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CROATIAN NURSING JOURNAL

Contents

Original scientific papers

Professional paper

Review

Health Status and Work Ability among Nurses

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Abstract

Introduction. Nurses are considered to be an integral part of health care system. Exposure to high level of occupational stress and various psychological problems can have direct impact on nurses' work ability and their health.

Aim. To identify health problems that affect nursing professionals in the acute care hospital and the related factors, especially WAI.

Methods. The data were collected from December 2017 to June 2018 at the Sisters of Mercy University Hospital Center in Zagreb, Croatia. The study included 713 nurses. The data were collected using socio-demographic, health- and work-related questions and the Work Ability Index Questionnaire.

Results. Nurses' self-rated health is considered good, but out of 51 health difficulties and diseases offered, 10 different problems are present in more than 10% respondents, which seems very worrying. The most common are disorder of the lower back (38.7%), disorder of the upper back or cervical spine (38.1%), back injury (22.7%), gastritis or duodenal irritation (17.4%), sciatica (16.7%), and hypertension (15.1%). Out of 51 health problems, a significant difference in self-rated health was found in 45, and in 29 for current work ability. Higher age, female gender, secondary education, none or too much physical activity, less overtime hours, and commuting longer than 60 minutes are connected with different health problems, mostly musculoskeletal disorders.

Conclusion. It is necessary to focus more on the nurses' health condition, both in the research and practical sense, and undertake various preventive and curative procedures that will reduce the incidence of numerous health problems present in this population.

Introduction

The concept of work ability (WA) is a comprehensive approach optimising health and productivity in the workplace. It was developed by Tuomi and Ilmarinen, at the Finnish Institute of Occupational Health (1,2). The model encompasses the resources of the individual, the external factors related to their work, the environment outside of their work and how these factors relate to an individual's work ability (3). The Work Ability Index Questionnaire is an instrument widely used in occupational health and research to identify workers at risk of reduced work performance and work-related disability (4). The Work Ability Index (WAI) is a summary measure obtained by summing up the scores of responses to all items in the WAI questionnaire (1,2). According to Ilmarinen and von Bonsdorff (2015), WAI has been found to be a valid indicator of sickness absence from work, work disability, and early retirement from the labour market (5).

Nurses are the largest group of healthcare professionals in healthcare system (6) devoted to the patient's well-being and obliged to provide high quality, patient-centered and safe nursing care (7). Nurses play a critical role in health promotion, disease prevention and delivering primary and community care (8). According to Schaller et al. (2021), nursing profession is accompanied by great physical and mental health burdens (9). Nursing is a demanding job and includes various occupational hazards, and work stresses can have negative effects on nurses' health and quality of life (10). Evidence from the literature points to some stressors that are common in nursing profession such as: conflict with co-worker(s), job dissatisfaction, health disorders, decreased professional satisfaction, reduced correct and timely decision-making, experiences of violence (9,11). All of the above can have a negative effect on nurses' health causing occupational diseases and/or work accidents (11). Thus, it can also have direct impact on delivery of safe and quality care of patients (10,12). According to Fischer and Martinez (2013), WA among nurses is related to individual characteristics, working conditions, and a health-related work outcome (13). A significant negative correlation between the WAI score and nurses' age, years in current job, and number of reported diagnoses was reported (14). Research findings have shown an association between

intensity of biomechanical hazards and a reduction in WA among nurses (15), also between higher perceived exposure to work stressors and impaired WA among nurses (16). According to Donovan et al. (2013), maintaining and supporting nurses' health is vital to ensure their WA (17).

In Croatia, we can find extensive literature that deals with the mental health of nurses, but research that deal with their physical health is extremely rare. Also, the application of the WAI to the nursing population for research purposes is only sporadic, therefore we considered it important to examine the health status of nurses in one of the largest hospitals in Croatia. Therefore, the aim of the present study is to identify health problems that affect nursing professionals in the acute care hospital and the related factors. We focused on the third question in WAI questionnaire *The number of current diseases diagnosed by a physician* (51 medical problems) which provides three response options, relating respectively to an absence of disease, a presence of self-diagnosed disease, and disease certified by a doctor (18).

Methods

Study design

A cross-sectional study was carried out from December 2017 to June 2018 at the Sisters of Mercy University Hospital Centre (SMUHC) in Zagreb, Croatia.

Participants

A total population of 1465 nurses of different profiles (registered nurses, Bachelor of Nursing, Master of Science in Nursing) working at SMUHC was considered for inclusion in the study. Due to nurses' sick, annual or study leave, it was possible to deliver the questionnaire to 1300 nurses. Finally, a total of 713/1300 nurses participated in the study.

Instruments

The sociodemographic, health-related, and work-related questionnaire

The sociodemographic questionnaire items were gender, age, marital status, educational level. The second group consisted of health-related factors: self-rated health with answers from 1 - *great,* to 5 - *poor,* number of cigarettes per day, and the level of physical activity. The third group consisted of work-related factors: work length, overtime, and commute time (≤60 minutes, >60 minutes).

Work Ability Index Questionnaire

Finnish Institute of Occupational Health (FIOH) researchers Tuomi et al. (1998) developed the Work Ability Index Questionnaire (WAIQ) (1). The WAIQ has already been translated into Croatian within the framework of a research project entitled Health at work and healthy environment, led by Andrija Stampar School of Public Health, School of Medicine, University of Zagreb.

The WAIQ consists of 7 groups: 1 – current WA compared to the lifetime best (answers from 0 - *completely unable to work* to 10 - *the best possible WA*), 2 – WA in relation to the job demands (two questions: How do you rate your current work ability with respect to the physical demands of your work?; How do you rate your current work ability with respect to the mental demands of your work?), 3 – 51 type of different diseases or health problems which can be diagnosed by a physician or by themselves, 4 – estimated work impairment due to diseases, 5 – sick leave during the past year, 6 – personal prognosis of WA after 2 years, and 7 – mental resources referring to the worker's life in general, both at work and during leisure time (three questions: Have you recently been able to enjoy your regular daily activities?; Have you recently been active and alert?; Have you recently felt yourself to be full of hope for the future?) (2). The results in a total WAI score can range from 7 (unable to work) to 49 (full work ability). Based on this score, an individual is classified into standard work ability categories of excellent (WAI 44–49), good (WAI 37–43), moderate (WAI 28–36), and poor (WAI ≤27) (18). In the present study the Croatian version of a WAIQ (WAIQ-CRO) was used with Cronbach's α=0.71 (19).

Procedure

After obtaining the approval of the Ethics Committee of SMUHC, the principal investigator organized a meeting with the head nurses of each clinic at the SMUHC and presented them with the aim and objectives of the research and the research protocol. The total population of nurses working at SMUHC was considered for inclusion in the study. The study questionnaires were distributed to hospital departments in sealed envelopes. All questionnaires were returned anonymously in sealed envelopes to protect nurses' privacy.

Ethics

The study was carried out in accordance with the ethical principles of the Helsinki Declaration. All respondents gave their informed consent to participate in the study, which was approved by the SMUHC (code EP–7811/16-19).

Statistics

In the statistical analysis, standard descriptive statistics was first performed and reported as frequencies, percentages, means, medians and standard deviation. Although the Kolmogorov-Smirnov test showed a statistically significant difference from normal distribution for all observed quantitative variables, the additional verification of skewness and kurtosis does not exceed the recommended values for the application of parametric statistics. The only exception is the number of cigarettes per day where the skewness is 1.443, so we will use non-parametric procedures in inferential statistics to check the differences. The relationship between WAI and sociodemographic, health- and work-related factors was assessed using t-test or chi-square test. A data analysis was performed using IBM SPSS Statistics for Windows (Version 21.0. SPSS Inc. Chicago. IL. USA).

Results

The group consisted of 630 women and 83 men. The mean age was 38.4±12.5 years (range: 19-65 years) and the mean work length was 17.48 years (SD 12.8, range 0-45).

Average number of cigarettes per day is 4.96 (SD=7,51), with median 0, and range 0-40 cigarettes. The answers offered to the self-rated health question ranged from 1 – *bad* to 5 – *perfect*. Average result is 3.08, median is 3, which indicates good health (SD=1.034, and range 1-5). Average hours of overtime per month is 7.33 (SD=10.51), median is 0, and range from 0 to 57 hours.

Table 1. **Socio-demographic characteristics and health related factors among Croatian nurses (n=713)**			
Variable	**Categories**	**f**	**%**
Marriage status	married	371	52.1
	divorced	48	6.7
	widowed	18	2.5
	single	186	26.1
	extra-marital union	89	12.5
Level of education	secondary education	429	60.2
	Bachelor of Nursing	256	35.9
	Master of Nursing	28	3.9
Physical activity	none	101	14.2
	once a week	163	22.9
	two times a week	145	20.4
	three times a week	123	17.3
	every day	180	25.3

It can be seen that more than half of the sample consists of married people, followed by singles (about a quarter of the sample). The majority are high school nurses, up to 60%. Regarding physical activity, the answers are quite variable: the fewest are those who do not exercise at all (14%), and the most are those who exercise daily - a quarter of the sample.

In this paper, we were interested which health problems occur in nurses and technicians working at the hospital system, examined by the WAI questionnaire. The mean value of the total WAI score was 40.5±5.6 points. The largest number of respondents belongs to the category 'good WAI' (304-44%), followed by 'excellent WAI' with 238 respondents (34.4%), 'moderate' 132 respondents (19.1%), and 'poor' only 17 (2.5%).

In the following table, the frequencies and percentages for certain health problems are presented, regardless of whether they are expressed as an official medical diagnosis, or whether they are the assessment of the respondents themselves, because given that they are health professionals, we consider their opinion to be credible. Also, some health problems, such as repeated pain in the upper back, or back injury, are not even formal diagnoses, but rather a symptom, so the diagnosis of such a condition by a physician can be a problem. In the table, the difficulties are ordered from the most frequent to the least frequent.

In each of 51 categories of various health difficulties and diseases offered, there is at least one respondent. The percentage of patients with a single problem goes as high as 38.7% for disorder of the lower back, repeated instances of pain. As many as 10 different problems appear in nurses and technicians with a share of more than 10%.

The number of diagnoses given by respondents ranges from 0 for 153 respondents (21.5%), one diagnosis is given by 15.3% of people, two or 3 diagnoses are given by 13.9 or 13% of respondents, and even up to 19 or 20 diagnoses are stated by one person each. The median is two diagnoses, the mode is 0, while M is 3.26 (with SD 3.351). Due to the extreme deviation from the normal distribution, we can consider the median as the most representative average. For more frequent health problems, which appear in more than 10% of respondents, comparisons were made according to certain characteristics of respondents. For quantitative variables, comparisons were made using t-test.

Smrekar M. et al. Health Status and Work Ability among Nurses. Croat Nurs J. 2024; 8(2): 77-88

81

Table 2. **Frequencies and percentages for different health problems among nurses and technicians working in a hospital (n=713)**

		f	%
1.	Disorder of the lower back, repeated instances of pain	276	38.7
2.	Disorder of the upper back or cervical spine, repeated instances of pain	272	38.1
3.	Back injury	162	22.7
4.	Gastritis or duodenal irritation	124	17.4
5.	(Sciatica) pain radiating from the back into the leg	119	16.7
6.	Hypertension (high blood pressure)	108	15.1
7.	Musculoskeletal disorder affecting the limbs (hands, feet), repeated instances of pain	98	13.7
8.	Slight mental disorder or problem (for example, slight depression, tension, anxiety, insomnia)	89	12.5
9.	Leg/foot injury	82	11.5
10.	Repeated infections of the respiratory tract (also tonsillitis, acute sinusitis, acute bronchitis)	75	10.5
11.	Goiter or others thyroid disease	66	9.3
12.	Anemia	65	9.1
13.	Obesity	63	8.8
14.	Arm/hand injury	59	8.3
15.	Urinary tract infection	55	7.7
16.	Allergic rash, eczema	44	6.2
17.	Chronic sinusitis	39	5.5
18.	Visual disease or injury (other than refractive error)	39	5.5
19.	Benign tumour	36	5.0
20.	Rheumatoid arthritis	36	5.0
21.	Gallstones or disease	31	4.3
22.	Neurological disease (for example stroke, neuralgia, migraine, epilepsy)	29	4.1
23.	Bronchial asthma	28	3.9
24.	Injury of other part of the body	28	3.9
25.	Other cardiovascular disease	26	3.6
26.	Chronic bronchitis	21	2.9

		f	%
27.	Other musculoskeletal disorder	21	2.9
28.	Other endocrine or metabolic disease	20	2.8
29.	Problems or injury to hearing	19	2.7
30.	Diabetes	19	2.7
31.	Gastric or duodenal ulcer	17	2.4
32.	Kidney disease	17	2.4
33.	Other digestive disease	15	2.1
34.	Other rush	14	2.0
35.	Other skin disease	14	2.0
36.	Liver or pancreatic disease	11	1.5
37.	Colonic irritation, colitis	11	1.5
38.	Genitals disease (for example fallopian tube infection in women or prostatic infection in men)	11	1.5
39.	Other genitourinary disease	11	1.5
40.	Coronary heart disease, chest pains during exercise (angina pectoris)	10	1.4
41.	Mental disease or severe mental health problem (for example, severe depression, mental disturbance)	10	1.4
42.	Malignant tumour (cancer)	9	1.2
43.	Other respiratory disease	6	0.8
44.	Other blood disorder	5	0.7
45.	Other neurological or sensory disease	4	0.6
46.	Cardiac insufficiency	4	0.6
47.	Coronary thrombosis, myocardial infarction	3	0.4
48.	Pulmonary tuberculosis	2	0.3
49.	Emphysema	1	0.1
50.	Birth defect	1	0.1
51.	Other disorder or disease	1	0.1

	Health difficulty or disease characteristics of people with a certain problem	Health problem	Self-rated health			Current work ability		
			M	t	p	M	t	p
1.	**Disorder of the lower back, repeated instances of pain** worse assessment of health and work ability	yes	2.80	5.831	**0.000**	7.95	4.963	**0.000**
		no	3.25			8.60		
2.	**Disorder of the upper back or cervical spine, repeated instances of pain** worse assessment of health and work ability	yes	2.81	5.477	**0.000**	7.96	4.672	**0.000**
		no	3.24			8.58		
3.	**Back injury** worse assessment of health and work ability	yes	2.73	4.892	**0.000**	7.93	3.127	**0.002**
		no	3.18			8.47		
4.	**Gastritis or duodenal irritation** worse assessment of health and work ability	yes	2.87	2.468	**0.014**	8.03	2.236	**0.026**
		no	3.12			8.41		
5.	**(Sciatica) pain radiating from the back into the leg** worse assessment of health	yes	2.63	5.277	**0.000**	7.78	3.949	**0.000**
		no	3.17			8.46		
6.	**Hypertension (high blood pressure)** worse assessment of health and work ability	yes	2.52	6.271	**0.000**	7.66	4.562	**0.000**
		no	3.18			8.47		
7.	**Musculoskeletal disorder affecting the limbs (hands, feet), repeated instances of pain** worse assessment of health and work ability, less overtime	yes	2.39	8.758	**0.000**	7.47	4.932	**0.000**
		no	3.19			8.49		
8.	**Slight mental disorder or problem** worse assessment of health and work ability	yes	2.65	4.211	**0.000**	7.35	5.077	**0.000**
		no	3.14			8.49		
9.	**Leg/foot injury** worse assessment of health and work ability	yes	2.62	4.298	**0.000**	7.87	2.687	**0.007**
		no	3.14			8.41		
10.	**Repeated infections of the respiratory tract** worse assessment of health and work ability	yes	2.75	2.954	**0.003**	7.77	3.055	**0.002**
		no	3.12			8.41		

Table 3. **Means and significant differences for more frequent health problems of nurses and technicians working in a hospital (N=713)**

Groups with any of the 10 most common health problems rate their health significantly worse. The situation is identical in terms of current working ability. It should be mentioned that out of 51 health problems, a significant difference in self-rated health was found in 45. The difference is not significant only for coronary thrombosis/myocardial infarction, emphysema, colonic irritation/colitis, urinary tract infection, other rush, and other skin diseases. Respondents with any of the other 45 health complaints statistically significantly rate their health as worse. The current work ability is significantly different for 29 diseases.

