



# CROATIAN NURSING JOURNAL

**Quality of Life and Treatment Satisfaction of  
Hospitalized and Day Hospital Psychiatric Patients**

**Nurses' Knowledge of Palliative Care at Primary,  
Secondary and Tertiary Levels of Health Care**

**Levels of Knowledge in Nursing Students on  
Hemodynamic Monitoring - A Cross-Sectional Study**

**Time Analysis in Emergency Medical Service Reporting Unit**

**Perception Of Stress and Illness Among Nurses in Psychiatry**

**Risk for Falls in Patients with Limb Amputations in the Clinical  
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the University Hospital Centre Zagreb**

**The Role of Perforin**

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**Book review Contemporary Perspectives on Ageism  
by Liat Ayalon & Clemens Tesch-Römer**

**CROATIAN  
NURSING  
JOURNAL**

VOLUME: 5  
NUMBER: 1  
JUNE 2021  
<https://doi.org/10.24141/2/5/1>  
ISSN: 2584-5659

**www.cnj.hr**

## **CROATIAN NURSING JOURNAL**

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University of Applied Health Sciences  
Croatian Nursing Council

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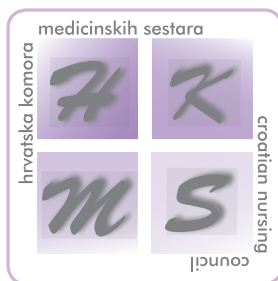
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### **PRINTED BY**

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The Journal is published biannually. The articles can be published in the English language with a summary in the Croatian language. Plag scan, a plagiarism detection software, was used. To find out more, please visit <https://www.plagscan.com/>.

The journal will be concurrently published in print and digital form and all accepted articles will be freely available to the scientific, professional and research community at the Journal's official website.



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Croatian Nursing Council**

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# **CROATIAN NURSING JOURNAL**

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ISSN  
2584-5659

UDC  
614.253.5

YEAR OF PUBLICATION  
2021.

VOLUME  
5

ISSUE  
1.

NUMBER OF PAGES  
1-97

DOI  
<https://doi.org/10.24141/2/5/1>

PLACE OF PUBLICATION  
Zagreb

PUBLISHED BY  
University of Applied Health Sciences

CIRCULATION  
The journal is published twice a year

PUBLISHED BY  
UNIVERSITY OF APPLIED HEALTH SCIENCES  
Mlinarska cesta 38, 10 000 Zagreb, Croatia  
[www.zvu.hr](http://www.zvu.hr)

FOR THE PUBLISHER  
**Krešimir Rotim**

ENGLISH TRANSLATION AND PROOFREADING  
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GRAPHIC LAYOUT  
**Kerschoffset d.o.o.**

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# Quality of Life and Treatment Satisfaction of Hospitalized and Day Hospital Psychiatric Patients

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**Article received:** 19.08.2020.

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**Article accepted:** 03.12.2020.

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**DOI:** 10.24141/2/5/1/1

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**Keywords:** mental disorders, day hospital, patient satisfaction, quality of life

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## Abstract

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**Introduction.** Day hospitals are becoming an increasingly common method of treatment for people with mental disorders in many Croatian psychiatric hospitals, but research examining their effectiveness is still rare.

**Aim.** The aim of this study was to compare treatment satisfaction and quality of life between patients enrolled in a day hospital program and patients hospitalized on a psychiatric ward.

**Methods.** The study design was cross-sectional with two outcome measures: treatment satisfaction and quality of life. The study sample consisted of 120 adult patients of the Clinic for Psychiatry of the University Hospital Centre Rijeka. The first group consisted of 60 patients included in the day hospital psychosocial program, while the second group consisted of 60 patients hospitalized on the inpatient ward.

**Results.** Day hospital patients reported a significantly higher level of overall treatment satisfaction compared to hospitalized patients (mean rank: 55 vs. 17,  $p=0.000$ ) and were significantly more satisfied in four out of seven different treatment domains: the explanations about treatment (mean rank: 68 vs. 53,  $p=0.013$ ), carefulness and precision of medical examination (mean rank: 72 vs. 49,  $p=0.000$ ), choices about treatment (mean rank: 67 vs. 57,  $p=0.027$ ) and feeling of respect (mean rank: 68 vs. 53,  $p=0.010$ ). Day hospital patients also reported a significant-



ly higher level of overall subjective quality of life (mean: 4.26 vs. 3.71,  $p=0.005$ ), being more satisfied with life in general (mean rank: 68 vs. 53,  $p=0.018$ ), financial situation (mean rank: 67 vs. 54,  $p=0.046$ ), accommodation (mean rank: 67 vs. 54,  $p=0.041$ ), personal safety (mean rank: 68 vs. 53,  $p=0.014$ ), people they live with or living alone (mean rank: 71 vs. 50,  $p=0.001$ ), relationship with their family (mean rank: 49 vs. 53,  $p=0.000$ ) and their mental health (mean rank: 69 vs. 52,  $p=0.008$ ).

**Conclusion.** Patients treated in the day hospital differed in the observed variables from those hospitalized on the ward, reporting higher levels of treatment satisfaction and higher subjective quality of life. Future studies should focus on different segments of day hospital programs and a broader set of outcomes.

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## Introduction

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Modern psychiatry encourages the development of outpatient and day hospital psychiatric treatment, with the ultimate goal of helping the patient to reintegrate into the community and prevent its social isolation (1). Day hospitals are a growing form of care for psychiatric patients drawing their roots from the „deinstitutionalization“ movement and the consequent transformation of traditional psychiatric hospitals (2,3). The term “deinstitutionalization”, in the context of psychiatry, describes the process of closing or reducing the number of large psychiatric hospitals and the establishment of a new model of community-based mental health care (4). Psychiatric care in western countries has gradually transformed itself from a system dominated by large, isolated clinics to smaller open institutions, and generally to a type of treatment that does not separate the patient from his or her primary social environment. The effects of deinstitutionalization vary from country to country depending on their health and social systems and the specificity of national traditions, socio-cultural context and the level of available resources (5). In Europe, most psychiatric day hospitals are designed to provide a variety of treatment programs for their patients, i.e., social support, psychodynamic groups, behavioural interventions, educa-

tion, etc. The available treatment programs depend on theoretical settings and therapeutic directions, professional training, goals, target populations, diagnoses, disease intensity and duration (2,6). Almost all major psychiatric clinics in the Republic of Croatia have organized treatment within day hospitals. The programs of day hospitals have many similarities, but they also differ in terms of the scope, breadth and intensity of therapeutic interventions, which is largely conditioned by the capacity, staff and equipment of individual clinics.

Numerous studies have shown that day hospital treatment is as effective or even more effective as inpatient treatment (7) and is associated with better social and general functioning, as well as a reduced rate of rehospitalizations (8). Studies have also shown that treatment in day hospitals is associated with cost reductions ranging from 20.9% to 36.9% over hospital care and is associated with greater treatment satisfaction (9). It has also been clearly established that the effective organization of day hospital treatment for acute psychiatric problems is associated with a lower need for hospitalization, while at the same time improving patient's subjective outcomes (10). Furthermore, psychiatric day hospitals appear to be more effective in terms of reducing psychopathology in a shorter period of time. Also, care within a day hospital has been found to reduce the burden on the family of the patient, reduce relapse rates and rehospitalizations, and is associated with a higher subjective quality of life (2,8,9). Commonly used outcomes in the majority of studies of the efficacy of psychiatric day hospitals are the subjective sense of satisfaction with treatment and the quality of life of patients. Different questionnaires and satisfaction scales are used, which are usually applied immediately after the end of the day hospital treatment and possibly during a certain follow-up period.

In the study by Dick et al. (11) 91 patients diagnosed with neurosis, personality disorder, or adjustment disorder, were assigned to a day hospital program or hospitalized at the ward. Clinical outcome measures after the follow-up period did not differ between hospitalized and day hospital patients, however, treatment satisfaction was significantly higher for patients treated at a day hospital (11). In a randomized controlled trial by Priebe et al. (12) 206 voluntarily admitted patients were either assigned to day hospital treatment or hospitalized on a conventional ward. The main outcomes were: level of psychopa-



thology, satisfaction with treatment and subjective quality of life on discharge, 3 months and 12 months after discharge. Readmission, or indication for acute psychiatric treatment within 3 and 12 months, and costs during the treatment period were also included as a secondary outcome. The results of this study showed, among other things, that treatment satisfaction was significantly higher in patients treated at a day hospital, however, the quality of life did not differ significantly between the patient groups examined (12). An extensive meta-analysis by Marshall et al. (9) on the effectiveness of day hospital compared to inpatient treatment also showed that the results of most of the included studies suggested greater treatment efficacy in day hospitals in terms of treatment satisfaction, reduced hospital days, the need for subsequent hospitalizations, and lower overall treatment costs. However, the results are not consistent when it comes to the effects on reducing the level of symptoms (9). Research into the efficacy of psychiatric day hospital programs in Croatia is relatively rare and typically includes smaller, convenient patient samples. A recent prospective study by Grahovac-Juretić et al. (13) sought to determine the effect of a day hospital psychosocial program on the symptomatology and quality of life of patients with schizophrenia. The results of this study showed that patients included in the day hospital program, compared with those who were not in day care, had a significant reduction in symptoms immediately after the end of the program, but also 6 months later. In addition, patients in the day hospital had a higher quality of life at the end of the study compared with those taking pharmacotherapy alone (13).

The first aim of this study was to compare differences in treatment satisfaction between patients enrolled in a day hospital program and patients hospitalized on a ward. We hypothesized that patients treated within a day hospital would be more satisfied with treatment compared to patients hospitalized on a ward.

The second aim of this study was to compare differences in quality of life between patients enrolled in a day hospital program and patients hospitalized on a ward. We hypothesized that patients treated within a day hospital would have a higher quality of life compared to patients hospitalized on a ward.

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## Methods

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### Participants

The study design was cross-sectional with two outcome variables: treatment satisfaction and quality of life. The study sample consisted of 120 adult patients of the Psychiatry clinic, Clinical Hospital Centre Rijeka. The first group consisted of 60 patients included in the day hospital psychosocial program, while the second group consisted of 60 patients hospitalized on the inpatient ward. The participants were assigned to each group at the suggestion of the psychiatrist respecting the established criteria applied in the practice of the Clinic for Psychiatry of the University Hospital Centre Rijeka. Patient diagnoses included schizophrenia, schizotypal, delusional, and other non-mood psychotic disorders (F20-F29), and mood (affective) disorders (F30-F39). The exclusion criteria were: 1) mental and behavioural disorders due to psychoactive substance use, 2) mental disorder caused by organic factors and 3) sensory or cognitive disabilities. All participants were informed of the purpose and procedures of the study and signed their informed consent.

### Instruments

Basic sociodemographic data and information on psychiatric treatment were collected by a short questionnaire created for the purposes of this research. Sociodemographic data included age, gender, education, employment, marital status and housing conditions. Information on psychiatric treatment included the number of years since the first visit to the psychiatrist, the number of previous hospitalizations, and the number of days spent in the hospital during the last hospitalization.

Treatment satisfaction was registered using the Short Assessment of Patient Satisfaction (SAPS) questionnaire (14). The SAPS consists of seven items assessing the core domains of patient satisfaction which include treatment satisfaction, explanation of treatment results, clinician care, participation in medical decision-making, respect by the clinician, time with the clinician, and satisfaction with hospital/clinic care. The participant's responses are recorded on a 5-point scale. The questionnaire showed

satisfactory metric characteristics (Cronbach  $\alpha=0.86$ ) in clinical trials and a high degree of correlation with other more extensive measures of patient satisfaction. In this study, Cronbach's alpha was slightly lower ( $\alpha=0.75$ ) but still satisfactorily reliable. SAPS is a generic measure of patient satisfaction and can be used to assess satisfaction with different forms of treatment with different groups of patients. Another advantage is that it is short and easy to use so most patients only need a few minutes to complete it.

Quality of life was registered with the Manchester Short Assessment of Quality of Life (MANSA) (15). The instrument consists of 16 items. Twelve questions represent subjective measures of quality of life and include satisfaction with life as a whole, job satisfaction (training/education, or unemployment/retirement), financial situation, number and quality of friendships, leisure activities, accommodation, personal safety, people with whom the patient lives (or single life), sex life, family relationships, physical health, and mental health. Participants rate these domains using a 7-point scale. Four items are considered objective measures of quality of life and the participant answers them with 'yes' or 'no'. These items assess whether a person has a close friend, has been in contact with friends in the past week, has been charged with a criminal offense in the past year, and has been a victim of physical violence. The Croatian language version of the questionnaire was validated and used in mental health research showing good metric characteristics (16). In this research, Cronbach's alpha was 0,89 indicating very good reliability.

## Procedure

The study has been approved by the Ethics Committee of the Clinical Hospital Centre Rijeka and the Ethics Committee for Biomedical Research of the Faculty of Health Studies, University of Rijeka. Participants were informed of the purpose and procedures of the research and signed their informed consent. Participation in the study was voluntary and data collection through questionnaires was anonymous. The study was conducted in accordance with all ethical principles and human rights in research. Participants were given detailed instructions before completing the questionnaire, and in case of any ambiguities, they could ask the researcher. For the hospitalized patients, data were collected on the last day of hospitalization, while participants treated in the day hos-

pital program completed questionnaires on the last day of day hospital treatment. Data collection was carried out over 2 months (from March to May 2019).

## Data analysis

Descriptive statistics for categorical data were presented as absolute and relative frequencies. For continuous measures, means (standard deviations - SD) and medians (interquartile ranges) were presented where appropriate. Differences in sociodemographic and clinical characteristics between the hospitalized and day hospital patients were examined by the chi-square test. Normality of distributions of continuous measures was examined by the Kolmogorov-Smirnov test. Distributions of the individual domains of treatment satisfaction as well as the total score significantly differed from normal so the non-parametric Mann-Whitney U test was used to examine the differences between the two groups of patients. Individual domains of subjective quality of life also significantly differed from a normal distribution, but not the total score, so the Mann-Whitney U test was used for differences in a particular domain and student t-test for independent samples for the overall result. The level of statistical significance was set at two-tailed  $p < 0.05$  with 95% confidence intervals. All statistical analyses were performed using the statistical software SPSS 23 (SPSS Inc., Chicago, IL, USA).

## Results

The study involved 120 participants treated at the Psychiatry clinic, Clinical Hospital Centre Rijeka. The first group were the patients included in the day hospital program, while the second group were participants at the inpatient hospital care. The two groups were matched by age, gender, level of education and employment status, but they differed by marital status. There were significantly more married/cohabitating participants in the hospitalized group ( $\chi^2=13.91$ ;  $p=0.008$ ). The two groups did not differ in the proportion of patients with schizophrenia, schizotypal, delusional, and other psychotic disorders (F20-F29), and mood (affective) disorders (F30-F39) but differed in some treatment characteristics. A sig-

nificantly higher proportion of day hospital patients had been treated for more than 5 years compared to hospitalized patients ( $\chi^2=12.46$ ;  $p=0.006$ ). Also, the duration of the last hospitalization was significantly longer for the day hospital group ( $\chi^2=6.03$ ;  $p=0.049$ ) (Table 1). Significant “p” values are **marked in bold** in all tables.

Day hospital patients reported a significantly higher level of overall treatment satisfaction compared to hospitalized patients (Mann-Whitney U=1090;  $p=0.000$ ). Participants attending a day hospital program were more satisfied in four out of seven different treatment domains: the explanations about treatment ( $p=0.013$ ), carefulness and precision of medical examination ( $p<0.001$ ), choices about treatment ( $p=0.027$ ) and feeling of respect ( $p=0.010$ ). The groups did not significantly differ in satisfaction with the treatment effect, feeling that the time

they had with the doctor/other health professional was too short and satisfaction with the care they received in the hospital/clinic (Table 2).

The results of the SAPS questionnaire can generally be grouped in three categories (14). A score ranging from 0 to 10 indicates poor health care and the need to urgently change the treatment or procedures the patient is receiving. In our study, the median satisfaction of both day hospital patients and ward patients was above this score.

In the next category, the results range from 11 to 18. Participants whose score falls into this range answered at least two questions (two aspects of their health care) with “dissatisfied” or “very dissatisfied” or did not answer any of the questions with “very satisfied.” The median score of patients hospitalized on the ward was 17 indicating inadequate health care in several areas of their treatment and the need

Table 1. **Differences in sociodemographic and psychiatric treatment characteristics between hospitalized and day hospital patients (n=120)**

	Day hospital n=60	Hospitalized n=60		
Age (years)	n (%)	n (%)	$\chi^2$	p
18-25	1 (1.6)	4 (6.7)	8.62	0.071
26-35	10 (16.7)	7 (11.7)		
36-45	7 (11.7)	14 (23.3)		
45-60	21 (35.0)	14 (23.3)		
> 60	21 (35.0)	21 (35.0)		
Gender				
Female	24 (40.0)	26 (43.3)	0.14	0.853
Male	36 (60.0)	34 (56.7)		
Education level				
None or primary	8 (13.3)	13 (21.7)	3.54	0.170
Secondary	42 (70.0)	32 (53.3)		
Higher	10 (16.6)	15 (25.0)		
Employment status				
Employed	13 (21.7)	13 (21.7)	2.21	0.531
Unemployed	21 (35.0)	24 (40.0)		
Retired	26 (43.3)	23 (38.3)		
Marital status				
Married/cohabiting	17 (28.3)	32 (53.3)	13.91	<b>0.008</b>
Single	33 (55.0)	14 (23.3)		
Divorced	7 (11.7)	9 (15.0)		
Widowed	3 (5.0)	5 (8.4)		

		Day hospital n=60	Hospitalized n=60		
Accommodation					
	Owned or rented	35 (58.3)	43 (71.7)	4.26	0.118
	With parents	23 (38.3)	13 (21.7)		
	Social housing or institution	2 (3.4)	4 (6.8)		
Diagnostic category					
	F20 - F29	19 (31,7)	27 (45,0)	2,26	0,133
	F30 - F39	41 (68,3)	33 (55,0)		
Years in psychiatric treatment					
	<1	9 (15.0)	8 (13.3)	12.46	0.006
	1-2	8 (13.3)	17 (28.3)		
	3-5	5 (8.3)	14 (23.3)		
	>5	38 (63.3)	21 (35.0)		
Number of hospitalizations					
	1	12 (20.0)	13 (21.7)	7.61	0.179
	2	8 (13.3)	15 (25.0)		
	3	9 (15.0)	13 (21.7)		
	4	4 (6.7)	5 (8.3)		
	5 and more	27 (45.0)	14 (23.3)		
Duration of last hospitalization (days)					
	1-10	14 (23.3)	25 (41.7)	6.03	0.049
	11-20	26 (43.3)	26 (43.3)		
	<20	20 (33.3)	9 (15.0)		

to change certain procedures. Treatment satisfaction of the day hospital patients is in the following category, which includes the range of results from 19 to 26 (median=20). This score indicates relatively high satisfaction with most services and forms of health care or applied therapeutic procedures. Day hospital patients answered more than half of the questions with "satisfied" or "very satisfied". Also, the level of satisfaction of the day hospital patients suggests that participants are more satisfied with particular segments of care, from communication and interaction with physicians or other health care staff, explanations related to illness and course of treatment, time devoted to treatment to various other treatment details. In a hospitalized group, a significant number of patients also stated that they are satisfied with the effectiveness of their treatment, but there were

10% to 20% of those who were "dissatisfied" or "very dissatisfied."

Day hospital patients reported a significantly higher level of subjective quality of life compared to hospitalized patients ( $t=2.89$ ;  $p=0.005$ ) (Table 3).

Participants attending day hospital program were more satisfied with life in general ( $p=0.018$ ), financial situation ( $p=0.046$ ), accommodation ( $p=0.041$ ), personal safety ( $p=0.014$ ), people they live with or living alone ( $p=0.001$ ), relationship with their family ( $p<0.001$ ) and their mental health ( $p=0.008$ ). The most prominent differences were in the domains of family relationships, satisfaction with people they live with or living alone, mental health and personal safety. The groups did not differ in other domains of subjective quality of life, as well as in four items related to objective quality of life (Table 4).

Table 2. **Differences in treatment satisfaction between hospitalized and day hospital patients (n=120)**

SAPS	Day hospital n=60		Hospitalized n=60		Mann-Whitney U	<i>p</i>
	Median (interquar- tile range)	Mean rank	Median (interquar- tile range)	Mean rank		
Satisfaction with the effect of your overall treatment/care	4 (4-5)	66.04	4 (3-4)	54.96	1467.50	0.058
Satisfaction with the explanations the doctor/other health professional has given you about the results of your treatment/care	4 (3.25-4)	67.78	4 (3-4)	53.23	1363.50	<b>0.013</b>
Satisfaction with how was the doctor/other health professional careful to check everything when examining you	4 (4-5)	71.92	4 (3-4)	49.08	1115.00	<b>0.000</b>
Satisfaction with the choices you had in decisions affecting your health care	4 (3-4)	66.95	4 (3-4)	57.05	1413.00	<b>0.027</b>
Feeling respected by the doctor/other health professional	4 (4-5)	68,27	4 (3-5)	52.73	1334.00	<b>0.010</b>
Feeling that the time you had with the doctor/other health professional was too short	3 (2-4)	62,86	3 (2-4)	58.14	1658.50	0.440
Satisfaction with the care you received in the hospital/clinic	4 (4-5)	65,22	4 (3-4)	55.78	1517.00	0.100
SAPS total	20 (18,25-22,00)	72.33	17 (16.00-20.75)	48.67	1090.00	<b>0.000</b>

## Discussion

The main goal of this study was to compare the satisfaction with the effectiveness of the treatment of the inpatient and day hospital program from the perspective of the patients with mental illness. The basic outcomes were satisfaction with the treatment and the quality of life.

The first segment of treatment satisfaction relates to general satisfaction with the effectiveness of treatment. Day hospital patients were more satisfied with the effectiveness of treatment compared to hospitalized patients. How this treatment efficacy was manifested cannot be precisely defined, but it can be assumed that day hospital patients felt subjectively

better in terms of improving symptoms, increasing the level of general functionality, etc., and attributed this to treatment within the day hospital program. It is illustrative that in the group of day hospital patient no one answered this question with "dissatisfied" or "very dissatisfied", which in another way indicates the general level of satisfaction with the efficiency of the day hospital. On the other hand, the level of satisfaction with the treatment effectiveness of hospitalized patients was lower compared to a day hospital, however, it is not extremely low. The organization of the day hospital program, the involvement of the patient in the organization of activities, a more open and humane approach and other aspects of day hospital treatment seem to change the established patterns of communication between doctor/staff - patient. It can also be assumed that doctors involved in day hospital activities were also likely to have

Table 3. **Differences in subjective quality of life between hospitalized and day hospital patients (n=120)**

MANSA - subjective quality of life	Day hospital n=60		Hospitalized n=60		Mann-Whitney U	p
	Median (interquartile range)	Mean rank	Median (interquartile range)	Mean rank		
Satisfaction with life in general	4.5 (3-5)	67.82	4 (3-4.75)	53.18	1361.00	<b>0.018</b>
Satisfaction with employment/ retirement	4 (3-5)	66.01	3 (2-5)	54.99	1469.50	0.077
Satisfaction with financial situation	4 (3-5)	66.72	3 (2-4.75)	54.28	1427.00	<b>0.046</b>
Satisfaction with friendships	4 (2-5)	58.71	4 (3-5)	62.29	1692.50	0.566
Satisfaction with leisure activities	4 (3-5)	63.59	4 (3-5)	57.41	1614.50	0.322
Satisfaction with accommodation	5 (3-6)	66.85	4 (3-5)	54.15	1419.00	<b>0.041</b>
Satisfaction with personal safety	5 (4-6)	68.12	4 (3-5)	52.58	1343.00	<b>0.014</b>
Satisfaction with people living with/ living alone	5 (4-6)	70.99	4 (3-5)	50.01	1170.50	<b>0.001</b>
Satisfaction with sex life	4 (2-5)	66.17	3 (1.25-4.75)	54.83	1460.00	0.069
Satisfaction with relationship with family	5.5 (5-6)	71.98	4 (3-5)	49.03	1111.50	<b>0.000</b>
Satisfaction with physical health	4 (3-5)	66.03	4 (2-5)	54.97	1468.00	0.076
Satisfaction with mental health	5 (3-5)	68.74	3 (3-4)	52.26	1305.50	<b>0.008</b>
	Mean (SD)		Mean (SD)		t	p
Total score	4.26 (1.11)		3.71 (0.96)		2.89	<b>0.005</b>

Table 4. **Differences in objective quality of life between hospitalized and day hospital patients (n=120)**

MANSA - objective quality of life n (%)	Day hospital n=60		Hospitalized n=60		$\chi^2$	p
	yes	no	yes	no		
Do you have a close friend?	44 (73.3)	16 (26.7)	47 (78.3)	13 (21.7)	0.41	0.670
Have you been in contact with friends in the past week?	41 (68.3)	19 (31.7)	44 (73.3)	16 (26.7)	0.36	0.688
Have you been charged with a criminal offense in the past year?	2 (3.3)	58 (96.7)	4 (6.7)	56 (93.3)	0.70	0.679
Have you been a victim of physi- cal violence?	1 (1.7)	59 (98.3)	7 (11.7)	53 (88.3)	4.82	0.061



more time and opportunities to get to know their patients better and developed a relationship that was less based on hierarchy and more on mutual respect. Also, the organizational structure and closeness of hospital treatment to a greater extent support traditional hierarchical patterns in which the doctor determines the course and method of treatment, and the patient's duty is to listen, not ask much and accept the doctor's instructions without discussion. In such conditions, patients often feel disrespected, neglected, and generally dissatisfied with treatment.

The results obtained are consistent with a number of studies showing that the treatment of patients with mental disorders within the day hospital is associated with greater treatment satisfaction. Somewhat similar results were obtained in the study of Dick et al. (11) comparing satisfaction with the treatment of patients diagnosed with neurosis, personality disorder, or adjustment disorder treated in a day hospital program with patients hospitalized on the ward. Measures of clinical outcomes, after the follow-up period, did not differ between hospitalized and day hospital patients, however, treatment satisfaction was significantly higher in day hospital patients (11). The results of a study by Priebe et al. (12) also showed that treatment satisfaction was significantly higher in patients treated in the day hospital. And in an extensive meta-analysis by Marshall et al. (9) it was also shown that the results of most of the included studies support the effectiveness of day hospital treatment in terms of greater treatment satisfaction, reduction of hospital days and the need for subsequent hospitalizations, and lower overall treatment costs.

