cervical and lumbar regions. Even though ergonomic assistive devices diminish the risks of injury and pain, they are rarely used in clinical practice.

The recommended preventive measures include recreational and sports activities which are usually undertaken when one is already experiencing a

problem. According to research results, the potential for lower back problems is increased by the elevated body weight. As the work-related back pain among nurses is a problem of significant proportion, the solution to this problem could be an adequate allocation of workload, the use of lifting assistive devices and the elimination of architectural barriers.

*Slovensko/Slovenian*

## Uvod

Zaposleni v zdravstveni negi so že dalj časa identificirani kot rizična skupina delavcev za poškodbe hrbtenice (Goldman et al., 2000; Hoogendoorn et al., 1999; Engkvist et al., 1998). Delo v zdravstveni negi zahteva nenehno fleksijo in ekstenzijo telesa ter dviganje in premeščanje bremen (Hui et al., 2001; Cromie, Robertson, Best, 2000; Elford Straker, Strauss, 2000). Aktivnosti, ki so povezane z dviganjem in premeščanjem pacientov, predstavljajo za negovalno osebje največjo fizično obremenitev in so po njihovem mnenju najpogosteje povezane s poškodbami (Retsas, Pinikhaba, 2000; Marras et al., 1999).

Zmanjševanje pojava mišično-skeletnih obolenj danes v številnih poklicih predstavlja enega osrednjih ciljev, in sicer tako v razvitih državah, kamor spada tudi Slovenija, kot v državah v razvoju (Jafry, O'Neill, 2000; Buckle, Devereux, 1999). Po mednarodnih ocenah se 40 % vseh zdravstvenih stroškov zaradi delovnih poškodb povezuje z mišično-skeletnimi obolenji (Takala, 1999). Znotraj mišično-skeletnih obolenj bolečina v hrbtenici predstavlja najpogostejši zaplet in daleč najdražje zdravljenje (Whiting, Zernicke, 2008). Stroške, povezane z zdravljenjem bolečin v hrbtenici, nekatere evropske države ocenjujejo v višini enega odstotka bruto domačega proizvoda (Hansson, Hansson, 2005; van Tulder, Koes, Bouter, 1995).

Veliko število raziskav potrjuje, da so mišično-skeletne bolezni posledica izpostavljenosti mehanskim dejavnikom (Turk, 2005). Prav tako raziskave potrjujejo, da zmanjšanje biomehaničnih tveganj za odpravo mišično-skeletnih obolenj samo po sebi ni dovolj, temveč se je treba ozirati tudi na stres pri delu oz. psihosocialne dejavnike (Kerr et al., 2001; Burton et al., 1997). Raziskave so šle tudi v smer ugotavljanja indeksa telesne mase (ITM) oz. debelosti zaposlenih, vendar niso dale jasnih rezultatov, saj se je izkazalo, da tveganje predstavlja tudi nizek ITM (Smedley et al., 2003; Kerr et al., 2001). Starejše raziskave so se ukvarjale tudi s kajenjem in alkoholom in jih izpostavile kot tveganje (Heliövaara, Knekt, Aromaa, 1987; Bigos et al., 1986; Kelsey et al., 1984). Avtorji Rubin (2007) ter Ferguson, Marras (1997) so povzeli naslednje dejavnike tveganja za nastanek kronične bolečine v hrbtenici: starost, ženski spol,

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nižji življenjski standard, nižja izobrazba, višji indeks telesne mase, kajenje, slabše zdravje, fizični napor, ponavljajoči se gibi, prisilna drža, nezadovoljstvo z delom, depresija, struktura hrbtenice posameznika in vidne anomalije. V naši raziskavi nismo upoštevali vseh zgoraj navedenih dejavnikov tveganja, predvsem smo se osredotočili na socialno-demografske dejavnike, delovno okolje in telesno aktivnost, obravnavali pa nismo zadovoljstva z delom, bolezenskih dejavnikov, kajenja in uživanja alkohola. Upoštevani dejavniki so predstavljeni v poglavju metode.