As can be seen in Table 4, out of 10 health problems, for 7 of them a statistically significant difference was obtained by age, always in such a way that the group

with the disease is statistically significantly older. For this same seven health problems, a significant difference was also obtained for the length of service, therefore the service was not shown separately in the table. Only back injury, repeated infections of the respiratory tract and gastritis are not significantly related to age.

For number of cigarettes, no statistically significant difference for 10 most frequent health problems was found. The number of overtime hours in the previous month is relevant only for musculoskeletal disorder affecting the limbs: people with this difficulty have statistically significantly fewer overtime hours (t=3.490; p=0.001). The average of the group without this difficulty is 7.7 overtime hours, and for the persons with the difficulty is 4.8 overtime hours.

Smrekar M. et al. Health Status and Work Ability among Nurses. Croat Nurs J. 2024; 8(2): 77-88

83

Table 4. **Means and significant differences in age for more frequent health problems of nurses and technicians working in a hospital (N=713)**				
Health difficulty or disease characteristics of people with a certain problem	**Health problem**	**Age**		
		M	**t**	**p**
1. Disorder of the lower back, repeated instances of pain	yes	41.1	-4.539	**0.000**
	no	36.8		
2. Disorder of the upper back or cervical spine, repeated instances of pain	yes	41.7	-5.366	**0.000**
	no	36.5		
3. (Sciatica) pain radiating from the back into the leg	yes	44,2	-5.620	**0.000**
	no	37.3		
4. Hypertension (high blood pressure)	yes	51.8	-15.309	**0.000**
	no	36.1		
5. Musculoskeletal disorder affecting the limbs (hands, feet), repeated instances of pain	yes	47.2	-8.330	**0.000**
	no	37.1		
6. Slight mental disorder or problem	yes	42.9	-3.655	**0.000**
	no	37.8		
7. Leg/foot injury	yes	44.3	-3.866	**0.000**
	no	37.7		

For qualitative and ordinal variables, differences were checked using the chi-square test. A statistically significant difference by gender was found for disorder of the upper back or cervical spine, (χ^2=16.004; df=1; p=0.0001), and for musculoskeletal disorder affecting the limbs (χ^2=4.723; df=1; p=0.0001). In both cases, women suffer significantly more. Considering that the male gender is present with only 11.6% in our sample, these results should be taken with a certain reserve.

For more transparent analyses, we divided education into two categories: the group with secondary education (60.2%), and the other with tertiary education (39.8%). Significant differences were obtained for musculoskeletal disorder affecting the limbs (χ^2=9.723; df=1; p=0.002), hypertension (χ=16.469; df=1; p=0.0001), and gastritis or duodenitis (χ^2=4.398; df=1; p=0.036). Significantly more people with a secondary education have those health problems.

For shift work, a significant difference was obtained for back injury (χ^2=9.839; df=2; p=0.007) and musculoskeletal disorder affecting the limbs (χ^2=6.717; df=2; p=0.035), however, as comparison was made for three types of shift work, we additionally checked which pairs of groups have a significant difference.

It was shown that respondents who work in three eight-hour shifts suffer significantly more from back injuries (40.4%) than those who work only in the morning shift (23.7%) (χ^2=5.6967; df=1; p=0.017), as well as from those working in 12/24 shifts (20.3%) (χ^2=9.8241; df=1; p=0.0017). For musculoskeletal disorders affecting the limbs, only the morning shift (17.9% of patients) differs significantly from 12/24 shifts (11%); in the latter there are significantly fewer persons with the mentioned disorder (χ^2=6.3676; df=1; p=0.011).

The physical activity level was found to be significant for musculoskeletal disorders affecting the limbs. Since five answer categories were offered (not at all; once; twice, three times a week; every day), we combined the groups that exercise once and twice a week, and the chi-square is 12.497 (df=3; p=0.006). Subsequent matching showed that those who do not exercise at all have statistically significantly more musculoskeletal disorders in the limbs, compared to people who exercise once or twice a week (χ^2=5.3872; df=1; p=0.0203), and three times a week (χ^2=12.084; df=1; p=0.00051). The group that exercises daily also has significantly more musculoskeletal problems in the limbs compared to those who exercise three times a week (χ^2=5.1623; df=1; p=0.0231). Those who exercise three times a week

have the fewest mentioned difficulties -6.9%, followed by the group that exercises once or twice a week -13%, then those who exercise daily -15%, and finally those who do not exercise at all -22.5 %.

In the case of the painful disorder of the lower back, a significant difference in the physical activity level was also shown: the group that exercises three times a week has a statistically significantly lower proportion of people with lower back pain, compared to all other groups, while in the comparison to other groups significant difference was not found. Significant chi-squares range from 5.516 to 6.6432, with a *p* of 0.02 to 0.01.

Given that five possible answers were offered on an ordinal scale for the duration of commuting, based on different combinations of matching categories for easier analysis, we expressed the duration in two categories: those who travel to work up to 60 minutes (N=526), and longer than 60 minutes (N=184). Significant differences were obtained for injured back (χ^2=4.180; df=1; *p*=0.041), injured leg or foot (χ^2=10.263; df=1; *p*=0.001), and for musculoskeletal disorder in limbs with recurrent pain (χ^2=4.563; df = 1; *p*=0.033): all three difficulties are significantly more common in the group that commutes longer than 60 minutes.

Discussion

In the present study, we assessed the prevalence of health problems that affect nursing professionals in the acute care hospital, and the related factors. The results of our study show that all the diseases that were listed in the third question of the WAIQ are represented in our sample of respondents. This indicates that nurses have a lot of health problems and therefore the health status of these professionals needs to be carefully examined, and where necessary, prevented or treated (20,21). The average of self-rated health is in the middle of the scale, which means that nurses' health is good (not very good or excellent!). Only one fifth of the sample is completely healthy, and these are people who were at their workplace at the time. We do not know the number of nurses and technicians who were on sick leave during the re-

search period, but the number of people with health issues would certainly be even higher if we included people who were on sick leave. However, it certainly sounds worrying that people with 5, 10, 15 or even 20 simultaneous diagnoses work in such demanding workplaces. On the other hand, health care is at their fingertips (since they work in hospital), and yet they are in such a worrying state. The nursing profession continues to face problems involving poor working conditions (22); exposure to various occupational hazards such as biological, chemical, physical, biomechanical, psychological; global nursing shortage and ageing of this workforce (21).

All of the above can affect both work ability and intention to leave the profession. Most of the respondents has good WAI -44%, followed by excellent WAI with 34% respondents (34.4%), moderate with 19% respondents (19.1%), and poor with only 17 (2.5%). At first glance, the situation does not seem so worrisome. However, we should be aware that people with moderate or good work ability are actually not completely healthy, and that maybe "good WAI" is not good enough, especially not for the workplace of hospital nurses. We can assume that people with poor WAI should not be at work at all, but on sick leave, and it should also be considered that the research did not include people who were on sick leave at the time.

Lower back pain with recurring pain is the most frequent health problem among nurses in the present study. More than 38% of respondents mentioned this health problem, which we consider to be an extremely high percentage. Namely, we can assume that low back syndrome pretty much affects nurses' work ability because a significant difference in the self-assessment of WA between those who have and those who do not have this difficulty was found. Having almost 40% of nurses with less than 100% work ability due to a single diagnosis in a demanding hospital system is really a situation that requires additional attention and intervention. Similar was reported in a study among nurses in Switzerland (23). Some of the factors associated with lower back pain among the nurses include lifting patients and high levels of workload. These are also biomechanical hazards related to the nursing profession (24). Therefore, workplace health-promoting measures to manage ergonomic risk factors are very important for nurses' health. Out of the 10 most common difficulties, as many as six relate to musculoskeletal problems that can be prevented with appropriate exercises.

We consider it necessary to mention that obesity, although it is not in the first 10 most frequent health difficulties, appears with 8.8%, which is also considered to be a large proportion because this problem can mostly be completely solved with healthy habits. In addition, this percentage is worryingly high because obesity itself can be the cause of other serious health problems such as hypertension, high cholesterol, diabetes, atherosclerosis, etc. This finding is also surprising because the nurses' job in hospital conditions is not sedentary, it is physically demanding and includes a lot of movement and other physical activities (turning patients and caring for them). On the other hand, obesity is not a rare phenomenon in our environment. Thus, the Croatian Institute for Public Health warns that in 2019, 35% of children aged 8 were obese. Men in Croatia 'lead' in terms of obesity in Europe with 87.6% with excessive obesity in the group over the age of 18 (25).

The current work ability is significantly different in terms of 'only' 29 diseases. Therefore, some health problems are not perceived by the respondents as affecting their current work ability. The reasons for this can be different: the patients have been suffering from a disease for a long time (e.g. chronic bronchitis) and have adapted their work to the limitations that the disease brings with it. Another reason may be that if the difficulty is present, it does not interfere with the ability to work (e.g. various rashes).

Women suffer significantly more from the upper back or cervical spine disorder, and from musculoskeletal disorder affecting the limbs. In general, women experience more pronounced pain in the neck area, and one possible explanation lays in anatomical gender differences in cervical vertebrae (26).

In terms of impact the age has on the prevalence of health problems that affect nursing professionals, age was found to be significant for the 10 most frequent health problems, except for back injury, repeated infections of the respiratory tract and gastrointestinal tract diseases. The reason could be found in a reduction of functional capacity of the nurses due to the aging process. It was suggested that older nurses can experience pain associated with musculoskeletal disorders and reduction in strength and flexibility which may result in reduced work performance (27). For respiratory infections, it is expected that they are not related to age, because they affect people throughout the entire lifespan. In contrast, we did not expect that gastrointestinal and lower back prob-

lems would not be related to age. This may indicate that some other factors play a greater role in the occurrence of these difficulties, such as daily physical effort at the workplace and/or intense stress.

The results of the present research revealed that nurses with secondary education have more health problems than the nurses with a bachelor's and master's degree in nursing. Evidence from the literature stated that lower level of education was a predictor for low level of work ability among nurses (28). The reason for that can lie in the fact that nurses with lower levels of educational status commonly take on work involving more physical labour than those with higher education. According to Golubic et al (2009), nurses with secondary education perceived hazards at workplace and shift work as statistically significantly more stressful than nurses with a college degree (29). It is possible that nurses with higher education during their studies had the opportunity to better educate themselves about different stress management strategies.

In the current study, the results revealed that nurses who do not exercise are more likely to suffer from musculoskeletal diseases related to limbs and lower back. Also, nurses who exercise daily were more likely to suffer from diseases of the musculoskeletal system in comparison with those who exercise once, twice or three times per week. For our respondents, it turned out to be optimal to exercise three times a week because that group had the fewest musculoskeletal problems. From this we can conclude that moderation is very important. Literature suggests that work-related musculoskeletal diseases have a greater negative impact on nurses' physical and mental health (30). Physical activity has many health benefits, such as improved cardiorespiratory fitness, muscular fitness, and bone health (31), but without overdoing it.

The results of the present research revealed that participants who spent 60 minutes or more time traveling to work had more health problems. This could be explained by the fact that a long commute can be stressful and exhausting for hospital nurses and can therefore be a risk factor for development of health problems. Turchi et al. (2019), showed that a longer commute time had a negative influence on hospital nurses' psychological well-being (32).

Study limitations

A participant's motivation to respond is a limitation of the present research. It is unknown whether the nurses who participated in the research had the same level WAI as the nurses who did not participate in the research. Although the data was collected a while ago, the findings point out severe problems in hospital system. It is certainly a condition that requires continuous assessment and intervention aimed at improvements at the individual and organizational level.

Study strengths

This research provided additional and important information and knowledge about the WAI and the prevalence of health problems that affect nursing professionals in the acute care hospital and the related factors.

Conclusion

Work ability index in our sample of hospital nurses is considered good (M=40.5), and self-rated health is also considered good, but only one fifth of the sample is considered completely healthy. Out of 51 health problems, a significant difference in self-rated health was found in 45, and in 29 for current work ability. Ten different problems are present in more than 10% respondents: disorder of the lower back, repeated instances of pain (38.7%), disorder of the upper back or cervical spine, repeated instances of pain (38.1%), back injury (22.7%), gastritis or duodenal irritation (17.4%), sciatica (16.7%), hypertension (15.1%), musculoskeletal disorder affecting the limbs (13.7%), slight mental disorder or problem (12.5%), leg/foot injury (11.5%), and repeated infections of the respiratory tract (10.5%). Higher age is connected to seven of these health problems (except back injury, respiratory tract infection, and gastritis), less overtime hours with only one (musculoskeletal disorder affecting the limbs). Women suffer significantly more from disorder of the upper back or cervical spine, and musculoskeletal disorder affecting the limbs. Significantly more people with secondary edu-

cation suffer from musculoskeletal disorder affecting the limbs, hypertension, and gastritis or duodenitis.