Another measure of day hospital efficiency was quality of life with the hypothesis that patients treated within the day hospital would have a higher overall level of quality of life compared to patients hospitalized on the ward. The obtained results confirmed the hypothesis. A comparison of individual segments of quality of life showed that day hospital patients were significantly more satisfied with their lives as a whole, they were more satisfied with their material or financial situation, accommodation and the level of personal security. From the aspect of social functioning, participants treated in a day hospital were more satisfied with the people they live with or living as singles and relationships with their family. In addition, day hospital patients were significantly more satisfied with their mental health. Domains of quality of life in which there was no significant difference be-

tween day hospital patients and those hospitalized in the ward were job satisfaction/schooling or retirement, quality and number of friends, leisure activities, sexual life and satisfaction with physical health. Therapeutic interventions within the day hospital program appear to have had some impact on the general level of quality of life and in particular on some aspects of social functioning. This result is easy to understand if we take into account that a good part of the day hospital program is precisely focused on developing social skills. The therapy group itself is a small social community in which participants have the opportunity to practice different models of communication. Patients are encouraged to participate as actively as possible in all processes within the group, emphasizing responsibility for themselves and cooperation with others. It is also useful that patients are not excluded from their primary community and family during the day hospital program, so they can apply and practice the skills learned in the day hospital on a daily basis in their own social environment. This allows for a gradual change in behaviour and improves their functioning in the "real world". Most of the effects described above are more difficult within hospital wards with patients who are isolated from their primary social environment. Despite the clear advantages of day hospital treatment in terms of developing social skills and increasing social competence, day hospital patients did not have a higher score in all social domains of quality of life. Satisfaction with friendships and leisure activities did not differ across groups. The results in these domains ranged on average from "mostly dissatisfied" to "neither satisfied nor dissatisfied", so it seems that both groups had certain problems in establishing and maintaining friendly relations and leisure activities. Another domain in which day hospital patients had significantly higher score is mental health. Although no clinical outcomes were examined in this study, this result is important because it indirectly indicates the level of symptomatology. Patients more satisfied with their mental health are likely to have a less severe clinical picture, while those who are generally dissatisfied are more likely to have higher levels of symptoms.

In addition to subjective measures, 4 objective measures of quality of life were examined: whether a person has a close friend, whether he has been in contact with friends in the past week, whether a person has been charged with a crime in the last year and whether he has been a victim of physical vio-

lence. No significant difference was found in any of these domains.

Numerous studies have shown that patients treated in day hospital programs have a higher level of quality of life compared to hospitalized patients treated in conventional psychiatric wards (9,12,13). A study comparing the efficacy and cost of acute day-hospital treatment and traditional inpatient treatment showed that patients treated in the day hospital program had a lower level of psychopathology, higher satisfaction with treatment and a higher level of subjective quality of life (12); which is consistent with the results obtained in our study.

Our results are also in line with the study that examined the effectiveness of day hospital treatment of patients with schizophrenia, which showed that patients who, after hospitalization, underwent treatment in a day hospital have a significantly higher quality of life at the end of treatment and 6 months after completion of day hospital (13). Finally, a meta-analysis by Marshall et al. (9) that included numerous studies of day hospital efficacy, encompassing different clinical and social outcomes, showed that day hospital programs are generally more effective in treating mental disorders, especially when it comes to improving patient quality of life. However, it is important to emphasize that the differences obtained in our study may be related to the different severity of the illness in patients of the two groups. The severity of symptoms was not directly examined, but differences in the length of psychiatric treatment and the duration of the last hospitalization could indicate that patients treated within the day hospital had less severe symptoms and milder illness.

This research has several limitations that need to be considered when interpreting and generalizing results. First, the participants were not randomly assigned to a day hospital or inpatient treatment but were selected according to the established criteria applied in the practice of the Clinic for Psychiatry of the University Hospital Centre Rijeka. Although matched by most of the registered sociodemographic characteristics, it is possible that the examined groups were not balanced in other relevant factors. For example, patients treated in a day hospital program were likely to be more motivated and had greater capacity and resources to improve their mental health. It is also possible that their general clinical condition was milder than in hospitalized patients. Factors of this type could influence the outcomes of the research. Another limitation of the study to be considered are

outcome measures. Only two outcomes were used in the study: the treatment satisfaction questionnaire (SAPS) and the quality of life questionnaire (MANSA), which are subjective self-assessment measures that may be influenced by a number of factors beyond the control of the researcher, such as current disease stage, acute symptoms, current mood and others. Another limitation is that it is a cross-sectional study that makes it impossible to monitor possible changes in outcomes over time and to link these changes to the effects of treatment.

With all the limitations, this research has its importance and quality. As already mentioned, this is a study conducted in a clinical setting taking into account the context and specific reality of the treatment. This "naturalistic" approach has made it possible to obtain relevant data on which to base future research that would include methodologically more rigorous designs. Despite the fact that psychiatric day hospitals have existed in Croatia for many years, only a few relatively small studies have investigated their effectiveness and we believe that this research will contribute to this under-researched area.

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## Conclusion

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The results of this study showed that patients treated in the day hospital had a higher level of overall treatment satisfaction compared to hospitalized patients. In addition to the overall score, participants attending the day hospital program were more satisfied in four of the seven different domains of treatment: explanations of treatment, care and accuracy of medical examination, treatment choices, and a sense of respect.

Also, patients treated in a day hospital had a higher overall subjective quality of life score compared to patients hospitalized on a psychiatric ward. The most prominent differences were in the domains of family relationships, satisfaction with people they live with or living alone, mental health and personal safety. The groups did not differ in other domains of subjective quality of life and the four items related to objective quality of life.

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## KVALITETA ŽIVOTA I ZADOVOLJSTVO LIJEČENJEM HOSPITALIZIRANIH PSIHIJATRIJSKIH BOLESNIKA I BOLESNIKA LIJEČENIH UNUTAR PROGRAMA DNEVNE BOLNICE

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### Sažetak

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**Uvod.** Dnevne bolnice postaju sve češći oblik liječenja osoba s mentalnim poremećajima u mnogim psihijatrijskim klinikama u Hrvatskoj, ali istraživanja koja ispituju njihovu učinkovitost još uvijek su rijetka.

**Cilj.** Cilj ovog istraživanja bio je usporediti zadovoljstvo liječenjem i kvalitetu života pacijenata liječenih unutar programa dnevne bolnice i pacijenata hospitaliziranih na psihijatrijskom odjelu.

**Metode.** Istraživanje je oblikovano kao presječna studija s dvije mjere ishoda: zadovoljstvo liječenjem i kvaliteta života. Uzorak se sastojao od 120 odraslih pacijenata Klinike za psihijatriju Kliničkoga bolničkog centra Rijeka. Prvu skupinu činilo je 60 pacijenata uključenih u psihosocijalni program dnevne bolnice, dok je drugu grupu činilo 60 pacijenata hospitaliziranih na bolničkom odjelu.

**Rezultati.** Pacijenti dnevne bolnice izvijestili su o značajno višem stupnju ukupnog zadovoljstva liječenjem u odnosu na hospitalizirane pacijente (srednji rang: 55 vs. 17,  $p = 0,000$ ) i bili su značajno zadovoljniji u četiri od sedam različitih područja liječenja: objašnjenja o liječenju (srednji rang: 68 vs. 53,  $p = 0,013$ ), pažljivost i preciznost liječničkog pregleda (srednji rang: 72 vs. 49,  $p = 0,000$ ), izbor liječenja (srednji rang: 67 vs. 57,  $p = 0,027$ ) i osjećaj poštovanja (srednji rang: 68 vs. 53,  $p = 0,010$ ). Pacijenti dnevne bolnice također su izvijestili o značajno višoj razini ukupne subjektivne kvalitete života (aritmetička sredina: 4,26 vs. 3,71,  $p = 0,005$ ). Zadovoljniji su životom općenito (srednji rang: 68 vs. 53,  $p = 0,018$ ), financijskom situacijom (srednji rang: 67

vs. 54,  $p = 0,046$ ), smještajem (srednji rang: 67 vs. 54,  $p = 0,041$ ), osobnom sigurnošću (srednji rang: 68 vs. 53,  $p = 0,014$ ), osobama s kojima žive ili time što žive sami (srednji rang: 71 vs. 50,  $p = 0,001$ ), odnosima s obitelji (srednji rang: 72 vs. 49,  $p = 0,000$ ) te mentalnim zdravljem (srednji rang: 69 vs. 52,  $p = 0,008$ ).

**Zaključak.** Pacijenti tretirani unutar dnevne bolnice i oni hospitalizirani na odjelu razlikovali su se, kako u zadovoljstvu tretmanom tako i u subjektivnoj kvaliteti života. Buduća istraživanja trebala bi se usredotočiti na različite segmente programa dnevnih bolnica te širi skup ishoda.

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**Ključne riječi:** mentalni poremećaji, dnevna bolnica, zadovoljstvo tretmanom, kvaliteta života

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# Nurses' Knowledge of Palliative Care at Primary, Secondary and Tertiary Levels of Health Care

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**Article received:** 03.02.2021.

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**Article accepted:** 24.04.2021.

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**DOI:** 10.24141/2/5/1/2

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**Keywords:** palliative medicine, palliative care, palliative patient

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## Abstract

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**Introduction.** Comprehensive care for patients who no longer respond to treatment procedures is called palliative care. Palliative medicine does not delay or accelerate death, it promotes life, and considers dying as a normal process. In palliative medicine and care there is no place for hierarchy - teamwork, focus on the patient and respect for his autonomy are what is important.

**Aim.** The conducted research shows the knowledge of nurses about palliative care at the primary, secondary and tertiary levels of health care.

**Methods.** Prospective research in the Republic of Croatia at three levels of health care has been conducted. The sample included 150 nurses. The instrument used in the study was the Palliative Care Quiz for Nursing (PCQN).

**Results.** The results showed that the nurses' knowledge of palliative care is insufficient among the nursing population. Despite numerous training activities conducted over the past ten years, levels of knowledge are still lower than expected. Nurses at the primary level of health care have far greater knowledge than nurses at secondary and tertiary levels.

**Conclusion.** Results of the study showed the need for quality education with real-life examples in order to achieve higher levels of empathy, spread knowledge about palliative care and about the importance of care for palliative patients. It is recommended to increase the number of educational activities in small groups, in the local language, adaptable and understandable to all health professionals.



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## Introduction

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Palliative care is an approach that improves the quality of life of a patient and his/her family who are facing problems associated with a deadly disease. The goals of palliative care are achieved through the prevention and alleviation of suffering, early recognition, flawless assessment and suppression of pain, and helping with other psychophysical, social, and spiritual problems (1,2). The establishment of palliative care in the system is one of the priorities of the Republic of Croatia and an integral part of the National Strategy for Health Development 2012-2020 (3). Palliative care offers the most basic concept of care - taking care of the patient's needs wherever he is cared for, either at home or in the hospital, because it affirms life and considers death a normal process. Palliative medicine is one of the newest subspecialty branches of modern medicine. The main centre of interest of palliative medicine is caring for patients in the final stage of life, where curative medicine can no longer make patients healthy (4, 5). The health care system should be oriented towards patients and citizens who should without a doubt participate in decisions concerning their health. Respecting and protecting the patient in the final stage of life includes, above all, ensuring adequate care in the appropriate environment, so that he or she can die with dignity (6,7). Death is easy to recognize, but difficult to define because it is one of the phenomena in medicine that has not been sufficiently researched. Very often there is a debate about decisions on one's end of life, and legal, as well as ethical issues, are raised (8). Even in the worst situation, a person is left with that ultimate freedom, and that is the choice of a point of view. If we accept suffering as a task, if we find meaning in it, then we are saved from despair because "he who knows *why* can deal with almost every *how*." It is true that old people have no opportunities in the future, but they do have more than that. Instead of opportunities in the future, they have accomplishments in the past, opportunities they have actualized, meaning they have fulfilled, values they have accomplished and no one and nothing can take those values away from the past. As for the possibility of finding meaning in suffering, the meaning of life is an unconditional one (9,10). By reviewing the scientific and professional literature, we can confirm

that in the Republic of Croatia there is not a sufficient number of conducted research on the topic of knowledge about palliative care, in contrast to many conducted research in the world. It is very important to address the issue of patients in need of palliative care, to improve knowledge and provide a dignified death. The research was conducted to highlight the importance of a high level of knowledge about palliative care and care for the patients who need it.

## Aim

The aim of this paper was to present the level of knowledge of nurses at primary, secondary and tertiary levels of health care about palliative care.

Specific aims:

1. Determine if there are differences in the knowledge of nurses in relation to primary, secondary and tertiary levels.
2. Determine if there are differences in the knowledge of nurses with regard to age, education and years of service.

## Hypothesis

**H1:** At the tertiary level of health care, nurses have received more formal and informal training on palliative care than nurses at the primary and secondary level of health care.

**H2:** Nurses/technicians from the primary level of health care have more knowledge about palliative medicine and care than nurses at the tertiary and secondary level of health care.

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## Methods

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The sample included 150 participants, 50 participants (33.3%) from two Health Centres (HC) - Health Centre East with 25 participants and Health Centre Centre with 25 participants, 50 participants (33.3%) from County Hospital Čakovec (CHČ) and 50 participants (33.3%) from the University Hospital Centre Zagreb (UHCZ). The time period in which the research was conducted was from 30 February 2020 - 30 June 2020. The questionnaire was com-



pleted by 150 nurses. Of these, 136 were women (90.7%) and 14 were men (9.3%). With regard to age, 46 (30.7%) participants were aged between 35 and 44 years, and 42 (28%) participants were aged between 25 and 34 years. 66 (44%) participants are nurses who completed secondary school or have a bachelor's degree in nursing, while 18 (12%) participants have a master's degree or are graduate nurses. The study used a PCQN (Palliative Care Quiz for Nursing, Ross et al. 1996) questionnaire consisting of 20 questions developed by Margaret M. Ross and colleagues from the University of Ottawa, Canada, and its purpose was to examine the knowledge of nurses on palliative care (11). In order to verify the factor structure of the PCQN questionnaire and the justification of the formation of one domain based on a set of selected items ( $k = 20$ ), exploratory factor analysis was performed using principal components analysis with direct oblimin rotation. The value of the Kaiser-Meyer-Olkin test is 0.638 which is more than the recommended value of 0.6. The Bartlett sphericity test is significant ( $p < 0.001$ ) indicating the factorability of the correlation matrix. According to the Guttman-Kaiser criterion (characteristic root greater than 1), the existence of as many as seven components was determined, which explain a total of 57% of the variance, but most of these factors explained only a small part of the total variance, and because of the content of items, which were not interpretable or meaningfully distributed in these factors, we retained one factor that explains 15.4% of the variance. Likewise, one of the limiting factors is the sample size which determines that we can only consider components with a factor load of 0.45 and higher (12). After that, the analysis of the main components with oblimin rotation was repeated. According to the Guttman-Kaiser criterion, one factor was determined that explains a total of 15.4% of the variance. After the one-factor structure of the PCQN questionnaire was determined, the reliability of the questionnaire was analyzed. The internal reliability coefficient of the whole Cronbach Alpha scale is 0.691, which means that it represents an acceptable level of reliability in the research (Cronbach Alpha values  $> 0.6$ ).

## Ethics

The ethics committees of the Health Centre East and Centre, the University Hospital Centre Zagreb and the County Hospital Čakovec approved the study. Nurses agreed to participate in the research and complete

the questionnaire and confirmed this by signing a consent form pursuant to hospital regulations. The principles of the Helsinki Declaration were adhered to during this study.

## Statistics

Categorical data are presented in absolute and relative frequencies. Differences in categorical variables were tested by the  $\chi^2$  test and, if necessary, by Fisher's exact test. Numerical data are described by the median and limits of the interquartile range. Differences in numerical variables between the two independent groups were tested by the Mann Whitney U test, and between the three independent groups by the Kruskal Wallis test. The significance level was set to  $p=0.05$  (x,y) (13). MedCalc Statistical Software version 19.1.7 (MedCalc Software Ltd, Ostend, Belgium; <https://www.medcalc.org>; 2020) and SPSS (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.) were used for statistical analysis (14).

## Results

There were 136 female participants (90.7%), and a significant number of these women are employed at a Health Centre (Fisher's exact test,  $p=0.007$ ). 66 (44%) participants are nurses who completed secondary school or have a bachelor's degree in nursing, while 18 (12%) participants have a master's degree or are graduate nurses, without significant difference in relation to institutions. Most participants, 44 of them (29.3%) have between 21 and 30 years of service, and the fewest of them have between 16 and 20 years of service. With years of service of up to 5 years, there are significantly more participants from the University Hospital Centre, 12 of them (24%), in the County Hospital there are significantly more participants with years of service between 21 and 30 years - 19 of them (37%), while in the Health Centres there are significantly more participants with 31 years or more years of service - 13 of them (26%) ( $\chi^2$  test,  $p=0.04$ ) (Table 1).

Table 1. **Gender, age, professional status and years of service in relation to the institution in which participants work**

Number (%)					
	HC	CH	UHC	Total	p
Gender					
Men	0	8 (16)	6 (12)	14 (9.3)	0.007
Women	50 (100)	42(84)	44 (88)	136 (90.7)	
Age of respondents (years)					0.42*
18 - 24	7 (14)	2 (4)	7 (14)	16 (10.7)	
25 - 34	9 (18)	19 (38)	14 (28)	42 (28)	
35 - 44	15 (30)	16 (32)	15 (30)	46 (30.7)	
45 - 54	10 (20)	7 (14)	8 (16)	25 (16.7)	
54 and more	9 (18)	6 (12)	6 (12)	21 (14)	
Total	50 (100)	50 (100)	50 (100)	150 (100)	
Number (%)					
	HC	CH	UHC	Total	p*
Professional status					0.07
Nurses with secondary education	25 (50)	25 (50)	16 (32)	66 (44)	
Bachelor’s degree in nursing	21 (42)	16 (32)	29 (58)	66 (44)	
Master’s degree/Graduate nurse	4 (8)	9 (18)	5 (10)	18 (12)	
Years of service					0.04
0 - 5	9 (18)	9 (18)	12 (24)	30 (20)	
6 - 10	5 (10)	10 (20)	4 (8)	19 (12.7)	
11 - 15	6 (12)	7 (14)	8 (16)	21 (14)	
16 - 20	7 (14)	2 (4)	7 (14)	16 (10.7)	
21 - 30	10 (20)	19 (38)	15 (30)	44 (29.3)	
31 and more	13 (26)	3 (6)	4 (8)	20 (13.3)	
Total	50 (100)	50 (100)	50(100)	150 (100)	

Note: HC – Health Centre; CH – County Hospital; UHC –University Hospital Centre

\* $\chi^2$  test

There are 38 (25.3%) participants from the cardiology department, 23 (15.3%) participants from the general practitioner's practice or from the neurology department, 17 of them (11.3%) are from the community nursing service, 15 (10%) ) from the pulmonary diseases department, and 12 (8%) participants from the oncology department, while a smaller number of participants are from other departments (nephrology, liver diseases department, gynaecology ambulatory clinic, ophthalmology ambulatory clinic, pediatric ambulatory clinic, internal medicine ambulatory clinic and palliative care department).

In everyday work, 128 (85.3%) participants encounter patients in need of palliative care, and this happens significantly more often for the participants employed in the University Hospital Centre - 48 of them (96%), compared to the participants from the Health Centres or the County Hospital. ( $\chi^2$  test,  $p=0.003$ ). During their regular education, 126 (84%) participants took courses about palliative care, 68 (45.3%) participants underwent informal palliative care education, and 130 (87.2%) stated that palliative care education would help them in working with their patients. There is no significant difference in education (formal and informal) and the importance of education in relation to the institution in which they are employed (Table 2).

### Knowledge of palliative care (PCQN questionnaire)

False statements that palliative care is appropriate only in situations where there is an evident worsening of the disease and deterioration were answered correctly by 104 (69.3%) participants: 117 (78%) participants answered that it is incorrect that men cope with grief more easily than women, and 135 (90%) participants answered that it is incorrect that suffering and physical pain are one and the same. To a true statement that the manifestation of chronic pain differs from that of acute pain, 122 (81.3%) participants answered correctly. A few participants - 28 (18.7%) of them, know that medicines that can cause respiratory depression are suitable for the treatment of severe dyspnea in the terminal phase of the disease, and 30 (20%) of them know that the statement that it is easier to bear the loss of a person with whom we are not close than with a loss of a close person is incorrect. Most participants, 71 (47.3%) of them, did not know the answer to the statement that in large doses codeine causes more nausea and vomiting than morphine; 68 of them (45.3%) did not know the answer to the statement that Dolatin is not an effective drug in the treatment of chronic pain, and 56 (37.3%) of them did not know whether the philosophy of palliative care is compatible with treatment activities (Table 3).

**Table 2. Distribution of participants according to whether they work with patients in need of palliative care, according to the current education on palliative care and the benefits of education on palliative care in relation to the institutions in which they work**

	Number (%)				
	HC	CH	UHC	Total	$p^*$
They encounter patients in need of palliative care in their daily work	36 (72)	44(88)	48 (96)	128 (85.3)	<b>0.003</b>
During their education, they took courses in palliative care	42 (84)	41(82)	473 (86)	126 (84)	0.86
They underwent informal education on palliative care	21 (42)	27(54)	20 (40)	68 (45.3)	0.32
Palliative care education would help them work with their patients	39(79.6)	45(90)	46 (92)	130 (87.2)	0.14

Note: HC - Health Centre; CH - County Hospital; UHC -University Hospital Centre

\* $\chi^2$  test

Table 3. **Answers to questions related to palliative care**

	Number (%) of participants			
	Correct	Incorrect	I do not know	Total
Palliative care is appropriate only in situations where disease exacerbation and deterioration is evident	42 (28)	*104 (69.3)	4 (2.7)	150 (100)
Morphine is the standard used to compare the analgesic effect of other opioids	*49 (3.7)	61 (40.7)	40 (26.7)	150 (100)
The extent of the disease determines how the pain is treated	86 (57.3)	*53 (35.3)	11 (7.3)	150 (100)
Adjuvant therapy is essential in the treatment of pain	*75 (50)	24 (16)	51 (34)	150 (100)
It is very important that family members are with the patient when death occurs	122 (81.3)	*11 (7.3)	17 (11.3)	150 (100)
In the last days of one's life, drowsiness associated with electrolyte imbalance reduces the need for sedation	*65 (43.3)	62 (41.3)	23 (15.3)	150 (100)
Addiction is a major problem with prolonged use of morphine in the treatment of pain	93 (62)	*40 (26.7)	17 (11.3)	150 (100)
People who take opioids must also take laxatives	*73 (48.7)	40 (26.7)	37 (24.7)	150 (100)
Providing palliative care requires emotional detachment	86 (57.3)	*43 (28.7)	21 (14)	150 (100)
Drugs that can cause respiratory depression are suitable for the treatment of severe dyspnea in the terminal phase of the disease	*28 (18.7)	89 (59.3)	33 (22)	150 (100)
Men cope with grief more easily than women	21 (14)	*117 (78)	12 (8)	150 (100)
The philosophy of palliative care is compatible with treatment activities	*52 (34.7)	42 (28)	56 (37.3)	150 (100)
The use of placebo is appropriate in the treatment of some types of pain	102 (68)	*34 (22.7)	14 (9.3)	150 (100)
In large doses, codeine causes more nausea and vomiting than morphine	*47 (31.3)	32 (21.3)	71 (47.3)	150 (100)
Suffering and physical pain are one and the same	11 (7.3)	*135 (90)	4 (2.7)	150 (100)
Dolantin is not an effective drug in the treatment of chronic pain	*35 (23.3)	47 (31.3)	68 (45.3)	150 (100)
Burnout due to the accumulation of losses is inevitable for those working in palliative care	79 (52.7)	*36 (24)	35 (23.3)	150 (100)

	Number (%) of participants			
	Correct	Incorrect	I do not know	Total
The manifestation of chronic pain is different from that of acute pain	*122 (81.3)	21 (14)	7 (4.7)	150 (100)
Losing a person we are not close to is easier to bear than losing a close person	116 (77.3)	*30 (20)	4 (2.7)	150 (100)
Anxiety or fatigue lowers the pain threshold	*42 (28)	93 (62)	15 (10)	150 (100)

Note: \*Correct answers

Table 4. Knowledge of palliative care with regard to the characteristics of the participants

	Median (interquartile range)	Minimum - maximum of correct an- swers	<i>p</i> *
Institution			
Health Centre	8 (6 - 10)	2 - 13	0.08
County Hospital	8 (6 - 8)	3 - 14	
University Hospital Centre	8 (7 - 10)	3 - 13	
Age of participants (years)			
18 - 24	7 (6 - 8)	2 - 11	0.49
25 - 34	8 (6 - 10)	3 - 13	
35 - 44	8 (6 - 10)	3 - 14	
45 - 54	9 (6 - 10)	4 - 13	
54 and more	8 (6 - 9)	4 - 12	
Professional status			
Nurses with secondary education	8 (6 - 9)	2 - 13	0.25
Bachelor's degree in nursing	8 (6 - 10)	3 - 13	
Master's degree/ Graduate nurse	9 (7 - 11)	3 - 14	
Years of service			
0 - 5	7 (6 - 9)	2 - 12	0.97
6 - 10	8 (6 - 10)	3 - 13	
11 - 15	7 (6 - 10)	4 - 14	
16 - 20	8 (6 - 11)	4 - 13	
21 - 30	8 (7 - 9)	3 - 13	
31 and more	8 (5 - 10)	4 - 13	

Note: \*Kruskal Wallis test

Out of a total of 20 correct answers that participants could have, the range of correct answers in our sample was from a minimum of 2 to a maximum of 14 correct answers, with a median of 8 (interquartile range from 6 to 9 correct answers). There is no significant difference in the number of correct answers with regard to the characteristics of the participants (Table 4).

Participants who encounter patients in need of palliative care in their daily work have significantly more correct answers, median 8 (interquartile range from 6 to 10) compared to participants who do not encounter patients in need of palliative care (Mann Whitney U test,  $p=0.004$ ). There is no significant difference in the number of correct answers as to whether or not participants received formal or informal palliative care education. The criterion of sufficient knowledge was determined by the author of the questionnaire

Ross et al. to 75% accuracy, while in 2016 Lovrić lowered these criteria to 50% accuracy due to research needs. The questions in the questionnaire relate to the philosophy of palliative care, psychological and spiritual issues, and the control of pain and other symptoms. The questionnaire is intended to check the basic knowledge of nurses about palliative care, and the possible answers are: *Correct*, *Incorrect* and *I do not know*. The authors scored the questionnaire in such a way that each respondent received one point for the answer *Correct*, and for the answers *Incorrect* and *I do not know*, he/she received zero points. Therefore:

- - „Good knowledge“ - >75% accuracy (15/20)
- - „Sufficient knowledge“ - >50% accuracy (10/20) (15).