Če težave s hrbtenico ločimo na težave ledvenega in vratnega dela hrbtenice, ugotovimo, da se vseživljenjska prevalenca pojava bolečine ocenjuje približno enako, med 60 % in 80 % (Croft, Papageorgious, McNally, 1997; Mäkelä et al., 1991). Prognostične študije za pojav bolečine vratnega dela hrbtenice so redkejšje in njeni dejavniki vpliva manj raziskani (Borghouts et al., 1999). Ugotavlja se, da je bolečina vratnega dela hrbtenice pogosto spremljana z glavoboli in da se širi na zgornje okončine (Coté, Cassidy, Carroll, 2000). Stroški zdravljenja bolečine vratnega dela hrbtenice so bili v preteklosti ocenjeni kot nekajkrat manjši od stroškov pri zapletih z ledvenim delom hrbtenice (Borghouts et al., 1999). Tudi pregled literature je pokazal, da se znanost pretežno ukvarja z bolečinami ledvenega predela hrbtenice, saj na raziskovalno usmeritev prav gotovo vpliva tudi finančni vidik (Leboeuf-Yde et al., 2012; Martin et al., 2008).

## Namen in cilj

Preučevali smo pojavnost bolečin v vratnem in ledvenem delu hrbtenice pri negovalnem osebju. V strokovni literaturi smo poiskali preučevane dejavnike tveganja. Glavni cilj raziskave je predstavljala analiza, ali preučevani dejavniki tveganja močneje vplivajo na pojav bolečin v vratnem ali v ledvenem predelu hrbtenice.

## Metode

### Vzorec

V presečno kvantitativno raziskavo smo zajeli osebje v negovalnem timu Univerzitetnega kliničnega

centra (UKC) Maribor: tehnike zdravstvene nege, višje medicinske sestre in diplomirane medicinske sestre/zdravstvenike. Uporabili smo priložnostni način vzorčenja. Na začetku raziskave je bilo osebju v negovalnih timih UKC Maribor razdeljenih 900 vprašalnikov, izpolnjenih smo prejeli 661 vprašalnikov,

v raziskavi smo jih nato uporabili 575. Stopnja odzivnosti preiskovancev je znašala 63,9 %. Po strukturi spola je sodelovalo 84,5 % žensk in 15,5 % moških, povprečna starost je znašala  $37,5 \pm 8,9$  let. Podrobni opis vzorca je predstavljen v Razpredelnici 1.

Razpredelnica 1: *Opis vzorca*

	<i>n = 575</i>	<i>%</i>
<b><i>Spol</i></b>		
moški	89	15,5
ženski	486	84,5
<b><i>Izobrazba</i></b>		
višja MS, diplomirana MS/diplomirani zdravstvenik	215	37,4
tehniki zdravstvene nege	360	62,6
	$\bar{x} \pm s$	interval
Starost v letih	$37,5 \pm 8,9$	20–60

Legenda:  $\bar{x}$  - povprečna vrednost,  $s$  - standardni odklon,  $n$  - število, MS - medicinska sestra

### *Opis merskega instrumenta*

Podatke v raziskavi smo zbirali s pomočjo strukturiranega vprašalnika. Strukturirani vprašalnik o bolečini v hrbtenici v povezavi z delovnim okoljem je zajemal skupaj štirideset vprašanj zaprtega ali odprtega tipa. Po sklopih je vprašalnik zajemal: deset vprašanj o delovnih obremenitvah, petnajst vprašanj o anamnezi težav s hrbtenico, štiri vprašanja o rekreativni in športni aktivnosti in enajst vprašanj o lastnem mnenju glede delovnega okolja. Dodatna vprašanja, ki so bila demografske narave, so zajemala: spol, starost, izobrazbo, telesno višino, telesno težo, poklic, skupno delovno dobo in delovno dobo na sedanjem delovnem mestu.

Za oblikovanje vprašalnika o bolečini v hrbtenici smo uporabili vprašanja iz posameznih referenčnih vprašalnikov, ki so pogosto zajeta v različnih raziskavah o bolečini v hrbtenici (Bot et al., 2004; Trinkoff et al., 2003; Davidson, Keating, 2002; Ando et al., 2000; Fairbank, Pynsent, 2000). V vprašalnik smo dodali tudi dejavnike, ki so pogosto obravnavani kot pozitivni ali negativni učinki na pojav bolečine v hrbtenici, tj. preventivne vaje za hrbtenico, ukvarjanje s športom ali rekreacijo, gledanje televizije in indeks telesne mase (ITM) (Burton et al., 2005; Shehab, Al-Jarallah 2005; Rainville et al., 2004; Trinkoff et al., 2003; Maher, Latimer, Refshauge, 1999). ITM je bil izračunan kot količnik telesne mase v kilogramih in kvadrata telesne višine v metrih. Prekomerno telesno maso je določala vrednost  $25 \text{ kg/m}^2$  ali več (BMI, 2006).