Those who do not exercise at all have statistically significantly more musculoskeletal disorders relating to the limbs, compared to people who exercise once or twice, and three times a week. The group that exercises daily also has significantly more musculoskeletal problems in the limbs compared to those who exercise three times a week. Respondents who exercise three times a week have a significantly lower proportion of lower back pain, compared to all other groups. Injured back, injured leg or foot, and musculoskeletal disorder in limbs are significantly more common in the group that commutes longer than 60 minutes.

It is necessary to focus more on the nurses' health condition, both in the research and practical sense, and undertake various preventive and curative procedures that will reduce the incidence of numerous health problems present in this population.

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ZDRAVSTVENO STANJE I RADNA SPOSOBNOST MEDICINSKIH SESTARA

Sažetak

Uvod. Medicinske sestre smatraju se sastavnim dijelom zdravstvenog sustava. Izloženost visokoj razini profesionalnog stresa i raznim psihološkim problemima može biti povezana s radnom sposobnošću medicinskih sestara i njihovim zdravljem.

Cilj. Identificirati zdravstvene probleme kod medicinskih sestara i tehničara zaposlenih u bolničkom sustavu i čimbenike koji su povezani s tim, posebice radnu sposobnost.

Metode. Podaci su prikupljeni od prosinca 2017. do lipnja 2018. u KBC-u Sestre milosrdnice u Zagrebu u Hrvatskoj. U istraživanju je sudjelovalo 713 medicinskih sestara i tehničara. Podaci su prikupljeni upitnikom o sociodemografskim, zdravstvenim i radnim čimbenicima te upitnikom za određivanje indeksa radne sposobnosti (WAI).

Rezultati. Samoprocjena je zdravstvenog stanja medicinskih sestara dobra, ali od 51 ponuđene kategorije raznih zdravstvenih poteškoća i bolesti, 10 različitih problema javlja se kod više od 10 % ispitanika, što se čini vrlo zabrinjavajućim. Najčešće su poteškoće i bolesti poremećaj donjeg dijela leđa (38,7 %), poremećaji gornjeg dijela leđa ili vratne kralježnice (38,1 %), ozljeda leđa (22,7 %), gastritis ili upala dvanaestnika (17,4 %), išijas (16,7 %) i hipertenzija (15,1 %). Od 51 zdravstvenog problema, znatna razlika u samoprocjeni zdravlja utvrđena je kod 45, a kod 29 za trenutačnu radnu sposobnost. Viša dob, ženski spol, srednjoškolsko obrazovanje, nikakva ili preve-

lika tjelesna aktivnost, manje prekovremenih sati i putovanje na posao duže od 60 minuta povezani su s različitim zdravstvenim problemima, ponajviše s poremećajima mišićno-koštanog sustava.

Zaključak. Zdravstvenom stanju medicinskih sestara potrebno je posvetiti više pažnje, kako u istraživačkom tako i u praktičnom smislu, te poduzimati različite preventivne i kurativne postupke koji će umanjiti smanjenje broja zdravstvenih problema prisutnih u ovoj populaciji.

Sleep Quality of Operating Room Nurses – a Cross-sectional Study

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Abstract

Introduction. Sleep is of crucial importance for the psychophysical functioning and health of every person. Nurses who work in operating rooms most often work on call, which significantly affects their sleep quality.

Aim. To determine the quality of sleep among nurses in operating rooms working 24-hour shifts.

Methods. The study is based on a questionnaire on sleep quality (Pittsburgh Sleep Quality Index) that was distributed to nurses in the surgical ward. The sample consisted of 40 employees.

Results. The study was conducted on 40 respondents, most of whom are female. The average age of the respondents was 32.3 years, and the average length of service was 12.1 years. The largest number of respondents had bachelor's degrees in nursing. The results of the questionnaire indicate a significantly reduced quality of sleep.

Conclusion. The quality of sleep was assessed as poor, which indicates the need for interventions that would improve the sleep quality of nurses working on call.

Introduction

Sleep is a part of the biological rhythm in which a natural state of reduced consciousness and a decrease in the function of the nervous system occur. During sleep, most vegetative functions (pulse, blood pressure, body temperature, breathing) decrease, along with muscle activity. At regular intervals, sleep alternates with wakefulness. We divide sleep into two phases: non-REM and REM. Sleep is controlled by the suprachiasmatic nucleus of the hypothalamus, which plays the role of an endogenous clock that regulates the production of melatonin (a sleep-inducing hormone) (1).

Dreaming is an unconscious mental activity that occurs during the REM sleep phase. It manifests itself as dreaming of a visually complex sequence of various events that are perceived as reality. In biological terms, sleep is the time when the central nervous system recovers (2).

Sleep is very important for maintaining our mental and physical health. Nurses' shift work greatly hinders this goal due to irregular sleep. During sleep, the body performs actions that it could not perform during the wake phase, because the body consumes a lot of energy while awake. The body has a system for regulating sleep and wakefulness, which we call the circadian rhythm (3).

Recommended sleep time for a healthy adult is seven to nine hours a day (refers to nighttime sleep). During 24-hour shifts, especially while in the operating room, the period of day and night is often equalized, that is, the body does not know what time of day it is. Such a feeling can also occur during flights to other time zones, when the physiological and biological rhythm is disrupted. Frequent disruption of the sleep rhythm can lead to slower reflexes, overweight, cardiovascular diseases, diabetes and cognitive difficulties. Long-term exposure to irregular sleep also leads to the impossibility of quality sleep (4).

Many studies have proven the negative effects of sleep deprivation in healthcare professionals due to the nature of their work (4). Research conducted on the topic of sleep quality and related errors shows that health professionals with impaired sleep quality are more likely to make medical errors (5).

Physiology of sleep

The human body has a sleep and wakefulness regulation system known as the "biological clock" (6). The main role of the biological clock is to generate circadian rhythms and control the timing of their activity. The circadian rhythm, which comes from the Latin word "circa dies" meaning "around the day", is key to our waking up in the morning and feeling sleepy when it is time to rest. Its 24-hour cycle is responsible for the mental, behavioral and physical changes that accompany our daily rhythms, including sleep cycles, hormone release, body temperature, eating habits and digestion. Circadian rhythms respond to the light and darkness of the environment, and melatonin, a hormone secreted by the pineal gland, plays a key role in this process. It is important to note that high exposure to light at night and insufficient exposure to light during the day can disrupt melatonin synthesis. Shift workers, healthcare workers on call and night shift workers are especially exposed to circadian rhythm disorders, which is related to the nature of their work and its negative impact on the body's natural rhythm (7).

Impact of night work on nurses

Emotional exhaustion is a common problem for nurses. Constant stress and emotional demands of patient care can lead to emotional exhaustion, depression, anxiety, which can result in burnout. Burnout can make it difficult for nurses to connect with patients, which negatively affects patient's satisfaction and hospital experience. Another factor that contributes to nurse burnout is heavy workload and long working hours (8).

Nurses must often work multiple shifts in a row, which leads to fatigue and exhaustion. Nurses are required to work during holidays or weekends, which disrupts their personal lives. Tired nurses are more likely to make mistakes. There is also a higher probability of absenteeism from work and leaving the nursing profession (9).

To alleviate the problem of nurse burnout, hospitals can take several steps. Firstly, they can implement scheduling practices that allow nurses adequate rest between shifts. This may include limiting the number of consecutive shifts and ensuring adequate time off between shifts. In addition, hospitals can provide nurses with resources to help them manage stress and emotional exhaustion, such as counseling services and employee assistance programs (10).

The most common health problems associated with sleep problems are cardiovascular disease, hypertension, digestive problems, thyroid problems, obesity, diabetes. The reason for this is that people who work night shifts or 24-hour shifts have a disturbed circadian rhythm. Shift work can be an independent risk factor for sleep quality, diabetes and hypertension (11).

In the study conducted by Slišković, a pattern showing that workers who work outside working hours, i.e. night shifts, develop more health problems over the years than workers who have never worked night shifts is observed (12). According to Sharma et al., research has shown that there is undoubtedly an increased risk of obesity and type 2 diabetes mellitus (12). Karlson, Knutsson and Lindahl report an increased risk of metabolic disorders in shift workers (13).

A study by Hidalgo and colleagues conducted among health professionals shows that an alarmingly large number of physicians and nurses do not engage in a healthy lifestyle, which is related to their way of working (14). Interestingly, the study concluded that health workers are aware of what a healthy lifestyle should be (15).

All the studies that have been carried out show that shift work is associated with psychophysical diseases, and that people who work in shifts in the healthcare system are well aware of the risks, i.e. sleep disorders and their consequences.

Aim

To assess the quality of sleep for Operating Room nurses who work 24-hour shifts.

Methods

Participants

The respondents were nurses employed at the Surgical ward of the UHC Zagreb's Surgery Clinic. A total of 40 questionnaires were distributed (the same number as nurses assigned to that workplace), and all 40 were filled out. Only respondents who work 24-hour shifts in their monthly work schedule were included. The research was conducted in December 2021. The average age of the respondents was 32.3 years (range 21-58 years), and the average length of service was 12.1 years (range 1-38 years).

Instrument

The Pittsburgh Sleep Quality Index (PSQI) was used (16). The Pittsburgh Sleep Quality Index assesses the quality and patterns of sleep through a self-report of the subject's habits during the past month. It contains 19 questions divided into 7 subscales: 1. subjective assessment of sleep, 2. transition from full wakefulness to sleep, 3. sleep duration, 4. usual sleep efficiency, 5. sleep disorders, 6. use of sleep medication and 7. daily functioning. The sleep quality score is obtained by summing all seven subscales. Each subscale is scored on a scale from 0 to 3, where 0 indicates no difficulty and 3 indicates great difficulty. The total PSQI score is obtained by summing the scores on the 7 subscales. The score ranges from 0 to 21. A total score greater than 5 indicates poorer sleep quality.

Procedure

The questionnaire was distributed in paper form to nurses at the surgical ward of UHC Zagreb. Respondents submitted their answers in a sealed envelope directly to the researcher. Due to this, the anonymity of the respondents was not fully guaranteed. However, all respondents were aware of this fact and agreed with this method of data collection, which they confirmed by their consent to participate. The consent of the Ethics Committee of UHC Zagreb was obtained for conducting the research. The results are presented in a table using Microsoft Excel.

Results

Demographic data obtained by the respondents is shown in Table 1.

Table 1. **Respondents' basic characteristics**			
		N	%
Gender	Female	28	70
	Male	12	30
Level of education	Secondary level	15	37.5
	Bachelor of nursing	20	50
	Master of nursing	5	12.5
Years of work experience	1-10	10	25
	11-20	17	42.5
	21-30	10	25
	31 and more	3	12.5

The quality of sleep is shown through 7 subscales of the PSQI questionnaire.

Subjective sleep quality

Subjective sleep quality is assessed by question number 9 (PSQI) *"During the past month, how would you rate your overall sleep quality?".*

Most respondents answered "relatively" (shown in Table 2).

Table 2. **Subjective sleep assessment**		
9. During the past month, how would you rate your overall sleep quality?	Number of respondents	%
Very good	3	7.5
Relatively good	10	25
Relatively bad	22	55
Very bad	5	12.5

Latency of falling asleep

The latency of falling asleep is assessed by two questions: question 2 and question 5a. Answering question 2 (PSQI) *"During the past month, how long (in minutes) did it usually take you to fall asleep each night?",* most respondents said it takes them about 31 to 60 minutes to fall asleep. Answering question

5a, most respondents answered that at least once or twice a week they could not fall asleep during the first 30 minutes (shown in Table 3).

Table 3. **Minutes needed to fall asleep**		
2. During the past month, how long (in minutes) did it usually take you to fall asleep each night?	Number of respondents	%
15 minutes	10	25
16-30 minutes	12	30
31-60 minutes	18	18
5a. During the past month, how often did you have trouble sleeping because you were not able to fall asleep within 30 minutes?	Number of respondents	%
Not during the past month	5	12.5
Less than once a week	4	10
Once or twice a week	16	40
Three or more times a week	15	37.5

Sleep duration

Question number 4 (PSQI) *«During the past month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spent in bed)"* was answered by most respondents as sleeping 4 to 5 hours during the night (shown in Table 4).

Table 4. **Nighttime sleep duration**		
4. During the past month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spent in bed)	Number of respondents	%
4-5 hours	18	45
5-6 hours	12	30
6-7 hours	10	25

Sleep efficiency

The results are obtained based on the answers to questions 1, 3, 4. Sleep efficiency is calculated by dividing the number of hours slept by the total hours spent in bed. To the question 1 (PSQI) "During the past month, what time did you usually go to bed at night?", the largest number of respondents answered

they went to bed between 11 and 12 p.m. To the question 3 (PSQI) "During the past month, what time did you usually get up in the morning?" as many as 28 respondents (70%) answered that they got up at between 5 and 6 in the morning. To the question 4. (PSQI) "During the past month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spent in bed), most respondents answered that they slept between 4 and 5 hours during the night (shown in Table 5).

Trouble sleeping

The answers to question 5 (PSQI) "During the past month, how often did you have trouble sleeping because you…?" show that many respondents had difficulty sleeping (shown in Table 6).

Taking sleep medication

Answering question 6 (PSQI) "During the past month, how often did you take medicine to help you sleep (prescribed or "over the counter")?", most respondents (29 or 72.5%) answered that they did not take any sleep medication (shown in Table 7).

Daytime functioning

This topic is covered by the answers to questions 7 and 8. In terms of question 7 (PSQI) "*During the past month, how often did you have trouble staying awake while driving, eating, or engaging in social activity?*",

as many as 31 respondents (77.5%) answered that they had difficulty staying awake less often than once a week. To the question 8. (PSQI) "*During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?*", 21 respondents (52.5%) answered that they experienced certain difficulties (shown in Table 8).