Table 5. **Sufficient knowledge of palliative care in relation to the characteristics of the participants**

	Number (%) of participants according to knowl- edge			p*
	Not sufficient knowledge	Sufficient knowledge	Total	
Institution				
Health Centre	34 (30)	16(43)	50 (33)	0.04
County Hospital	44 (39)	6 (16)	50 (33)	
University Hospital Centre	35 (31)	15 (41)	50 (33)	
Professional status				
Nurses with secondary education	53 (47)	13 (35)	66 (44)	0.40
Bachelor's degree in nursing	48 (42)	18 (49)	66 (44)	
Master's degree/ Graduate nurse	12 (11)	6 (16)	18 (12)	
Years of service				
0 - 5	23 (20)	7 (19)	30 (20)	0.78
6 - 10	14 (12)	5 (14)	19 (13)	
11 - 15	14 (12)	7 (19)	21 (14)	
16 - 20	11 (10)	5 (14)	16 (11)	
21 - 30	36 (32)	8 (22)	44 (29)	
31 and more	15 (13)	5 (14)	20 (13)	
Total	113 (100)	37 (100)	150 (100)	

Note: \* $\chi^2$  test



Significantly more sufficient knowledge have the participants who meet patients in need of palliative care in their daily work, 36 of them (97.3%) (Fisher's exact test,  $p=0.02$ ), while according to formal and non-formal education there is no significant difference in the amount of knowledge about palliative care. According to the number of correct answers, we divided the participants into two groups: a group of participants who do not have enough knowledge (less than 10 correct answers), 113 of them, and a group of participants with sufficient knowledge, 37 of them (24.7%) (Table 5).

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## Discussion

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Based on the conducted research, it is concluded that the knowledge of nurses caring for patients in need of palliative care should be far greater, given that numerous training activities on this topic have been conducted over the past ten years. The conducted research found that 128 participants had taken courses on palliative care and medicine, and 68 had undergone informal education. There is no significant difference in education (formal and informal) and the importance of education in relation to the institution in which they are employed, which cannot confirm the first hypothesis. Mann Whitney U test proved that participants who encounter patients in need of palliative care on a daily basis have greater knowledge than participants who do not encounter patients in need of palliative care in their work. From the above results (Tables 4 and 5) it is evident that there is no significant difference in knowledge between nurses at the primary and tertiary level of health care, therefore, the second hypothesis has not been confirmed. Knowledge of palliative medicine is the most important component in providing palliative care. Participants, 93 (62%) of them, answered that addiction is a major problem with long-term use of morphine in the treatment of pain, while 102 (68%) of them answered that placebo is suitable in the treatment of some types of pain, which leads to the conclusion that in four different health institutions at three levels of health care, knowledge about the treatment of symptoms is insufficient. Previous research indicates a lack of nurses' knowledge on pal-

liative care, especially on pain control, use and side effects of opioids, the principles and use of palliative care and the identification of palliative patients, which is unfortunately proven by more recent research (15 - 17). Over the years, pain management issues have become a priority, but there is very little data on pain assessment and analgesics use. It is also necessary to address the question: "The loss of a person with whom we are not close is easier to bear than the loss of a close person." The author of the questionnaire indicated "incorrect" as the answer, but the main determinant of the intensity of grief is closeness. Every loss is a difficult and unpleasant experience no matter whether it is a close person or a patient we cared for. Every person needs to find meaning in loss. In times when people lived in more harmony with nature, people could more easily accept dying as a natural process like any other. Until just a hundred years ago, death was not an enigma except in the sense that death will always remain somewhat mysterious. People died in the presence of the whole family, in prayer and the hope of meeting again in heaven, which unfortunately today we cannot confirm to be so. Very often patients in need of palliative care do not die in the comfort of their home or in the presence of family and loved ones precisely because of a lack of knowledge about palliative care and care for patients in need of it (17). The need for palliative care is growing with age, and the population in the Republic of Croatia is getting older. In order to improve the knowledge of nurses about palliative care, in addition to the numerous training activities held on this topic, it is necessary to invite professionals from different backgrounds who are in direct contact with palliative patients to recount from their own experience the situations they encounter every day. Perhaps such experience would begin to change the image and vision of students about palliative care. In addition to nurses who meet patients in need of palliative care, it is necessary to invite patients or families to practical classes who would like to tell their life story and through emotions, they convey, raise awareness of seriously ill people who need to be provided with a quality life. The research should be repeated every year and the obtained results should be publicly presented. According to the results of various recent studies, the importance of a high level of knowledge about palliative medicine and care for patients in need of palliative care can be determined. Regardless of the negative results of this research, hope is placed into numerous educa-

tional activities that take place on the topic of palliative medicine. There is no significant difference in the number of correct answers in relation to the characteristics of the participants, but participants employed in Health Centres and University Hospital Centre have more knowledge about palliative care than participants working in the County Hospital. The disadvantage of this research is the insufficient number of male participants in order to compare knowledge by gender, and the insufficient number of highly educated nurses to compare knowledge by the level of education and the large difference in the number of participants by the department. It would also be interesting to prospectively monitor health professionals when and how they change their attitudes about palliative care through a longitudinal study. Time goes by and palliative medicine progresses, and the need for palliative care increases. It is positive that nurses show compassion, not fear when it comes to caring for patients in need of palliative care. *"I dream of people who do not see death as horror and their defeat but as the greatest point and end of this earthly life. I dream of people who give the gravely ill the opportunity to die in the place where they lived, to close their eyes at home and be surrounded by family. I dream of people who possess humanity."* (unknown author)

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## Conclusion

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Comprehensive care for patients who no longer respond to treatment procedures is called palliative care. Palliative care encompasses the community, the family and the patient and is interdisciplinary in its approach. The development of palliative medicine in the 1960s in the UK and the 1970s in the US and Canada began precisely as a reaction to changes in medical culture and was prompted by several outstanding visionaries and historical figures in medicine. In the Republic of Croatia, the legal framework for the organization of palliative care was created in 2003 with the entry into force of the new law on health care. In the Republic of Croatia, the process of establishing a palliative care system in all elements of the health care system is underway, according to the National Palliative Care Development Program

2017-2020. Inaccessible and unorganized palliative care opens the possibility of thinking about euthanasia. Life and death are two inseparable parts of human reality and, in addition to the art of living, there is also the art of dying. The fear of death overwhelms anyone who is in imminent danger of death. It is especially emphasized in those who are not surrounded by the kindness and attention of close people. Nurses play a key role in a multidisciplinary team, and it is very important that they have a large amount of knowledge about this domain. It is necessary to conduct more frequent education on palliative care and emphasize the importance of caring for a palliative patient, and this research could encourage this.

Given the results obtained by this research, we conclude that respondents are aware of the importance of a high level of knowledge about palliative medicine and palliative care, but that education needs to be conducted more often in a language they understand. Many studies prove that it is necessary to pay attention to psychological professionals and provide psychological support because everyone has a hard time dealing with death and dying, be it a close person or patients they meet. Numerous educational activities would bring the level of knowledge about palliative medicine and care to a higher level and would improve the quality of providing adequate care to patients, families and loved ones.

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## ZNANJE MEDICINSKIH SESTARA/TEHNIČARA O PALIJATIVNOJ SKRBI NA PRIMARNOJ, SEKUNDARNOJ I TERCIJARNOJ RAZINI ZDRAVSTVENE ZAŠTITE

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### Sažetak

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**Uvod.** Sveobuhvatnu brigu za bolesne koji više ne reagiraju na postupke liječenja nazivamo palijativnom skrbi. Palijativna medicina ne odgađa niti ubrzava smrt, ona promiče život, a umiranje smatra normalnim procesom. U palijativnoj medicini i skrbi nema mjesta za hijerarhiju, važan je timski rad, fokus na bolesnika i poštivanje njegove autonomije.

**Cilj.** Provedeno istraživanje prikazuje znanje medicinskih sestara i tehničara o palijativnoj skrbi na primarnoj sekundarnoj i tercijarnoj razini zdravstvene zaštite.

**Metode.** Provedeno je prospektivno istraživanje na području Republike Hrvatske na tri razine zdravstvene zaštite. U studiju je uključeno 150 ispitanika, a u istraživanju je primijenjen instrument PCQN (Palliative Care Quality Network, 1996.), anketni upitnik koji su izradile Margaret M. Ross i suradnice sa Sveučilišta Ottawa u Kanadi, koji je hrvatskom jeziku prilagodila Sandra Lovrić.

**Rezultati.** Rezultati provedenog istraživanja pokazuju kako je znanje medicinskih sestara i tehničara o palijativnoj skrbi nedostavno bez obzira na brojne edukacije koje se provode unazad deset godina, ali da daleko veće znanje imaju medicinske sestre i tehničari na primarnoj razini zdravstvene zaštite nego na sekundarnoj i tercijarnoj.

**Zaključak.** Prema rezultatima provedenog istraživanja možemo zaključiti da je potrebno provoditi kvalitetnije edukacije s primjerima iz stvarnog

života kojima je cilj postizanje veće razine empatije, širenja znanja o palijativnoj skrbi i važnosti brige za palijativne bolesnike. Preporuka je povećanje broja edukacija u manjim grupama, na lokalnom jeziku, prilagodljivo i razumljivo svim zdravstvenim djelatnicima. Edukaciju moraju provoditi visokoobrazovani ljudi iz područja palijativne medicine i skrbi, kao i zdravstveni djelatnici koji rade na navedenom području.

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**Ključne riječi:** palijativna medicina, palijativna skrb, palijativni bolesnik

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# Levels of Knowledge in Nursing Students on Hemodynamic Monitoring - A Cross-Sectional Study

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**Article received:** 30.03.2021.

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**Article accepted:** 26.05.2021.

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**DOI:** 10.24141/2/5/1/3

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**Keywords:** hemodynamic monitoring, level of knowledge, nursing, students

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## Abstract

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**Introduction.** Hemodynamic monitoring is of great importance because it covers all vital organic systems and their functioning, and any error in the interpretation of the monitored parameters can lead to a drastic deterioration of the patient's condition and cause death.

**Aim.** The aim of this study was to determine the levels of knowledge about hemodynamic monitoring of full-time and part-time students of the first, second, and third year of the undergraduate study of nursing at the University of Applied Health Sciences in Zagreb.

**Methods.** A cross sectional study was conducted. The survey subjects were students at the University of Applied Health Sciences in Zagreb (N=280) in the period between December 2020 and February 2021. For the purposes of the study, the authors created a questionnaire that students filled in using an online platform, and the results of the questionnaire were anonymous.

**Results.** The research found that most students have an adequate level of knowledge in the field of hemodynamic monitoring. By determining differences in knowledge of part-time and full-time nursing students, it was observed that students with work experience showed statistically significantly better results ( $p < 0.05$ ).

**Conclusion.** The conducted study showed an adequate level of knowledge of nursing studies, since a high number of students, outside of their faculty

obligations, have not been in contact with hemodynamic monitoring. The specificity and complexity of work in the intensive care unit comes from a particularly vulnerable population of patients who require maximum care, which is why nurses need continuous education, skill improvement, and training regarding new monitoring methods.

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## Introduction

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The term *monitoring* refers to the dynamic monitoring of physiological parameters of patients (1). Quality monitoring has a major effect on reducing the possible poor outcome of treatment by recognizing changes before possible damage occurs. The appearance of a hemodynamic monitoring improved clinical assessment with the specificity and precision of measurements of hemodynamic parameters (2).

The main goal of hemodynamic monitoring in providing care for patients in critical conditions is to ensure adequate tissue oxygenation and organ perfusion, which is achieved by carefully observing the minute volume and systemic vascular resistance of the patient (3). Most often it is difficult to assess how to achieve these goals, i.e., whether the use of infusion solutions, the use of vasopressors, pharmacotherapy, or other types of treatment will prove to be most successful. Moreover, if the wrong treatment strategy is applied, the patient's condition may deteriorate further. For example, excessive patient hydration can lead to oedema, gas exchange, and acidosis (4,5).

Since the insertion of catheters, which is necessary for hemodynamic monitoring, requires sufficient education of healthcare workers, invasive hemodynamic monitoring represents an important intervention which requires advanced skills and knowledge (6). Considering the complex clinical environment and the use of specific technological apparatus, it is a great challenge for nurses to provide adequate nursing care to critically ill patients. Furthermore, nursing students face an even more demanding challenge, since their experience in a clinical setting is limited. Several studies have shown how invasive hemodynamic evaluation influences therapy management and important clinical decisions, meaning that nurses

must be properly trained in order to provide the necessary care and that training needs to be implemented during their formal education (7).

Following the use of hemodynamic evaluation parameters in therapy management, these parameters are also efficiently implemented in the diagnostic decision processes. The main goal in hemodynamic monitoring is to interpret pharmacological, biochemical, and physiological changes. For critical care nurses, continuous education, both theoretical and practical, is essential (8). Continuous education and improvement of skills and knowledge associated with hemodynamic monitoring increases patient safety and assures the quality of healthcare (9,10).

Patient monitoring in the intensive care unit is one of the most important duties of nurses. In this way, feedback is obtained on the effectiveness of the treatment methods used in relation to the general condition of the patient (11). Hemodynamic monitoring in this context is of immense importance because it covers all vital organ systems and their functioning, and any error in the interpretation of the monitored parameters can result in a drastic deterioration of the patient's health or even death (12).

Studies suggest that better education contributes to the development of theoretical knowledge and skills, but this does not necessarily mean their implementation in clinical practice is improved. In the long term, lack of knowledge is cited as one of the reasons for poor practical skills of healthcare personnel (13). Students believe that knowledge in the fields of nursing, clinical, and basic medical sciences is most important, as well as having good communication skills. They carefully assess their practical skills and competences, and most think traineeship programmes should be mandatory, with a minimum duration of 6 months (14).

One study evaluated the levels of knowledge of intensive care nurses in European countries by investigating their knowledge of hemodynamic monitoring, infections present in intensive care units, ventilation and respiratory care, the effects of drugs, causes of shocks, and other areas of intensive care (15). Although knowledge varied between states, there was no significant difference. Worse results were found in the areas of respiration/ventilation, and the authors of the study recommend prioritising these areas (15). Existing literature points to limited theoretical knowledge about hemodynamic monitoring within the scope of nurses, so Ahmed et al. conducted a



study with the aim of evaluating the knowledge and roles of nurses in intensive care units (16). The results pointed to insufficient knowledge of nurses in the field of hemodynamic monitoring, without statistically significant difference depending on the level of qualifications. The study is unique because it provides concrete insight into specific knowledge and skills on hemodynamic monitoring, i.e., provides useful feedback on the competences of nurses in intensive care units (16).

Considering that after finishing their undergraduate studies students are faced with numerous challenges while working in the field of hemodynamic monitoring, this study will contribute to a better understanding of their skill level and knowledge in Croatia, as well as in other countries. Furthermore, the results of this study could prove useful in determining the approaches to improving the skills they have according to the requirements of modern medicine.

## Aim

The aim of this study is to investigate the level of knowledge of hemodynamic monitoring among students in the undergraduate study of nursing at the University of Applied Health Sciences in Zagreb. The specific aims of the study are to explore the associations between the year of study with the level of knowledge and to explore the association of work experience with the level of knowledge.

## Hypotheses

1. The level of knowledge is associated with the year of study.
2. The level of knowledge about hemodynamic monitoring is higher in students with work experience.

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## Methods

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A cross-sectional study was conducted on a sample of 280 nursing students at the University of Applied Health Sciences in Zagreb. The survey subjects were students at the University of Applied Health Sciences in Zagreb (N=280) in the period between December 2020 and February 2021. A convenience

sample was used and the participants signed an informed consent form. The target population consisted of students of the undergraduate study of nursing. Prior to the study, the Ethical Committee of the University of Applied Health Sciences issued an approval (Class: 053-01/20-01/231, Reg. No. 251-379-10-20-02). The study was aligned with ethical standards in biomedical sciences and the Declaration of Helsinki (17). Participation was voluntary, and the participants were informed of all aspects of the study and consented to participate by providing their digital signature.

The instrument used in this study is the questionnaire "Levels of knowledge of nursing students about hemodynamic monitoring" created by the authors. The questionnaire has two types of questions, which the participants answered through an online platform, and the results of the questionnaire were anonymous. The questionnaire is designed to ensure a uniform representation of questions from all areas of hemodynamic monitoring in order to obtain a complete assessment of the student's knowledge of hemodynamics. The first part of the questionnaire examines demographic data: age, gender, full-time or part-time studies, and year of study. The second part of the questionnaire relates to the knowledge of nursing students about hemodynamic monitoring and consists of 11 questions in the form of statements (with possible answer being "correct" and "incorrect") and 19 questions with four possible answers, only one of which is correct. A score of 75% was considered successful. This number was selected because 50% of correct answers usually come from average students, while students who are above average provide an additional 25% of correct answers.

For continuous variables the arithmetic mean, standard deviation, and minimum and maximum result were presented. Since the continuous variables (total knowledge score on the test) statistically significantly deviate from the normal distribution, the description also shows the median and the interquartile ranges, which in this case represent a clearer measure of central tendency and scattering of results. The normality of distribution was checked by the Shapiro-Wilk test.

For nominal (categorized) variables, the number and percentage of subjects in the associated categories are shown, and statistical significance of the differences was calculated using a chi-squared test. The Mann-Whitney and Kruskal-Wallis tests were used to

test the significances of the differences in average scores on the total knowledge test,

The psychometric properties of the knowledge test are presented through the difficulty of the question, sensitivity and reliability of the test (whose homogeneity was calculated by the Kuder-Richardson formula, the result of which is 0.65), and the level of question discrimination (Table 1).

The differences closest to zero indicate the lowest level of discrimination, while differences of 15-20% indicate good discrimination - a condition that most questions in the test meet.

## Results

A total of 280 students at the University of Applied Sciences in Zagreb participated in the study of the level of knowledge of nursing students of hemodynamic monitoring. Most of the subjects were female, 241 (86.1%), while noticeably fewer were males, only 39 (13.9%). The demographic data is presented in Table 2.

Table 1. **Discriminant validity of the test shown as the difference in correct answers between extreme groups (25% of the best and 25% of the worst results)**

	Lowest 25%	Top 25%	Difference
Hemodynamics is synonymous with the transportation role of the cardiovascular system.	88%	95%	-7%
Hemodynamic monitoring aims to ensure a reduction in tissue perfusion, so that the cardiovascular system receives a better supply of oxygen.	38%	89%	-51%
The diameter of the blood vessel is regulated by growth and development, and it is not possible to change its diameter.	72%	92%	-20%
The stroke volume is the amount of blood pumped during one heart action from which part of the heart:	46%	80%	-34%
The amount of blood pumped from the left ventricle for one minute is called:	62%	88%	-26%
Cardiac output is the product of the stroke volume and frequency, and the normal value is:	49%	86%	-37%
The ratio of heart filling time to frequency is explained as follows:	50%	76%	-26%
Knowledge concerning ECG is part of:	80%	87%	-7%
Which blood pressure represents the average pressure in the arteries during the heart cycle:	46%	77%	-31%
Which pressure represents peak cycle pressure:	18%	60%	-42%
Which type of blood pressure measurement is the most reliable?	36%	91%	-55%
Which artery does not represent one of the most common places for cannulation?	20%	56%	-36%
Central venous pressure is an indicator of blood pressure in the venae cavae and reflects the amount of blood returning to the heart, as well as the ability of the heart to pump the blood back into the arterial system.	80%	95%	-15%
In which part of the heart does the tip of the catheter by which the central venous pressure is measured most often end:	31%	74%	-43%
For the insertion of the central venous catheter, two nurses are needed, one of whom assists the physician in the insertion of a catheter, while the other nurse assists the two of them.	66%	95%	-29%

Insertion of the central venous catheter is done exclusively in the operating room due to the highest level of sterility.	39%	68%	-29%
The normal values of the central venous catheter are:	38%	64%	-26%
The most common places of insertion of central venous catheters are:	35%	53%	-18%
Pulse oximetry is an invasive method of measuring peripheral blood oxygen saturation.	47%	88%	-41%
Oxygen saturation level refers to the amount of oxygen which binds to the haemoglobin	89%	97%	-8%
In healthy individuals, the normal value of SaO <sub>2</sub> is approximately:	61%	94%	-33%
A thermodilution catheter provides the basic hemodynamic parameters:	50%	78%	-28%
The Swan-Ganz catheter ends in:	22%	58%	-36%
The central venous pressure is an indicator of preload:	16%	48%	-32%
The intrathoracic volume of blood is the volume of blood in:	28%	59%	-31%
The LiDCO monitor is a minimally invasive hemodynamic monitor designed to optimize the hemodynamics of patients in terms of goal-oriented therapy.	70%	85%	-15%
Cardiac output can be determined reliably on the basis of clinical examination and routine assessment.	42%	69%	-27%
Hemodynamic monitoring can be:	69%	96%	-27%
Invasive monitoring includes:	59%	95%	-36%
Low central venous pressure indicates hypoxemia	19%	68%	-49%

Table 2. Demographic data

		n	%
Age of subjects	18-24	225	80.4
	25-34	39	13.9
	35-44	12	4.3
	45-65	4	1.4
Sex	male	39	13.9
	female	241	86.1
Type of study	full-time study	146	52.1
	part-time study	134	47.9
Year of study	first year	73	26.1
	second year	90	32.1
	third year	117	41.8
Total		280	100

Table 3 shows the sum total of the results of the knowledge test and the comparison of the type of study, the year of study, and other demographic indicators.

By determining the differences in students' knowledge, it was observed that students with work experience achieve statistically significantly better results, over 75% ( $p=0.013$ ).

The highest number of correct answers were provided for the following question: Oxygen saturation level refers to the amount of oxygen which binds to the haemoglobin. 261 (93.2%) students offered the correct answer, i.e., 135 (92.5%) full-time and 126 (94%) part-time students answered the question correctly. The lowest number of correct answers was provided for the following question: Which artery does not represent one of the most common places for cannulation. Only 105 (37.5%) students answered correctly, i.e., 37 (25.3%) full-time and 68 (50.7%) part-time students answered the question correctly.

Statistically significant difference by year of study is visible only in the question "Knowledge concerning

Table 3. **Number and percentage of subjects with a total score on the questionnaire above 75%**

	Result above 75%		Result below 75%		Total	
	n	%	n	%	n	%
Total number of subjects	113	40	167	60	280	100
Type of study: Full-time study	50	34.2	96	66.8	146	100
Part-time study	63	47	71	53	134	100
Year of study: First year	27	37	46	63	73	100
Second year	36	40	54	60	90	100
Third year	50	42.7	67	57.3	117	100

Table 4. **Number and percentage of subjects who provided correct answers to individual questions, according to the type of study**

		Type of study				
		Full-time study		Part-time study		
		n	%	n	%	Chi-square <i>p</i>
Cardiac output is the product of the stroke volume and frequency, and the normal value is:	Incorrect	40	27.4	54	40.3	<b>0.023</b>
	Correct	106	72.6	80	59.7	
Knowledge concerning ECG is part of:	Incorrect	11	7.5	33	24.6	<b>&lt;0.001</b>
	Correct	135	92.5	101	75.4	
Which artery does not represent one of the most common places for cannulation?	Incorrect	109	74.7	66	49.3	<b>&lt;0.001</b>
	Correct	37	25.3	68	50.7	
For the insertion of a central venous catheter, two nurses are needed, one of whom assists the physician in the insertion of a catheter, while the other nurse assists the two of them.	Incorrect	30	20.5	13	9.7	<b>0.013</b>
	Correct	116	79.5	121	90.3	
Insertion of the central venous catheter is done exclusively in the operating room due to the highest level of sterility.	Incorrect	85	58.2	48	35.8	<b>&lt;0.001</b>
	Correct	61	41.8	86	64.2	

Pulse oximetry is an invasive method of measuring peripheral blood oxygen saturation.	Incorrect	54	37	26	19.4	0.001
	Correct	92	63	108	80.6	
The Swan-Ganz catheter ends in:	Incorrect	92	63	67	50	0.030
	Correct	54	37.0	67	50	
The central venous pressure is an indicator of preload:	Incorrect	77	52.7	97	72.4	0.001
	Correct	69	47.3	37	27.6	
Cardiac output can be determined reliably based on clinical examination and routine assessment.	Incorrect	71	48.6	48	35.8	0.039
	Correct	75	51.4	86	64.2	
Low central venous pressure indicates hypoxemia.	Incorrect	99	67.8	59	44	<0.001
	Correct	47	32.2	75	56	
Total		146	100	134	100	

ECG is part of:" ( $p<0.001$ ), for which the students of the first year of study provided only 50 (68.5%) correct answers, followed by the students of the second year with a significant difference of 80 (88.9%) correct answers, and the students of the third year with 106 (90.6%) correct answers.

The difference by type of study is statistically significant ( $p=0.013$ ), and better results are achieved by part-time students (Figure 1). Differences by year of study are not statistically significant ( $\chi^2=0.624$ ,  $df=2$ ,  $p=0.732$ ), but among part-time students there is a higher proportion of those who fulfilled the 75% solution criterion ( $\chi^2=4.732$ ,  $df=1$ ,  $p=0.038$ ) (Figure 2).

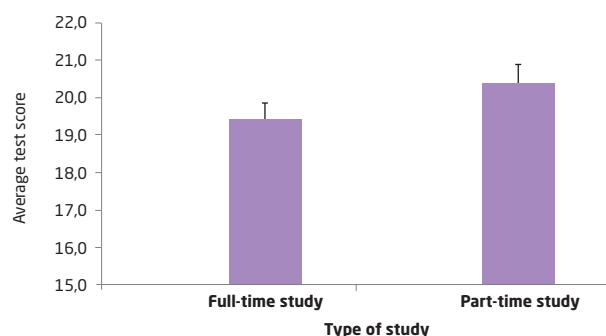


Figure 1. Average test success by type of study

## Discussion

Quality hemodynamic monitoring in intensive care units requires competent and educated staff, especially in the case of critical care patients who require a continuous assessment of their status. This ensures timely recognition of the deterioration of status and timely provision of care to the patient.

The main goal of the study was to determine whether there is a difference in the level of knowledge about hemodynamic monitoring between full-time and part-time nursing students and the presence of a difference in knowledge in the first, second, and third years of study. The results of our study showed that part-time students achieve better results in the field of hemodynamic monitoring when compared to full-time students, which confirms our hypothesis. The most statistically significant difference is present in the responses to questions examining the level of knowledge related to arterial catheters and their roles, where the difference in the proportion of correct and incorrect answers in favour of part-time students is up to 30% (Table 4).

