

Research Article

Prevalence of Pain among Intensive Care Unit Personnel

Vesna Bratić^{1*} and Dijana Filipović²

¹University Hospital Center Zagreb, Croatia Anita Lukić, General Hospital Varaždin, Croatia

²University Hospital Center Zagreb, Croatia

Abstract

Although pain is commonly observed among medical staff, studies on pain among all types of intensive care unit personnel are uncommon, especially Intensive Care Unit (ICU) physicians and physiotherapists. The aim of this study was to estimate the prevalence of pain among ICU personnel and explore the risk factors for their pain. The research was conducted in Croatia at the Clinical Hospital Center Zagreb, at the Clinic for Anesthesia, Reanimation and Intensive Medicine and Pain Therapy. A total of 277 ICU personnel (physicians, nurses/technicians, physiotherapists) were included in the final analysis. The results were obtained by a questionnaire consisting of 16 questions. Respondents were nurses (N 173), physiotherapists (N 24), and physicians (N 80). Authors' hypotheses were confirmed as follows. The prevalence of examined medical professionals with low back pain is above 50%. This study indicates that ICU personnel exhibit a high prevalence of pain. Back pain is most common among nurses (N 152), but also present in physicians (N62), and physiotherapists (N 13). Nurses/technicians have a higher occurrence of low back pain than physicians and physiotherapists. Health workers are not educated about protective, facilitating positions for the purpose of preservation spine in the workplace. Therefore, disease prevention and health promotion measures are needed to protect the health of ICU personnel at the Clinical Hospital Center Zagreb, at the Clinic for Anesthesia, Reanimation and Intensive Medicine and Pain Therapy.

Keywords: Back pain; Disease prevention; Education; Intensive care unit; Occupational health; Protective measures

Introduction

Low Back Pain (LBP) is a ubiquitous health problem affecting most of healthcare staff. Most studies are focused on prevalence of pain among nurses in intensive care units in countries all over the world.

*Corresponding author: Vesna Bratić, University Hospital Center Zagreb, Croatia Anita Lukić, General Hospital Varaždin, Croatia, Email: vbratic@kbc-zagreb.hr

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Twenty-seven studies reporting data from 2004 to 2020 on the prevalence of LBP in a defined ICU nurses were included (participants:6258; range: 3-1345). Twenty-one (77.8%) studies were of "high" quality. Among the included studies, the lowest and the highest prevalence were found to be 34.5% and 100.0%, respectively. Conclusion was that LBP is prevalent among ICU nurses. Greater attention is urgently needed to address this burdensome health problem among ICU nurses, particularly with an emphasis to develop preventive strategies [1].

The objective of a study in 2014 was to identify the occupational factors associated with low back pain using a surveillance tool and to characterize the low back pain by the resistance of the extensor muscles of the vertebral column among nursing professionals at an Intensive Care Unit. Conclusions of study are that the main occupational factors associated with the low back pain were the posture and the characteristics of the physical and organizational conditions [2]. Another study showed that individual-level interventions are not likely to succeed in eliminating manual patient lifting by nurses. Our results suggested that interventions without administrative measures might have limited success [2]. Another study was undertaken to evaluate an education program to prevent low back pain among nurses. This interventional study used a one-group, pretest/posttest design and was conducted in four hospitals in Bolu, Turkey. Nurses' knowledge was assessed before and after training; 60 nurses were evaluated while performing five procedures that can lead to low back pain using an observation form. These forms were given to the nurses 3 months after the training to assess their knowledge and observations of the five specified behaviors were repeated. The mean knowledge and procedure scores of the nurses were higher just after and 3 months after the training compared to before training [2].

Yet a smaller number of studies reveal the high prevalence of pain among ICU personnel including physicians, physiotherapists and technicians. Psychosocial factors, such as psychological fatigue, and ergonomic factors, such as bending or twisting the neck, play important roles in the development of pain. This study indicates that ICU personnel have a high prevalence of pain, with 72.7%, 64.4%, and 52.9% of ICU nurses, ICU doctors, and ICU workers reporting pain, respectively [3].