Table 5. **Sleep efficiency**		
1. During the past month, what time did you usually go to bed at night?	**Number of respondents**	**%**
22.00 - 23.00	8	20
23.00 - 24.00	22	55
24.00 - 01.00	10	25
3. During the past month, what time did you usually get up in the morning?	**Number of respondents**	**%**
5.00 - 6.00	28	70
6.00 - 7.00	9	22.5
7.00 - 8.00	3	7.5
4. During the past month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spent in bed)	**Number of respondents**	**%**
4 - 5 hours	18	45
5 - 6 hours	12	30
6 - 7 hours	10	25

Table 6. **Trouble sleeping**				
5. During the past month, how often did you have trouble sleeping because you…?	**Not during the past month**	**Less than once a week**	**Once or twice a week**	**Three or more times a week**
	N (%)	**N (%)**	**N (%)**	**N (%)**
were not able to fall asleep within 30 minutes	5 (12.5)	4 (10)	16 (40)	15 (37.5)
woke up in the middle of the night or early morning	3 (7.5)	5 (12.5)	21 (52.5)	11 (27.5)
had to get up to use the bathroom	0	32 (80)	8 (20)	0
could not breathe comfortably	11 (27.5)	28 (70)	1 (2.5)	0
coughed or snored loudly	7 (17.5)	13 (32.5)	11 (27.5)	9 (22.5)
felt cold	6 (15)	17 (42.5)	17 (42.5)	0
felt hot	6 (15)	17 (42.5)	17 (42.5)	0
had bad dreams	9 (22.5)	13 (32.5)	18 (45)	0
felt pain	4 (10)	20 (50)	16 (40)	0

Table 7. **Taking sleep medication**		
6. During the past month, how often did you take medicine to help you sleep (prescribed or "over the counter")?	**Number of respondents**	**%**
Not during the past month	29	72.5
Less than once a week	9	22.5
Once or twice a week	2	5
Three or more times a week	0	0

Table 8. **Daytime functioning**		
7. During the past month, how often did you have trouble staying awake while driving, eating, or engaging in social activity?	**Number of respondents**	**%**
Not during the past month	2	5
Less than once a week	31	77.5
Once or twice a week	7	17.5
Three or more times a week	0	0
8. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?	**Number of respondents**	**%**
No problem at all	4	10
Only a very slight problem	12	30
Somewhat of a problem	21	52.5
A very big problem	3	7.5

Total sleep scale

Based on the PSQI scores, seven individual results are obtained, each of which can range from 0 (no difficulty) to 3 (great difficulty). By adding up the individual results, the total number of points is obtained (in range from 0 to 21). A higher score means worse sleep quality. Our results show that the total number of PSQI index points of all individual amounts to 12.

Table 9. **Individual scores for the seven subscales of the PSQI**		
PSQI subscales	**Result span**	**Individual results**
1. Subjective sleep quality	0-3	2
2. Latency of falling asleep	0-3	2
3. Sleep duration	0-3	3
4. Sleep efficiency	0-3	1
5. Trouble sleeping	0-3	2
6. Taking sleep medication	0-3	0
7. Daytime functioning	0-3	2
8. Total (PSQI index)	0-21	12

Discussion

Chang et al. obtained data that nurses who work night shifts have worse sleep quality than nurses who work morning shifts (17). The data obtained in our research concurs with this data. Most respondents (55%) rated their sleep quality as 'relatively bad'. These data are completely opposite to those obtained in a study conducted at UHC Osijek, where the subjects assessed the quality of their sleep as 'very good' (15). In her research, Srdar also obtained information that the largest number of respondents rated their sleep as 'very good' (18).

In our study, the latency of falling asleep was prolonged by 31-60 minutes, compared to the study from Osijek, where the data obtained showed that 10-15 minutes were enough for most respondents to fall asleep (15).

The most significant data obtained from the study refer to the amount of sleep of the respondents. The majority of respondents in our study sleep 4 to 5 hours or less, and similar data was obtained by Srdar, who states that most respondents sleep between 5 to 6 hours (18). The literature states that an adult needs 6 to 8 hours of sleep for normal functioning (6).

Research has shown that sleep problems, especially the length of sleep, affect the daily functioning of an individual, the work-life balance, and lead to a number of health problems (19).

In our study, 77% of respondents stated that they had difficulties in daily functioning, such as maintaining alertness while driving, during meals or socializing. Also, difficulty is manifested in completing daily activities they started, as well as a lack of energy. Similar results were obtained by Brazilian researchers Palhares de Castilho et al. One of the conclusions of their research is that the respondents were mostly female and that difficulties in daily functioning and lack of energy can be attributed to the fact that women participate more in family and household duties to the detriment of their own sleep and rest (20).

Srdar's data also point to difficulties in daily functioning after shift work. Difficulties relate to maintaining alertness while driving or engaging in social activities, as well as mood swings (18).

Another study, carried out in Turkey, confirms that workers who do shift work are more often tired, sleepy, which leads to reduced concentration during daily activities, as well as during the performance of work tasks. All the above aggregates to an increased amount of workplace errors and is associated with more needlestick injury incidents (21).

The largest percentage (72%) of our respondents does not take sleeping pills, while Srdar obtained different information. Her data shows that a quarter of the respondents use sleeping pills, on medical advice or on their own, with varying frequency (one part of the respondents less than once a week while another part of the respondents uses sleeping pills several times a week) (18).

The instructions state that a score above 5 indicates unsatisfactory sleep quality (16). Looking at the overall PSQI index, our data results in a score of 12, which indicates unsatisfactory sleep quality. Similar data was obtained by Srdar, who obtained a score of 6 for respondents who work shifts (18). In her research on the quality of sleep at CH Merkur, Radinović obtained a score of 5 for respondents who work in shifts, compared to score less than 5 for respondents who only work the morning shift, which indicates satisfactory sleep quality (22).

Conclusion

The total PSQI score of 12 points obtained through the study points to an unsatisfactory sleep quality of nurses working in operating rooms. The most important data show that 55% of respondents rate their sleep quality as "mostly bad", that their sleep duration generally lasts 4-5 hours, and that they have certain difficulties in daily functioning.

Care must be taken when interpreting the results because this is a small sample of respondents in a single hospital. However, attention should be paid to the impact that sleep quality has on the functioning of nurses and certain interventions should be undertaken at the organizational level.

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KVALITETA SPAVANJA MEDICINSKIH SESTARA ZAPOSLENIH U OPERACIJSKIM DVORANAMA – PRESJEČNA STUDIJA

Sažetak

Uvod. Spavanje je ključno i važno za psihofizičko funkcioniranje i zdravlje svake osobe. Medicinske sestre i medicinski tehničari koji rade u operacijskim dvoranama najčešće rade u dežurstvima, što znatno utječe na njihovu kvalitetu spavanja.

Cilj. Utvrditi kvalitetu spavanja medicinskih sestara i tehničara zaposlenih u operacijskim dvoranama koji rade u 24-satnim dežurstvima.

Metode. Istraživanje se temelji na upitniku o kvaliteti spavanja (*Pittsburgh Sleep Quality*) koji je distribuiran medicinskim sestrama i tehničarima s odjela kirurških operacija. Uzorak je činilo 40 zaposlenika.

Rezultati. Istraživanje je provedeno na 40 ispitanika od kojih je većina ženskog spola. Prosječna dob ispitanika je bila 32,3 godine, a prosječna duljina radnog staža je bila 12,1 godinu. Najveći broj ispitanika bili su prvostupnici sestrinstva. Rezultati na upitniku ukazuju na znatno smanjenu kvalitetu spavanja.

Zaključak. Kvaliteta spavanja procijenjena je lošom, što ukazuje na potrebu za intervencijama koje bi poboljšale kvalitetu spavanja medicinskih sestara koje rade u dežurstvima.

How do Journalism Students Perceive the Nursing Profession?

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Abstract

Introduction. The media play a significant role in the perception of nursing profession in the public. Journalists report on nurses according to their observations and personal perceptions, as well as their knowledge of the field they cover and thus generate information. Insufficient information and knowledge of the work of nurses may affect attitudes which can reflect on the dynamics and manner of reporting on nurses.

Aim. To evaluate the attitudes of journalism students towards the profession of nurses, their competencies and work, the status of nurses in society, the need for the nursing profession to be represented in the media, and personal experience in the work of nurses.

Methods. The research was carried out by an anonymous survey which included 68 undergraduate students of journalism (60 female and 8 male) at the Faculty of Political Sciences of the University of Zagreb.

Results. The results of the research showed that a significant number of journalism students believe that nurses are assistants to doctors and that they are not independent in performing healthcare activities. However, the attitudes of journalism students towards the representation of nurses in the media showed that the majority (80.88%) were open in terms of the importance of the media appearance of nurses. However, at the same time, journalism students do not see a reason or are undecided regarding the claim that the experiences of nurses could be interesting content for the media (82.82%). When it comes to the work of nurses, which is related to the personal experience of journalism students, it is shown that about one half of the students have positive experiences (45.52%), while a significant number have opposing views.

Conclusion. The research indicated that there is a significant lack of understanding of the nursing profession and its scope of work among students of future journalism careers.

Introduction

Despite the development of nursing over the decades, progress in education and professionalisation, and contribution to treatment, numerous studies have shown that nurses do not receive adequate recognition from the public for their knowledge and skills. There are many reasons for this, and one of them is related to the typically gendered role of nursing in the healthcare system, where it is predominantly a female profession (1,2). Furthermore, nursing is perceived as subordinated to the medical profession (1) despite the competences they gained to provide health care independently (3). The public perception towards the professional identity of nursing changes with the development of society, but it is often linked to stereotypes derived from the portrayal of nursing through literature and the media (4). Therefore, the image of nurses is subject to various prejudices and stereotypes, usually with a negative connotation. When defining image, a professor of public relations and image expert from the Faculty of Political Sciences in Zagreb, Božo Skoko, states that image is the way others see us or a reflection of our personality, identity and is therefore subject to numerous influences. It is influenced by previous experiences, prejudices, stereotypes, knowledge, misinformation, etc. (5).

Although personal experience plays an exceptional role in creating a perception about someone or something, mass media play an indispensable role in creating public opinion. Through the media, most of the public receives information which shapes their opinions, attitudes and values about different topics and groups of people. Regardless of the fact that the media cannot be attributed direct responsibility for the activities and attitudes of society and the actions of individuals, it is clear that the media has the power to shape both positive and negative opinions and attitudes, as well as to initiate certain activities.

Through the media, most of the public receives information which shapes their opinions, attitudes and values about different topics and groups of people.

Mass media increase the reputation and authority of individuals or groups by legitimizing their status, influencing the acceptance of social norms, and in some cases seem dysfunctional by causing non-

participation and passivity (6). Furthermore, when it comes to the representation of nursing in the media, journalists play a significant role by monitoring the work of nurses in the written media or through guest appearances on television and radio media. However, journalists rarely cover the work of nurses or read their journals, therefore nurses are not recognized as people who could promote their knowledge, innovation or perspective. Furthermore, numerous hospitals and healthcare systems don't have a policy of nurses contacting the media (7).

In that area, a study initiated by the international nursing society Sigma Theta Tau is significant. That study analysed 20,000 articles, among which there were 2,600 articles about healthcare. They were published in 16 US newspapers, magazines and publications. The study results were devastating: nurses rarely write or are rarely cited regarding issues with the healthcare system, guidelines in healthcare and challenges which they face in their profession. Nurses were cited or referred to in only 4% out of 2,600 health-related articles. A nurse is mentioned in less than 1% of articles in US News & World Report, Time, Newsweek and Business Week magazines (8).

The George Washington University researchers re-conducted that major US research from 1990s titled Woodhull Study on Nursing and Media. In order to do so, they reviewed a random sample of 537 articles from health-related news in the US in order to determine how often nurses are cited, mentioned or identified in images in popular magazines and newspapers (8).

The Woodhull Study Revisited was conducted in three parts, where the first two have been published in Journal of Nursing Scholarship and American Journal of Nursing in the past two months. According to the researchers of the new study, the number of nurses cited in the media as credible sources has not changed statistically significantly in 20 years, despite calls for it in the late 1990s (9).

Woodhull study on nursing and the media initiated an important dialogue between nurses and journalists in order to develop more efficient communication channels. Nurses should help journalists get stories about the width and depth of nurses' contributions to present a more comprehensiove picture of health and disease, including the critical roles which nurses play in today's healthcare system (8).

With the emergence of COVID-19 pandemic, there are visible changes related to reporting on the work of

nurses in the media. Coronavirus pandemic exposed the nurses' daily job to the public. The research, which was conducted in Croatia on the presentation of the work of nurses in daily printed newspapers, showed that during the pandemic, much more was written about nurses than in the preceding period. During the pandemic, 348 articles about nurses appeared in daily newspapers, while in the preceding period, there were only 57 articles. A total of 88.89% of articles written about nurses during the pandemic cover positive situations and events, compared to only 11.11% in the period before the coronavirus pandemic. There were 64.29% negative articles before the pandemic. All the articles found during the pandemic which refer to nurses featured acknowledgements and descriptions of nurses as professional, responsible, reliable and accurate experts. Furthermore, the results show that the media has significantly increased interest in nurses compared to the previous period. This research showed that during the pandemic, nurses were extremely positively presented to the public through the media (10).

Aim

To examine the attitudes of journalism students towards the profession of nurses, their competencies and work, the status of nurses in society, the need for the nursing profession to be represented in the media, and personal experience in the work of nurses.

Methods

The research was conducted at the Faculty of Political Sciences of the University of Zagreb in February 2023 among undergraduate journalism students. There were 68 respondents who completed the anonymous questionnaire using the paper and pencil method. This is a random sample of respondents, students attending 3 years of undergraduate studies

in journalism, which is 56.67% of the total number of students in the third year of journalism in this institution. A total of 60 female and 8 male participants aged 21 to 23 took part in the study.