A difference in knowledge between the first, second, and third years of study was not confirmed, which

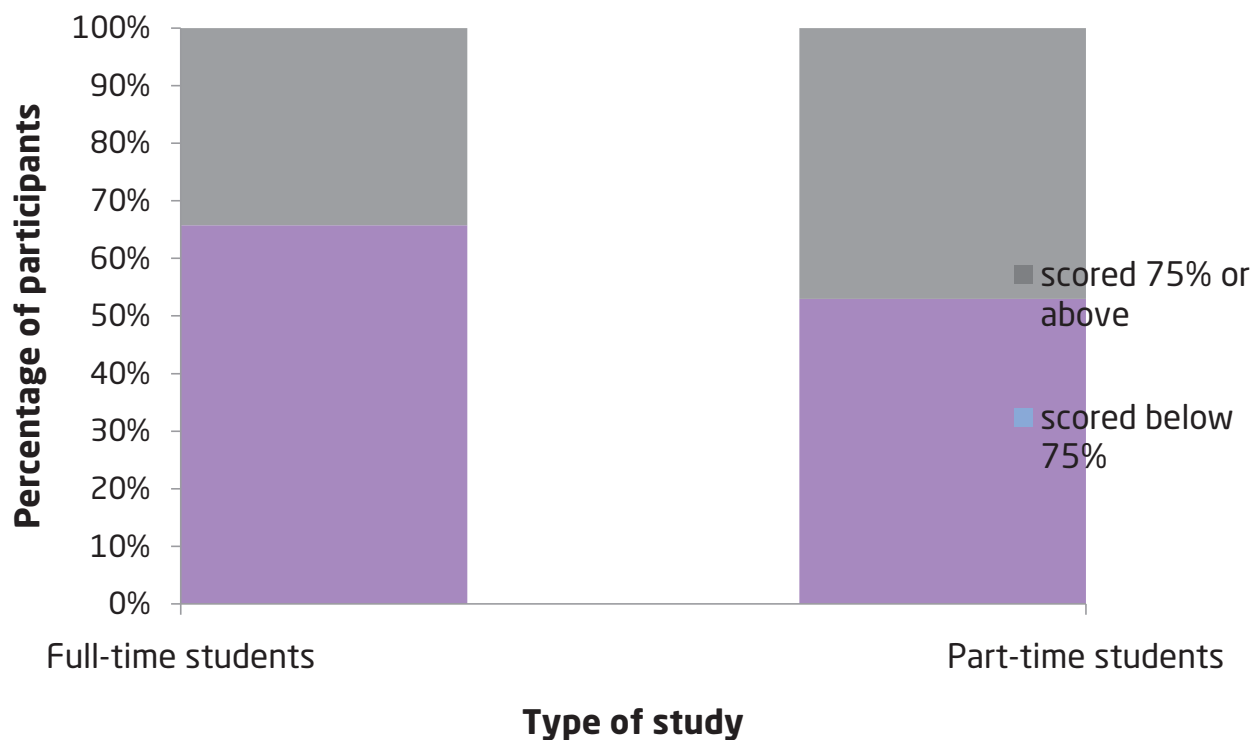


Figure 2. **Percentage of students who fulfilled the 75% test solution criterion, based on the type of study**

indicates that there is a need for improvement of clinical exercises. Lectures about hemodynamic and hemodynamic monitoring are implemented in several different courses in all three years of undergraduate study. The significance of difference between the knowledge of part-time and full-time students gives us valuable indicators for improving and highlighting the field of hemodynamic monitoring in clinical settings.

A Sudanese study conducted on 50 nurses shows insufficient knowledge of arterial catheters (18), which we can also link to this study because if the differences between full-time and part-time students are disregarded, the participants generally do not achieve good results in the field of arterial catheters. When asked about the catheter entry point, only 37.5% (N=105) of students provided the correct answer, and only 31.6% (N=60) of the correct answers to this question are also included in the survey conducted in Egypt (19).

Certain areas of hemodynamic monitoring, such as knowledge of central venous pressure values, catheter entry points, and knowledge of the roles of arte-

rial catheters, result in poor knowledge of full-time and part-time nursing students, indicating the need for additional education in these areas (Table 4). A Sudanese study by Ahmed et al. conducted on 90 nurses showed unsatisfactory results in the field of hemodynamics, highlighting the need for additional training in order to make patients feel safer and nurses more satisfied with their approach in everyday work (16).

The results of the study show that students of all years of nursing, whether full-time or part-time, achieved a generally satisfactory level of knowledge in the field of hemodynamic monitoring (table 4). Nevertheless, part-time students achieved better results than full-time students, which is expected due to their constant contact with new information and less difficulty in understanding it. Khalel et al. conclude that continuous improvement of existing training programmes for nurses in the field of hemodynamic monitoring lays an excellent foundation for mastering advanced patient monitoring techniques (18). Furthermore, by constantly working in a hospital setting, part-time students acquire a greater amount



of knowledge that they can apply in the theoretical field, which may not always be the case with applying the theoretically learned content in practice. Recent theories of knowledge and knowledge acquisition through experience (i.e., experiential learning theory) support the fact that theoretical knowledge is also acquired faster and more efficiently through the practical application of it (20).

In any clinical setting, in particular in the field of intensive care, a higher level of knowledge and competence provides benefits for nurses and for the patient's safety and satisfaction (21).

Although this study targeted students of full-time and part-time nursing studies at the University of Applied Health Sciences in Zagreb regarding knowledge in the field of hemodynamic monitoring, other nursing studies in Croatia should be included in future studies in order to encompass a higher number of students studying at different universities. The questionnaire proved to be a good tool for collecting information, and its content can also be modified, depending on specific questions about hemodynamic monitoring that would like to be examined. Furthermore, the advantage of this study is that it has provided insight into both strong and weak points in students' knowledge related to monitoring hemodynamic status, which would be a good indicator for teachers and associates regarding which topics should be more represented. It would be suggested to increase hemodynamic monitoring themes in clinical exercises. The specificity and complexity of work in the intensive care unit is a result of the particularly vulnerable population of patients who require maximum care, which is why nurses require continuous education and improvement of skills and knowledge regarding new monitoring methods.

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## Conclusion

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The following conclusions can be drawn from the results of this study: there is a statistically significant difference in the level of knowledge regarding hemodynamic monitoring between full-time and part-time students. Part-time students achieve better results, and differences in knowledge by year of study are

not statistically significant. The study shows that there is an adequate level of knowledge among the participants, since a high number of them have not been in contact with hemodynamic monitoring outside of their university studies. However, the results of this study show that there is a need for some improvement of clinical exercises.

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## RAZINE ZNANJA STUDENATA SESTRINSTVA O HEMODINAMSKOM MONITORINGU

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### Sažetak

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**Uvod.** Hemodinamski monitoring od neizmjerne je važnosti jer obuhvaća sve vitalne organske sustave i njihovo funkcioniranje, a svaka greška u interpretaciji praćenih parametara može rezultirati drastičnim pogoršanjem bolesnikova stanja te dovesti do smrti.

**Cilj.** Cilj ove studije bio je istražiti razine znanja o hemodinamskom monitoringu redovnih i izvanrednih studenata prve, druge i treće godine na preddiplomskom studiju sestrinstva Zdravstvenog veleučilišta u Zagrebu. Hipoteze istraživanja bile su da je razina znanja povezana s višom godinom studija te da je razina znanja o hemodinamskom monitoringu veća kod izvanrednih studenata.

**Metode.** Ispitanici istraživanja bili su redovni i izvanredni studenti Zdravstvenog veleučilišta u Zagrebu (N = 280) u periodu od prosinca 2020. do veljače 2021. Za potrebe istraživanja autori su izradili upitnik koji su studenti rješavali *online*, a rezultati upitnika bili su anonimni.

**Rezultati.** Istraživanjem je utvrđeno da je kod svih godina redovnog i izvanrednog studija sestrinstva prisutna adekvatna razina znanja u području hemodinamskog monitoringa. Utvrđivanjem razlika u znanju studenata izvanrednog studija sestrinstva i redovnog studija sestrinstva uočeno je kako izvanredni studenti postižu nekoliko statistički značajno boljih rezultata ( $p < 0,05$ ).

**Zaključak.** Provedena studija pokazuje zadovoljavajuću razinu znanja kod studenata re-

dovnog studija sestrinstva, s obzirom na to da veliki dio studenata, izvan fakultetskih obveza, nije bio u kontaktu s hemodinamskim monitoringom. Specifičnost i kompleksnost rada u jedinici intenzivnog liječenja proizlazi iz posebno ranjive i osjetljive populacije pacijenata koji zahtijevaju maksimalnu skrb, zbog čega medicinske sestre i tehničari trebaju kontinuiranu edukaciju, usavršavanje starih i novih vještina i znanja te upoznavanje s novim metodama monitoringa.

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**Ključne riječi:** hemodinamski monitoring, razina znanja, studenti sestrinstva, sestrinstvo

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# Time Analysis in Emergency Medical Service Reporting Unit

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**Article received:** 01.02.2021.

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**Article accepted:** 07.04.2021.

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**DOI:** 10.24141/2/5/1/4

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**Keywords:** analysis, emergency call, medical dispatcher, mobilisation time, response time

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## Abstract

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**Aim.** The aim of this paper was to determine whether there are any differences in the time of mobilisation and response time of the emergency medical service (EMS) team with respect to the location of the emergency call.

**Methods.** The data for this paper was collected and analysed in detail using the program "e-hitna" ("e-emergency"). The sample consists of all calls received in the period between 1 January and 31 December 2019 in the Medical Reporting Unit of the Department of Emergency Medicine of Zagreb County (DEMZC; Zavod za hitnu medicinu zagrebačke županije). This paper presents the number, category, place of intervention, time of mobilisation of the emergency medical service team, and the response time of the emergency services team to emergency calls designated as priority 1 (A).

**Results.** A total of 47,060 calls were recorded in the "e-hitna" system. We found that out of the total number of calls received, 49% (23,235) were related to emergency interventions. In 38% (8,841) of calls, the medical dispatcher opted for priority 1 (A). According to the place of emergency, 53% (4,691) of priority 1 (A) cases take place in the apartment, while 46% (4,071) occur in a public place. The average mobilisation time of an EMS team for priority 1 (A) cases for apartments is  $1.87 \pm 1.27$ , while for public places it is  $1.92 \pm 0.78$  min. (Mann Whitney U test,  $p < 0.001$ ). The average response time of an EMS team for priority 1 (A) cases for apartments is  $11.02 \pm 4.27$ , and for public places it is  $6.57 \pm 3.78$  min. The response

time was on average much shorter for calls related to emergencies in public places (Mann Whitney U test,  $p < 0,001$ ).

**Conclusion.** The collected data showed that the Department of Emergency Medicine of the Zagreb County effectively aligns their working processes as well as resources with the needs of the population regarding emergency medical care. Creativity, imagination, and constant time analysis are the determinants of the work of a medical dispatcher.

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## Introduction

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The activity of outpatient emergency medical services is organized as a public service with the aim of providing continuous urgent medical care to all persons whose life is directly endangered due to illness or injury. The activity of outpatient emergency medical services includes the implementation of measures and procedures for emergency medical care on the scene, as well as during the transport of affected and/or injured persons to the appropriate medical institution with the aim of maximally shortening the time from the occurrence of the emergency to the provision of medical care (1). Emergency medical services include functional connectivity and coherence, as well as cooperation at all horizontal and vertical levels with other healthcare providers, given the scale and complexity of the work and the characteristics of the area where the emergency event occurs (1). In the medical dispatch centre of emergency medical service, specific activities begin which are the basis of complete management and a prerequisite for achieving an efficient, uniform, accessible, and quality health service (2).

The main task of the medical dispatch service is to respond to an emergency medical call in as short a period of time as possible. During an emergency call, the medical dispatcher collects basic information about the location and type of the event, assesses the data according to the Croatian Emergency Call Receiving Index (CECRI; Hrvatski indeks prijema hitnog poziva), and on the basis of the collected data makes a decision on the priority and manner of intervention of the emergency medical service team. The

nearest appropriately trained and equipped team is sent to the scene (3).

Time management in the medical dispatch service is reflected in the achievement and maintenance of quality standards, as well as in taking responsibility for the outcomes of health care in the health status of patients and the population. Understanding the real conditions of the working processes, the role of participants in those processes, and efficient monitoring and evaluation of processes enables the improvement of healthcare, and therefore the existing health system (4). Tam et al. (2018) claim that the effectiveness of triage systems allows priority decisions to be made at the most favourable time given the severity of the health status of the person in need. Through a developed triage system, decisions contribute to reducing disability and mortality of a person in a life-threatening condition (5). Working time is measured using different approaches, setting its priorities and developing a plan for its use. Time is a resource which we optimize through planning and constant control. In order to optimize working time, it is important to distinguish between urgent cases and those that must be addressed without delay, and to accept the challenge of modern time management through adaptability, spontaneity, and openness to unpredictable events. The quality of the provided health service is evaluated by analysing time periods and is a fundamental indicator of the work in terms of resource planning, according to which the conditions, organization, and mode of operation of the emergency medical service are proposed, with the aim of achieving the highest quality of health care. By conducting data analysis during mobilisation and response of the emergency medical service team, we perform a series of activities that are closely related to the coordination of time of response and are crucial for the survival of patients and the provision of immediate health services (6). The team's standard mobilisation time refers to the movement of an activated emergency medical service team while responding to a priority 1 (A) intervention within 60 seconds.

The standard of response time is the time for a medical emergency team to arrive on the scene, measured from the moment the medical dispatcher responds to an emergency call. This standard depends on network configuration and team availability. The standard varies for urban and rural areas as well as for individual periods throughout the day (3). Cabral's



(2018) literature review presented response times for emergency medical services in several parts of the world, claiming that response times are basic indicators of the quality of emergency medical services (7). Blackwell (2002) claims that a less than 5-minute emergency response time contributes to a higher percentage of survival than calls that have a response time of more than 5 minutes (8). Mell et al. have shown that medical dispatchers in the United States respond to 37 million calls per year (9).

The demand for a highly efficient, accessible, and effective emergency medical service is an essential precondition for reducing disability and sustaining human life, so it poses a particular challenge for emergency medical service. A review of existing literature showed no similar studies conducted in the Republic of Croatia, leading us to believe that this paper would represent a significant contribution to the improvement of the work of emergency medical service. The aim of this paper is to present the number of calls, the category of calls, the place of intervention, the time of mobilisation of the EMS team, and the response time of the emergency call team to calls indicated as priority 1 (A) in the period from 1 January 2019 to 31 December 2019. Furthermore, the study aims to determine whether there is a difference in the time of mobilisation and response of the EMS team between emergency calls of priority 1 (A) made in apartments versus those made in public places.

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## Methods

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Retrospectively, all calls received in the information communication system "e-hitna" of the Department of Emergency Medicine of Zagreb County were analysed in the period from 1 January 2019 to 31 December 2019. The sample consists of all calls received in the period from 1 January 2019 to 31 December 2019 by the medical dispatch service of the DEMZC. For each call marked with priority 1 (A), the mobilisation time and response time of the EMS team were analysed. The interventions are divided into those that take place in apartments and those that take place in an open public space. The average mobilisation time of the EMS team (the time from receiving an emergency call to the submission of a call to

an EMS team) and the response time (the time from the medical dispatcher's call to the EMS team to the team's arrival on the scene) were also investigated.

Descriptive statistical methods were used to describe the distribution of frequencies of variables. Mean values are expressed by arithmetic mean and median, measures of variability by standard deviation and range, and structure indicators are presented as percentages. The nonparametric Mann Whitney U test was used to determine the differences between dependent, mobilisation, and response times in comparison with independent variables. Significance was set at  $p=0.05$ . The IBM SPSS 25 system was used to process the data.

## Ethics

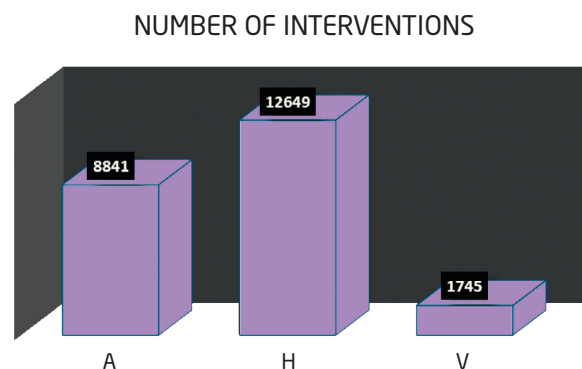
The study was conducted according to the Helsinki Declaration with ethical principles and human rights in research. Prior to the study, the approval of the director of DEMZC was obtained, as well as the approval of the ethics committee of DEMZC.

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## Results

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A total of 47,060 calls were received from 1 January 2019 to 31 December 2019. Each call received is triaged according to CECRI, and placed in one of the following categories: intervention, advice, other, or disturbance.



Graph 1. Number of emergency calls according to priority

Table 1. **Number of calls for priority A interventions to the scene**

Place of intervention	Call number	Percentage
Apartment	4,691	53
Public place	4,071	46
Unmarked	79	1
Total	8,841	100

Table 2. **Number of calls for priority A in a public place**

Place of intervention	Number of calls	Percentage
Sports facility	14	0.3
Educational institution	24	0.5
Closed public place	146	4
Open public place	814	20
Primary health care centre	542	13
Police	21	0.5
Prison	11	0.2
Retirement home	754	19
Emergency room	1,184	29
Hospital	44	1
Place of work	83	2
Field	6	0.1
Mountain	4	0.1
River	4	0.1
Highway	54	1
Road	366	9
Total	4,071	100

According to results medical dispatcher received 11,454 calls (24%) categorised into advice. 23,235 calls (49%) were recorded as an intervention. 307 (1%) calls were categorized as harassment. 12,064 (26%) calls were categorised as "other" and were related to providing general information.

Graph 1 shows the number of emergency calls according to their priority levels. For priority 1, or red answer, the letter A is used as the initial character - "AKKUT" (acute), for a total of 8,841 (38%) calls. For priority 2, or yellow answer, the letter H is used as the initial character - "HASTER" (urgently), for a total of 12,649 (55%) calls. For priority 3, or green answer,

Table 3. **Total mobilisation time of EMS teams for priority A calls**

Time in minutes	Number of calls	Percentage
< 1 min	3,011	34
2	4,131	47
3	1,524	17
4	35	0.3
5	19	0.2
6	16	0.1
7	2	0.02
8	2	0.02
9	2	0.02
10	2	0.02
11	2	0.02
12	4	0.04
13	1	0.01
14	1	0.01
15	1	0.01
16	1	0.01
17	1	0.01
18	2	0.02
19	2	0.02
20	1	0.01
33	2	0.02
Unmarked	79	0.8
Total	8,841	100

the letter V is used as the initial character- "VANLIG" (regular), for a total of 1,745 (7%) calls.

Table 1 shows the number of priority 1 calls (A) with regard to the place of intervention. A total of 4,691 (53%) interventions took place in apartments, 4,071 (46%) interventions took place in public places, while the total number of unmarked calls in the "e-hitna" IT system was 79 (1%).

Table 2 shows the number of calls for priority 1 (A) in public places according to specific venues. More significant is the fact that the majority of calls for public places came from the EMS infirmary, i.e., the resuscitation area. The total number of such calls was 1,184 and 29, respectively. Fewest emergency calls for priority 1 (A) were made from fields and rivers, a total of 4 (0.1%) for each location.

Table 3 shows the total time in minutes for a medical dispatcher to mobilise an EMS team for priority 1 (A)

Table 4. **The time for the mobilisation of EMS teams in minutes for priority 1 (A) calls made in apartments and public places**

Time	Apartment		Public place	
	Number of calls	Percentage	Number of calls	Percentage
<1 min	1,783	38	1,228	30
2	2,088	45	2,043	50
3	756	16	768	19
4	23	0.49	12	0.29
5	9	0.19	10	0.24
6	12	0.25	4	0.09
7	1	0.02	1	0.02
8	1	0.02	1	0.02
9	1	0.02	1	0.02
10	1	0.02	1	0.02
11	1	0.02	1	0.02
12	3	0.06	1	0.02
13	1	0.02	0	0
14	1	0.02	0	0
15	1	0.02	0	0
16	1	0.02	0	0
17	1	0.02	0	0
18	2	0.04	0	0
19	2	0.04	0	0
20	1	0.02	0	0
33	2	0.04	0	0
Total	4,691	100	4,071	100

calls. 4,131 (47%) emergency calls were forwarded to an EMS team in 2 minutes from the start of the call and 3,011 (34%) in less than one minute.

Table 4 shows the mobilisation time for EMS teams in minutes for priority 1 (A) calls made in apartments. 2,088 (45%) emergency calls were forwarded within 2 minutes of the start of the call. 1,783 (34%) calls were forwarded to an EMS team in less than one minute, while 756 (16%) emergency calls were submitted within 3 minutes. 2,043 (50%) emergency calls were forwarded within 2 minutes of the start of the

call, 1,228 (30%) calls were forwarded in less than one minute, and 768 (19%) emergency calls were forwarded within 3 minutes.

Table 5 shows the mobilisation time of the EMS team for priority 1 (A) calls for apartments in relation to priority 1 (A) calls for public places. The mobilisation time of an EMS team for priority 1 (A) calls for apartments ranges from 1 minute to 33 minutes (min=1, max=33), while the time for priority 1 (A) calls for public places ranges from 1 minute to 12 minutes (min=1, max=12). The average mobilisation time for

Table 5. **Mobilisation time of EMS teams for priority 1 (A) calls for apartments in relation to priority 1 (A) calls for public places**

Place of intervention	n	$\Sigma$ (sd)	Mean	(min; max)	Mann Whitney
Apartment	4,691	1.87 (1.27)	(1.83; 1.86)	(1.00;33.00)	< 0.015
Public place	4,071	1.92 (0.78)	(1.89; 1.95)	(1.00;12.00)	< 0.015

Table 6. **Total response time of EMS teams for priority 1 (A) calls**

Time in minutes	Number of calls	Percentage
1-5 min	932	11
6-10 min	3,643	41
11-15 min	3,525	40
16-20 min	460	5
21-30 min	87	1
> 30 min	109	1
Unmarked	79	1
Total	8,841	100

priority 1 (A) calls for apartments is  $1.87 \pm 1.27$  and for public places it is  $1.92 \pm 0.78$  min. (Mann Whitney U test,  $p < 0.001$ ).

Table 6 shows the total response time of the EMS team for priority 1 (A) calls. For 3,643 (41%) calls, the average time the EMS team took to arrive at the emergency call intervention site was between 6 and 10 minutes. 932 (11%) calls received assistance within 1-5 minutes, and 11 to 15 minutes were needed for 3,525 (40%) calls.

Table 7 shows the response time of the EMS team for priority 1 (A) calls in apartments and public places. The EMS team usually arrived at the apartment as the emergency call intervention site in 11 to 15 minutes for a total of 2,304 (49%) calls. 403 (9%) calls received assistance within 1 to 5 minutes, and 6 to 10 minutes were needed for 1,404 (30%) calls.

Table 7. **The EMS team response time for priority 1 (A) calls for apartments and public places**

Time in minutes	Apartment		Public place	
	Number of calls	Percentage	Number of calls	Percentage
1-5 min	403	9	529	13
6-10 min	1,404	30	2,239	55
11-15 min	2,304	49	1,221	30
16-20 min	402	9	58	1
21-30 min	75	1	18	1
> 30 min	103	2	6	1
Total	4,691	100	4,071	100

Table 8. **Response time of the EMS team for priority 1 (A) calls for apartments in relation to priority 1 (A) calls for public places**

Place of intervention	n	$\Sigma$ (sd)	Mean	(min; max)	Mann Whitney
Apartment	4,691	11.02 (4.27)	(10.58; 11.86)	(1.00;93.00)	< 0.001
Public place	4,071	6.57 (3.78)	(6.50; 6.95)	(1.00;32.00)	< 0.001

The EMS team usually arrives in a public place as an emergency call intervention site in 6 to 10 minutes in 2,239 (55%) calls. 529 (13%) calls received assistance within 1 to 5 minutes, and 11 to 15 minutes were required for 1,221 (30%) calls.

Table 8 shows the response time of the EMS team for priority 1 (A) calls for apartments and public places. The response time of EMS teams for priority 1 (A) calls made in apartments ranges from 1 minute to more than 93 minutes (min=1, max=93), while the response time for priority 1 (A) calls made in public places ranges from 1 minute to 32 minutes (min=1, max=32). The average response time for priority 1 (A) calls for apartments is  $11.02 \pm 4.27$ , and for public places it is  $6.57 \pm 3.78$  min. The response time for public places was on average much shorter than for calls to a public place (Mann Whitney U test,  $p < 0.001$ ).

calls for apartments is  $11.02 \pm 4.27$ , and for public places it is  $6.57 \pm 3.78$ .

Mell et al. claim that emergency medical services teams operate effectively in their area regardless of the scene of emergency and recognize that telephone instructions to the caller located at the emergency scene have a positive effect on the outcomes of treatment for people in life-threatening conditions (9).

Graph 1 shows that 49% of calls relate to emergency interventions, 24% to advice provided to the caller, while the rest are categorized as "other" or "disturbance", and are related to providing general information.

According to graph 2, emergency calls of priority 1 (A) received and triaged according to CECRI represent a total of 38% (8,841). Most calls, 55% of them, were triaged as priority 2 (H) (12,649), while only 7% (1,745) were triaged as priority 3 (V). Bogunović (2018) claims that during one calendar year, 10.26% of all emergency calls were triaged as priority 1 (A) (10). A total of 19% of all calls were triaged as priority 1 (A) in DEMZC. A survey conducted in Italy suggests that 78% of calls were categorized as priority 1 (A), indicating that medical dispatchers did not work according to the guidelines (11). In total, 49% of priority 1 (A) calls were categorized in the Department MRU, which confirms that all medical dispatchers are trained and educated for work.

Tam et al. conclude that different triage systems help the medical dispatcher make decisions (5). A timely and accurate decision reduces the frequency of undesirable events. The results show that the application of the triage system reliably recognises the gravity of the emergency call and the life-threatening situation. Tam et al. claim that greater precision of triage represents better quality of emergency services (12).

## Discussion

The aim of this paper was to determine whether there is a difference in mobilisation and response between emergency calls of priority 1 (A) for apartments and public places. The statistical processing of data contained in tables 5 and 8 shows that there is no significant difference between the time of mobilisation and the response time of EMS teams for priority 1 (A) calls made from apartments in comparison with calls made from public places. The average mobilisation time of EMS teams for priority 1 (A) calls for apartments is  $1.87 \pm 1.27$ , while for public places it is  $1.92 \pm 0.78$  (Mann Whitney U test,  $p < 0.001$ ). The average response time of EMS teams for priority 1 (A)

Blanchard and Christophin (2002) claim that in Canada 31% (7,760) of calls were categorized as priority 1 (A), while in Iran 52% (11,961) of calls were of priority 1 (A) (13-15). On the basis of existing literature mentioned above, the number of calls of priority 1 (A) in the DEMZC is acceptable if we take into consideration various factors that directly affect the organization of work, such as the population number, the emergency medicine network, and the education and qualifications of medical dispatchers.

In 53% (4,691) of cases, the number of emergency interventions marked as priority 1 (A) take place in apartments, while the other 46% (4,071) occur in public places. 1% (79) of calls have an unmarked location. Compared to the survey conducted by Bogunović, the DEMZC has a lower percentage of interventions in public places by 6.2%. Bogunović lists a total of 52.2% of interventions in public places, with the remaining 47.8% representing priority 1 interventions that took place in apartments (10).