V testiranje zanesljivosti vzorca smo vključili preučevane dejavnike delovnega okolja in telesne aktivnosti, gledanje televizije ter frekvenco bolečin v hrbtenici; skupaj dvanajst dejavnikov. Za testiranje

zanesljivosti vzorca smo uporabili metodo koeficienta Cronbach alfa; le-ta je z vrednostjo koeficienta 0,724 presejel prag 0,7, ki v strokovni literaturi predstavlja mejo dovolj visoke stopnje zanesljivosti vzorca (Nunnally, Bernstein, 1994).

### *Zbiranje podatkov in etična načela*

Podatke s strukturiranim vprašalnikom smo zbirali v letu 2007 in 2008. Postopek je bil izpeljan tako, da so vprašalnike o bolečini v hrbtenici med negovalno osebje razdelile glavne medicinske sestre oddelka UKC Maribor. Vsi sodelujoči so bili obveščeni o prostovoljnem sodelovanju in v primeru nejasnosti so glavne medicinske sestre oddelka nudile pomoč ali prosile raziskovalce za dodatna pojasnila. Izpolnjene vprašalnice smo prejeli po pošti.

Udeleženci, ki so izpolnjevali strukturirani vprašalnik, so bili obveščeni o namenu raziskave, prejeli so splošni ustni opis s strani glavnih medicinskih sester oddelkov, vsakemu vprašalniku je bila tudi priložena podrobnejša razlaga. Udeležba je bila prostovoljna in anonimna; čeprav se je z imenovanjem oddelka v UKC Maribor in s tem manjšega vzorca anonimnost do neke mere skrčila, posameznikov še vedno ni bilo mogoče izpostaviti. Vprašanja so bila zelo splošna, niso se dotikala zasebnega življenja oz. čustvenega ali intimnega življenja udeležencev. Dovoljenje za opravljanje raziskave v UKC Maribor je bilo izdano s strani Strokovnega sveta za zdravstveno nego (SZN-12-2007, 12. 10. 2007).



## Obdelava podatkov

Statistična analiza je v prvi fazi zajemala opis vzorca, ki je bil predstavljen s frekvenčno in odstotno porazdelitvijo oz. povprečno vrednostjo in standardnim odklonom za starost preiskovancev. Numerične dejavnike, kot so bili starost, delovna doba, delovna doba na sedanjem delovnem mestu in gledanje televizije, smo preoblikovali v kategorične dejavnike z dvema razredoma na podlagi vrednosti mediane. Na podlagi pogostosti navedb smo v dva razreda preoblikovali tudi odvisna dejavnika bolečine v hrbtenici. Po preoblikovanju odvisnih in neodvisnih dejavnikov smo izvedli logistično regresijo, kjer smo za vsaki dejavnik izračunali Waldov hi-kvadrat ( $\chi^2$ ), razmerje obetov, 95% interval zaupanja (IZ) za razmerje obetov in vrednost p. Statistična analiza je bila opravljena s programom SPSS 18.0. Statistično pomembnost je določala vrednost  $p < 0,05$ .

## Rezultati

Rezultati prikazujejo, da so preiskovanci v veliki večini izrazili pojavnost bolečin v ledvenem predelu hrbtenice. Iz Razpredelnice 2 je razvidno, da je 90,3 % negovalnega osebja že čutilo bolečino, in sicer skoraj 80 % večkrat, težav ni navedlo le 9,7 %. Zaradi lažje analize vpliva na bolečino smo obstoječe rezultate razdelili v dve skupini oz. razreda, skupino z redkim pojavom in skupino s pogostim pojavom bolečine. Preiskovanci so prav tako v večini primerov izrazili pojav bolečine v vratnem predelu hrbtenice. Rezultati prikazujejo, da je 79,8 % negovalnega osebja že čutilo bolečino, in sicer okoli 65 % večkrat, brez težav je bilo 20,2 % negovalnega osebja. Incidenca je nekoliko nižja kot pri rezultatih za bolečino ledvenega predela hrbtenice. Za lažjo analizo vpliva na bolečino smo obstoječe rezultate v enaki obliki kot za bolečino v ledvenem predelu hrbtenice razdelili v dve skupini, skupino z redkim pojavom in skupino s pogostim pojavom bolečine.