For this research, a questionnaire was constructed based on a review of the literature in this area. The survey was divided into four parts. Each part included statements to which the respondents gave answers on a five-point Likert scale, from 1 - I do not agree at all, to 5 - I completely agree. The first part referred to attitudes about the competences and work of nurses. The questionnaire consisted of 15 statements. Example of a statement: *In addition to clinical knowledge, nurses should have a high level of communication skills.* The second part of the survey examined the attitudes of journalism students about the status of nurses in society. The questionnaire consisted of 7 statements. Example of a statement: *Nursing is a profession intended for women.* The third part of the survey was about the students' attitudes toward the need for the representation of the nursing profession in the media. The questionnaire consisted of 8 statements. Example of a statement: *Nurses need more education in the field of media usage.* The fourth part explored the students' personal experiences with the work of nurses. The questionnaire consisted of 5 statements. Example of a statement: *My experiences with the work of nurses during the use of healthcare services (personal, family, friends) have been positive.* Descriptive statistical analysis methods were used to analyse the questionnaire. Statistical data processing was carried out using the Microsoft Office Excel tool. For each statement, the mean (M), standard deviation (SD), and coefficient of variation (C) were calculated to determine central tendency and variability.

Results

Attitudes about the competencies and work of nurses

In the first part of the survey, the attitudes of journalism students about the competencies and work of nurses (Table 1) were investigated. The students

mostly or completely agreed (92.58%) that the work of nurses is both physically and mentally hard. Furthermore, the students mostly or completely agreed that the work of nurses requires calmness and mental stability (94.11%) and a large amount of knowledge (91.17%), but a smaller number of students think that nurses should educate throughout their whole life (61.69%). Although the majority of students didn't agree with the statement that nurses can work only in hospitals, more than 30% of students agreed with that statement. When answering to the statement *The work of nurses and doctors is equally important for successful treatment*, the majority of students were undecided (54.41%), while there was almost equal share of those who agreed (22.5%) and those who didn't agree (23.52%). There are similar results in the attitudes that the nurse is independent in the implementation of healthcare, whereby 41.17% of students were undecided and 32.29% disagreed or mostly disagreed that the nurse is independent in the implementation of healthcare. However, 47.0% of students completely and mostly agreed that nurses are competent in conducting education and public health activities in health promotion, while 41.17% were undecided, and a smaller portion disagreed with the given statement. A total of 76.4% of students believed that nurses should have a high level of education and 63.22% believed that they should have a high level of communication skills. A total of 36.75% respondents believed that nurses are assistants to the doctors, while 25% of students were undecided. When it comes to the statement that nurses are assistants to the patients, 54% of students were undecided, while 23.52% of them agreed with that statement. When it comes to the statement that nurses are poorly educated and have a low level of education, 19.11% of students answered that they completely or mostly agreed with the statement, while 30.88% were undecided. A total of 13.23% of students disagreed with the statement that nurses are an important part of the medical team, while 61.67% of students agreed with that statement.

Attitudes regarding the status of nurses in the society

One part of the survey included questions about attitudes regarding the status of nurses in the society (Table 2). The majority of journalism students were undecided regarding the statement that nurses

should be involved in the development of healthcare policy (39.7%), while the same number of students disagreed or mostly disagreed with that statement. When it comes to the statement: *Nursing as a profession is highly valued in the society*, 61.76% of students answered negatively and 30.88% were undecided. The majority of respondents (57.34%) disagreed or mostly disagreed with the statement: *Nursing is a profession intended for women*. A total of 5.88% of respondents agreed with the statement *Nurses are highly valued by the doctors*, while 38.23% were undecided and 55.87% mostly disagreed with that statement. More than one half of the participants (57.34%) disagreed or mostly disagreed with the following statement: *All nurses want to become doctors*, while 35.29% were undecided.

The largest number of students (39.70%) were undecided in the assessment (I neither agree nor disagree) that nurses are an invisible part of the society, while the majority (32.35%) of students completely or mostly agreed with that statement. Furthermore, the results show that students (76.46%) disagreed or mostly disagreed with the following statement: *Nurses have good income based on their work*.

Attitudes about the need to represent the nursing profession in the media

In the third part of the survey, it was examined what journalism students think about the representation of nurses in the media (Table 3).

A significant part of the respondents (73.52%) completely disagreed or mostly disagreed with the statement: *Nurses should not be in the media because their place is exclusively with the patient*. Furthermore, 80.88% of respondents agreed or completely agreed with the following statement: *Nurses are competent interlocutors in the media in the field of health and patient care*. When it comes to the statement: *Nurses need more education in media usage*, 39.7% of respondents disagreed or completely disagreed, while 36.5% of respondents partially or completely agreed with that statement. When it comes to the statement: *Nurses are under-represented in the media*, a large part of respondents (69.11%) answered negatively, that is I completely disagree or I mostly disagree, while only 2.94% partially agreed, and 27.94% were undecided. The largest part of the respondents (50%) were undecided in the assessment of the statement *The knowledge of nurses is*

Table 1. **Attitudes about the competencies and work of nurses**								
Statements	**Agreeing with the statement**					**M**	**SD**	**C**
	(1 - I completely disagree, 2 - I mostly disagree, 3 - I neither agree nor disagree, 4 - I partially agree, 5 - I completely agree)							
	1	**2**	**3**	**4**	**5**			
The work of nurses is physically extremely hard	0%	2.94%	4.41%	45.58%	47%	4.37	0.71	0.16
The work of nurses is mentally extremely hard	0%	1.47%	2.94%	51.47%	44.11%	4.38	0.62	0.14
The work of nurses requires calmness and mental stability	0%	0%	5.88%	41.17%	52.94%	4.47	0.61	0.14
Nurses should have a large amount of knowledge	0%	1.47%	7.35%	30.88%	60.29%	4.50	0.70	0.15
Nurses can work only in hospitals	29.4%	35.29%	11.76%	13.23%	10.29%	2.40	1.31	0.55
Nurses should educate throughout their whole life	1.47%	7.35%	29.4%	51.4%	10.29%	3.62	0.82	0.23
The work of nurses and doctors is equally important for successful treatment	13.23%	10.29%	54.41%	11.76%	10.29%	2.96	1.08	0.36
The nurse is independent in the implementation of healthcare	10.29%	22%	41.17%	20.58%	5.88%	2.90	1.03	0.36
The nurse is competent in conducting education and public health activities in health promotion	7.35%	4.41%	41.17%	45.58%	1.47%	3.29	0.88	0.27
Nurses should have a high level of education	0%	2.94%	22%	29.4%	47%	4.19	0.87	0.21
Apart from clinical knowledge, nurses should have a high level of communication skills	0%	2.94%	33.82%	42.64%	20.58%	3.81	0.79	0.21
Nurses are assistants to the doctors	4.41%	19.11%	25%	20.58%	16.17%	3.29	1.16	0.35
Nurses are assistants to the patients	10.29%	11.76%	54.41%	17.64%	5.88%	2.97	0.97	0.33
Nurses are poorly educated and have a low level of education	14.7%	35.29%	30.88%	16.17%	2.94%	2.57	1.02	0.40
Nurses are an important part of the medical team	2.94%	10.29%	25%	33.82%	27.94%	3.74	1.07	0.29

valuable in educating the population through the media, while 45.58% of the respondents completely or partially agreed with that statement. When it comes to the statement: *Nurses appear in the media more than doctors*, 72.05% of the respondents gave a negative answer (I completely disagree / I mostly disagree), while 8.82% partially agreed and 19.11% of the respondents were undecided. The majority of respondents (69.11%) completely or partially agreed

with the following statement: *Nurses are neglected in the media presentation compared to doctors*, while 13.23% of the respondents mostly disagreed and 17.64% were undecided. When it comes to the statement: *The experiences of nurses can be interesting content for the media*, 70.58% of the respondents disagreed or mostly disagreed, while 11.76% of the respondents partially agreed. A total of 17.64% of the respondents were undecided.

Table 2. **Attitudes regarding the status of nurses in the society**								
	Agreeing with the statement							
Statements	**(1- I completely disagree,2 - I mostly disagree, 3 - I neither agree nor disagree, 4 - I partially agree, 5 - I fully agree)**					**M**	**SD**	**C**
	1	**2**	**3**	**4**	**5**			
Nurses should be involved in the development of healthcare policy	17.64%	22.05%	39.70%	13.23%	7.35%	2.71	1.13	0.42
Nursing as a profession is highly valued in the society	26.47%	35.29%	30.88%	7.35%	0%	2.19	0.91	0.42
Nursing is a profession intended for women	29.41%	41.17%	22.05%	7.35%	0%	2.07	0.90	0.43
Nurses are highly valued by the doctors	19.11%	36.76%	38.23%	5.88%	0%	2.31	0.84	0.37
All nurses want to become doctors	11.76%	45.58%	35.29%	2.94%	4.41%	2.43	0.90	0.37
Nurses are an invisible part of the society	13.23%	14.7%	39.7%	27.94%	4.41%	2.96	1.06	0.36
Nurses have good income based on their work	33.82%	42.64%	19.11%	2.94%	1.47%	1.96	0.88	0.45

Table 3. **Attitudes about the need to represent the nursing profession in the media**								
	Agreeing with the statement							
Statements	**(1 - I completely disagree,2 - I mostly disagree, 3 - I neither agree nor disagree, 4 - I partially agree, 5 - I fully agree)**					**M**	**SD**	**C**
	1	**2**	**3**	**4**	**5**			
Nurses should not be in the media because their place is exclusively with the patient	33.82%	39.7%	17.64%	4.41%	4.41%	2.06	1.04	0.51
Nurses are competent interlocutors in the media in the field of health and patient care	0%	4.41%	14.70%	55.88%	25%	4.01	0.76	0.19
Nurses need more education in media usage	14.70%	25%	23.52%	20.58%	16.17%	2.99	1.30	0.44
Nurses are under-represented in the media	32.35%	36.76%	27.94%	2.94%	0%	2.01	0.85	0.42
The knowledge of nurses is valuable in educating the population through the media	2.94%	1.47%	50%	39.7%	5.88%	3.44	0.76	0.22
Nurses appear in the media more than doctors	42.64%	29.41%	19.11%	8.82 %	0%	1.94	0.98	0.51
Nurses are neglected in the media presentation compared to doctors	0%	13.23%	17.64%	41.17%	27.94%	3.84	0.98	0.26
The experiences of nurses can be interesting content for the media	36.76%	33.82%	17.64%	11.76%	0%	2.04	1.01	0.49

Personal experience regarding the work of nurses

In the final part of the survey, the students were asked about their experience in the work of nurses (Table 4).

When it comes to the statement: *My experiences with the work of nurses during the use of healthcare (personally, family, friends) are positive*, 45.52% of the respondents answered positively (I completely agree / I partially agree), 14.7% of the respondents completely or mostly disagreed, and 38.23% of them were undecided. The statement: *Nurses are nice* had the following answers: 45.52% of the respondents agreed or mostly agreed, 41.17% were undecided, while 13.23% disagreed or mostly disagreed. When it comes to the statement: *Nurses are arrogant and harsh*, the majority (41.17%) of the respondents answered that they disagreed or mostly disagreed, while 36.76% were undecided and 22.05% agreed or completely agreed with that statement. The statement: *Nurses know how to communicate* had the following answers: 54.4% of the respondents agreed, 38.23% were undecided, and 7.35% mostly disagreed. The statement: *Nurses are interested in the patients' problems* had the following answers: 61.7% of the respondents agreed or completely agreed, 36.76% were undecided, while only one respondent (1.47%) mostly disagreed.

Discussion

The starting point for every political option, economic effect, some other idea in culture, effect in sports, a certain professional group, and even nursing is to present oneself to the public in the best possible light, in the most beautiful edition, and to present one's idea and one's work as best as possible to the public. There is an attempt to achieve recognizability through the media, which also includes nursing. When it comes to nursing, the media often have to correct the distorted image that the public has about nurses. For such purpose, it is important to develop and maintain quality relations and cooperation with the media, through which one should present one's work and ideas to the general public

This research shows that there is still a significant part of ignorance of the nursing profession and the scope of work among students of the future journalism. An insight into the attitudes of journalism students about the competencies of nurses shows that journalism students are familiar with the physical and psychological demands of nurses' work and that nurses need calmness and mental stability, as well as a large amount of knowledge. Similar results were obtained from a study conducted in Croatia on the attitudes of non-healthcare students towards the nursing profession. In the assessment of the characteristics of nurses, a significant number of the students who took the survey agreed with the state-

Statements	Agreeing with the statement					M	SD	C
	(1 – I completely disagree, 2 – I mostly disagree, 3 – I neither agree nor disagree, 4 – I partially agree, 5 – I fully agree)							
	1	2	3	4	5			
My experiences with the work of nurses during the use of healthcare (personally, family, friends) are positive	1.47%	14.70%	38.23%	23.52%	22%	3.50	1.04	0.30
Nurses are nice	10.29%	2.94%	41.17%	35.29%	10.29%	3.32	1.05	0.32
Nurses are arrogant and harsh	10.29%	30.88%	36.76%	17.64%	4.41%	2.75	1.01	0.37
Nurses know how to communicate	0%	7.35%	38.23%	33.82%	20.58%	3.68	0.88	0.24
Nurses are interested in the patients' problems	0%	1.47%	36.76%	39.7%	22%	3.82	0.78	0.21

Table 4. **Personal experience regarding the work of nurses**

ment that the job of a nurse is stressful, demanding and requires a lot of knowledge (11). However, a significant share of students were not sure that nurses need to educate throughout their whole life, while 8.82% didn't believe that nurses should continuously educate. The progress of technology and science poses the need that nurses should educate continuously according to the Nursing Act (12). The research conducted on patients' attitudes towards nursing education showed a correlation between better knowledge of the scope of nurses' work and a more positive attitude towards their education (13).

Furthermore, about one third of journalism students believe that nurses can only work in hospitals. Nurses are employed at all levels of primary, secondary and tertiary healthcare, as well as in social institutions (retirement homes, centres for rehabilitation and education of persons with disabilities) and kindergartens (14). Furthermore, students' attitudes related to the nurses' contribution to the success of treatment are to a lesser extent affirmative. The majority of students were undecided, while some of them didn't believe that the nurses' work is as important as that of doctors for the success of treatment. Furthermore, a high percentage (41.17%) of students were undecided in their attitudes that the nurse is independent in the implementation of healthcare, while 32.29% of students disagreed or mostly disagreed that the nurse is independent in the implementation of healthcare. The given data shows ignorance of the nurses' work because nursing care is exclusively the field of work of nurses and is defined by their competencies (12). However, research has shown that the majority of journalism students think that nurses should have a high level of education. Despite this, one third of the respondents are undecided in their assessment of the current education of nurses, and a certain percentage of them (19.1%) agree with the statement that nurses are poorly educated and have a low level of education. In the research, it can be seen that a significant part of journalism students think that nurses are assistants to doctors, as well as to patients and that they are not an important part of the team. Similar data were obtained in a study conducted among non-healthcare students, where more than one half of them stated that a nurse is a doctor's assistant (11). Nurses are an integral part of the team, which is regulated by the Health Care Act (14) and the Nursing Act (12).