Further analysis of the calls visible from table 2 shows that most emergency interventions in public places for priority 1 (A) calls, as much as 29% (1,184), take place in EMS clinics, followed by interventions in the open (814, or 20%), interventions in retirement homes (754, or 19%), and in primary care clinics (542, or 13%).

Table 5 shows the mobilisation time of the DEMZC ranging from 2 minutes to 33 minutes for interventions marked as priority 1 (A). The EMS team was mobilised within 2 minutes in 47% (4,131) of cases, while in 34% (3,011) of cases it was mobilised within 1 minute. The timing of the EMS team's mobilisation is affected by its availability. Intervals that have a longer period of time in the range testify to the unavailability of an EMS team due to another pre-existing intervention (12). Bogunović claims that the mobilisation time in Serbia is less than 1 minute in 55.7% of cases and 1-5 minutes in 35.5% of cases (10). The same survey shows the results of an Israeli survey claiming that the mobilisation time for Camel County is 2.50 minutes and The Lakish District 2.40 minutes. In Ankara, the mobilisation time is 2.49 minutes, while in Ireland 41% of calls the HMS team is mobilized in less than 3 minutes (10). By comparing these results, we can see that the DEMZC mobilizes an EMS team within 3 minutes in 98% of calls for interventions of priority 1 (A), which enables the achievement of standard times and efficiency of the emergency medical service system.

The total response time of EMS teams for priority 1 (A) calls was investigated. According to table 6, an EMS team of the DEMZC usually arrives at the place of emergency within 6 to 10 minutes in 41% (3,643) of cases. In 40% (3,525) of cases, the EMS response time is between 11 and 15 minutes. Ankara has an average response time of 9 minutes, Malaysia 11 minutes, Long Island 7 minutes, while in Belgrade the average is 9 minutes (10). In Canada, according to Blanchard and Christoph (2002), in 24% (1,865) of interventions of the EMS team, the response time is more than 8 minutes, and less than 7 minutes in 6.4% (497) of interventions (15). In Iran, 81% of EMS interventions for priority 1 (A) calls have a response time of within 8 minutes. In North America, 90% of priority 1 (A) response times of EMS teams range within 9 minutes (16). According to a study conducted in Virginia, USA (2004), the average response time of EMS teams for priority 1 (A) calls is 12 minutes (17). Olive and Kobusingye (2004) state that in Monterrey, Mexico, the average response time of EMS teams is 10 minutes, while in Hanoi, Vietnam, the average response time of EMS teams is 30 minutes (18). Blackwell (2002) claims that a response time of less than 5 minutes contributes to a higher percentage of survival than calls that have a response time of more than 5 minutes. The mortality risk was 1.58% for patients whose response time exceeded 5 minutes and 0.51% for those whose response time was less than 5 minutes (8). Taking into consideration the number of EMS teams in the EMS network and the geographical layout of the Zagreb County, the response times of the EMS teams in the DEMZC meet the EMS standards and are approximately similar to such departments in other countries. One limitation of this study was the fact that the data were collected retrospectively and it would be good to conduct a study with a prospective longitudinal design.

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## Conclusion

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The continuous strategic development of the DEMZC ensures effective, accessible, uniform, and quality healthcare that meets the needs of all citizens. The aim of this study was to determine whether there are any differences in the time of mobilisation and re-



sponse of EMS teams with respect to the place of intervention. The median value of team mobilisation time is 2 minutes. The median response time value of EMS teams is 6 to 10 minutes. We can conclude that a regular analysis of response time improves the quality of workflow while taking into account the prescribed standards and the real needs for health care in the system of emergency medicine.

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## ANALIZA VREMENA U PRIJAVNO-DOJAVNOJ JEDINICI HITNE MEDICINSKE SLUŽBE

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### Sažetak

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**Cilj.** Cilj je ovog rada utvrditi postoji li razlika u vremenu mobilizacije i vremenu odziva tima hitne medicinske službe s obzirom na mjesto odvijanja hitnog poziva.

**Metode.** Podaci za izradu ovog rada prikupljeni su i detaljno analizirani iz informatičkog programa „e-hitne”. Uzorak čine svi pozivi koji su zaprimljeni u periodu od 1. siječnja do 31. prosinca 2019. u Medicinskoj prijavno-dojavnoj jedinici Zavoda za hitnu medicinu Zagrebačke županije. Ovim su radom prikazani broj, kategorija, mjesto intervencije, vrijeme mobiliziranja tima hitne medicinske službe te vrijeme odziva tima hitne medicinske službe za hitne pozive koji su označeni I. prioritetom (A).

**Rezultati.** Ukupno je u sustavu „e-hitne” zabilježeno 47 060 poziva. Dobivenim rezultatima utvrdili smo kako se od ukupnog broja zaprimljenih poziva 49 % (23 235) odnosi na hitne intervencije. Medicinski dispečer u 38 % (8841) poziva odlučio se za I. prioritet (A). Prema mjestu događaja, I. prioritet (A) u 53 % (4691) slučajeva odvija se u stanu, dok se 46 % (4071) događa na javnom mjestu. Prosječno vrijeme mobilizacije tima HMS-a za I. prioritete (A) za stan iznosi  $1,87 \pm 1,27$  min, a za javno mjesto  $1,92 \pm 0,78$  min, Mann-Whitneyjev U-test ( $p < 0,001$ ). Prosječno vrijeme odziva tima HMS-a za I. prioritete (A) za stan iznosi  $11,02 \pm 4,27$  min, a za javno mjesto  $6,57 \pm 3,78$  min. Vrijeme odziva za javno mjesto prosječno je bilo znatno kraće za pozive na javnom mjestu, Mann-Whitneyjev U-test ( $p < 0,001$ ).

**Zaključak.** Iz istraživanja je vidljivo da Zavod za hitnu medicinu Zagrebačke županije učinkovito usklađuje radne procese, kao i resurse u odnosu na potrebe populacije za hitnom medicinskom pomoći. Kreativnost, imaginacija te neprestano analiziranje vremena odrednica su procesa rada medicinskog dispečera.

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**Ključne riječi:** hitni poziv, medicinski dispečer, menadžment, vrijeme mobilizacije, vrijeme odziva

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# Perception Of Stress and Illness Among Nurses in Psychiatry

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**Article received:** 09.02.2021.

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**Article accepted:** 12.04.2021.

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**DOI:** 10.24141/2/5/1/5

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**Keywords:** allostasis, allostatic load, disease, homeostasis, nurses, stress

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## Abstract

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Homeostasis is important for maintaining balance and normal functioning of the organism. Allostatic mechanisms further help to establish this balance. If the body is under stress for a longer period, a complex condition in the body called allostatic load occurs. If such a load lasts longer, the risk of developing diseases increases significantly. This study was conducted anonymously with the aim of determining the health status of male and female nurses in the Neuropsychiatric hospital "Dr. Ivan Barbot" in Popovača and their exposure to everyday stressors in the workplace. The main purpose was to examine the relationship between stress and the health status of nurses in relation to gender, age, and seniority. A total of 142 nurses participated. The Health Questionnaire and Workplace Stress Questionnaire were used. The results showed that the most common diseases nurses suffer from are cardiovascular diseases, thyroid diseases, gastrointestinal diseases, and allergies. Women showed higher sensitivity to stress than men. The most common stressors faced by nurses in the workplace are inadequate personal income, inadequate workspace and material resources for work, lack of staff, daily contingencies, 24-hour responsibility, and administrative work. This study found an association between age and, consequently, work experience with the likelihood of illness, although both the healthy and the sick perceive equal levels of stress. One disadvantage of this study is that it covers a large area and deals with general issues, but it can certainly be a starting point for further research. Many questions remain open, which means there is a need for further research and study of the link between stress and illness.

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## Introduction

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Nursing is a stressful, high-risk occupation. Stress affects not only health and personal and work satisfaction, but also the facilities in which nurses work. Their absence from work and their replacement can both have an impact on patient care (1). Workplace stressors depend on the individual, and everyone reacts to them differently. Some factors that can cause stress in the workplace can be task planning, a person's role in an organization, career development, work relationships, organization, life-work balance, workplace conditions, etc. Most of the respondents gained their work experience by doing shift work. Shift work, especially at night, can increase the risk of developing chronic diseases, depending on the number of years spent doing shift work (2). Night work increases the risk of cancer (most often breast cancer), metabolic syndrome and heart disease (3). Nurses who work night shifts are at three times higher risk of obesity, and the risk increases with years of service or night work (4). Higher levels of stress increase the risk of disease (5). According to a study conducted at a psychiatric ward, 50% of nurses developed symptoms of anxiety (6). Depression and stress were present in about 40% of respondents. Women have proven to be a more vulnerable group, and as the number of years of service increases, so does the number of people suffering from anxiety and depression. Warning signs that may indicate excessive stress are most often dizziness, jaw tension, tooth friction, general pain, headaches, indigestion, sleep problems, increased or decreased appetite, muscle tension, fatigue, exhaustion, sweaty palms, trembling, tremor, weight gain or weight loss, sexual problems, etc. Secondary traumatic stress (STS) occurs when working with people who have experienced a particular trauma. It is also called compassion exhaustion. In psychiatry, it is most associated with working with people suffering from PTSD. STS affects the behaviour and emotions of workers who have knowledge of other people's traumatic experiences. The symptoms can be emotional, cognitive, physical, and behavioural.

## Homeostasis

After the concept and mechanism of homeostasis was identified, decades later there were still many

discussions on the subject. Later in the 20th century some scientists believed that the body does not merely act when something happens, but that it also has the ability to predict certain situations. Homeostasis implies the state of an internal balance of the organism. Usually, negative influences are those that require adaptation from the organism. There are also positive factors that require certain changes in the body, such as pregnancy. Such changes also require easier adjustment because the body perceives them as a more natural and less harmful phenomenon. Homeostatic control mechanisms use predefined values (starting points). Some examples include the body temperature, fluid volume, gastric acid pH, electrolyte values, etc. Since 1911, various theories have been developed about the connection between pathological conditions and stress. It has been shown that emotional stimuli can cause physical damage to the body. Hanse Seyle believed that every organism has an adaptive energy that is limiting. This would mean that the body can cope with stress, but prolonged stress can lead to burnout, which can result in a reduced ability to adapt to diseases (7).

## Allostasis

Allostasis is a process that supports homeostasis (8). Homeostasis achieves adaptation based on previously mentioned starting points, while allostasis achieves adaptation through changes. Homeostasis is important for life while allostasis is important for the balance achieved through changes in the environment and living conditions. The allostatic process begins with the activation of the autonomic nervous system (ANS). The ANS sends impulses to the hypothalamus, which releases corticotropin. Corticotropin affects the release of adrenocorticotropin (ACTH) in the pituitary gland, which then enters the bloodstream. ACTH stimulates the production and release of adrenaline and cortisol. Adrenaline and cortisol stimulate the release of glucose stores into the bloodstream, which is needed for the body to overcome a given situation or escape from it. When the danger passes, all these intermediaries return to their original state (7). Cortisol and cytokines cause inflammatory changes in the body. Inflammatory changes require an immune response, and a negative response of the organism suppresses the immune response in order to protect the organism. By suppressing the immune system, the body becomes vulnerable to pathogens. The short-term effect of neu-

rotransmitters and hormones is desirable, but during sustained stress their effect becomes detrimental.

### **Allostatic condition**

In the allostatic state, the balance of primary mediators changes. The length of the allostatic state depends on food intake or stored energy that feeds homeostatic mechanisms (8). The final result of a chronic allostatic condition is allostatic load or overload.

### **Allostatic load and overload**

Allostatic load occurs when allostatic mechanisms are active when they should not be (7). Continuous excessive release of stress hormones leads to 3 types of overload (7): excessive exposure to stress hormones due to normal stress; inability to suppress the allostatic mechanism when it is not needed or inability to adapt to the same stressor; and inability to stimulate the allostatic response when this is needed, which activates other harmful mechanisms.

Type 1 overload implies conditions in which the energy needs of the organism exceed the actual energy intake. In that case, the body's energy reserves are activated. Such a condition can result in weight loss.

Type 2 overload occurs when energy needs are not sufficient, so the body tries to create as much stock or even more than needed. This can result in food intake (fatty foods), metabolically unbalanced changes, and the accumulation of fat deposits around the waist.

### **Diseases associated with allostatic overload**

It is believed that the modern way of life and poor socio-economic conditions pose a great risk for developing various diseases. Cardiovascular diseases are the most common diseases associated with adverse socioeconomic conditions. Studies have shown that hypertension occurs to workers whose jobs are unstable (8), while those who are exhausted have a significantly increased risk of developing cardiovascular disease (8). Abdominal obesity is also associated with stress, which leads to an increased risk of developing type 2 diabetes and cardiovascular disease (8). Tension is considered a risk factor for infections, especially when experiencing disturbances in interpersonal relationships and negative life situations (8). It has been shown that there is a connection between

socioeconomic conditions and the development of mental disorders such as depression, schizophrenia, and substance abuse (8).

### **The role of the brain, hormones, and neurotransmitters in stress and disease**

It is still not clear why some people fall ill under the influence of chronic stress of similar intensity and type, while others do not. The reason for this may be that the perception of stress in the brain of each individual is different and that each organism displays different behaviour and physiological response to stress. By storing previous events in the brain, the body can predict the necessary physiological response in advance. It is believed that these previously stored stressful events affect the vulnerability of the organism (9). Impaired brain function can consequently affect the body's ability to cope and self-regulate (9). Thyroid hormones play an important role in protecting the body from disease. They are important for the antioxidant process which reduces oxidative stress in the body. As the main "energy" gland, the thyroid plays a significant role in the body's energy supply. Neurotransmitters are important for communication within brain areas that respond to stress (prefrontal cortices, amygdala, hypothalamus, etc.). Within these areas, cortisol cooperates with neurons and astrocytes and produces strong effects on the functional and anatomical changes of the brain's structure. Insulin, some peptides, oestrogen, etc., can also take part in these changes.

### **Aim**

The goal was to investigate and determine the health status of male and female nurses and their exposure to daily stressors in the workplace in order to examine the relationship between stress and health status of respondents in relation to gender, age, and years of work experience.

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### **Methods**

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The survey was conducted anonymously, using a questionnaire with a total of 31 questions, three of which

Gender	N/%	Education level	N/%	Age	N/%	Years of work experience	N/%	Position	N/%	Work length in psychiatry	N/%	Workplace	N/%
Male	101	High school degree	99	20-25	23	less than 1 y	2	Head nurse of ward or clinic	18	All-time	74	Clinic	6
	71.1%		70.0%		16%		1.4%		12.7%		52.1%		4.2%
Female	41	Bachelor's degree	13	25-30	12	1-5	26	Head of health care team	15	1/3 and more	20	Ward	129
	28.9%		9.0%		8.5%		18.3%		10.6%		14.1%		90.8
				30-35	32	5-10	15	Nurse in clinic	2	2/3 and more	41	Other	7
					22.5%		10.6%		1.4%		28.9%		4.9%
				35-40	10	10-15	23	Shift nurse	102	Other ward in hospital	7		
					7.0%		16.2%		71.8%				
				40-45	13	15-20	10	Other nursing positions	5				
					9.2%		7.0%		3.5%				
				45-50	12	20-25	10						
					8.5%		7.0%						
				50-55	16	25-30	19						
					11.3%		13.4%						
				55-60	21	30-35	17						
					14.8%		12.0%						
				60-65	3	35-40	15						
					2.1%		10.6%						
						40-45	5						
							3.5%						



are related to demographic data (gender, age, and education), four to information regarding employment and years of work experience, while other questions are part of the Health Questionnaire (by FDI World Dentist Federation) and the Workplace Stress Questionnaire (by "Andrija Štampar" School of Public Health). The Health Questionnaire had to be adapted to the respondents and modified for that purpose. The Workplace Stress questionnaire contains 17 items where respondents choose one of the following answers: 1 (not stressful at all), 2 (rarely stressful), 3 (sometimes stressful), 4 (stressful), or 5 (extremely stressful). The range of results for each respondent is from 17 to 85. The average result of perceived stress in the workplace is obtained by dividing the total gross result by the number of items.

142 respondents, exclusively employees of the Neuropsychiatric Hospital "Dr. Ivan Barbot" completed the survey. For the purposes of the study, the online service Google Forms ([https://docs.google.com/forms/d/17C6y0Jg0cVF\\_gSSjh19zkNWbt-sC-WYR-PrvsYoXxXtE/edit](https://docs.google.com/forms/d/17C6y0Jg0cVF_gSSjh19zkNWbt-sC-WYR-PrvsYoXxXtE/edit)) was used, and the respondents were contacted via the Viber application, which was

used to send the link to the form. All responses (completed questionnaires) were received between 3 and 9 March 2020. The respondents answered the questions by choosing the answer that most accurately described their opinions. All necessary analyses were performed in Microsoft Excel and the SPSS program. Participation in the study was voluntary and anonymous and was approved by the hospital ethics committee.

## Results

The questionnaire was completed by a total of 142 respondents, of whom 71% were male, had secondary education (70%) and were mostly between the ages of 30 and 35. Most of the respondents work in shifts and have worked in psychiatric wards throughout their careers. Table 2. shows the respondents' answers to the items of

Table 2. **Health Questionnaire (N=142)**

	Yes	No
Do you suffer from any diseases?	58	84
	40.8%	59.2%
Have you been treated by a medical doctor in the last two years?	96	46
	67.6%	32.4
Have you been treated in a hospital in the last two years?	24	118
	16.9%	83.1%
Have you ever been treated with radiation?	0	142
	0%	100%
Have you ever received chemotherapy?	1	141
	0.7%	99.3%
Have you ever had any infectious (contagious) diseases?	38	104
	26.8%	73.2%
Have you ever received a blood transfusion?	10	132
	7%	93%
Have you ever had a stabbing incident?	32	110
	22.5%	77.5%
Have you ever been tested for infectious diseases?	44	98
	31%	69%
Have you had fertility problems?	10	132
	7%	93%

the Health Questionnaire. 60% of those surveyed at the time of the study were not suffering from any diseases, but almost 70% have been to a family doctor for some reason in the last two years. Most were not hospitalized during the same period, and none were treated with radiation, while only one employee received chemotherapy. 30% of them regularly take some form of therapy, 40% only occasionally, and 32% never take any form of therapy. 70 to 80% of those surveyed had a stab incident at the workplace and were tested for infectious diseases. Only 7% of the respondents had some fertility problems and the respondents were most often (30%) pregnant twice, while 16% were pregnant three or more times and 8.5% once. Most of them did not have any problems or complications with pregnancy (72.5%). Approximately 22% of them had complications during pregnancy, 4% after, and only one respondent had complications before pregnancy itself.

The most common diseases among those respondents who were between 20 and 35 years of age and had up to 10 years of work experience are allergic diseases, asthma, and thyroid disease. In the age group of 30 to 40 and between 10 and 20 years of work experience, the most common diseases are anaemia, high blood pressure, sinusitis, and thyroid disease. High blood pressure, thyroid disease, allergic difficulties, gastrointestinal diseases, and sinusitis are the most common diseases of the age group between 45 and 60 and between 30 and 40 years of work experience.

One respondent aged between 50 and 55, a shift nurse in a department who spent between 30 and 35 years of work experience in psychiatry, listed a number of illnesses she had suffered from during her life or is currently suffering from (anaemia, sinusitis, thyroid disease, arthritis, autoimmune disease, gastroesophageal reflux, gastroduodenal ulcer, neurological diseases, glaucoma, dermatological diseases).

In the Health Questionnaire, the most common diseases mentioned by the respondents were sinusitis, allergic difficulties, thyroid diseases, and high blood pressure.

41% (N=58) of the respondents stated that they were currently suffering from a disease and 59% (N=84) stated that they were not ill. 36% (N=51) stated that they did not suffer from any of the diseases they could choose from. 42% (N=38) indicated one of the diseases they could choose from, while

Table 3. **Respondents' current or past diseases and conditions**

DISEASE/CONDITION	N
Atherosclerosis	1
Glaucoma	1
Pacemaker	1
Prostate problems	1
Constant cough	1
Stent implantation	1
Oral candidiasis	1
Hepatitis	2
TB	2
Thrombosis	2
Enlarged glands	3
Coronary heart disease	4
Mental problems	6
Neurological diseases	7
Diabetes	8
Asthma	9
Arthritis	9
Autoimmune disease	10
Dermatological diseases	11
Gastroduodenal ulcer	11
Anaemia	13
Gastroesophageal reflux	16
Sinusitis	20
Thyroid disease	22
Allergic difficulties	23
High blood pressure	27
<b>TOTAL:</b>	<b>212*</b>
None of the above	51

\*Total number of diseases of the respondents

Table 4. **Diseases that afflict respondents by gender**

Female		Male	
Disease	N	Disease	N
Thyroid disease	17	Hypertension	7
Allergic difficulties	16	Diabetes	4
Sinusitis	15	Sinusitis	4
Hypertension	15	Asthma	3
Gastroesophageal reflux	14	Allergic difficulties	3
Anaemia	10	Gastroduodenal ulcer	3
Dermatological diseases	10	Gastroesophageal reflux	2
Autoimmune disease	8	Autoimmune disease	2
Arthritis	9	Neurological diseases	2
Gastroduodenal ulcer	7	Mental problems	2
Neurological diseases	5	Prostate problems	1
Coronary heart disease	5	Constant cough	1
Asthma	4	TB	1
Diabetes	3	Thyroid disease	1
Thrombosis	2		
Enlarged glands	2		
Hepatitis	1		
Candidiasis	1		

58% (N=53) indicated that they currently suffer or have suffered from more than one disease.

Most of the respondents 95.8% (N=136) have not suffered from a disease, nor do they now suffer from any of the malignant diseases they could choose from. Six subjects reported suffering from cervical cancer, testicular cancer, and melanoma.

The most common disease that occurs among male respondents is hypertension, while among female respondents there are several diseases, such as thyroid disease, allergic difficulties, sinusitis, hypertension, and gastroesophageal reflux.

More than half of the respondents (57.7%) believe that the work they do has an impact on their previous and/or current health status.

Table 5 shows the statements of the questionnaire "Stress in the workplace of hospital health workers" and the percentage of agreement of respondents with each statement. A substantive analysis of the claims suggests that respondents experience the following factors as the most prominent causes of stress: inadequate personal income, inadequate workspace and material resources for work, lack of staff, unforeseen everyday situations, and 24-hour responsibility. Numerous administrative tasks are al-

Table 5. **Overview of all statements from the questionnaire “Stress in the workplace of hospital health workers” and percentages with regard to the different degree of agreement with each statement**

Stressors	PERCENTAGE OF AGREEMENT				
	1	2	3	4	5
1. Inadequate personal income.	3.5	19.7	45.1	<b>26.1</b>	<b>5.6</b>
2. Inadequate material resources for appropriate work (financial restrictions)	3.5	17.6	49.3	<b>23.2</b>	<b>6.3</b>
3. Inadequate workspace.	6.3	16.2	50.0	<b>23.9</b>	<b>3.5</b>
4. Little chance of advancement.	<b>19.0</b>	<b>27.5</b>	35.2	14.8	3.5
5. Poor communication with superiors.	<b>14.1</b>	<b>17.6</b>	43.0	18.3	7.0
6. Insufficient number of employees.	4.9	12.7	42.3	<b>26.1</b>	<b>14.1</b>
7. Poor work organization.	4.2	26.8	35.2	23.9	9.9
8. Unforeseen everyday situations.	6.5	12.2	52.1	<b>21.1</b>	<b>8.5</b>
9. Administrative affairs.	6.3	12.7	37.3	<b>28.2</b>	<b>15.5</b>
10. Work overload.	5.6	9.9	49.3	<b>26.8</b>	<b>8.5</b>
11. Threat of lawsuit and/or litigation.	12.0	25.4	27.5	24.6	10.6
12. Inadequate expectations from patients and families.	4.2	23.9	41.5	21.8	8.5
13. Exposure to inappropriate public criticism.	6.3	21.8	37.3	23.2	11.3
14. Misinformation of patients by the media and other sources.	7.7	23.2	47.9	12.7	8.5
15. Conflicts with patients or their family members.	7.7	22.5	39.4	23.9	6.3
16. Impossibility of separating professional and private life.	<b>11.3</b>	<b>28.2</b>	45.1	10.6	4.9
17. 24-hour responsibility.	4.2	18.3	38.0	<b>27.5</b>	<b>12.0</b>

Table 6. **Descriptive data and differences in the perception of stress and the presence of disease by gender**

		STRESS			DISEASE		
	N	M	SD	t-test	yes	no	$\chi^2$
Male	41	2.86	0.556	-2.126 df=1 $p=0.049^*$	13	28	1.496 df=1 $p=0.221$
Female	101	3.12	0.688		45	56	
All	142	3.04	0.662		58	84	

\*  $p<0.05$

Table 7. **Descriptive data and differences in experience of stress and disease presence by age**

Age group	N	STRESS			DISEASE		
		M	SD	Significance	Yes	No	$\chi^2$
20-25	23	3.10	.573	F=0.762  df=8  p=0.637	4	19	21.344  df=8  p=0.006*
25-30	12	3.22	.571		1	11	
30-35	32	2.99	.681		14	18	
35-40	10	2.93	.848		3	7	
40-45	13	3.31	.754		4	9	
45-50	12	3.17	.656		7	5	
50-55	16	2.89	.688		9	7	
55-60	21	2.88	.566		14	7	
60-65	3	2.94	1.070		2	1	
<b>TOTAL</b>	142	3.04	.662		58	84	

\*p&lt;0.05

so a great source of stress. All of these sources lead to feelings of work overload. The respondents consider the following factors as less prominent causes of stress: little chance of advancement, poor communication with superiors, and the impossibility of separating professional and private life.

Table 3 shows that the overall average score of the Workplace Stress questionnaire is 3.04, which corresponds to an estimate of 'sometimes stressful'. Men rate stress slightly less (2.86) than women (3.12). Testing the significance of the difference in average scores of the stress questionnaire indicates a marginal but still statistically significant difference. A statistically significant difference was obtained in the average overall score of experienced stress in men and women.

The chi-square test tested the significance of the difference in the incidence of the disease in men and women. The result indicates that there is no statistically significant difference in the presence of the disease in men and women.

Table 7 shows the average total values of experienced stress by age groups. Analysis of variance tested whether respondents of different ages differed in experienced stress. No statistically significant difference was obtained, so we conclude that there are no differences in the estimated experienced stress in

relation to age. In other words, respondents, regardless of their age, equally experience stress at work.

The chi-square test was used to check whether there were differences in the presence of the disease in relation to the age of the subjects. As expected, a statistically significant difference in the presence of the disease was obtained in subjects of different ages. The association between age and disease was statistically significant ( $r=0.339$ ;  $p=0.0$ ) and positive. As one grows older, the probability or presence of disease increases. One worrying fact is that there is the same number of sick respondents between the ages of 30 and 35 as in the group of respondents aged between 55 and 60.