Razpredelnica 2: Pojav bolečine v ledvenem in vratnem predelu hrbtenice pri negovalnem osebju v bolnišnici

Pogostost navedbe	Ledvena hrbtenica				Vratna hrbtenica			
	n	%	združitev	%	n	%	združitev	%
nikoli	56	9,7	nikoli ali redko	21,0	116	20,2	nikoli ali redko	34,1
enkrat	30	5,2			39	6,8		
dvakrat	35	6,1	pogosto	79,0	41	7,1	pogosto	65,9
večkrat	454	79,0			379	65,9		

Legenda: n - število, % - odstotek

V 127 primerih so preiskovanci navedli le pogosto bolečino v ledvenem predelu hrbtenice ali le pogosto bolečino v vratnem predelu hrbtenice; pogosta bolečina v ledvenem predelu hrbtenice je bila navedena v 101 primeru, pogosta bolečina v vratnem predelu hrbtenice pa v 26 primerih. Primere ( $n = 353$ ), kjer sta bili kot pogosti hkrati navedeni obe vrsti bolečine smo iz nadaljnje analize izločili. Prav tako smo izločili primere, kjer sta bili obe bolečini obenem opredeljeni kot redki oz. kot nikoli občuteni ( $n = 95$ ). V Razpredelnici 3 je prikazana primerjava, kako posamezni dejavniki pozitivno ali negativno vplivajo na pojav ene izmed vrst bolečine v hrbtenici. Rezultati prikazujejo, da nobeden izmed merjenih dejavnikov ni pokazal statistično pomembnega vpliva za eno ali drugo vrsto bolečine v hrbtenici. Če upoštevamo moč (Wald  $\chi^2$ ) posameznih dejavnikov, naši rezultati izpostavljajo, da ukvarjanje z rekreacijo in športom »v sedanjosti« zmanjšuje tveganje za bolečino v ledvenem predelu hrbtenice, dnevno gledanje televizije dve uri ali več in ITM  $\geq 25$  pa tveganje povečujeta. Obravnava pacientov IV. kategorije (življenjsko ogroženi pacienti, ki pri zdravstveni negi ne morejo sodelovati) glede na razmerje obetov v višini 3,25 sicer predstavlja

največje tveganje za pojav bolečine v ledvenem predelu hrbtenice, vendar je bila moč tega dejavnika zaradi nižjih odstotkov navedb obravnave pacientov IV. kategorije (3,8 % in 11,9 %) manjša.

## Diskusija

V prvi fazi so rezultati naše raziskave pokazali, da je problem bolečine v hrbtenici pri negovalnem osebju v bolnišnici pereč, saj je skoraj 80 % preiskovancev navedlo pogoste bolečine v ledvenem predelu hrbtenice in več kot 65 % pogoste bolečine v vratnem predelu hrbtenice. Oba rezultata sta primerljiva s tujo literaturo, ki navaja pogoste težave z bolečino v ledvenem ali vratnem predelu hrbtenice 60–80 % in negovalno osebje izpostavlja kot eno najbolj tveganih delovnih skupin za pojav bolečine v hrbtenici (Ball, Pike, 2009; Buerhaus et al., 2000). Bolečina v vratnem predelu hrbtenice se je izkazala kot nekoliko manjši problem v primerjavi z bolečino v ledvenem delu hrbtenice. 20,2 % preiskovancev je navedlo, da bolečine še niso občutili nikoli; v primeru bolečine v ledvenem predelu hrbtenice je ta podatek znašal le 9,7 %.

Razpredelnica 3: Vpliv dejavnikov tveganja in preventive za pojav bolečine v hrbtenici pri negovalnem osebju v bolnišnici