When it comes to the attitudes regarding the status of nurses in society, the majority of journalism students do not think that nursing as a profession is highly valued in society and that it is an invisible part of society. These attitudes have a basis in reality because nurses are not in the group of 'prestigious' professions such as doctors, lawyers, etc. Furthermore, the majority of students (76.46%) think that nurses aren't adequately paid based on their work. The assumption is that these attitudes were influenced by the monitoring of nurses' speeches in public, which discussed salaries, and the media coverage of strikes and announcements of strikes. The attitudes of journalism students towards the representation of nurses in the media showed that the majority were open in terms of the importance of the media appearance of nurses. Particularly, 80.88% of the respondents agreed or completely agreed with the statement that nurses can be competent interlocutors in the media in the field of health and patient care and they don't think that nurses should be exclusively with the patient and that they should not be present in the media. However, at the same time, journalism students do not see a reason or are undecided regarding the claim that the experiences of nurses could be interesting content for the media. The reason for this attitude can be linked to ignorance of the complexity of the nurses' work, in which a significant proportion of journalism students consider the nursing profession as one which helps doctors, and therefore is not autonomous. But the experiences during the pandemic made visible to a greater extent the competence and autonomy of the nursing profession, which applies the most complex technology and treatment methods in its work and was the most common mediator in the communication between doctors and patients as well as families during isolation. But the fact is that nurses don't have experience in working with the media and that they feel incompetent (15) and afraid of the media (15). For that reason, it is important to educate them about communication in the media. Nurses, even though they are the most numerous in the healthcare system, are under-represented in the media, unless it is some kind of a sensation (16). Nurses can change the way the public perceives them through interventions related to media monitoring, communication and cooperation with the media. Nurses must promote a positive image in public through their own behaviour and activities. One of the ways is to communicate with the media. Effective strategies for this are the joint participation of nurses and people from the media at conferences. In addition, knowledge of the technical aspects of the media industry enables nurses to better perceive the media, i.e. understand their role,

function and purpose. A good communication with the media includes praising the media for presenting a realistic image of nursing (17). When it comes to the nurses' work which is related to the personal experience of journalism students, it is shown that about one half of the students have positive experiences, while a significant number have opposing views. For example, 45.52% of the respondents have positive experiences during healthcare usage in person, with family or friends, while a small share of respondents (14.7%) is dissatisfied. About one half of the respondents believe that nurses are kind, know how to communicate, and are interested in the patient's problems. About one third of the students are undecided in this assessment, while the remaining ones report negative experiences and evaluations. The data on indecision as well as negative answers about dealing with patients represent significant data, which shows the need for continuous evaluation and self-evaluation of the nurses' work, who must be ready for constant expertise in their work and dealing with patients. This information is important for improving the work with patients and their families, but it is also important in creating the image of the profession. Furthermore, this research showed that it is necessary to include more activities which would introduce future journalists to the nursing profession. This is possible in various ways, in which professional nursing associations or regulatory bodies would organize events, public forums and invite journalism students and journalists as guests. In addition, by actively participating in public events, projects and public health campaigns, nurses have the opportunity to show the general public the competence and breadth of their profession. An example of this is the recent corona crisis, which encouraged journalists to "peek" into the world of work of nurses and thus become familiar with their work and competencies, which resulted in the wider public becoming familiar with the work of this profession (10). It is in the interest of the nursing profession that the public is familiar with their work, because in that way, through the reputation of the profession, they will be able to act more effectively for the purpose of education and the common good. On the other hand, it is in the interest of the journalism to be informed and able to competently get to the core of every topic it talks about, to enrich the media world with different topics when it comes both to healthcare and the nursing profession and to contribute to the well-being and health literacy of the population through media reports.

Study limitations

This research was conducted on a small number of respondents, that is, on one group of journalism students in Zagreb, which represents a limited sample. Nevertheless, the results of the research showed the key critical points which are significant for nurses in the activities of developing the image of their own profession, as well as the critical points of journalism students, i.e. future journalists who need better familiarization with the work of the most numerous profession in the health system to be able to more systematically and realistically cover this area and so that they are not limited in their work due to prejudices which exist due to ignorance of the nursing profession. For this reason, more intensive research and their results could be useful arguments for nursing and journalism professions in articulating activities in the field of education and informing the public about various areas which can be useful for the quality of life and health of the population.

Conclusion

This research has revealed several key points which are significant for the public image of the nursing profession, in which journalists and the media play an important role. Journalism students have demonstrated a positive attitude towards the mental and physical demands of nursing, emphasizing the importance of composure, psychological stability, and extensive knowledge. The research indicated that there is a significant lack of understanding of the nursing profession and its scope of work among students of future journalism careers. The study also revealed that a significant portion of journalism students is unaware of the autonomy of the nursing profession in providing healthcare, its competence in conducting education and public health activities for promoting health, and the need for continuous education. Additionally, a large portion of journalism students believe that nurses are assistants to doctors and patients. Furthermore, most journalism students are undecided regarding the claim that nurses should be involved in developing healthcare policy and whether nursing as a profession is highly

respected in society. Most journalism students disagree with the notion that nursing is a profession meant for women and that nurses are highly valued by doctors, or that they are appropriately compensated in accordance with their work. Most journalism students believe that nurses are competent media interlocutors in the field of health and patient care, and that nurses are underrepresented in media coverage compared to doctors. However, a significant portion of respondents do not believe that nurses' experiences could be interesting content for the media. When it comes to the work of nurses linked to journalism students' personal experiences, about one half of the students have positive experiences, while a significant portion holds opposite views. Furthermore, this research showed that it is necessary to include more activities which would introduce future journalists to the nursing profession. This is possible in various ways, in which professional nursing associations or regulatory bodies would organize events, public forums and invite journalism students and journalists as guests. In addition, by actively participating in public events, projects and public health campaigns, nurses have the opportunity to show the general public the competence and breadth of their profession. An example of this is the recent corona crisis, which encouraged journalists to "peek" into the world of work of nurses and thus become familiar with their work and competencies, which resulted in the wider public becoming familiar with the work of this profession (10). It is in the interest of the nursing profession that the public is familiar with their work, because in that way, through the reputation of the profession, they will be able to act more effectively for the purpose of education and the common good. On the other hand, it is in the interest of journalism to be informed and able to competently get to the core of every topic it talks about, to enrich the media world with different topics when it comes both to healthcare and the nursing profession and to contribute to the well-being and health literacy of the population through media reports.

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109

KAKO STUDENTI NOVINARSTVA PERCIPIRAJU PROFESIJU MEDICINSKIH SESTARA?

Sažetak

Uvod. Mediji imaju važnu ulogu u percepciji sestrinstva u javnosti. Novinari su uključeni u izvješćivanje o medicinskim sestrama u skladu sa svojim opažanjem i osobnom percepcijom, kao i poznavanjem područja koje prate i stvaraju informacije. Nedovoljna informiranost i poznavanje rada medicinskih sestara može utjecati na stavove koji se mogu reflektirati na dinamiku i način izvještavanja o medicinskim sestrama.

Cilj. Procijeniti stavove studenata novinarstva o profesiji medicinskih sestara i tehničara, kompetencijama i radu medicinskih sestara, statusu medicinskih sestara u društvu, potrebi zastupljenosti sestrinske profesije u medijima te osobnom iskustvu o radu medicinskih sestara.

Metode. Istraživanje je provedeno anonimnom anketom u kojoj je sudjelovalo 68 studenata preddiplomskog studija novinarstva (60 žena i osam muškaraca) na Fakultetu političkih znanosti Sveučilišta u Zagrebu.

Rezultati. Rezultati istraživanja pokazali su da znatan dio studenata novinarstva smatra da su medicinske sestre pomoćnice liječnicima te da nisu samostalne u obavljanju zdravstvene njege. No stavovi studenata novinarstva o zastupljenosti medicinskih sestara u medijima pokazali su u većini (80,88 %) otvorenost prema važnosti medijskog istupanja medicinskih sestara. Istodobno, studenti novinarstva ne vide razlog ili su neodlučni u tvrdnji da bi iskustva medicinskih sestara mogla biti interesantan sadržaj za medije (82,82%). Kad je riječ o radu medicinskih sestara koji je povezan s osobnim iskustvom studenata novinarstva, pokazuje se da otprilike polovica studenata ima pozitivna iskustva (45,52%), dok znatan broj ima suprotna stajališta.

Zaključak. Istraživanje je pokazalo da postoji znatno nerazumijevanje sestrinske profesije i njezina djelokruga rada među studentima pred kojima su novinarska zanimanja.

How Much Nursing Students Know about Sepsis? – A Cross Sectional Study

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Abstract

Introduction. Understanding sepsis is essential for its early detection and prompt treatment. Education on sepsis should begin during training, making it important to evaluate students' knowledge. This research aimed to build on a previous study by exploring the level of sepsis knowledge among undergraduate nursing students and analyzing differences across academic years and study formats.

Methods. This cross-sectional study involved 419 nursing students from the University of Applied Health Sciences in Zagreb, Croatia. Participants included students from all three academic years, as well as both full-time and part-time (employed) nursing students. Data collection utilized a modified version of the sepsis knowledge questionnaire created by Eitze et al., while demographic details such as gender, age, employment status, and academic year were also recorded. The data were analyzed using SPSS (IBM, Version 25.0), employing the Chi-square test to assess statistical significance.

Results. Statistically significant differences were found in the percentage of third-year students providing correct answers related to sepsis knowledge when compared to first- and second-year students. Additionally, employed students demonstrated a significantly higher number of correct responses regarding the causes and symptoms of sepsis compared to their non-employed peers.

Conclusions. The capacity of nursing students to recognize and respond to a patient's deterioration due to sepsis highlights the urgent need for comprehensive sepsis education. Our results indicate the need for greater integration of sepsis-related topics into the core nursing curriculum, particularly emphasizing practical training and simulation exercises to enhance early detection and management of sepsis.

Introduction

According to the latest definition, sepsis is described as a life-threatening organ dysfunction caused by the body's inadequate response to infection (1). Based on the most recent data, there were 48.9 million sepsis cases globally in 2017, leading to 11 million deaths. The World Health Organization states that prevention, appropriate diagnosis, and treatment are crucial in improving mortality rates (2). Today, sepsis is becoming more common in general wards, making it essential for nursing students to acquire adequate knowledge of sepsis and how to recognize it during their studies. The available literature indicates that coverage of sepsis in undergraduate nursing programs is often ineffective and inadequate (3).

Higher education in Croatia is organized through university and professional study programmes, which are equivalent to colleges or universities in the United States. Professional programmes provide students with the necessary level of knowledge and skills for applied professions, facilitating their direct integration into the workforce. The undergraduate nursing programmes last for three years, and after completion students are awarded the title "Bachelor of Nursing". Subsequently, graduates may choose to pursue a two-year graduate programme. Students have the option to study nursing on a full-time or part-time basis. Education on sepsis is integrated throughout each year of study in various courses (4).

Stefaniet et al. report that 60.8% of their respondents were educated about the early detection of sepsis; however, they noted that knowledge about sepsis itself is scarce, as almost no one knew its definition (5).

Harley and colleagues assessed the knowledge of final-year nursing students at four Australian universities, finding that 86.1% of respondents correctly identified sepsis symptoms, and nearly half (44.7%) emphasized the importance of starting treatment early (6).

Research by Nakiganda and colleagues on knowledge of guidelines for treating and recognizing sepsis revealed that only 30% of nurses had heard of sepsis treatment guidelines, and were unfamiliar with their content (7).

At a medical centre in Chicago, Illinois, sepsis screening is conducted by nurses. During the implementation of the screening, it was observed that the nurses lacked general knowledge of sepsis, revealing deficiencies in the curriculum and nursing education related to this topic. The research led to the development and implementation of educational interventions, including simulation exercises and a sepsis course (8). Valičević and colleagues' research also found that nursing students had poor knowledge of sepsis (9), while Harley emphasized the importance of incorporating sepsis into the curriculum in Australia to enable comprehensive education for nurses, promoting early recognition of sepsis (6).

Evaluating the knowledge levels of undergraduate nursing students is crucial, as it indicates their preparedness for future roles in the healthcare system postgraduation, highlighting its increasing relevance. This study aimed to investigate the extent of sepsis knowledge among undergraduate nursing students and to analyze variations across different academic years and study formats. The importance of this research is rooted in assessing the effectiveness of the educational materials offered to students throughout their academic progression.

This study builds upon the previous research by Valičević et al., titled "Knowledge of Sepsis in Nursing Students – A Cross-Sectional Study" (9).

Methods

Participants and Procedure

A cross-sectional study was conducted at the University of Applied Health Sciences in Zagreb from September 2022 to September 2023. The study included 419 nursing students from all three years of the undergraduate program, encompassing both part-time students (who were employed in the healthcare sector) and full-time students. Participation was voluntary, and informed consent was obtained from all the participants. Before administering the surveys, the university's teaching staff briefed the students on the study's objectives and purpose.

Instrument

For this study, demographic data (including gender, age, employment status, and year of study) and a questionnaire provided by Eitze et al. (10) were used. The questionnaire comprised five demographic questions, two questions related to awareness items preceding the knowledge scale, nine questions on knowledge of sepsis, and seven questions on knowledge of the symptoms of sepsis. The respondents answered the sepsis-related questions with "yes," "no," or "unsure." The questionnaire was administered in Croatian and underwent a double-blind translation process.

Data Analysis

The data was analyzed using SPSS software (IBM, Version 25.0) (11). For categorical (nominal) variables, the results were presented as frequencies and percentages. The Chi-square test was employed to determine the statistical significance between the variables.

Ethics

The study adhered to the principles outlined in the Declaration of Helsinki and was approved by the Ethics Committee of the University of Applied Health Sciences in Zagreb (Class: 602-03/22-18/540, Reg. No. 251-379-10-22-02, dated 1 September 2022). Participation was completely voluntary, and all participants provided informed consent.

Results

The sample consisted of 419 undergraduate nursing students across all three academic years, including 369 (88.1%) females and 50 (11.9%) males. A more detailed description of the sample can be found in Graph 1.