Table 8 shows the average total values of experienced stress according to the number of years of work experience. The analysis of variance shows that there is no statistically significant difference in the experienced stress in relation to the years of work experience of the respondents, i.e., regardless of the number of years of work experience, the respondents experience the same stress. A statistically significant difference was obtained in the presence of the disease in relation to the number of years of work experience. The association between work experience and disease presence was also statistically significant ( $r=0.261$ ;  $p=0.002$ ).

Table 8. **Descriptive data and differences in the experience of stress and the presence of disease according to work experience**

		STRESS			DISEASE		
Years of work experience	N	M	SD	Significance	Yes	No	$\chi^2$
0-10	43	3.13	.620	F=0.861 df=4 p=0.489	11	32	11.792 df=4 p=0.019*
10-20	33	3.01	.633		11	22	
20-30	29	3.12	.769		14	15	
30-40	32	2.91	.624		20	12	
40-	5	2.77	.806		2	3	
<b>TOTAL</b>	142	3.04	.662		58	84	

\*p&lt;0.05

Table 9. **Descriptive data and differences in the experience of stress and the presence of disease according to education**

		STRESS			DISEASE		
Age	N	M	SD	Significance	yes	no	$\chi^2$
High school graduate	99	2.97	0.679	F=1.846 df=2 p=0.162	37	62	2.057 df=2 p=0.358
University graduate (3 years of study)	29	3.21	0.594		14	15	
University graduate (more than 3 years of study)	13	3.19	0.650		7	6	
<b>TOTAL</b>	141	3.04	0.664		58	83	

\*p&lt;0.05



Table 9 shows descriptive data on the experience of stress and the presence of disease according to the education of the respondents. Analyses show that there is no statistically significant difference in the assessment of stress and the presence of the disease among subjects based on different levels of education.

The difference in the experience of stress of respondents who are currently suffering from a disease and those who are not was examined. No statistically significant difference was obtained between these two groups ( $t = -.642$ ,  $df = 140$ ,  $p = 0.522$ ). In other words, both those who are ill and those who are not ill experience an equal degree of stress.

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## Discussion

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By analysing the Health Questionnaire, we have discovered that 40.8% of respondents suffer from some disease. On the positive side, only 16.9% of them have been treated in hospital for the past two years, while 67.6% of them have been treated by family doctors. Two-thirds of respondents take a medication occasionally or continuously. 31% of respondents were tested for infectious diseases. 45.8% of respondents were never pregnant, while the rest were pregnant one or more times. 72.5% of respondents stated that they did not have any problems in pregnancy.

Allergic difficulties are closely related to excessive psychological stress. Allergic diseases are the most common cause of disorders of the immune system or cytokine imbalance (10). According to the results of this study, allergic difficulties predominate in all age groups, mostly in younger age groups and in women, which speaks in favour of similar results obtained in other studies (10). Allergic diseases are also considered adaptation diseases (6). Asthma is also associated with stress due to inflammatory processes caused by stress. As with other diseases, oxidative stress plays an important role in the development of the disease (11). Almost 50% of children with atopic dermatitis develop asthma while as many as 75% develop allergic reactions (10). This study showed the highest number of asthma sufferers among those

aged between 20 and 35. Asthma is a disease that has been confirmed to be more prevalent in younger age. According to the results of this study, thyroid diseases are present among those aged between 20 and 60. According to some studies, stress is frequently associated with the onset of Graves' disease (12). Thyroid disease is predominantly much more common in women.

Allostatic condition increases the risk of autoimmune diseases (7,8,10). The most common stress-related diseases are lupus and rheumatoid arthritis (8). This study showed a higher number of autoimmune diseases among those aged 45 and above, which would correspond to the fact that a longer period of exposure to stress leads to the development of the disease. The study by Song et al. showed that younger persons had a higher risk of developing autoimmune diseases, while PTSD is considered to be a major disorder associated with the development of autoimmune diseases (13). As many as 50% of autoimmune diseases do not have a clear disease trigger (14).

Stress leads to increased sensitivity of the mucosa in the small intestine, where gram-negative bacteria easily penetrate and cause inflammatory changes (15). A study by Jansson et al. showed that people with low job satisfaction have twice the risk of developing GERD, as do those prone to self-pressure or time pressure (16). Stressful life situations can increase the risk of developing inflammatory bowel disease, GERD, and peptic ulcer (17). In this study, subjects reported gastrointestinal diseases, most commonly reflux and to a lesser extent, ulcers.

Nurses' exposure to stress makes them a group that is at high risk of developing depression (18). This study has a small number of responses in which respondents cite mental difficulties or illnesses which may be a certain indicator for denying the existence of mental problems.

Oxidative stress is one of the important causes of many diseases. It is also involved in the pathophysiology of diabetes and cardiovascular disease (19). When carbohydrates are ingested and broken down, free radicals are released. Excessive amounts of free radicals lead to oxidative stress. A study by Wang et al. showed an increased risk of developing metabolic syndrome symptoms (obesity, hypertension, increased triglycerides) in nurses working night shifts (3). Allostatic load of type 2 leads to increased concentrations of glucocorticoids, which cause increased appetite and consequently increased food consump-

tion. Excess energy obtained from food is deposited as fat or results in obesity (8). Obesity also affects the development of autoimmune diseases (14).

Hypertension is a common disease in the elderly (20). It is the result of the influence of genetic and environmental conditions (21). Oxidative stress also plays a role in the development of hypertension. Some studies have shown that oxidative stress has a greater effect on blood pressure in men (22). Psychosocial stress leads to an increased risk of developing hypertension (23). The expected results of patients with hypertension were obtained in those subjects who have over 30 years of work experience or who are between 45 and 60 years of age.

Oxidative stress increases the risk of skin diseases and aging. Inflammatory factors that occur in the middle of the oxidative process have a strong influence on the development of skin cancer (24). Some autoimmune skin diseases such as psoriasis, vitiligo, and alopecia may be associated with oxidative stress or imbalance of oxidative and antioxidant processes (25). Elevated levels of daily stress can affect lower cortisol levels, which can result in a detrimental effect on skin disease and its treatment (26). This research showed that in a large number of subjects skin changes occurred between the ages of 45 and 60 after 30 to 40 years of work experience. Therefore, it is impossible to clearly determine whether stress influenced the onset of the disease, which is supported by the perception of equal experience of stress by sick and healthy subjects.

The results of the questionnaire on stress in the workplace of hospital health workers show that the respondents cited small possibility of advancement, poor communication with superiors, and the inability to separate work and private life as not significantly stressful factors. It has been shown that a "healthy" work environment and mutual support of colleagues in the workplace lead to better efficiency at work and reduced stress levels, which in turn leads to better care (27). Nurses in hospitals showed higher levels of stress than those outside hospitals (28). It has been shown that poor atmosphere in the workplace and the pressure of work result in higher dissatisfaction of the staff, which matches the results of other studies. Hospitals should have organized training on stress management, regular meetings with colleagues and superiors, optimal shift work, and improved occupational health safety conditions to keep nurses' stress at an acceptable level (29). Some studies have shown that nurses are stressed by the ag-

gressive behaviour of other nurses, physicians, and colleagues, while some have been stressed by verbal aggression of patients (30). Psychiatric patients have proven to be more difficult, demanding, and dangerous, causing stress for those who work with them (31). The respondents cited the following factors as causes of stress: inadequate personal income, inadequate material resources for work, inadequate workspace, insufficient number of workers, unforeseen daily situations, administrative work, work overload, and 24-hour responsibility. Occupational stress may be associated with personal and workplace problems (31). A study conducted in Wales found that 51% of nurses experience high levels of long-term emotional exhaustion related to stress and workplace conditions. Factors such as increased work responsibilities and lack of support from colleagues can also be stressful (32).

According to the results of this study, respondents are moderately stressed by poor work organization, the threat of lawsuits, inadequate expectations from families and patients, exposure to public criticism, misinformation of patients and families by the media and other sources, and conflicts with patients and their family members. A study by Kane shows that moderate stressors are present in most nurses (5). Dissatisfaction with pay can affect the level and quality of care provision (33,34). Corruption can also affect service delivery (34). Long-term stress can affect nursing decisions, as well as the ability to meet the patient's needs, which in turn leads to exhaustion and sick leave (35). The way nursing and nursing work is organized can predict the motivation and satisfaction of nurses. It has not been clearly demonstrated that organizational models influence stress in nurses (36).

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## Conclusion

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This study found an association between age and work experience with the likelihood of illness, although both the healthy and the sick perceive equal levels of stress. The most common diseases among the subjects are cardiovascular diseases, thyroid diseases, gastrointestinal diseases and allergic diseases.

es. One disadvantage of this study is that it covers a large field and deals with general matters, but it can certainly be a starting point for further, more precise research.

It would be interesting to repeat this study in 10 to 15 years. Given that a large number of respondents could participate in the survey again, such a study would show whether the results remained the same, or whether they improved or worsened. In the Republic of Croatia, a small number of studies have been conducted on this topic, which is why the conclusions of this study cannot be generalized.

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## PERCEPCIJA STRESA I OBOLJENJA MEDICINSKIH SESTARA I TEHNIČARA U PSIHIJATRIJI

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### Sažetak

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Homeostaza u našem organizmu pokušava održavati stabilnost koja je važna za normalno funkcioniranje organizma. Alostatski mehanizmi dodatno pomažu u uspostavljanju te ravnoteže. Kronični stres izaziva složeno stanje u organizmu koje se naziva alostatsko opterećenje. Ako takvo opterećenje potraje, znatno se povećava rizik od nastanka neke bolesti. Ovo istraživanje provedeno je anonimno u cilju utvrđivanja zdravstvenog stanja medicinskih tehničara i medicinskih sestara u Neuropsihijatrijskoj bolnici „Dr. Ivan Barbot“ u Popovači i njihova izloženost svakodnevnim stresorima na radnom mjestu. Glavna svrha bila je ispitati vezu između stresa i zdravstvenog stanja medicinskih sestara u odnosu na spol, dob i staž. Sudjelovale su ukupno 142 medicinske sestre. Primijenjeni su zdravstveni upitnik i upitnik za stres na radnom mjestu. Rezultati su pokazali da su najčešće bolesti od kojih boluju medicinske sestre kardiovaskularne bolesti, bolesti štitnjače, gastrointestinalne bolesti i alergije. Žene su pokazale veću osjetljivost na stres od muškaraca. Najčešći stresori s kojima se medicinske sestre susreću na radnom mjestu jesu neadekvatna osobna primanja, neadekvatni radni prostor i materijalna sredstva za rad, nedostatak broja djelatnika, svakodnevne nepredviđene situacije, 24-satna odgovornost i administrativni poslovi. Najčešće bolesti ispitanika jesu kardiovaskularne bolesti, bolesti štitnjače, gastrointestinalne bolesti i alergijske bolesti. Ovo istraživanje utvrdilo je povezanost dobi, posljedično i radnog staža s vjerojatnošću oboljenja, iako i zdravi i bolesni percipiraju podjednaku razinu stresa. Manjkavost je ovog istraživanja

što obuhvaća veliko područje i bavi se općenitim stvarima, ali svakako može biti polazište za daljnja preciznija istraživanja. I dalje ostaje mnogo otvorenih pitanja, što otvara potrebu za daljnjim istraživanjima i proučavanjem poveznice između stresa i bolesti.

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**Ključne riječi:** alostaza, alostatsko opterećenje, bolest, homeostaza, medicinske sestre, stres

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# Risk for Falls in Patients with Limb Amputations in the Clinical Institute for Rehabilitation and Orthopedic Aids of the University Hospital Centre Zagreb

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**Article received:** 08.03.2021.

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**Article accepted:** 29.04.2021.

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**DOI:** 10.24141/2/5/1/6

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**Keywords:** fall, risk of falls, Morse Falls Scale, limb amputation

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## Abstract

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**Introduction.** Patient falls are a significant clinical problem, as the fall can result in disability and, in some cases, death. The fall affects the patients' quality of life, prolongs hospitalization, and increases the cost of treatment. Falls are the result of interaction between various factors. In the hospital setting, falls are considered adverse events.

**Aim.** To determine the number of patients' falls at the Clinical Institute for Rehabilitation and Orthopedic Aids of the University Hospital Centre Zagreb (UHC Zagreb) between September 1, 2019, and February 29, 2020.

**Methods.** The data was extracted after the event from the Hospital Information System (Nursing records) and then processed. The study included 212 patients with limb amputations (both sexes) who were hospitalized in the Clinical Institute for Rehabilitation and Orthopedic Aids.

**Results.** The results showed that patients with limb amputations have a risk for falls when doing rehabilitation for their primary diagnosis. Of the 212 patients admitted, 209 were at risk of falling according to the Morse Falls Scale, but of the total number of patients, only 2 fell.

**Conclusion.** Patients with limb amputations have a higher risk of falls. The retrospective study shows that despite the increased risk of falls, the actual number of falls is very small. This shows that the medical staff are doing excellent work.

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## Introduction

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The World Health Organization defines a fall as an event which results in a person coming to rest inadvertently on the ground or floor with the inability to get up, and which occurs under circumstances affected by many factors that affect stability (1). In hospital settings, falls represent a significant clinical problem because they often result in injuries, thereby extending the duration of hospitalization and increasing the cost of treatment. More than 70% of falls occurred in rooms, when moving into a bed, chair, or wheelchair, and 19% when moving patients from a bed to the bathroom and vice versa (1).

In patients with amputations, the energy expenditure required for walking, both without and with a prosthesis, plays a major role. The reason for this is the increased metabolic oxygen consumption, which is up to 70 times higher in people with above-the-knee amputations, and 40 times higher than normal in below-the-knee amputations. Although the data could suggest that the risk of fall is greater in patients with above-the-knee amputations, in everyday work we more often see falls occurring in patients with below-the-knee amputations. This is especially true in younger patients who overestimate their sense of balance and their capabilities (2). A study conducted in the UK showed that the incidence rate of falls among amputated patients was 32%, while another study in Canada showed an incidence rate of 20.5% (3). Vu et al. cite diabetes and below-the-knee amputations as decisive factors in the risk of fall (4).

### Fall prevention in patients with lower limb amputation

The Clinical Institute for Rehabilitation and Orthopedic Aids conducts primary and secondary prosthesis provision and rehabilitation, providing patients with walking aids such as prostheses, crutches, or walkers. When prosthesis provision is not possible, patients are provided with a wheelchair.

After amputation, patients encounter many difficulties in everyday life, such as mental and physical adaptation to the new situation, overcoming numerous obstacles, returning to daily activities, adjusting environmental conditions (reducing obstacles such as thresholds, carpets, electrical installations, adjust-

ing the bathroom). After amputation, patients have a disturbed sense of balance, and so when they get up, they often forget that they do not have a leg, and thus a fall happens, possibly causing an injury. Because of pain in the remaining part of the leg, but also because of phantom pain, patients use pain medication that can also disturb their sense of balance.

Incorrect use of walking aids (crutches, walker, wheelchair) is also a contributing factor, increasing the risk of falls in patients with amputations. Interventions in amputees are primarily focused on day-to-day training in overcoming obstacles, properly using a wheelchair, getting out of bed and walking with crutches or a walker, properly performing bed-to-wheelchair, wheelchair-to-toilet transfers to prevent falls. Interventions must be adjusted to each patient individually, depending on specific personal characteristics.

Adjustment of interventions and the human factor are sometimes not enough to prevent a fall, thus in the Clinical Institute, special attention is given to the adaptation of amputees' rooms, according to the Ordinance on ensuring the accessibility of buildings for people with disabilities and reduced mobility, which justifies its purpose. The installation of transfer aids, the adjustment of bathrooms and toilets, the provision of flat surfaces and the reduction of barriers all lead to better living conditions for patients in the ward, and to a reduction in the risk for falls (2,5).

### Consequences of a fall

Falls in hospital settings are caused by unadapted environments and the patients' altered state of health. Possible consequences mostly affect the patients themselves - their mental and physical health - but they can also affect health workers who were working at the time of the fall. The medical institution also feels the consequences of the fall, because of prolonged hospitalization and increased cost of health care.

Consequently, falls lower the quality of life, making the patients dependent on certain everyday activities that they had hitherto done on their own. Anxiety, depression, fear of repeated falling, loss of self-confidence, and independence can occur - in short, the patient becomes dependent on other people's help, which affects the whole family.

Injuries in hospital settings that are the result of a fall, can be divided into several categories:

- no visible injury,
- minor injury - hematoma, scratches,
- moderate injury - fractures, sprains, injuries that require suturing or immobilization,
- serious injury - surgical treatment or transfer to an ICU due to a life-threatening injury is required,
- death (6).

## Aims

1. To determine the number of patient falls, the consequences of a fall, and whether the fall was reported as an adverse event to the Department for Health Care Quality Assurance and Improvement.
2. To determine whether the patient is assessed according to the Morse scale during admission to the Clinical Institute and whether a nursing care plan is written when the assessment shows there is a risk for a fall.

## Methods

A retrospective study on a sample of 212 patients with amputated lower limbs was conducted at the Clinical Institute for Rehabilitation and Orthopedic Aids of the UHC Zagreb between September 1, 2019, and February 29, 2020. The study was approved by the hospital's Ethical Board. The data was retrieved from the Hospital Information System that serves as the operative IT system in the Clinical Institute for Rehabilitation and Orthopedic Aids of the UHC Zagreb.

The study included 212 persons with limb amputations (both sexes) who were hospitalized in the Clinical Institute for Rehabilitation and Orthopedic Aids of the UHC Zagreb during the study period.

Fall risk assessment was conducted using the Morse scale, which uses six variables to easily and quickly calculate the risk of fall (8). The Morse scale parameters include previous falls, other medical diagnoses, mobility aids, presence of an IV-line, posture/movement, and mental status of the patient. The score can

be between 0 and 125 points. The result is interpreted in the following way:

- 45 points and over - high risk
- 25 - 44 points - moderate risk
- 0 - 24 points - low risk (7).

The data is shown in a table.

## Results

The study included 122 men and 90 women, which corresponds to the prevalence of amputations both in Croatia and globally, where more males than females have cardiovascular problems. According to a report from the Croatian Health Insurance Fund (HZ-ZO) from 2019, amputees are 60% male, and 40% female (8).

Most respondents belonged to the age group between 61 and 80, i.e., 124 respondents. The average age of respondents was 61,88. The age range was from 10 to 93 (Table 1).

Table 1. **Respondent characteristics according to gender and age**

Respondent characteristics		N	%
Gender	Male	122	58
	Female	90	42
	Total	212	100
Age	1- 40 years	18	8
	41- 60 years	50	24
	61- 80 years	124	58
	81- 100 years	20	10
	Total	212	100

During the 6-month study period, 48 out of the 212 respondents received primary prosthetic provision and rehabilitation, while 164 received secondary prosthetic provision and rehabilitation.

Table 2. **Respondents with regard to the type of rehabilitation, length of hospitalization and type of amputation**

Respondent characteristics		N	%
Rehabilitation	Primary	48	23
	Secondary	164	77
	Total	212	100
Duration of hospitalization	1 - 10 days	45	21
	11 - 20 days	119	56
	21 - 30 days	17	8
	31 or more days	31	15
	Total	212	100
Amputation	Above-the-knee	88	42
	Below-the-knee	94	44
	Bilateral below-the-knee	24	11.5
	Bilateral above-the-knee/ below-the-knee and above-the-knee	5	2.5
	Total	212	100

According to hospitalization duration, we distributed the patients into 5 categories: 45 patients were hospitalized up to 10 days, 119 patients were hospitalized between 11 and 20 days, 17 patients were hospitalized between 21 and 30 days, and 31 patients spent more than 31 days in the hospital.

Most patients had a below-the-knee amputation.

On admission, all patients had a Morse scale assessment done. For all patients with a risk for fall according to the Morse scale assessment, a nursing care/fall risk plan was written, and carried out during the patient's stay on the ward.

The score range on the Morse scale varied between 35 and 75 points, with most patients, 153 of them,

Table 3. **Respondents according to the Morse scale assessment and the nursing care plan**

Morse scale, nursing care plan		N	%
Morse scale	High risk	209	98
	Moderate risk	3	2
	Low risk	0	0
	Total	212	100
Nursing care plan	Yes	209	98
	No	3	2
	Total	212	100

having a point score of 75. Of all the patients, 3 of them had a moderate fall risk, so for them, a nursing care plan was not written (Table 3).

The number of amputees with recorded falls during hospitalization at the Clinical Institute for Rehabilitation and Orthopedic Aids was 2, i.e., 1%. Both were reported to the Department for Health Care Quality Assurance and Improvement, with the outcome in the two patients being:

1. The first patient, who was undergoing primary prosthetic rehabilitation for below-the-knee amputation, fell on the balcony of the patient's room, where he stumbled. The patient hit his right shoulder, right leg, and left knee. He had also strained his back. X-rays showed no fractures or strains. After 2 days of rest with cryotherapy and analgesics, the patient continued his rehabilitation.
2. The other patient, a female, also undergoing primary prosthetic rehabilitation for above-the-knee amputation, slipped from her wheelchair while opening the room door and fell on her right arm. An X-ray revealed anterior dislocation of the shoulder. Repositioning was performed, and a control X-ray revealed a suspicion of a humerus head fracture without displacement. The patient was discharged home in good general condition with status post Luxatio humeri dex, Fractura capiti humeri l. dex. after two days of observation in the ward, with immobilization and recommendations for further treatment.

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## Discussion

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The study assessed amputee falls at the Clinical Institute for Rehabilitation and Orthopedic Aids of the UHC Zagreb on a sample of 212 respondents. Of these, 122 were male and 90 were female. The larger number of men is in line with data from the World Health Organization and the Croatian Institute for Public Health, which show that the number of men with lower limb amputation, and vascular system diseases is higher than the number of women, in a ratio of 60% to 40% (2). Age is an important predic-

tor for falls in patients with lower limb amputation, as indicated by the average age of patients, between 61 and 80 years of age. A patient's age affects the expected increase in amputations, doubling the risk for amputation in persons over 65 years of age (5).

Although studies indicate that a fall risk is associated with the level of amputation, given the small number of falls in our study, we cannot conclude whether the fall occurs more frequently in patients with above-the-knee amputation. Namely, in our two fall cases, one was a patient with a below-the-knee amputation, and the second one was a patient with an above-the-knee amputation.

Out of 212 patients, 209 had a high risk of fall according to the Morse scale. For all patients with a risk for fall according to the Morse scale a nursing care plan was written. The plans were carried out during the whole rehabilitation period, i.e., the duration of a patient's hospital stay is equivalent to the duration of the plan implementation.

Steinberg et al. discovered that patients with a lower limb amputation have an increased risk of falls in all rehabilitation phases (9). They state that healthcare professionals must be aware of the risk of falls when caring for people with limb amputations and work daily to reduce the risk factors that lead to falls.

Hunter et al. had similar results. They also found that people with lower limb amputation have an increased risk and that risk factors vary depending on the stages of rehabilitation. They also stated that falls also occur after the discharge of patients, mostly during the first year following the limb amputation (10).

Our data suggests that both patients fell during primary prosthetic rehabilitation, but it is difficult to determine to what extent the rehabilitation phase affected the fall, because of the short patient monitoring period and just two falls during the monitoring period.

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## Conclusion

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Given the lack of research related to falls, the Clinical Institute for Rehabilitation and Orthopedic Aids of the UHC Zagreb conducted a retrospective study

on a sample of 212 patients with lower limb amputations. The study showed that a larger number of men were in rehabilitation for limb amputation and that the majority of patients was elderly.

On admission to the ward, all patients were assessed using the Morse scale, and in accordance with the score, a nursing diagnosis stating the risk of fall was written for all patients who had a risk of falling. During the study period, two cases of falls occurred. Both falls were reported to the Department for Health Care Quality Assurance and Improvement.

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## RIZIK ZA PAD PACIJENATA S AMPUTACIJOM UDOVA NA KLINIČKOM ZAVODU ZA REHABILITACIJU I ORTOPEDSKA POMAGALA KBC-a ZAGREB

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### Sažetak

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**Uvod.** Pad pacijenta predstavlja znatan klinički problem, jer kao posljedica pada može nastupiti invalidnost, a u nekim slučajevima i smrtni ishod. Pad utječe na kvalitetu života pacijenata, uzrokuje produljenje boravka u bolnici te povećava troškova liječenja. Pad nastaje kao posljedica interakcije brojnih čimbenika. U bolničkoj zdravstvenoj ustanovi pad spada u neželjene događaje.

**Cilj.** Utvrditi broj padova pacijenata unutar Kliničkog zavoda za rehabilitaciju i ortopedska pomagala KBC-a Zagreb u periodu od 1. rujna 2019. do 29. veljače 2020.

**Metode.** Podaci su uzeti retrogradno iz BIS sustava (sestrinska dokumentacija) te su obrađeni. Istraživanje je uključivalo 212 pacijenata s amputacijom udova (oba spola) koji su u navedenom periodu hospitalizirani u Kliničkom zavodu za rehabilitaciju i ortopedska pomagala.

**Rezultati.** Rezultati su pokazali da pacijenti s amputacijom udova prilikom dolaska na rehabilitaciju zbog svoje primarne dijagnoze imaju rizik za pad. Od 212 zaprimljenih pacijenata 209 ih je imalo rizik za pad prema Morse skali, a od ukupnog broja pacijenata samo su dva pacijenta pala.

**Zaključak.** Pacijenti s amputacijom udova imaju povećani rizik za pad. Retrospektivno istraživanje pokazuje da je usprkos povećanom riziku za pad broj padova u pacijenata malen. To ukazuje na kvalitetan rad svih zdravstvenih djelatnika.

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**Ključne riječi:** pad, rizik za pad, Morse skala, amputacija udova

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# The Role of Perforin

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**Article received:** 16.07.2020.

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**Article accepted:** 24.11.2020.

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**DOI:** 10.24141/2/5/1/7

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**Keywords:** perforin, lymphocytes, target cell, granzymes, literature

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## Abstract

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Some literature reviews have been carried out about the role of perforin in medicine. The first step involved a systematic search to identify relevant studies published between 2001 and 2019 in the following electronic databases - EBSCOhost, Scopus, Science Direct, Web of Science, and Elsevier. By analyzing the available literature, it can be concluded that perforin plays an important role in cytotoxic activity of natural killer cells (NK) and CD8+ T cell. NK and CD8+ use the same mechanism for destroying target cells. This article cites the disease hemophagocytic lymphohistiocytosis (HLH) which is characterized by heavy abnormalities in the immune system. The point is that this disease is caused by perforin gene mutation. The key is the application of properly sensitized dendritic cells (DCs) because they are effective in immunotherapy against cancer. It may be effective in  $\gamma$ -irradiated colon cancer cell lines HT-29. Growth hormone-inhibiting hormone (GHI) induces maturation and activation of DCs. In that way, GHI-DCs shows increased cytotoxic activity and higher perforin and granzyme expression. So, this means that theoretical research has shown that efficient activity against cancer is induced when DCs are sensitized with  $\gamma$ -irradiated cancer cells. In that way, through a direct increase of cytotoxicity and indirect T cell activation, there can be anti-tumor activity. It is suggested to continue scientific research about the role of perforin in the future.