Research

Hypotheses

- H1 The prevalence of examined medical professionals with low back pain will be above 50%.
- H2 Nurses/technicians will have a higher occurrence of low back pain than physicians and physiotherapists.
- H3 Health workers are not educated about protective, facilitating positions for the purpose of preservation spine in the workplace.

Materials and methods

The research was conducted in Croatia at the Clinical Hospital Center Zagreb, at the Clinic for Anesthesia, Reanimation and

	Pain, No.			Insoles, No.			P	Use of analgesics				Sick leave			Therapy			Use of special techniques				
	Yes	No	P	Yes	Someti mes	No		Regularly	When neede	No	P	Yes	No	P	Yes	No	P	Regularly	Rarely	No	P	
Profession																						
Nurses	152	21	<0.001	20	16	137	0.401	25	138	10	<0.001	57	116	0.860	99	74	0.010	122	37	14	0.004	
Physical therapists	13	11		6	1	17		1	10	13		7	17		19	5		22	2	0		
Physicians	62	18		13	6	61		4	71	5		24	56		36	44		43	23	14		
Gender																						
Male	74	25	0.020	19	5	75	0.087	12	78	9	0.820	27	72	0.232	54	45	0.793	68	22	9	0.909	
Female	153	25		20	18	140		18	141	19		61	117		100	78		119	40	19		
Work experience, Years																						
< 5	71	18	0.765	9	3	77	0.168	8	68	13	0.474	13	76	<0.001	40	49	0.115	57	25	7	0.110	
5-10	63	13		15	5	56		8	59	9		27	49		49	27		58	13	5		
11-20	35	10		6	7	32		6	36	3		24	21		28	17		28	11	6		
21-30	40	6		7	6	33		4	39	3		17	29		26	20		31	6	9		
>31	18	3		2	2	17		4	17	0		7	14		11	10		13	7	1		
Shoe pads																						
Yes	31	8	0.063	-	-	-	-	9	27	3	0.037	17	22	0.004	24	15	0.591	29	8	2	0.707	
Sometimes	23	0		-	-	-		2	21	0		13	10		14	9		17	2	4		
No	173	42		-	-	-		19	171	25		58	157		116	99		141	24	50		
Shifts, Hours																						
8	55	28	<0.001	12	4	67	0.436	5	61	17	<0.001	20	63	0.113	52	31	0.021	58	22	3	<0.001	
12	149	15		21	15	128		25	129	10		60	104		92	72		115	35	14		
24	23	7		6	4	20		0	29	1		8	22		10	20		14	5	11		
Standing hours																						
2	3	2	<0.001	1	0	4	0.583	0	4	1	0.721	0	5	0.023	2	3	0.191	3	1	1	0.302	
3-5	25	16		6	1	34		6	30	5		7	34		18	23		22	6	13		
>5	199	32		32	22	177		24	185	22		81	150		134	97		162	21	48		

Table 1: Demographic and occupational characteristics.

Intensive Medicine and Pain Therapy. The total of 277 respondents (physicians, nurses/technicians, physiotherapists) working at the intensive care units of the Clinic for Anesthesia, Reanimation and Intensive Medicine and Pain Therapy participated in the research. Through a questionnaire of 16 questions, respondents had to choose the appropriate [4-5] answer based on which statistics and corresponding results were obtained. The demographic data of the respondents were presented with descriptive statistics, and the normality of the distribution of continuous numerical variables was tested with the D’Agostino-Pearson test. The existence of differences between categorical variables was tested with the χ^2 -test. All statistical analyses were performed using MedCalc 20.110 (MedCalc Software Ltd, Ostend, Belgium). P values less than 0.05 were considered statistically significant.

Results

As shown in (Table 1) A total of 277 healthcare workers, 178 (64 %) female and 99 (36%) male, at the Clinic for Anesthesia and Intensive Care, University Hospital Centre Zagreb, Croatia, participated in the research. Three groups were examined: nurses (N 173), physiotherapists (N 24), and physicians (N 80).