Table 1 illustrates the number and percentage of respondents who provided correct, incorrect, or unsure responses to questions about sepsis. First-year students had significantly fewer correct answers regarding the statement, "Sepsis can be caused by lung inflammation", in comparison to second- and third-year students. Additionally, knowledge about the statement "Sepsis can be caused by influenza" improved with advancing years of study, with third-year students demonstrating a significantly higher level of understanding compared to first-year students.

Table 3 results indicate that first-year students showed the lowest level of knowledge about sepsis symptoms on several questions. In their answers to the questions "*Are chills and fever symptoms of sepsis?*" and "*Is a high heart rate a symptom of sepsis?*" there were significantly fewer correct answers among first-year students compared to second-year students. Additionally, their answers to the questions "*Is disorientation a symptom of sepsis?*" and "*Is shortness of breath a symptom of sepsis?*" demon-
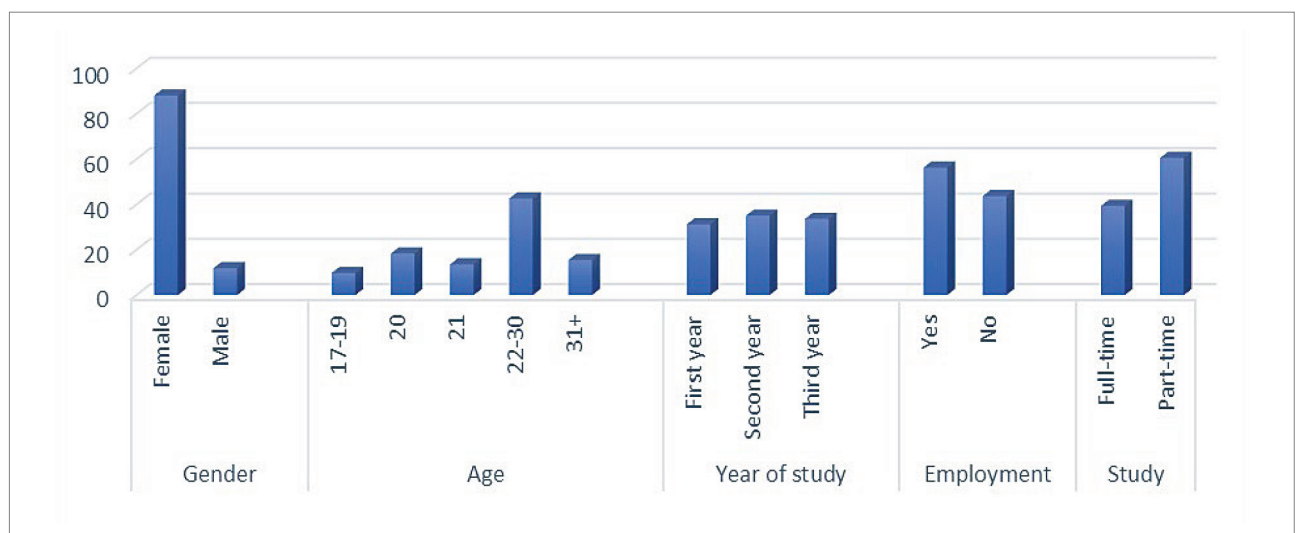
Graph 1. **Respondents' demographic data**

Table 1. Distribution of Students' Correct Responses to "Knowledge of Sepsis" by Year of Study

		Year of study						
		First year		Second year		Third year		p
		N	%	n	%	n	%	
With sepsis, you must call the emergency services immediately.	Incorrect or unsure	18	13.7	21	14.3	21	14.9%	0.964
	Correct	113	86.3	126	85.7	120	85.1%	
Sepsis is an intense allergic reaction.	Incorrect or unsure	26	19.8	18	12.2	22	15.6	0.221
	Correct	105	80.2	129	87.8	119	84.4	
Sepsis is an intense immune response of the body.	Incorrect or unsure	43	32.8	31	21.1	32	22.7	0.055
	Correct	88	67.2	116	78.9	109	77.3	
Sepsis is caused by multidrug-resistant superbugs in hospitals.	Incorrect or unsure	13	9.9	16	10.9	11	7.8	0.662
	Correct	118	90.1	131	89.1	130	92.2	
Sepsis can be diagnosed by a red line infiltrating from a wound up to the heart.	Incorrect or unsure	116	88.5	118	80.3	114	80.9	0.128
	Correct	15	11.5	29	19.7	27	19.1	
Mortality after heart attacks is higher than mortality after sepsis.	Incorrect or unsure	98	74.8	109	74.1	103	73	0.945
	Correct	33	25.	38	25.9	38	27	
There are more cases of breast cancer than cases of sepsis.	Incorrect or unsure	92	70.2	94	63.9	90	63.8	0.447
	Correct	39	29.8	53	36.1	51	36.2	
Sepsis can be caused by lung inflammation.	Incorrect or unsure	56	42.7	34	23.1	41	29.1	**0.002**
	Correct	75	57.3	113	76.9	100	70.9	
Sepsis can be caused by influenza.	Incorrect or unsure	89	67.9	85	57.8	70	49.6	**0.009**
	Correct	42	32.1	62	42.2	71	50.4	

strated a significantly lower level of knowledge than both second and third-year students.

Employed students answered questions concerning disorientation, shortness of breath, and low blood pressure as symptoms of sepsis more accurately, as shown in Table 4.

Discussion

Following the previous research, the teaching staff at the faculty were informed about the results and the need for enhanced education on sepsis by sharing published article. In our study, students' knowledge of sepsis was assessed. There was a difference in sepsis knowledge among students who were not employed and among those who were at the beginning of their education (Table 3). Students who were at the beginning of their education showed a lower level of knowledge than third-year students. This

Table 2. Distribution of Students' Correct Responses to "Knowledge of Sepsis" Based on Employment Status

		Employment				
		Yes		No		p
		n	%	n	%	
With sepsis, you must call the emergency services immediately.	Incorrect or unsure	40	16.9	20	10.9	0.081
	Correct	196	83.1	163	89.1	
Sepsis is an intense allergic reaction.	Incorrect or unsure	32	13.6	34	18.6	0.162
	Correct	204	86.4	149	81.4	
Sepsis is an intense immune response of the body.	Incorrect or unsure	57	24.2	49	26.8	0.540
	Correct	179	75.8	134	73.2	
Sepsis is caused by multidrug-resistant superbugs in hospitals.	Incorrect or unsure	18	7.6	22	12	0.129
	Correct	218	92.4	161	88	
Sepsis can be diagnosed by a red line infiltrating from a wound up to the heart.	Incorrect or unsure	183	77.5	165	90.2	**0.001**
	Correct	53	22.5	18	9.8	
Mortality after heart attacks is higher than mortality after sepsis.	Incorrect or unsure	175	74.2	135	73.8	0.930
	Correct	61	25.8	48	26.2	
There are more cases of breast cancer than cases of sepsis.	Incorrect or unsure	151	64	125	68.3	0.355
	Correct	85	36	58	31.7	
Sepsis can be caused by lung inflammation.	Incorrect or unsure	58	24.6	73	39.9	**0.001**
	Correct	178	75.4	110	60.1	
Sepsis can be caused by influenza.	Incorrect or unsure	121	51.3	123	67.2	**0.001**
	Correct	115	48.7	60	32.8	

Table 3. Distribution of Students' Correct Responses to "Knowledge of the Symptoms of Sepsis" by Year of Study

		Year of study						
		First year		Second year		Third year		p
		N	%	n	%	n	%	
Are chills and fever symptoms of sepsis?	Incorrect or unsure	24	18.3	11	7.5	14	9.9	**0.014**
	Correct	107	81.7	136	92.5	127	90.1	
Is disorientation a symptom of sepsis?	Incorrect or unsure	48	36.6	30	20.4	32	22.7	**0.004**
	Correct	83	63.4	117	79.6	109	77.3	
Is shortness of breath a symptom of sepsis?	Incorrect or unsure	83	63.4	65	44.2	66	46.8	**0.003**
	Correct	48	36.6	82	55.8	75	53.2	
Is a high heart rate a symptom of sepsis?	Incorrect or unsure	32	24.4	13	8.8	28	19.9	**0.002**
	Correct	99	75.6	134	91.2	113	80.1	
Is low blood pressure a symptom of sepsis?	Incorrect or unsure	62	47.3	56	38.1	53	37.6	0.187
	Correct	69	52.7	91	61.9	88	62.4	
Is diarrhoea a symptom of sepsis?	Incorrect or unsure	91	69.5	95	64.6	91	64.5	0.619
	Correct	40	30.5	52	35.4	50	35.5	
Are a skin rash and eczema symptoms of sepsis?	Incorrect or unsure	83	63.4	83	56.5	92	65.2	0.272
	Correct	48	36.6	64	43.5	49	34.8	

Table 4. Distribution of Students' Correct Responses to "Knowledge of the Symptoms of Sepsis" Based on Employment Status

		Employment				
		Yes		No		p
		n	%	n	%	
Are chills and fever symptoms of sepsis?	Incorrect or unsure	22	9.3	27	14.8	0.086
	Correct	214	90.7	156	85.2	
Is disorientation a symptom of sepsis?	Incorrect or unsure	44	18.6	66	36.1	**<0.001**
	Correct	192	81.4	117	63.9	
Is shortness of breath a symptom of sepsis?	Incorrect or unsure	106	44.9	108	59	**0.004**
	Correct	130	55.1	75	41	
Is a high heart rate a symptom of sepsis?	Incorrect or unsure	35	14.8	38	20.8	0.112
	Correct	201	85.2	145	79.2	
Is low blood pressure a symptom of sepsis?	Incorrect or unsure	82	34.7	89	48.6	**0.004**
	Correct	154	65.3	94	51.4	
Is diarrhoea a symptom of sepsis?	Incorrect or unsure	153	64.8	124	67.8	0.530
	Correct	83	35.2	59	32.2	
Are a skin rash and eczema symptoms of sepsis?	Incorrect or unsure	148	62.7	110	60.1	0.587
	Correct	88	37.3	73	39.9	

highlights the significance of education during the academic journey.

Our findings are in line with earlier research of Valicevic et al., although it is challenging to make direct comparisons due to variations in the sepsis knowledge questionnaires utilized and differences in the ward settings across different studies (9).

Similar results were obtained in the Harley (6) study on Australian students, where there was also less knowledge in first-year students than final-year students. For example, 36.6% of first-year respondents answered the question "*Is shortness of breath a symptom of sepsis?*" correctly, while 53.2% of third-year students provided a correct answer.

In the Tilton study (12), the majority of the respondents (60%) were familiar with the definition of sepsis: "a host's uncontrolled systemic inflammatory response to an infection". In our study, when asked "Is sepsis an intense immune response of the body?", more than 80% of respondents in each year answered the question correctly.

According to research findings by Chua (13), nursing job grade ($p > 0.001$), education level ($p < 0.001$) and clinical work area ($p < 0.001$) were identified as sig-

nificant predictors of nurses' knowledge of sepsis. As in our study, employed students demonstrated better knowledge than unemployed ones.

Significant improvement in the level of knowledge of sepsis is visible on several items compared to the previous research wave of Valicevic et al.: "*With sepsis, you must call the emergency services immediately*", "*Sepsis is caused by multidrug-resistant superbugs in hospitals*", "*There are more cases of breast cancer than cases of sepsis*" and "*Sepsis can be caused by lung inflammation*". However, there were fewer correct associations with the statement "*Sepsis can be diagnosed by a red line infiltrating from a wound up to the heart*" than in 2020 (9).

Knowledge of sepsis symptoms was significantly better than 2020 in most of the evaluated items: "*Are chills and fever symptoms of sepsis?*", "*Is disorientation a symptom of sepsis?*", "*Is shortness of breath a symptom of sepsis?*", "*Is a high heart rate a symptom of sepsis?*", "*Is low blood pressure a symptom of sepsis?*". There were fewer correct answers to the question of whether diarrhoea is a symptom of sepsis than there were in 2020.

The importance of early recognition and treatment of patients with sepsis cannot be overstated. There-

fore, it is crucial to raise awareness and understanding of sepsis in healthcare workers and students. To achieve this, students need to be educated and trained to recognize sepsis promptly, focusing on early diagnosis and treatment (14).

Nurses play a crucial role in patient assessment and care. Therefore, the importance of education during nursing studies must be emphasized to enable students to develop appropriate skills and knowledge. While refining and improving knowledge and skills is ideally done in a clinical setting at the patient's bedside, this is often challenging to implement in practice. More educational institutions are conducting simulations (15). Learning through simulation and play is frequently positively evaluated and accepted by students during their training, as they find it facilitates knowledge acquisition and ensures practice in a safe environment. Learning through play or simulation is considered a more effective approach than traditional lecture-based or e-learning methods (16). Technological advances are enabling knowledge and skills development through online platforms. The increasing use of three-dimensional computer simulations presents real-life situations in a computerized environment, providing users with the impression of being in a specific situation (15). This type of simulation ensures a safe learning environment without risks for patients, and it is flexible, allowing different approaches for each patient. Research conducted by Adhikari and colleagues (15) focusing on a sepsis-related simulation indicated an increase in self-confidence and a reduction in anxiety in both nurses and students when identifying clinical deterioration due to sepsis (15).

We would like to emphasize the importance of education-related interventions to conduct proper assessments of septic patients. Nursing students should better understand sepsis guidelines and use tools for early detection. Furthermore, educational institutions should implement teaching strategies that facilitate students' acquisition of knowledge, attitudes, and skills (15,17). This research once again highlights the need for education of nurses about sepsis.

Study limitations

Geographical Limitation: This study was carried out at a single institution, the University of Applied Health Sciences in Zagreb, which may restrict the generalizability of the findings to nursing students across Croatia. Including multiple institutions could provide a broader understanding of sepsis knowledge.

Gender imbalance: As is common in nursing programs, the majority of the sample consisted of female students (88.1%). While this reflects the gender distribution in the nursing profession, it limits the study's ability to explore potential gender differences in sepsis knowledge.