Dejavnik	Bolečina v hrbtenici (%)		Wald $\chi^2$	Razmerje obetov	95 % IZ za razmerje obetov	p
	vratna (n = 26)	ledvena (n = 101)				
Starost 40 let ali več	46,2	34,7	0,23	1,91	(0,13–27,40)	0,632
Ženski spol	84,6	78,2	0,00	0,99	(0,26–3,75)	0,984
Celotna delovna doba 20 let ali več	46,2	32,7	0,28	0,48	(0,03–7,16)	0,598
Delovna doba na sedanjem delovnem mestu 15 let ali več	50,0	36,6	1,04	0,49	(0,12–1,93)	0,307
Obravnava pacientov IV. kategorije	3,8	11,9	1,08	3,25	(0,35–29,97)	0,298
Večkratno dnevno ročno dviganje in premeščanje bremena nad 10 kg mase	46,2	58,4	0,19	1,24	(0,46–3,36)	0,666
Samostojno dviganje in premeščanje bremen	15,4	14,9	0,25	1,42	(0,36–5,56)	0,615
Dviganje in premeščanje bremen s pripomočki	11,5	7,9	0,00	1,06	(0,19–5,89)	0,945
Pomoč dvizne postelje pri negi ležečega pacienta	34,6	26,7	0,56	0,68	(0,24–1,88)	0,453
Delo z računalnikom dve uri ali več	26,9	27,7	0,01	0,96	(0,31–2,93)	0,938
Izvajanje preventivnih vaj za hrbtenico	42,3	41,6	0,49	1,46	(0,51–4,17)	0,485
Ukvarjanje z rekreacijo in športom v mladosti	46,2	54,5	0,33	1,35	(0,49–3,72)	0,565
Ukvarjanje z rekreacijo in športom v sedanjosti	34,6	24,8	1,81	0,46	(0,15–1,43)	0,178
Dnevno gledanje televizije dve uri ali več	42,3	56,4	1,49	1,82	(0,70–4,73)	0,222
ITM $\geq 25$	19,2	33,7	1,69	2,21	(0,67–7,31)	0,194

Legenda: Regresijski model:  $\chi^2 = 10,831$ , stopnje prostosti = 15,  $p = 0,764$ , Nagelkerke  $R^2 = 0,128$

IZ - interval zaupanja

V analizi smo želeli ugotoviti, ali v literaturi ugotovljeni dejavniki tveganja za pojav bolečine v hrbtenici predstavljajo večje tveganje za pojav bolečine v ledvenem predelu hrbtenice ali v vratnem predelu hrbtenice. Za ta pristop smo se odločili, ker podobne primerjave v literaturi nismo našli. Rezultati naše analize niso pokazali nobenega dejavnika, ki bi bil statistično pomemben za napoved določene vrste bolečine. Z drugimi besedami to pomeni, da med analiziranimi dejavniki nismo ugotovili nobenega dejavnika, ki bi lahko pomenil večje tveganje za pojav bolečine le v ledvenem ali le v vratnem predelu hrbtenice. Pokazale so se le določene tendence, ki bi lahko pri večjem vzorcu pripeljale do statistične pomembnosti, kar smo izpostavili v poglavju o omejitvah raziskave. Močnejše izraženi dejavniki v statistični analizi so bili sedanje ukvarjanje z rekreacijo in športom, dnevno gledanje televizije dve uri ali več in ITM  $\geq 25$ . Če izhajamo iz literature, kjer je bolečina v ledvenem predelu hrbtenice navedena kot večji zdravstveni problem (Wenig et al., 2009; Borghouts et al., 1999), naši rezultati za preventivo negovalnega osebja v bolnišnici okvirno priporočajo več rekreacije in športa, manj gledanja televizije in normalen ITM.

V literaturi zgoraj omenjeni trije dejavniki igrajo le podrejeno vlogo, saj sta centralna problema bolečine

v hrbtenici pri negovalnem osebju ročno dviganje in premeščanje bremen ter prisilna telesna drža (Trinkoff et al., 2003; Elford, Straker, Strauss, 2000; Zhuang et al., 1999). To pomeni, da se je najprej potrebno izogibati tem opravilom in se šele nato osredotočiti na t. i. sekundarne dejavnike. V analizo smo vključili dejavnik večkratno dnevno ročno dviganje in premeščanje bremen nad 10 kg mase, ki je bil naveden v povezavi z bolečino v približno 50 %, vendar ni predstavljal povečanega tveganja izključno za bolečino v ledvenem predelu hrbtenice. Rezultat je bil v nasprotju z našimi pričakovanji, saj je pri ročnem dviganju in premeščanju bremen v literaturi bolj izpostavljen problem bolečine ledvenega predela hrbtenice (Warming et al., 2009; Zhuang et al., 1999). Med preiskovanci z bolečino jih je le okoli 10 % navedlo, da za dviganje in premeščanje bremen uporabljajo tehnične pripomočke. V klinični praksi se pripomočki redko uporabljajo med drugim zaradi pomanjkanja časa in arhitekturnih ovir (Berčan et al., 2010; Videman et al., 2005; Engkvist et al., 1995). Bolečina v hrbtenici lahko poleg dviganja ali premeščanja bremen nastane še zaradi številnih drugih razlogov, med katerimi sta najbolj očitna nepravilno sedenje in prevelika telesna teža, saj tudi pri tem primeru prihaja do prekomerne obremenitve mišično-skeletnega sistema.