The obtained results show that back pain is most common among nurses (152 = 88 %), but also present in physicians (62 = 78 %), and physiotherapists (13 = 54 %). If necessary, all medical workers take analgetics (N 219). Out of 215 respondents only a small number of health workers use orthopedic insoles regularly (39=14 %).

Although the majority of healthcare workers have had no previous injuries or illnesses (N 189), some previous diseases are present in female respondents, mostly in nurses (N 57). When asked whether they use any form of physical therapy to reduce back pain (massage, swimming, exercise), 154 (56%) health workers give an affirmative answer - 99 (57 %) nurses, 19 (79 %) physiotherapists, 36 (45 %)

physicians, while 123 (44 %) health workers do not use any form of physical therapy. When asked in their daily work whether they apply techniques to reduce the load on the spine (hospital bed at hip height, lifting loads from squatting, moving and turning an immobile patient with the help of colleagues), 187 give an affirmative answer, while 90 sometimes or almost never they use protective forms. Considering the years of experience at the workplace, those with 5 to 10 years of work experience state that they use orthopedic insoles (N15). Some form of analgesia, if necessary, is mostly used by those with less than 5 years of work experience. Respondents with 5-10 years of work experience (N 27) already have some impairment or illness. The most represented healthcare workers who use some form of physical therapy are those with less than 5 years of work experience (N 40) and with 5-10 years of work experience (N 49). As many as 31 workers out of 46 having 21-30 years of work experience use some form of physical therapy.

39 respondents wear orthotic insoles, the pain is genuine in 9 of them, and they continue to use some form of analgesia, while 17 already have some damage or illness. 24 people who wear orthopedic insoles use some form of physical therapy, and 29 of them adhere to techniques to reduce the load on the spine.

Considering the working hours, pain is present in 149 respondents in the 12-hour shift. Insoles are used by 12 of them in a 8-hour shift, by 21 in a 12 hour-shift, and 6 of them in a 24-hour shift.

During the 12-hour shift, 129 respondents use some form of analgesia, 60 already have had some earlier damage or illness, while 104 do not have any damage.

During the 8-hour shift, 52 of them use some form of physical therapy, while 31 do not. In a 12-hour shift, 92 of them use some form of physical therapy, while 72 do not, in a 24-hour shift, 10 use

	Pain, No.			Spine part mostly burdened, No.					Use of analgesics, No.			
	Yes	No	P	cervical	to r- acal	lumbal	Combi. parts	P	Regu- larly	When needed	No	P
Profession												
Nurses	152	21	<0.001	21	11	113	28	0.008	25	138	10	<0.001
Physiotherapists	13	11		4	2	17	1		1	10	13	
Physicians	62	18		15	8	33	24		4	71	5	
Gender												
Male	74	25	0.020	18	10	54	17	0.311	12	78	9	0.820
Female	153	25		22	11	109	36		18	141	19	
Work experi- ence, Years												
< 5	71	18	0.765	11	7	57	14	0.628	8	68	13	0.474
5-10	63	13		13	6	47	10		8	59	9	
11-20	35	10		6	4	24	11		6	36	3	
21-30	40	6		8	4	23	11		4	39	3	
> 31	18	3		2	0	12	7		4	17	0	
Insoles												
Yes	31	8	0.063	12	5	17	5	<0.001	9	27	3	0.037
Sometimes	23	0		4	7	10	2		2	21	0	
No	173	42		24	9	136	46		19	171	25	
Shifts, Hours												
8 h	55	28	< 0.001	13	5	51	14	0.030	5	61	17	< 0.001
12 h	149	15		18	12	103	31		25	129	10	
24 h	23	7		9	4	9	8		0	29	1	
Standing hours												
2	3	2	< 0.001	2	0	1	2	0.303	0	4	1	0.721
3-5	25	16		5	3	22	11		6	30	5	
> 5	199	32		33	18	140	40		24	185	22	

some form of physical therapy, and 20 do not. In a 12-hour shift, 115 healthcare workers apply protective measures at the workplace (bed, squat...).