## Introduction

Perforin is a glycoprotein responsible for forming pores in cell membrane softargeted cells. An annotation about the structure and function of human perforin was announced in 2010 (1). Its structure and mechanism are described in detail in the paper published by Monash University researchers in 2010. Jules Brodet, a Nobel prizeman, published the first hypothesis about the forming pores of targeted cells as apart of the immune response (2). Natural killer cells (NK) and CD8+positive T-cells are the main sources of perforin. Meanwhile, CD4+ positive T-cell is also capable of expressing a low quantity of perforin, when classical cytotoxic is not efficient or distressed (3). Much attention is dedicated to their role in the immune response to bacterial and viral infections, immune surveillance, and immunopathology. Besides that, perforin is involved in the pathogenesis of autoimmune diseases and alogen rejection of transplant organs (2).

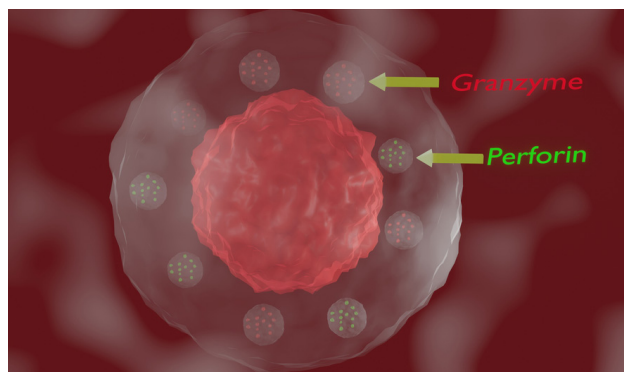


Figure 1. **Perforin**

Source: Shutterstock.com

Figure 1. represents cytotoxic T lymphocyte which shows the cytotoxic substances, perforin and granzyme, in 3d illustration.

Furthermore, the purpose of this article is to understand the importance of perforin in medicine. The rationale of this article is to conduct further research about the role and use of perforin for medical purposes, as well as to motivate for further research and education about the role of perforin.

## Methods

The author systematically reviewed the literature using different scientific and medical literature. National Library of Medicine (NHL) was mostly used, as well as the articles published between 2001 and 2019 in bibliographic databases EBSCOhost, Web of Science, Science Direct and Elsevier. Its structure and mechanism are described in detail in the paper published by Monash University's researchers, in detail, in 2010. Jules Brodet, a Nobel's prizeman, published the first hypothesis about the forming pores of targeted cells as a part of the immune response. The reviewed articles were obtained by using the following keywords: perforin, lymphocytes, target cell, T cell, natural killer cell, granzymes. The author then used these areas to develop a list of keywords and searched for these terms in conjunction with the keyword „perforin“.

## The structure of perforin

Perforin is 60-70 kDa glycoprotein. The National Protein Database indicates that it has 555 amino acids, which should give it about 70 kDa[2]. One perforin molecule consists of four domains, including two (N-terminal and C-terminal) which are typical for perforin and connected with its biological functions. Two other domains, located in the center of the molecule, are 20% homologous on the analogous domains in the molecular addendum (C6, C7, C8, and C9) (4). One of the homologous domains contains the sequence which enables forming two  $\beta$ - chains and one  $\alpha$ -helix structure. It is a hydrophobic domain and it may be connected with the lipid membrane of the targeted cell. Besides, perforin consists of cysteine because it is a rich domain which is homologous with low-density lipoprotein (LDL), receptor B type, and forerunner for epitel growth's factor (1). The same author cites: „A 14-nm channel is formed by approximately 20 perforin molecules; however, it was shown that even 3-4 perforin molecules are able to form an efficient pore“ (2). A polymerized molecule of perforin makes cylindrical and hydrophobic channels that enable free, unselective, and passive transport of ions, water, small molecules surfactants, and enzymes. As a consequence, channels disturb protective barriers of the target cell and destroy the integrity of the target cell (6).

Also, the phenotypic and functional changes in human DCs sensitized with  $\gamma$ -irradiated colon cancer cell-line HT-29 (GIH) was investigated by Sun Kyung et al. GIH-sensitized DCs showed increased cytotoxic activity against HT-29 through higher expression of perforin and granzyme B. They further induced expression of effector cytokines, cytotoxic molecules, and mucosal-homing receptor in autologous T-cells. Conclusively, these results suggest that effective anti-cancer activity is induced when DCs are sensitized with  $\gamma$ -irradiated cancer cells via both direct augmentation of the cytotoxicity and indirect activation of T cells. Gamma-irradiation-induced apoptotic cancer cell-line HT-29 (GIH) induced maturation and activation of dendritic cells (DCs). The other conclusion of the research showed that GIH-sensitized DCs showed an enhanced cytotoxic activity against live HT-29, that GIH-sensitized DCs activated autologous T cells to express cytokines, cytotoxic molecules, and mucosal-homing receptors, and DCs sensitized with gamma-irradiated cancer cells could be an effective anti-cancer therapeutic (7).

## The role of perforin

Perforin can be polymerized and it can form channels in the targeted cell membrane. Perforin polymerization and pore formation require  $\text{Ca}^{2+}$  ion. They are responsible for the transformation from inactive, globular form to active perforin which afterward can be infiltrated in the cell membrane. The processes of embedding and polymerization depend on different factors, including temperature, platelet-activating factor (PAF), and the activation of membrane receptors. Calreticulin is an important cytolytic granules' enzyme that has a role in supporting perforin protein. It protects from activation and degradation in the way that keeps in glomerular form. It is bounded by  $\text{Ca}^{2+}$  and inhibited spontaneous perforin polymerization inside granules. Perforin binds target cells through membrane phospholipids. Phospholipids can bind  $\text{Ca}^{2+}$  ions and increase perforin affinity for the target cell membrane.

The pores formed by perforin interfere with the cell membrane and allow free influx and efflux of ions and polypeptides. As a result, ion homeostasis is disrupted and necessarily leads to the development of tonic shock. Indirectly, activation of proapoptotic pathways and DNA degradation leading to cell death is induced (5). Calcium ions can be responsible for inhibition of perforin polymerization and can cause blockage of

transmembrane channels. That kind of phenomenon is observed in low pH and increased concentration of calcium ions. Protein S inhibits perforin. Protein S is a glycoprotein which inhibits lytic activities for complementary components. Because of structural homology between components for perforin complement and C9, protein S can inhibit perforin functions. Protein S binds on the perforin spot at the cell membrane and therefore inhibits the creation of pores (6).

Perforin plays an important role in cytotoxic activity of natural killer cells (NK) and  $\text{CD8}^+$  T cell. NK and  $\text{CD8}^+$  use the same mechanism for destroying cell membranes but the activation ways differ. NK cells, unlike  $\text{CD8}^+$  cells show spontaneous cytotoxicity towards target cells. This depends on perforin and discharge of granzyme B. The first step in the cytotoxic process is the identification of the target cell which can be specific (in the case of T  $\text{CD8}^+$  cell). Unlike T cells, NK cells do not identify major histocompatibility complex (MHC) bounded antigens. The next step is the formation of lytic synapses between effectors and the target cells. The contact between these two cells makes changes in the structure of the effector cell. Cell organelles (such as microtubules, Aparati Golgi, and cytological granules) are translocated toward the synapse. The released granules contain perforin and granzyme B which are involved in the cytotoxic reaction in the target cells (8). NK cells and cytotoxic cells are resistant to other cytotoxic NK cells' activities. The inhibition of pore formation in these cells is most likely connected with decreased binding of perforin on the surface of their cell membrane.

Figure 2 shows cytotoxic T cell which regulates immune responses, releases the perforin and granzymes, and attacks infected or cancerous cells. Through the action of perforin, granzymes enter the cytoplasm of the target cell and lead to apoptosis cell death.

The most sensitive method for intracellular perforin detection is flow cytometry. Flow cytometry enables the proof that there is a perforin expression through superficial tags which identify specific cell population. Also, flow cytometry is used to validate perforin colocalization with granzyme B in cytotoxic granules polarized to the immunological synapse, and to assess the expression of perforin in cytotoxic T lymphocytes at various stages of activation. The sensitivity of this technique also allowed to distin-

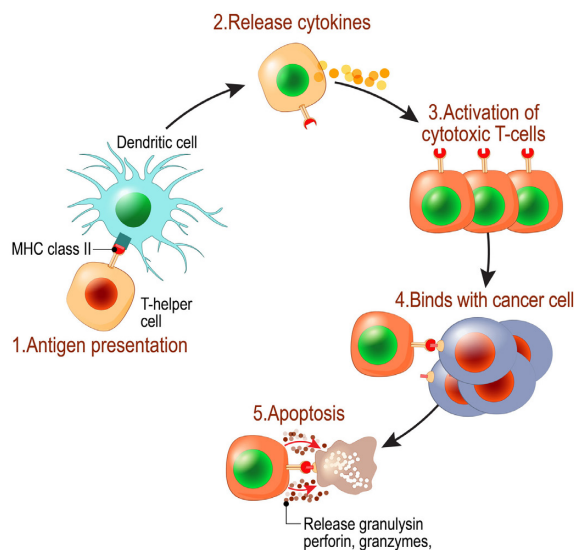


Figure 2. **Cancer and cytotoxic T cells**

Source: 123rf.com

guish perforin levels in Prf1(+/+) and Prf1(+/-) mice (22). Hemophagocytic Lymphohistiocytosis (HLH) is a disruption characterized by heavy abnormalities connected with uncontrolled hyperactivation in the immune system. Family (Hemophagocytic Lymphohistiocytosis) HLH can be caused by a characteristic perforin gene mutation. It proves that gene shortcomings cause the lack of perforin. It can be a significant cause of HLH development, that is why, perforin expression in CD16 +CD56+ NK cells is included in the HLH diagnosis protocol (10).

Meanwhile, partial lack in perforin production can be the cause of increased sensitivity to hematological malignancies development (leukemia and lymphoma). Detailed analysis of patients with mutation PRF1 and with postponed symptoms typical for HLH, (Hemophagocytic Lymphohistiocytosis) showed that half of the examined patients had developed primary hematological diseases. The cytometric analysis showed that abnormal binding of perforin on the target cell (neoplastic cell) is the main resistance mechanism to perforin. The mutation in both perforin's allele gens may be the cause of uncontrolled lymphoproliferation. Research on knockdown mice model showed that those animals were more vulnerable to neoplastic diseases than those with normal perforin

content. It confirms the significant role of perforin-dependent cytotoxic mechanisms in the anti-tumor response. The role of perforin and granzyme B in inhibiting tumor growth and disease progression suggests that this mechanism may become a therapeutic target in the future (11).

## Colorectal cancer

A host against a tumor is thoroughly confirmed in the defense mechanism in the content for the role of tumor-infiltrating lymphocyte (white blood cell that has migrated to a tumor, TIL). It is known that cytotoxic lymphocytes CTL and NK directly kill tumor cells. In the tissue of perforin, cancer can be extracted from CTL (cytotoxic T lymphocytes) and NK cells and have an important role in antitumor activity.

In colorectal cancer stroma, perforin (PRF) cells have been more numerous nearby tumor infiltration than in normal mucosa membrane. Also, the number of pore-forming protein (PFP) cells have decreased following tumor progression. Double coloring of PFP+ cells has shown that PFP in TIL (tumor-infiltrating lymphocyte) mainly produces CD8+ cells but not CD16 cells which were a different medical finding from that from PBL (peripheral blood lymphocyte). Nakanishi et al. explain that PFP+ cells were most numerous in Dukes A and decreased in number according to the progression of tumours (12). The PFP+ cells in TIL exhibited the same phenotypes as those in PBL but the PFP+ cells were more numerous in CD8+ cells than in CD16+ cells at all stages. This study represents the first evidence that PFP is mainly secreted from CD8+ cells in tumour tissues. It is hypothesised that the decrease in the number of PFP+ cells in accordance with tumour progression may reflect the suppression of the hosts local immunity (12).

In that way, this supports previous reports that CD cells have an important role in curbing tumor growth (15). A lot of researchers reported that the number of CD8+ cells or CD16 cells in TIL has got the tendency to be reduced in progressive cancer (13). PFP can also have an important role in the defense mechanism against cancer in coordination with other factors. The data about NK cells in peripheral blood of the patients with colorectal carcinoma can be found in the literature in the National Library in Medicine (NIH). The number of NK cells in peripheral blood is significantly reduced in patients with disseminated cancer forms. Meanwhile, there are contradictory data about the



reduction and increase of NK cells in peripheral blood of patients with colorectal cancer. Furthermore, following data from Carlsen et al., 1-2 % NK cells of the donors with a good health status have superficial term CD107a. It is a study mentioned (14) in the literature that an occurrence of CD107a on the surface is believed as a sign of NK cells degranulation and a patient's malignant tumor response to intrinsic environmental factors. The functional activity of peripheral NK cells in the patient with cancer is more significantly changed in comparison with the donor of a good health status. Namely, the percentage of CD56+CD107a+GB-PF cells is reduced, otherwise the percentage of CD56+CD107a+GB+PF+ cells is increased. The population of CD56+CD107a+GB-PF cells should have to be thought of as a group of functionally incorrect cells. These cells do not contain active cytotoxic enzymes in granulations whereas superficially expressed 107a protects NK cells from apoptosis after degranulation (14,15).

## Conclusion

Perforin is a cytotoxic protein that lymphocytes secrete to destroy virus-infected cells and tumor cells. It also plays an important role in the activity of cytotoxic T cells and natural killer cells as it causes a series of abnormal body cells and an elimination of cells infected with the virus and tumor. Upon degranulation, PRF inserts itself into the target cell's plasma membrane, forming a pore, in accordance with research of L.-F. Wang et al. The subsequent translocation of pro-apoptotic granzymes (including granzyme B, A, M et al.) into the cytoplasm provides the proteases with access to numerous protein substrates that promote apoptosis after cleavage. These proteases are believed to be the main executioners of target cell apoptosis. Although the PRF and granzyme components are both critical to this process and in some way involved in inducing cell death in target cells, the inhibition of tumor growth could still be efficient in granzyme-deficient mice. It is unclear whether PRF alone can suppress tumors. In this study, we discovered that forced ectopic expression of PRF alone, in the absence of granzymes, could mediate cell death in cancer cells. Although PRF and

granzyme's components are critical for this kind of process and in some way, cause cell death in the target cell and inhibit tumor growth. It is not clear that PRF can suppress tumors alone. Taking into consideration scientific facts, it may be possible to use PRF as pro-apoptotic gene for anti-tumor therapy (17).

Digestive malignancies still occur at persistently high rates, and disease progression in these kinds of cancers is associated with the escape of tumor disease surveillance.

So, NK cell dysfunction can be responsible for this phenomenon, but there is no clear explanation about the relationship between tumor immune surveillance in digestive malignancies and NK cell dysfunction.

It is clear that mutation of function loss in genetic PRF decoding significantly reduces the ability of cytotoxic T lymphocytes and natural killer cells to kill target cells by that way causing immunosuppression and impairing the immune system (18).

It is not yet proven that NK cells have a key role in suppression of the development of spontaneous metastases in patients with cancer. Despite a wide range of studies, it has not yet been clear whether NK cells play a key role in suppressing the development of spontaneous metastases in cancer patients. Despite a wide range of studies, it remains unclear to date to what extent primary tumor growth along with the formation of distant metastases and NK cell activity affect each other.

The increase of primary tumor's size in patients with colorectal carcinoma results in the increased share of activated peripheral blood NK cells, cytolytic granules which contain enzymes GB and PF. Even though besides producing lymphogenic metastases, hematogenic metastases in the liver as the main form of cancer progression for colorectal carcinoma, the presence or absence of lymphogenic spread, has no significant impact on perforin quantity and NK cell subpopulation (19).

Properly sensitized dendritic cells (DCs) may also be effective in immunotherapy against cancer. It may be effective in  $\gamma$ -irradiated colon cancer cell lines HT-29 (GIH, growth hormone-inhibiting hormone). Growth hormone-inhibiting hormone induces maturation and activation of DCs. In that way, GIH-DCs shows increased cytotoxic activity and bigger perforin and granzyme expression. Arguably, these results show that efficient activity against cancer is induced when

DCs are sensitized with  $\gamma$ -irradiated colon cancer. In that way, through a direct increase of cytotoxicity and indirect T cell activation so we may act in an anti-tumor way (20).

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## Abbreviations

C terminal- the end of the peptide chain carrying the free alpha carboxyl group of the last amino acid, conventionally written to the right

C6- Complement component 6 (C6 protein) in the complement cascade system of immune proteins (native immunity)

C7- C7 protein, engineered transcription factors

C8- C8 complex, three proteins involved in the complement system (part of the immune system)

C9- C9 (Complement component 9), a protein

Ca<sup>2+</sup>- A gene on chromosome 8q22 that encodes an isoenzyme of carbonic anhydrase, a zinc metalloenzyme that catalyses the reversible hydration of carbon dioxide. Carbonic anhydrase 2 is essential for bone resorption and osteoclast differentiation

CD 107a- cluster of differentiation 107a

CD 16- cluster of differentiation 16

CD 4-cluster of differentiation 4

CD 56- cluster of differentiation 56

CD 8 T- cluster of differentiation 8 trombocyte

CTL- Cytotoxic T-Lymphocyte (immunology)

DNA- deoxyribonucleic acid

DCs- dendritic cells

GIH- growth hormone-inhibiting hormone

HLH- Hemophagocytic Lymphohistiocytosis

LDL- low-density lipoprotein (Biochemistry)

MHC- major histocompatibility complex, minor histocompatibility complex.

N terminal-the amino (NH<sub>2</sub>) end of a polypeptide chain, conventionally written to the left

NK-Natural killer cell

PAF- platelet-activating factor

PBL- Peripheral blood lymphocyte

PFP-phosphate; phosphotransferase (PFP is an exclusively cytosolic enzyme that catalyses the phosphorylation of fructose-6-phosphate to fructose-1,6-bisphosphate in the glycolytic direction, and the de-phosphorylation of fructose-1,6-bisphosphate to fructose-6-phosphate in the gluconeogenic reaction)

PRF- Platelet Rich Fibrin

PFR - PoreForming Protein

TIL- Tumour-infiltrating lymphocyte, a white blood cell that has migrated to a tumour

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## ULOGA PERFORINA

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### Sažetak

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Istražena je literatura o ulozi perforina u medicini. Prvi je korak bio sustavno pretraživanje tako da se prepoznaju relevantne studije koje su objavljene od 2001. i 2019. u sljedećim elektroničkim bazama: EBSCOhost, Scopus, ScienceDirect, Web of Science i Elsevier. Analizom dostupne literature zaključuje se da perforin igra važnu ulogu u citotoksičnoj aktivnosti prirodnoubilačkih stanica i CD8<sup>+</sup> stanica. Prirodnoubilačke stanice i CD8<sup>+</sup> služe se istim mehanizmom za uništenjem ciljnih stanica. U ovom radu navedena je bolest hemofagocitnalimfocitocitoza (HLH) koju obilježavaju iznimne abnormalnosti u području imunskog sustava. Poanta je u tome da ovu bolest uzrokuje genska mutacija perforina. Ključ je u primjeni pravilno senzibiliziranih dendritičnih stanica (DCs) koje mogu biti također učinkovite u imunoterapiji protiv raka. GIH inducira sazrijevanje i aktivaciju DCs. GIH-DCs pokazuju povećanu citotoksičnu aktivnost te veću ekspresiju perforina i granzima. Teorijska istraživanja pokazala su da je učinkovita aktivnost protiv raka inducirana kada se DCs senzibiliziraju s  $\gamma$ -ozračenim stanicama raka. Tako se putem izravnog povećanja citotoksičnosti i neizravne aktivacije T-stanica možda još može djelovati antitumorski. Predlažem da se nastavi znanstveno istraživanje o ulozi perforina u budućnosti.

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**Ključne riječi:** perforin, limfociti, ciljna stanica, granzimi, literatura

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# Correlation between Depression and Anxiety in Patients with Chronic Non-Malignant Pain

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**Article received:** 18.03.2021.

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**Article accepted:** 12.04.2021.

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**DOI:**10.24141/2/5/1/8

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**Keywords:** depression, anxiety, chronic non-malignant pain, ethnicity, primary health care

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## Abstract

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**Introduction.** Two-thirds of primary care patients with depression also have somatic symptoms present, making detection of depression more difficult. Primary health care is the first level of screening for depression, and early detection is key to treatment success. Anxiety also has a high comorbidity rate with chronic pain conditions. Generalized anxiety disorder (GAD) is common among patients with “medically unexplained” chronic pain and chronic physical illness and is also a predictor of chronic musculoskeletal pain after trauma. Belonging to different ethnic groups and ignorance of these differences by primary care physicians can be an obstacle to good health care, especially early recognition of depressive symptoms.

**Aim.** The aim of this proposed, systematic work was to draw conclusions from empirical research dealing with the processes involved in the examination of depression, anxiety, and chronic non-malignant pain. The research question for this review paper was to examine the correlation of depression and anxiety with chronic non-malignant pain. The aim was to examine the role of primary health care in recognizing, preventing, and treating depression and anxiety in patients with chronic non-malignant pain, and whether there is a difference in the correlation between depression, anxiety, and chronic non-malignant pain according to ethnicity.

**Methods.** Methods for identifying the study were derived from the Medline database (via PubMed).

The analysis included all scientific papers in English, regardless of methodology, published since 2011. The papers dealt with the correlation between depression, anxiety, and chronic non-malignant pain, and included the population of primary care patients over 18 years of age who suffer from chronic non-malignant pain and at the same time have symptoms of depression and anxiety present or are members of ethnic groups. 403 articles were found, original and review papers, of which, after a detailed reading, 10 were selected that meet the inclusion criteria for the purposes of this review.

**Results.** Depression and anxiety are significantly more present in people with chronic pain (23%), compared to those who do not have chronic pain (12%). The most common is chronic musculoskeletal pain, with one-third of patients having depression. Depression and anxiety are significantly associated with the intensity and duration of pain. Chronic pain and depression also differ according to ethnic groups, with cultural differences and language barriers being a barrier to early detection of depression.

**Conclusion.** Depression is the most common mental health disorder associated with chronic pain. It is extremely important to treat both depression and pain, in order to prevent the development of severe depression and chronic pain at an early stage. The integrated program at the level of primary health care is expected to have positive effects on both the physical and mental condition of patients. Cultural differences and ethnicity, which can significantly reduce the detection of depressive symptoms at the primary health care level, should certainly be taken into account.

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**Keywords:** depression, anxiety, chronic non-malignant pain, ethnicity, primary health care

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## Introduction

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Depression and anxiety are the most common mental disorders in the general population (1,2) and the most common mental health disorder in patients in primary care (3-6). Although symptoms of depression are dominant in primary care patients, only a few

patients discuss these symptoms directly with their physician. Two-thirds of primary care patients with depression also have somatic symptoms present (e.g., headache, or chronic pain), making it difficult to detect depression (7,8).

If patients are not directly asked about their mood, they will omit information about depressive symptoms for a variety of reasons, including fear of stigmatization, belief that depression is beyond primary health care, belief that depression is not a "real" disease but a personal flaw. There are also concerns about medical records and data confidentiality, as well as concerns about prescribing antidepressant medications or referrals to a psychiatrist (9).

Among patients with chronic diseases, the annual prevalence of depression is significantly higher, about 25% (10). The rate of depression may be particularly high in diseases of the central nervous system (e.g., stroke, traumatic brain injury, Parkinson's disease) (11-13), cardiovascular disorders (14,15), cancer (16), and conditions involving immune and inflammatory mechanisms (e.g., systemic lupus erythematosus) (17). Risk factors for depression may be genetic, medical, environmental and social in nature, and they include: previous depressive episodes, family history, female gender, childbirth (i.e., postpartum depression), childhood trauma, stressful life events, poor social assistance, serious medical illness, dementia, drug abuse (18).

Patients with depressive syndrome may have mood swings, cognitive, neuro-vegetative, or somatic symptoms. Mood swings include sadness, emotional stress, emotional emptiness, or sometimes anxiety or irritability. Neuro-vegetative symptoms include loss of energy, changes in sleep, appetite, or weight. Some patients are more likely to have somatic symptoms (headache, pelvic pain, back pain, or other physical ailments), which can interfere with the diagnosis of depression. Populations in which somatic symptoms often predominate are pregnant women, the elderly, prisoners, members of other cultural nations, low-income patients, and patients with comorbidity of somatic symptoms and other diseases (7).

Risk screening options include two approaches. The first approach, recommended by the United States Preventive Services Task Force (USPSTF) is to monitor all patients during routine depression examinations and further evaluate those whose score is above a certain threshold (19). The second approach



is more selective, known as case-finding, and evaluates only those patients whose clinical condition raises the suspicion of depression (20): insomnia, fatigue, chronic pain, recent life changes or stressors, good or poor health self-assessment, unexplained physical symptoms. Although the likelihood of depressive disorder increases by 1.5 to 3.5-fold if a patient reports any of these symptoms, this targeted approach is only moderately more effective than routine screening and detects more patients with depressive disorder (21, 22).

Depression is widespread throughout the world, with a tendency to increase (23). A study conducted in ten countries: Brazil, Canada, Chile, the Czech Republic, Germany, Japan, Mexico, the Netherlands, Turkey, and the United States, shows that the prevalence of depression ranges from 3% in Japan to 16% in the United States. The average range is from 8-12% (24).

Data for Slovenia show that the prevalence of depression by gender is 17.4% in men and 14.6% in women. Major depressive disorder is more present in women (6.5%) while it is significantly lower in men (0.6%) (25). The lower rate of depression in some countries may be explained by cultural or genetic factors (26). For Croatia, there is no exact data for the prevalence of depression, but a survey was conducted for the capital of Croatia, Zagreb, where the prevalence of depression is about 2.2% (27).

Anxiety is closely related to depression, and these two most common mental health disorders are studied together. Generalized Anxiety Disorder (GAD) is characterized by excessive and persistent anxiety, which is difficult to control, and causes significant discomfort or damage, and lasts for at least six months. Other features include psychological symptoms of anxiety, such as irritability, and physical (or somatic) symptoms of anxiety, such as increased fatigue and muscle tension. Efficacy in the treatment of GAD includes psychological interventions such as cognitive-behavioral therapy and relaxation and pharmacotherapy. Epidemiological studies on nationally representative samples in the U.S. have found that generalized anxiety disorder (GAD) predominates from 5.1% (28, 29) to 11.9% (30). A review of epidemiological studies in Europe (EU) estimates that 38.2% of the EU population suffers from a mental disorder each year. The most common disorders are anxiety disorders (14.0%), insomnia (7.0%), major depression (6.9%) (31). In a study of patients in primary adult care in four Nordic countries, GAD rates

ranged from 4.1 to 6.0% among men and from 3.7 to 7.1% among women (32). Anxiety disorder is about twice as common in women (28, 29) and probably the most common mental disorder in the elderly population (31,33).