## Omejitve raziskave

Pregled literature je pokazal, da imajo številne bolnišnice po svetu podobne težave kot bolnišnice v Sloveniji. Vzrok težav, ki povzročajo bolečine in poškodbe negovalnega osebja, so najpogosteje neustrezni kadrovske normativi in delovni stres (hitenje pri delu, fizične in psihične obremenitve ipd.) (Videman et al., 2005; Smedley et al., 2003; Aiken et al., 2001; Hollingdale, Warin, 1997). Iz praktičnih razlogov smo se v raziskavi omejili na UKC Maribor. Mnenja smo, da je izbrani vzorec enakovreden vzorcem v mednarodnih raziskavah, saj UKC Maribor pokriva vse vrste zdravstvene oskrbe in zdravljenja bolni. Tako smo v raziskavo lahko vključili vsa področja oz. oddelke, ki jih opredeljuje mednarodna medicina.

Večjo omejitev raziskave je predstavljal manjši vzorec navedb bolečine v vratnem predelu hrbtenice, saj je le 27 (4,7 %) od skupno 575 preiskovancev navedlo samo pogosto bolečino v vratnem predelu hrbtenice in ne tudi pogoste bolečine v ledvenem predelu hrbtenice. Manjše število primerov je povzročilo, da rezultati niso pokazali pričakovanih statistično pomembnih vplivov posameznih dejavnikov na eno ali drugo vrsto bolečine v hrbtenici.

V raziskavi smo uporabili vprašalnik, ki smo ga sestavili sami, zato obstaja možnost, da izbrani razredi pri posameznih dejavnikih niso bili najbolj ustrezni, prav tako smo morda izpustili kakšen pomemben dejavnik s področja delovnega okolja. Vprašalnik prav tako ni bil pilotsko testiran, ker smo bili mnenja, da se nanaša na dobro raziskano problemsko področje in zajema dejavnike, ki so preiskovancem poznani. Izbrani način priložnostnega vzorčenja ni najbolj optimalen, ko gre za različne bolnišnične oddelke z različnimi zahtevnostmi dela. Tako obstaja tveganje, da smo v raziskavo zajeli preveč preiskovancev z oddelkov, kjer je fizična obremenitev večja, ali nasprotno. Tež nevarnosti smo se nekoliko izognili z večjim vzorcem, saj smo zajeli skoraj 40 % vseh zaposlenih v zdravstveni negi UKC Maribor.

## Predlogi za bodoče raziskave

Rezultati naše raziskave niso pokazali jasnega kritičnega ali preventivnega dejavnika za razmejitev med vrstami bolečine v hrbtenici. Za bodoče raziskave bi bilo smotno, da se izvede bolj podrobna analiza delovnih nalog, ki bi morda lahko pokazala določena tveganja za eno ali drugo vrsto bolečine v hrbtenici.

## Zaključek

Raziskava je potrdila velik zdravstveni problem pri negovalnem osebju v UKC Maribor. Primerjava

med bolečino v ledvenem in bolečino vratnem predelu hrbtenice med merjenimi dejavniki ni pokazala očitnih razlik. Pokazalo se je, da veliko tveganje za nastanek bolečine predstavlja vsakodnevno ročno dviganje oz. premeščanje bremen večje mase, ki pa je enako tvegano za pojav bolečine tako v ledvenem kot v vratnem predelu hrbtenice. Rezultati so nadalje nakazali, da uporaba ergonomskih tehničnih pripomočkov predstavlja zmanjšano tveganje za bolečino v hrbtenici, vendar tudi, da se pripomočki v klinični praksi premalo uporabljajo. Tudi preventivni dejavniki niso pokazali jasne slike, sicer se načeloma preventiva v obliki rekreacije in športa priporoča, vendar se pogosto prične, ko so težave že prisotne. V naših rezultatih je prekomerna telesna teža nakazovala večjo verjetnost pojava bolečine v ledvenem predelu hrbtenice. Problematika delovnih obremenitev negovalnega osebja predstavlja velik izziv za bodočnost, saj je treba poiskati rešitve za zagotovitev ustreznih kadrovske normativov, za zagotovitev uporabe tehničnih pripomočkov in za odstranitev obstoječih oziroma preprečevanje pojava novih arhitektonskih ovir.

## Zahvala

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