As many as 199 health workers feel pain if they are on their feet for more than 5 hours, 32 of them wear insoles, and 24 use some form of analgesia, 81 have some disease or damage, 134 use some form of physical therapy, while 162 use protective measures at work.

Nurses/technicians have the most pain in their backs (152 N) among ICU staff, the lumbar part of the spine being most affected. 28 nurses also report pain in a larger area of the spine (combination of thoracic, cervical, lumbar). The next group by suffering back pain are physicians, pain is present in 62, mostly in the area of the lumbar part (N 33). In the cervical part of the spine it is present in 15 physicians, in the thoracic part in 8, and in the combination of the larger extent of the affected parts of the spine (cervical, thoracic, lumbar) in 24 of them. Although the least number of physical therapists participated in this research, pain is present in 13, while 11 of them do not have pain. The most frequently painful part of the back is lumbar (N17). If necessary, health workers take some form of analgesia, and the most represented are nurses (N 178). Considering the years of service less than five, the trend of back pain in the lumbar spine area is higher

(N57), while healthcare professionals with 5-10 years of experience follow the trend of back pain in the lumbar spine area (N 47). Orthopedic insoles are mostly used by people who have back pain in the lumbar part of the spine (N 17). 149 healthcare workers have back pain during a 12-hour working day, mostly in the lumbar region (N 103), while some form of analgesia use 129 healthcare workers. Working for more than 5 hours results in back pain in the lumbar part of the spine (N 140), and if necessary, they use some form of analgesia (N 18). Orthopedic insoles are mostly worn by nurses/technicians (N 20), followed by physicians (N 13) and physiotherapists (N 6). Some form of illness or damage from before is most prevalent in nurses (N 57). 19 physiotherapists use some form of physical activity, while nurses are the most numerous, 99 of them follow the trend of using some form of physical therapy. 122 (71 %) nurses/technicians use certain techniques for easier performance at work, 22 (92 %) physiotherapists, and 43 (54 %) doctors. Considering the years of work experience from the table, we can conclude that some form of illness or impairment is least common among people with less than 31 years of experience (N7). Considering the years of service, 5-10 mostly use some form of protective forms to perform work (58). 157 healthcare workers do not wear orthopedic insoles at all. Taking into account the working hours of healthcare professionals, 92 respondents use some form of physical

	Shoe pads, No.				Sick leave, No.			Therapy, No.			Use of special techniques, No.			
	Yes	Sometimes	No	P	Yes	No	P	Yes	No	P	Regularly	Rarely	No	P
Profession														
Nurses	20	16	137	0.401	57	116	0.860	99	74	0.010	122	37	14	0.004
Physiotherapists	6	1	17		7	17		19	5		22	2	0	
Physicians	13	6	61		24	56		36	44		43	23	14	
Gender														
Male	19	5	75	0.087	27	72	0.232	54	45	0.793	68	22	9	0.909
Female	20	18	140		61	117		100	78		119	40	19	
Work experience, Years														
< 5	9	3	77	0.168	13	76	< 0.001	40	49	0.115	57	25	7	0.110
5-10	15	5	56		27	49		49	27		58	13	5	
11-20	6	7	32		24	21		28	17		28	11	6	
21-30	7	6	33		17	29		26	20		31	6	9	
> 31	2	2	17		7	14		11	10		13	7	1	
Insoles														
Yes	-	-	-	-	17	22	0.004	24	15	0.591	29	8	2	0.707
Sometimes	-	-	-		13	10		14	9		17	2	4	
No	-	-	-		58	157		116	99		141	24	50	
Shifts, Hours														
8 h	12	4	67	0.436	20	63	0.113	52	31	0.021	58	22	3	<0.001
12 h	21	15	128		60	104		92	72		115	35	14	
24 h	6	4	20		8	22		10	20		14	5	11	
Standing hours														
2	1	0	4	0.583	0	5	0.023	2	3	0.191	3	1	1	0.302
3-5	6	1	34		7	34		18	23		22	6	13	
> 5	32	22	177		81	150		134	97		162	21	48	

therapy during the 12-hour random time, while 72 respondents do not. Working less than five hours, 97 respondents do not use any form of physical therapy.