GAD is common among patients with "medically unexplained" chronic pain (34) and chronic physical illness (35). Although excessive and long-term anxiety is a feature of a generalized anxiety disorder (GAD), most patients have other symptoms present related to irritability, hyperactivity, and muscle tension. Many complain of poor sleep, fatigue, and difficulty relaxing. Headaches and pains in the neck, shoulders, and back are very common.

Chronic non-malignant pain is a major public health problem with a continuous increase in prevalence. Despite numerous studies, various pharmacological and non-pharmacological methods of treatment, and the establishment of pain treatment centers and clinics, chronic pain is still present in about 20% of the adult European population (36). Psychosocial factors, as well as individuals' reactions to pain, play an important role in the development of chronic pain (37). Studies show that both depression and anxiety are significantly more present in people with chronic pain (23%), compared to those who do not have chronic pain (12%) (38).

The objectives of the study were to investigate whether there is correlation between depression and anxiety and chronic non-malignant pain, their impact on treatment outcomes, and to investigate the association of chronic pain and depression among different ethnic groups.

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## Methods

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### Sources of papers and search strategies

A review of articles from the Medline database (via PubMed), on the topic of the relationship between depression, anxiety, ethnicity, chronic non-malignant pain, and primary health care.

The search strategy was a combination of terms that met the inclusion criteria, as possible methodologi-



cal filters. For Boolean operators, the terms were combined with each other (and, or): depression and anxiety, and chronic non-malignant pain, and primary care or family practice, or primary level and ethnicity, depression and anxiety and chronic pain, primary health care or family medicine, or primary level and ethnicity). Search terms were keywords in English: depression, anxiety, chronic non-malignant pain, primary care, ethnicity.

### **The process of including and excluding papers in the review**

The analysis included papers according to the following criteria: all scientific papers in English, regardless of the methodology; papers related to the correlation between depression, anxiety, and chronic non-malignant pain; papers which included primary care patients who were older than 18 years, members of ethnic groups and who were suffering from chronic non-malignant pain and at the same time had symptoms of depression and anxiety. As the research question was too broad, it needed to be narrowed down, so only papers published in the last five years (since 2011) were included in the review.

The excluded papers were the papers not written in English or the papers that did not include all the pre-defined criteria, as well as the papers published before 2011 that included patients under 18 years of age and the patients that did not have chronic non-malignant pain with concomitant symptoms of

depression and anxiety. Paper titles that included depression, anxiety, chronic pain, primary health care, and ethnicity were reviewed.

The final analysis included 10 papers in English, published in 2011, that met all the given criteria: the correlation between depression, anxiety, and chronic non-malignant pain at the level of primary care.

### **Methods of analysis**

Selected papers were analyzed in four steps. In the first step, the analysis included those articles whose titles corresponded to the selected keywords entered into the Medline database (via PubMed). In the second step, the papers published in the period 2011-2016 were analyzed. In the third step, abstracts of papers corresponding to the title and year of publication were analyzed. In the fourth step, a table was made with the overview of the included papers according to the title, goals, surveyed population, research method, and results. The articles were divided into groups, depending on the field of the topic they deal with (depression, anxiety, ethnicity, primary health care, and chronic non-malignant pain). Content analysis was performed. The correlation between depression, anxiety, and ethnicity in patients with chronic non-malignant pain, at the level of primary health care was researched.

## Result

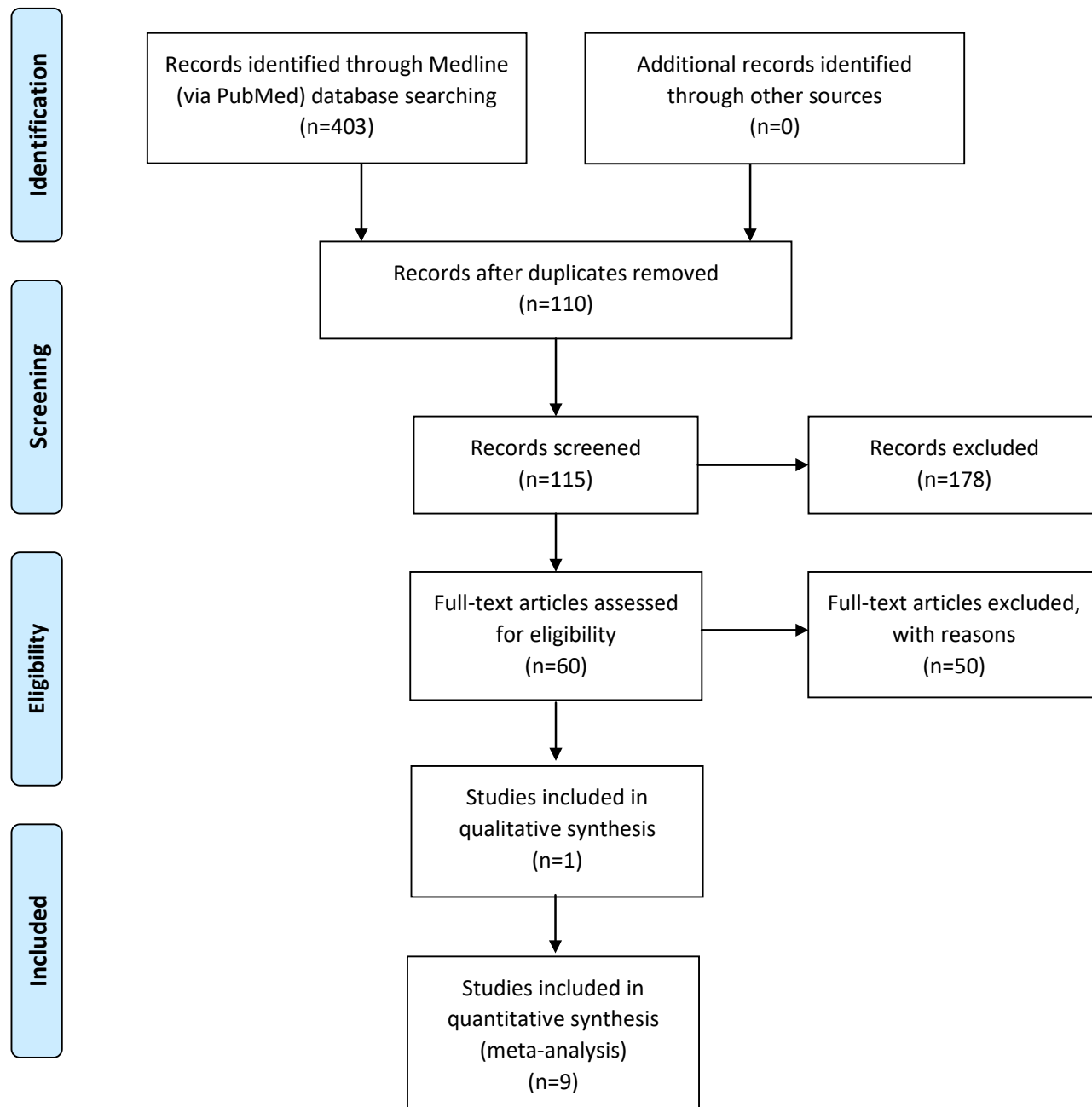


Figure 1. **Flow chart of article search and selection process**

Table 1. **Overview of the studies finally included**

Study	Aim	Observed population	Methods	Conclusion
Psychological considerations in the assessment and treatment of pain in neurorehabilitation and psychological factors predictive of therapeutic response: evidence and recommendations from the Italian consensus conference on pain in neurorehabilitation (39)	<ol style="list-style-type: none"> <li>1. Identify psychological factors that are related, or are predictive of pain and are a consequence of neurological diseases.</li> <li>2. Assess the impact of these aspects on the outcome of neurorehabilitation.</li> </ol>	Patients with various forms of chronic non-malignant pain.	PubMed database search - a systematic review of the literature.	Psychological factors (depression, anxiety, coping strategies, excessive experience of pain severity, and beliefs about pain) are associated with pain. These factors may predict therapeutic response to neurorehabilitation interventions.
Understanding the link between depression and pain (40)	Elucidate the relationship between depression and pain.	Patients with chronic musculoskeletal pain.	Searching databases (MedLine and PhysicINFO) found 244 articles including 6 reviews.	There is a valid reason to treat both depression and pain, in order to prevent the development of true depression and chronic pain at an early stage.
Efficacy and safety of oral ketamine versus diclofenac to alleviate mild to moderate depression in chronic pain patients: A double-blind, randomized, controlled trial (41)	Examine the safety and efficacy of oral ketamine versus diclofenac, in reducing symptoms of mild to moderate depression in patients with chronic pain.	Patients with chronic pain and symptoms of mild to moderate depression.	A randomized, controlled, double-blind study, with two groups of subjects. (Original article)	Oral ketamine is a safe and effective choice in improving depressive symptoms in patients with chronic pain and mild to moderate depression.
Evaluation of a multicomponent programme for the management of musculoskeletal pain and depression in primary care: a cluster-randomised clinical trial (the DROP study) (42)	Examine whether a new program for an integrated approach to chronic musculoskeletal pain and depression leads to better results than conventional care.	n = 330 patients aged 18-80 years, with moderate or severe musculoskeletal pain ( $\geq 5$ ), for at least 3 months and with major depression criteria (DSM-IV).	Cluster randomized controlled trial in two groups: control and the test group. (Original article)	Depression and chronic musculoskeletal pain may benefit from an integrated program at the primary care level. Positive effects on both the physical and mental condition of the patient are expected.
Anxiety, depression and quality of life in individuals with phantom limb pain (43)	The aim of the study was to assess emotional factors, such as anxiety and depression, and the quality of life of people with chronic pain after amputation of a body part.	n = 27 patients aged 18-80 years.	Descriptive, cross-sectional study with a quantitative approach (semi-structured interview) (Original article)	Anxiety is more common at the age of 18-38, and depression is more prevalent in older patients aged 60-80.

Study	Aim	Observed population	Methods	Conclusion
Diagnosing Depression in Chronic Pain Patients: DSM-IV Major Depressive Disorder vs. Beck Depression Inventory (BDI) (44)	The aim of this study was to evaluate the association of somatic and cognitive-emotional items of the Beck Depression Scale with the diagnosis of depression, pain intensity, and disability.	n = 100 patients with chronic pain	Structured clinical interview. (Research article)	Somatic, physical symptoms factors are associated with major depressive disorder (-MDD), while a negative self-image is not. Insomnia and weight loss were not dependent on the diagnosis of depression..
Impact of depression and anxiety on burden and management of episodic and chronic headaches - a cross-sectional multicentre study in eight Austrian headache centres (45)	The aim of this study was to evaluate the impact of depression and anxiety on the treatment of episodic and chronic headaches in patients, in eight Austrian headache centers.	n = 392 patients with chronic headache	Cross-sectional multicenter examination. Original article.	Depression and anxiety were more common in subjects with chronic than episodic headaches (64% vs. 41%, $p < 0.0001$ ).
Depression among chronic pain patients at Hospital Tengku Ampuan Rahimah, Klang (46)	The aim of this study was to investigate the incidence of depression and depression-related factors, in a sample of patients with chronic pain in Malaysia.	n = 83 clinically diagnosed patients with chronic pain.	Cross-sectional study. Original article.	Nearly a third of patients with chronic pain, in this study, have depression. Depression is significantly associated with the intensity and duration of pain.
Selected aspects of mental health of elderly patients with chronic back pain treated in primary care centers (47)	The aim of this study was to assess the mental health of patients with chronic back pain treated in primary care centers.	n = 100 (53 patients with chronic back pain and 47 patients without pain, in the control group)	The research was conducted as an anonymous screening study.	The study found that mental health was significantly poorer in patients with chronic back pain than in healthy individuals. A preliminary assessment of aspects of mental health shows that more attention should be paid to the rehabilitation of patients with chronic back pain treated in primary care practices.
Ethnic differences in the association between depression and chronic pain: cross-sectional results from UK Biobank (48)	The aim of this study was to investigate chronic pain and depression with respect to ethnic groups and to examine whether this association differs, regardless of possible factors.	n > 500,000 subjects with chronic pain and depression, aged 40-70 years, across England, Scotland, and Wales.	Cross-sectional study. Original article.	Chronic pain and depression differ according to ethnic groups.

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## Discussion

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Musculoskeletal pain is one of the most common chronic non-malignant pain conditions, especially in patients in primary care, and is often associated with depression (42). Nearly one-third of patients with chronic pain also have depression (46). Of the many factors studied related to chronic non-malignant pain (depression, anxiety, excessive experience of pain severity, coping strategies and belief in pain), depression has been identified as a key factor and can be considered a predictor of secondary painful symptoms and conditions, such as, musculoskeletal pain, multiple sclerosis, etc. (49,50). Of the demographic variables, the following are associated with depression: education level, age, and marital status, younger women, older men, the unemployed, and those who have been suffering from pain for a longer period of time have a greater correlation with depression (51). Anxiety and depression also occur in patients who suffer from persistent chronic pain after limb amputation, at different levels (transfemoral, transtibial, transcarpal, and transhumeral). Research shows that anxiety is more common at a younger age, 18-36 years of age, while depression is more common in those of the older age group, 60-80 years of age (43).

In their study, Seed et al. (2015) particularly pointed out that higher pain intensity is significantly associated with the outcome of depression (46) and that depression significantly complicates effective pain management and affects quality of life, as confirmed by other authors (43 - 46). People who suffer from musculoskeletal pain and who are also depressed are twice as long on sick leave than those who suffer from pain but are not depressed (52,53). In general, depression and anxiety reduce quality of life (44,45), affect work status, resulting in reduced earnings, reduced career success, and a lack of understanding of the community. Social support, understanding of family, employers and colleagues have a strong impact on reducing anxiety and depression. It happens that patients avoid telling or complaining about experiencing pain such as a headache. Anxiety and depression have been shown to be more common in people with chronic headaches than in those with episodic headaches, and the ratio is 64% to 41% (45).

However, those with chronic headaches are more likely to seek medical help than those with episodic headaches (54). Examining the mental state in patients with chronic back pain, the results obtained show that mental health is significantly worse in patients with chronic non-malignant back pain than in healthy individuals. A preliminary assessment of aspects of mental health shows that more attention should be paid to the rehabilitation of patients with chronic back pain treated in primary care settings (47).

Assessing depression in chronic pain is challenging because somatic symptoms of depression and pain often overlap (44). Somatic symptoms are the ones that often lead to the diagnosis of depression, and if they were ruled out when diagnosing it, the rate of detected or diagnosed depressions would probably be drastically reduced (55). The consequences of undiagnosed depression are associated with a higher risk of suicide attempt in patients with chronic non-malignant pain (56). By analyzing somatic and cognitive-emotional symptoms separately, it is possible to shed light on the occurrence of depression in chronic non-malignant pain (44). Although anxiety has been studied to a lesser extent than depression, it still has a high comorbidity rate with chronic pain conditions, and correlates with pain intensity, for example, it exacerbates headaches after traumatic brain injury (57,58) and is also a predictor of chronic muscular bone pain after trauma (59).

In neurorehabilitation, effective pain management must certainly take into account both specific (e.g., anxiety, depression) and non-specific psychological factors of various illnesses (e.g., anger, fear, anger, avoidance, uncertainty), but also include the environment in which the person lives and family relationships as well (39). Therefore, there is a valid reason for the simultaneous treatment of both depression and pain, in order to prevent the development of severe depression at an early stage, but also chronic pain (40). It often happens that the focus is only on one of the symptoms, either chronic pain or depression, and in that case the other disease remains undetected. Both symptoms, depression and chronic non-malignant pain, need to be treated (39) thus increasing the successful outcome of treatment (40). The symptom of over-experiencing the severity of pain, which is also a factor associated with depression, should not be overlooked (39, 40). For example, if patients with chronic non-malignant pain, and concomitant mild to moderate depression, are given oral Ketamine therapy, the symptoms of depression improve (41).

Patients who come to the doctor at primary health care differ in many aspects: age, gender, employment status, level of education, etc., and there are also differences in cultural and ethnic affiliation. These differences should certainly be taken into account, since the study by Nicholl et al (2015) showed that there are cultural barriers within the three ethnic groups that were included in the study (whites, Asians, and blacks) (48). In line with these differences, it is recommended to adapt the approach to patients of different ethnic groups. For example, population studies show that ethnic groups (Indians, Pakistanis, and Bangladeshis) in the United Kingdom (UK) go to the doctor more often than others for musculoskeletal pain, and this pain is spread in several places in the body (60). Regarding the correlation between depression and chronic pain, research by Nicholl et al (2015) shows that this association is present in all three ethnic groups studied (whites, Asians, and blacks), but is still somewhat more pronounced in the Asian and black ethnic groups. The majority of respondents had a history of depression, while the comorbidity of depression and chronic pain was present in 11% of respondents, and more often in ethnic minorities, especially in blacks as an ethnic group (48). On the other hand, mental health problems have been detected to a lesser extent in ethnic groups (Indians, Pakistanis, and Bangladeshis) by primary care physicians (60). Cultural differences and language barriers can be an obstacle to good health care, as well as ignorance of these differences by health professionals (48). With integrated programs at the primary health care level, positive effects can be expected on both the physical and mental condition of patients (42). It should certainly be emphasized that appropriate, valid treatment is of paramount importance, and above all adequate screening, i.e., early detection of depressive symptoms and risk groups, which certainly include people with chronic non-malignant pain.

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## Conclusion

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Depression and anxiety are very common in patients suffering from chronic pain and are significantly associated with pain intensity. Liaison or consultative psychiatry should certainly be included in the treat-

ment of patients with chronic pain for the purpose of diagnosing depression and anxiety. Oftentimes, the depressive disorder remains undetected and masked by physical symptoms. Primary care physicians are the first to be contacted by patients and this should be the site of the first level of screening. Good education of family physicians should also include knowledge of the mental disorders associated with most organic chronic diseases, especially those accompanied by pain. However, health professionals are often focused on only one disease and do not address other medical conditions. Optimal treatment at the primary care level should include a holistic approach and address concomitant conditions as well, since anxiety and depression along with chronic pain, often remain unrecognized and inadequately treated. This may be due to lack of time, cultural barriers, insufficient resources, or the skills of doctors. Early detection and treatment of psychological symptoms also result in a reduction in the secondary consequences of somatic disorders.

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## POVEZANOST DEPRESIJE I ANKSIOZNOSTI KOD BOLESNIKA S KRONIČNOM NEMALIGNOM BOLI

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### Sažetak

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**Uvod.** Dvije trećine pacijenata primarne zdravstvene zaštite s depresijom ima prisutne i somatske simptome, čineći otkrivanje depresije težom. Primarna zdravstvena zaštita prva je razina probira za depresiju, a rano otkrivanje ključno je za uspjeh liječenja. Anksioznost također ima visoku stopu komorbiditeta s kroničnim bolnim stanjima. Generalizirani anksiozni poremećaj (GAD) čest je među pacijentima s „medicinski neobjašnjivom“ kroničnom boli i kroničnim fizičkim bolestima te je i prediktor kronične mišićno-koštane boli nakon traume. Pripadnost različitim etničkim skupinama i činjenica da liječnici primarne zdravstvene zaštite nepoznaju te razlike mogu biti prepreka u dobroj zdravstvenoj skrbi, prije svega ranom prepoznavanju simptoma depresije.

**Cilj.** Cilj ovog predloženog, sistematičnog rada bio je izvući zaključke iz empirijskog istraživanja koje se bavi procesima uključenima u ispitivanje depresije, anksioznosti i kronične nemaligne boli. Istraživačko pitanje za ovaj pregledni rad bilo je ispitati povezanost depresije i anksioznosti s kroničnom nemalignom boli. Cilj je bio ispitati ulogu primarne zdravstvene zaštite u prepoznavanju, prevenciji i liječenju depresije i anksioznosti kod bolesnika s kroničnom nemalignom boli te postoji li razlika u povezanosti depresije, anksioznosti i kronične nemaligne boli s obzirom na etničku pripadnost.

**Metode.** Metode za identifikaciju studije izvedene su iz baze podataka Medline (via PubMed). U analizu su uključeni svi znanstveni radovi na engleskom jeziku, bez obzira na metodologiju, objavljeni od 2011. koji

se odnose na povezanost depresije, anksioznosti i kronične nemaligne boli, koji obuhvaćaju populaciju pacijenata iz primarne zdravstvene zaštite starijih od 18 godina koji boluju od kronične nemaligne boli i istodobno imaju prisutne simptome depresije i anksioznosti ili su pripadnici etničkih skupina. Pronađeno je 403 članka, originalnih i preglednih radova, od kojih je nakon detaljnog čitanja odabrano 10 koji zadovoljavaju uključujuće kriterije za potrebe ovog pregleda.

**Rezultati.** Depresija i anksioznost značajno su prisutnije kod osoba s kroničnom boli (23 %) u odnosu na one koji ih nemaju (12 %). Najčešća je mišićno-koštana kronična bol, pri čemu trećina pacijenata ima depresiju. Depresija i anksioznost značajno su povezane s intenzitetom i trajanjem boli. Kronična bol i depresija razlikuju se i s obzirom na etničke skupine, pri čemu kulturalne razlike i jezična barijera mogu biti prepreka u ranom otkrivanju depresije.

**Zaključak.** Depresija je najčešća smetnja mentalnog zdravlja koja je povezana s kroničnom boli. Od iznimne je važnosti liječenje i depresije i boli, kako bi se u ranoj fazi spriječio razvoj teže depresije i kronične boli. Od integriranog programa na razini primarne zdravstvene zaštite očekuju se pozitivni učinci i na fizičko i na psihičko stanje pacijenata. Svakako treba uzeti u obzir kulturološke razlike i etničku pripadnost, koje na razini primarne zdravstvene zaštite mogu značajno smanjiti otkrivanje simptoma depresije.

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**Ključne riječi:** depresija, anksioznost, kronična nemaligna bol, etnička pripadnost, primarna zdravstvena zaštita

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# Book review *Contemporary Perspectives on Ageism* by Liat Ayalon & Clemens Tesch-Römer

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**Article received:** 17.02.2021.

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**Article accepted:** 23.02.2021.

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**DOI:**10.24141/2/5/1/9

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**Keywords:** ageism, intervention, health professionals

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## Abstract

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The aim of the paper is to describe the contents of a book entitled *Contemporary Perspectives on Ageism*. Book debates around the various facets of ageism, its consequences on society and in society, and provides a background for several feasible interventions on how to tackle and attempt to lessen ageism. The book brings important theoretical and empirical knowledge to all those, who work with the older population.

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## Review of a book entitled *Contemporary Perspectives on Ageism* by Liat Ayalon & Clemens Tesch-Römer

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Ageism is a term that first appeared in the 1960s and has been an area of interest for many scientists in various fields since then. Multidisciplinary knowledge accumulated since 2018 has been collated in *Contemporary Perspectives on Ageism* by Liat Ayalon, a psychologist from Israel, in collaboration with Clemens Tesch-Römer, a psychologist from Germany, in this SpringerOpen edition. The book is available online and has been downloaded over 738,000 times over the last two years, which in itself speaks in favour of its significance for the scientific world.

Bringing together scientists from the social sciences, humanities, and biomedicine and health, the work is presented in a 550-page plain text format. Over four years, the editors collaborated with many authors from over 35 countries, and this book is the result of their work. Given the diversity of interests of each author and their large number, this is a truly exceptional example of multidisciplinary symbiosis in the fields of psychology, sociology, social work, medicine, health care, law, politics and economics, demography, pharmacy, and occupational therapy and communication, all united under a common denominator – ageism. The book provides a thorough insight into the very origin of ageism and its consequences on society and in society, and prescribes interventions aimed at combating negative stereotypes towards older people. It is divided into 31 chapters and thematically categorized. The first chapters focus on ageism in general at a global and individual level, describing the concept of ageism and its origin, as well as ageism in the labour market, and providing more perspectives from the economic and legal viewpoints. For me, as a health professional with a special interest in the incidence of ageism in nursing practice and health care, I have a particular interest in Chapter 13, “Ageism in the Health Care System: Providers, Patients, and Systems”, by Mary F. Wyman, Sharon Shiovitz-Ezra, and Jürgen Bengel. The chapter states that, statistically, elderly people make up two thirds of health care users, and this trend looks set to continue into the future. Negative attitudes towards elderly patients are potential obstacles to health equality and the quality of care and its outcomes. The chapter also deals with the elderly population at two levels of health care: the micro and the macro. From the micro, individual-level perspective, it describes attitudes among health professionals towards elderly patients, with special emphasis on the attitudes of nurses and nursing students, their communication styles, and the decision-making processes adopted for treatment and care. From the macro-level perspective, it examines the impact of economics on treatment, health care benefits, the reasons why older patients are not included

in clinical trials, and the consequences of a lack of education in the field of geriatrics. The key in the fight against negative attitudes towards elderly patients by health professionals is the provision of continuous education in the field of geriatrics and the inclusion of more geriatric topics in the curriculum. The latter is particularly emphasized as one of the interventions in the fight against ageism, although it is apparent that progress has been made in the last decade and that ageism is no longer viewed as an abstract and unknown concept. In conclusion, we can end on a positive note: there is a growing recognition of the manifestation of ageism at all levels and increasing support for interventions aimed at changing negative attitudes. By gathering the findings of so many different experts in one place, the editors have created an indispensable publication which answers a wealth of questions on the topic of ageism. The chapters are clearly structured and thematically presented to facilitate reading. I would recommend this book to all health professionals, primarily nurses, because their attitudes and styles of dealing with patients are examined in detail in chapter 13. I would also recommend it to all students in the field of medicine and health who are going to work with the geriatric population in the future in order to expand their existing knowledge, gain some further understanding of this issue, and recognize their ageist attitudes in time, even though these may be unintentional. The opportunity to download this book for free is certainly an added benefit and an incentive to recommend this valuable text book.

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## References

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## PRIKAZ KNJIGE *SUVREMENE PERSPEKTIVE AGEIZMA* AUTORA LIAT AYALON I CLEMENSA TESCH-RÖMERA

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### Sažetak

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Cilj je rada opisati sadržaj knjige naslova *Suvremene perspektive ageizma*. Knjiga raspravlja o različitim aspektima ageizma, njegovim posljedicama na društvo i društvu općenito te propisuje intervencije usmjerene na suzbijanje negativnih stereotipa prema starijim ljudima. Knjiga donosi važna teorijska i empirijska znanja svima koji rade sa starijom populacijom.

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**Ključne riječi:** ageizam, intervencije, zdravstveni profesionalci

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ISSN: 2584-6531