Conclusion

Hypothesis 1 is statistically significant ($P < 0.001$), confirming that more than 50% of medical workers have pain in some part of the back. 82% of the 277 surveyed healthcare professionals gave an affirmative answer, which exceeds the percentage of more than 50%. There are statistically significant differences if we compare education ($P < 0.001$), where the pain is most genuine in 152 (88%) nurses, 62 (78%) doctors, and least 13 (54%) physiotherapists. If we compare with working hours, there is a statistically significant difference ($P < 0.001$) in healthcare workers who have 12-hour shift (91%). There is a statistically significant difference compared to standing during the working day ($P < 0.001$), where 199 (86%) of the healthcare workers state that they feel the presence of pain in some parts of the back after standing for more than 5 hours. Hypothesis 2 is statistically significant ($P < 0.001$), it confirms that the pain is most genuine in 152 (88%) nurses/technicians, and that they have a higher occurrence of low back pain than doctors and physiotherapists. Hypothesis 3 is partially statistically significant because it takes into account questions 8, 9 and 10. 158 (57%) whether healthcare workers are familiar with special techniques used in daily work with patients that reduce the burden on the spine. There is a statistically significant difference if

we compare by education where is $P < 0.001$ (χ^2 -test) i. e. where 96% of physiotherapists are familiar with the mentioned techniques, followed by nurses (57%), while the least familiar are doctors (45%). 193 health workers (70%) state that they would like to have education about protective positions for the purpose of preserving the spine. The statistically significant difference is with regard to working hours $P < 0.006$, (χ^2 -test), where the most affirmative answers are 106 of them (65%) given by people who work 12 hours, followed by people who work 8 hours in a higher percentage (83%), but a smaller number 69. If we take into account the question related to whether healthcare professionals apply techniques to reduce the load on the spine during their daily work (hospital bed at the height of your hips, lifting loads from a squat, moving and turning an immobile patient with the help of colleagues), 187 healthcare professionals gave an affirmative answer which is 68%, a statistically significant difference if we compare it with education $P < 0.004$, and working hours $P < 0.006$. This study indicates that ICU personnel exhibit a high prevalence of pain. Ergonomic factors, contribute to pain levels among ICU personnel. As many as 227 (82%) respondents attribute back pain to working conditions, just 88 (32%) go on sick-leave, but 263 (95%) consider that back pain should be qualified as occupational disease. 193 (70%) respondents consider education about special techniques used in daily work with patients that reduce the burden on the spine is important. Therefore, disease prevention and health promotion measures are needed to protect the health of ICU personnel at the Clinical Hospital Center Zagreb, at the Clinic for Anesthesia, Reanimation and Intensive Medicine and Pain Therapy.

References

1. Sang S, Wang J, Jin J (2021) Prevalence of low back pain among intensive care nurses: a meta-analysis. *Nurs Crit Care* 26: 476-484.
2. Petersen R de S, Marziale MHP (2014) Low back pain characterized by muscle resistance and occupational factors associated with nursing. *Rev Latino-Am Enfermagem* 22: 386-93.
3. Coskun Beyan A, Dilek B, Demiral Y (2020) The effects of multifaceted ergonomic interventions on musculoskeletal complaints in intensive care units. *Int J Environ Res Public Health* 17: 3719.
4. Karahan A, Bayraktar N (2013) Effectiveness of an education program to prevent nurses low back pain: An nnterventional study in Turkey. *Workplace Health & Safety* 61: 73-78.
5. Wang M, Ding Q, Sang L, Song L (2022) Prevalence of pain and its risk factors among ICU personnel in tertiary hospital in China a cross-sectional study. *J Pain Res* 15: 1749-1758.



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