Conclusion

Sepsis is a leading cause of mortality and long-term complications in patients. Early recognition of its symptoms, combined with appropriate therapeutic interventions, is crucial for improving patient outcomes. The ability of nursing students to swiftly detect and respond to patient deterioration due to sepsis is vital, highlighting the need for thorough sepsis education. Our study evaluated the sepsis knowledge among undergraduate nursing students, identifying an overall gap in their ability to recognize, understand, and manage sepsis. The results also showed an improvement in sepsis knowledge in later academic years, along with a significant difference between full-time and part-time (employed) students. Considering the scarcity of global research on this topic, there is a pressing need for further studies and educational initiatives that prepare nursing students to provide effective and timely care for sepsis patients. The authors advocate for greater inclusion of sepsis-related material in nursing curricula, covering both theoretical knowledge and hands-on clinical and simulation training.

Acknowledgments

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119

KOLIKO STUDENTI SESTRINSTVA ZNAJU O SEPSI? – PRESJEČNO ISTRAŽIVANJE

Sažetak

Uvod. Razumijevanje sepse ključno je za njezino rano otkrivanje i brzo liječenje. Edukacija o sepsi trebala bi započeti tijekom obrazovanja, stoga je važno vrednovati znanje studenata. Ovo istraživanje imalo je za cilj unaprjeđenje prethodne studije istražujući razinu znanja o sepsi među studentima prijediplomskog studija sestrinstva i analizirajući razlike između studijskih godina i vrsta studija.

Metode. Ovo presječno istraživanje uključilo je 419 studenata sestrinstva sa Zdravstvenog veleučilišta u Zagrebu u Hrvatskoj. Sudionici su bili studenti svih triju studijskih godina, kao i redovni i izvanredni (zaposleni) studenti sestrinstva. Za prikupljanje podataka primijenjena je modificirana verzija upitnika znanja o sepsi koju su izradili Eitze i sur., dok su također zabilježeni demografski podaci kao što su spol, dob, status zaposlenja i studijska godina. Podaci su analizirani primjenom SPSS-a (IBM, verzija 25.0) te primjenom hi-kvadrat testa za procjenu statističke značajnosti.

Rezultati. Utvrđene su statistički značajne razlike u postotku studenata treće godine koji su dali točne odgovore o znanju o sepsi u odnosu na studente prve i druge godine. Dodatno, zaposleni studenti pokazali su znatno veći broj točnih odgovora o uzrocima i simptomima sepse u odnosu na svoje vršnjake koji nisu zaposleni.

Zaključci. Sposobnost studenata sestrinstva da prepoznaju i odgovore na pogoršanje pacijenta uslijed sepse naglašava hitnu potrebu za sveobuhvatnim obrazovanjem o sepsi. Naši rezultati ukazuju na potrebu za većom integracijom tema povezanih sa sepsom u temeljni kurikulum sestrinstva, posebno naglašavajući praktičnu obuku i simulacijske vježbe za poboljšanje ranog otkrivanja i liječenja sepse.

Knowledge of Cardiopulmonary Resuscitation and Automated External Defibrillator Use in the General Population

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Abstract

Introduction. Sudden cardiac arrest represents a significant public health issue worldwide. Laypersons are often the first responders in emergencies. Timely recognition of the distressed individual and providing aid is crucial. Education on basic life support procedures is essential to reduce mortality among affected individuals, alongside addressing laypersons' fear of performing cardiopulmonary resuscitation.

Aim. The aim of this study was to assess the knowledge of Croatian citizens regarding basic life support procedures and knowledge of automated external defibrillator use.

Methods. A cross-sectional study was conducted on 597 respondents in Croatia between November 2022 and April 2023. The research was carried out using an online questionnaire distributed through social media platforms. The questionnaire utilized a combination of Atlagić K. and Al Haliq's surveys. The obtained results were presented in frequency and percentage of respondents. Continuous variables were displayed using mean and standard deviation.

Results. The majority of respondents (89.9%) had attended a first aid course. Half of the respondents (56.3%) expressed readiness to provide assistance to an injured person. A high percentage of respondents (87.4%) recognized chest compressions as the most crucial measure during cardiac arrest. Only 52.8% of respondents were aware of the 30:2 compression-to-ventilation ratio. When it comes to who is allowed

to use an automated external defibrillator, only 35.2% of respondents knew that everyone can use it. A statistically significant difference was observed concerning the education level of respondents, with those with primary education being the least prepared to apply life-saving measures.

Conclusion. Respondents showed readiness to provide first aid; however, there was a knowledge gap despite attending first aid courses. This highlights the need for introducing education initiatives aimed at enhancing citizens' knowledge of administering first aid.

Introduction

Sudden cardiac arrest is the third leading cause of death in Europe (1). According to The Guidelines® - Resuscitation Registry data from 2017, the survival rate after cardiac arrest until hospital discharge is approximately 25% (1). Defibrillation in the critical first minutes of out-of-hospital cardiac arrest can improve survival (2).

The annual incidence of out-of-hospital cardiac arrest in Europe ranges between 67 to 170 per 100,000 inhabitants. Resuscitation is continued or attempted by medical personnel in about 50-60% of cases. The rate of bystander-initiated cardiopulmonary resuscitation (CPR) varies from country to country (average 58%). The use of automated external defibrillators (AEDs) remains low in Europe (average 28%). In the Republic of Croatia, for now, there is no register of resuscitation or any other form of systematic monitoring of resuscitation outcomes (3).

The actual frequency of out-of-hospital cardiac arrest in Europe is not known; available literature is based on emergency medical services reports. Therefore, the frequency may be underestimated since in certain countries, due to cultural or belief reasons, bystanders might not call emergency medical services at the time of a person's cardiac arrest. Other reasons for not seeking emergency assistance include instances where no one witnessed the event, and the patient is presumed dead, or the individual chooses not to initiate CPR. Hence, out-of-hospital cardiac arrest, when emergency medical assistance arrives, can be divided into two groups: those patients where CPR was initiated and those where CPR was not initiated (1). Addressing population knowledge gaps and education on patient needs are crucial for improving survival rates (4).

Chen et al. in their study found statistically significant differences in the willingness to use public AED based on participation in training, education level, residential location, family members with cardiovascular disease, population density, and the presence of elderly family members aged 65 or over ($p<.05$) (5). Alradini et al. detected strong association between knowledge of and willingness to use AEDs in emergency situations among the public (6). Knowledge of basic life support procedures is one of the essential skills that each person needs to adopt (7).

In the study by Wang et al. (8), three reasons were cited why laypersons do not initiate cardiopulmonary resuscitation: lack of practical knowledge, fear of injuring the patient, and inadequate familiarity with resuscitation technique skills. After undergoing online training, readiness to provide assistance increased. Public knowledge about the use of automated external defibrillators is generally low worldwide and unevenly distributed, varying from country to country. In their research, it was found that 34.5% of respondents knew what an automated external defibrillator was, yet half of the respondents could not answer any questions about the use of automated external defibrillators, and only 12.28% answered all questions correctly (8).

Aim

To explore the population's knowledge levels regarding resuscitation procedures and the use of automated external defibrillators. The specific objectives of this study are to determine whether differences exist based on place of residence, education level, and completion of a first aid course.

Methods

The conducted research was based on a cross-sectional study design. Participants completed an anonymous survey. Prior to survey completion, they were briefed on the purpose of the research, and participation was voluntary. The survey was conducted using Google Forms questionnaire. Assistance was provided to participants in accessing social media platforms. Approval for the research was obtained from the Ethics Committee of the University of Applied Health Sciences Zagreb. The cross-sectional study was conducted on the convenience sample in Croatia from November 2022 to April 2023. A total of 597 respondents participated in the study, consisting of 151 male and 446 female respondents. Participants voluntarily consented to take part in the study and participated via informed consent. They engaged in the research by completing an online questionnaire distributed publicly across various social media platforms.

Instruments

In the research, several instruments were utilized to gather comprehensive data. Firstly, demographic information was collected, which included details such as gender, age, education level, and place of residence of the respondents. This data provided a foundational understanding of the participants' backgrounds.

Additionally, the research employed a questionnaire developed by Atlagić K., titled "Knowledge and awareness of resuscitation procedures and the application of automated external defibrillators in the population" (9). This instrument was designed to assess the respondents' knowledge and awareness regarding resuscitation procedures and the use of automated external defibrillators. The questionnaire included a series of questions aimed at evaluating how well the general population understands and can apply these life-saving techniques.

Furthermore, the study incorporated another questionnaire from Al Haliq and colleagues, titled "Assessment on CPR Knowledge and AED Availability in Saudi Malls by Security Personnel: Public Safety Perspective" (10). This instrument covered basic questions related to basic life support (BLS), focusing particularly on the knowledge of CPR and the availability of AEDs, as understood and practiced by security personnel in Saudi malls.

Through these instruments, the research aimed to provide a detailed analysis of the participants' knowledge and awareness of critical life-saving procedures, as well as the availability and accessibility of AEDs in public spaces.

Statistics

The results obtained in the research were presented by frequency and percentage (%) of respondents. Correct individual responses were computed into Total score on "Knowledge and awareness of resuscitation procedures" scale. For that continuous variable the normality of distribution was assessed using the Shapiro-Wilk test and it showed statistically significant deviation from normal distribution ($p<0.001$), therefore beside mean and standard deviation also median and interquartile range is shown. Independent samples χ^2 test was used to evaluate the presence of statistically significant differences between groups based on completion of first aid during the driver's licence testing in respondents' knowledge of basic life support and the use of automated external defibrillators. Kruskal-Wallis was used as a non-parametric substitute for one-way analysis of variance to check the significance of differences between age and education groups on Knowledge and awareness scale.

Results

A total of 597 citizens has participated in the survey, 151 male (25.3%), and 446 female (74.7%). Table 1 shows sample demographic features.

Table 1. **Demographic features**			
		n	%
Age	18 – 25	180	30.3
	26 – 35	131	22
	36 – 45	133	22.4
	46 – 55	103	17.3
	56 – 65	32	5.4
	65 +	16	2.7
Gender	Male	151	25.3
	Female	446	74.7
Level of education	Primary education	25	4.2
	Secondary education	320	53.6
	Bachelor degree	142	23.8
	Master degree or College degree	110	18.4
Type of settlement	Rural	296	49.6
	Urban	301	50.4
Area	Zagreb County	276	46.4
	The City of Zagreb	130	21.8
	Sisak-Moslavina County	40	6.7
	Istria County	11	1.8
	Bjelovar-Bilogora County	25	4.2
	Karlovac County	10	1.7
	Virovitica-Podravina County	5	0.8
	Primorje-Gorski Kotar Couty	11	1.8
	Zadar County	7	1.2
	Varaždin County	4	0.7
	Koprivnica-Križevci County	19	3.2
	Požega-Slavonia County	4	0.7
	Lika-Senj County	3	0.5
	Split-Dalmatia County	14	20.4
	Krapina-Zagorje County	9	1.5
	Brod-Posavina County	7	1.2
	Šibenik-Knin County	7	1.2
	Osijek-Baranja County	4	0.7
	Vukovar-Srijem County	3	0.5
	Dubrovnik-Neretva County	2	0.3
	Međimurje County	4	0.7
Do you have a driver's licence?	Yes	511	85.9
	No	84	14.1

Female respondents prevail in this sample (74.7%), as well as younger respondents (30.3%) aged 18 to 25 and additional 22% accounts for peopled aged 26 to 35.

Most respondents were from Zagreb County (46.4%) and the City of Zagreb (21.8%). More than half have completed secondary education (53.6%), while 18.4% have college degree, and 23.8% have bachelor's degree. Majority have driver's licence (85.9%).

Questions related to knowledge and awareness about basic life support are shown in Table 2.

People with higher education levels have a higher percentage of correct answers compared to people with lower education levels in terms of questions: What is the next step if a person does not respond to a stimulus (sound, touch) (χ^2=14.975, df=3, p=0.002) and Compression ratio of artificial respiration during resuscitation of an adult in which two people participate (χ^2=16.701, ss=3, p=0.001). Given that Levene's test of homogeneity of variances showed statistical significance, instead of one-way ANOVA analysis, the Kruskal-Wallis test has been used to check the significance of the difference between the groups of respondents with regard to education in the average total score on the Scale of Knowledge and Awareness of Resuscitation Procedures. The Kruskal-Wallis test determined that the groups differed statistically significantly (p<0.001), with additional Mann-Whitney test between subgroups, in such a way that respondents with primary education had a lower average score (M=2.40, SD=1.08, Median=2, Interquartile Range=1), while those with a higher professional education had a higher average number of points on Knowledge (M=3.60, SD=1.24, Median=4, Interquartile Range=1.25), p<0.001 between two subgroups, as well as between primary and college education (M=3.28, SD=1.42, Median=3, Interquartile Range=2) with p=0.004. Maximum score on Graph 1 is 6, this indicates approximately one point better result for the two highly educated subgroups, but they achieved moderately high results overall.

Series of chi-square tests were used to determine if groups differ statistically significantly. Only in terms of the question "Do you know who is allowed to use an automatic external defibrillator" the respondents differ according to education, in such a way that those with higher education levels have a higher percentage of the correct answer (χ^2=46.047, df=3, p<0.001).

Table 2. **Percentage of population with correct answers in Knowledge related to basic life support according to their education**									
n		Primary education		Secondary education		Bachelor's degree		Master's degree or PhD	p
		%	n	%	n	%	n	%	
What is the next step if a person does not respond to sound or touch?	Incorrect	14	56	134	41.9	42	29.6	30	27.3	**0.002**
	Correct	11	44	186	58.1	100	70.4	80	72.7	
What is the most beneficial for a person with cardiac arrest?	Incorrect	5	20	44	13.8	14	9.9	12	10.9	0.409
	Correct	20	80	276	86.3	128	90.1	98	89.1	
What should be compression ratio in resuscitation with two persons involved?	Incorrect	18	72	160	50	49	34.5	55	50	**0.001**
	Correct	7	28	160	50	93	65.5	55	50	
What should be the number of compressions for an adult without stopping?	Incorrect	21	84	214	66.9	87	61.3	67	60.9	0.105
	Correct	4	16	106	33.1	55	38.7	43	39.1	
What should be the depth of the chest compression for adults?	Incorrect	16	64	164	51.2	61	43	59	53.6	0.136
	Correct	9	36	156	48.8	81	57	51	46.4	
What is the correct hand position when resuscitating an adult person?	Incorrect	16	64	216	67.5	88	62	77	70	0.547
	Correct	9	36	104	32.5	54	38	33	30	
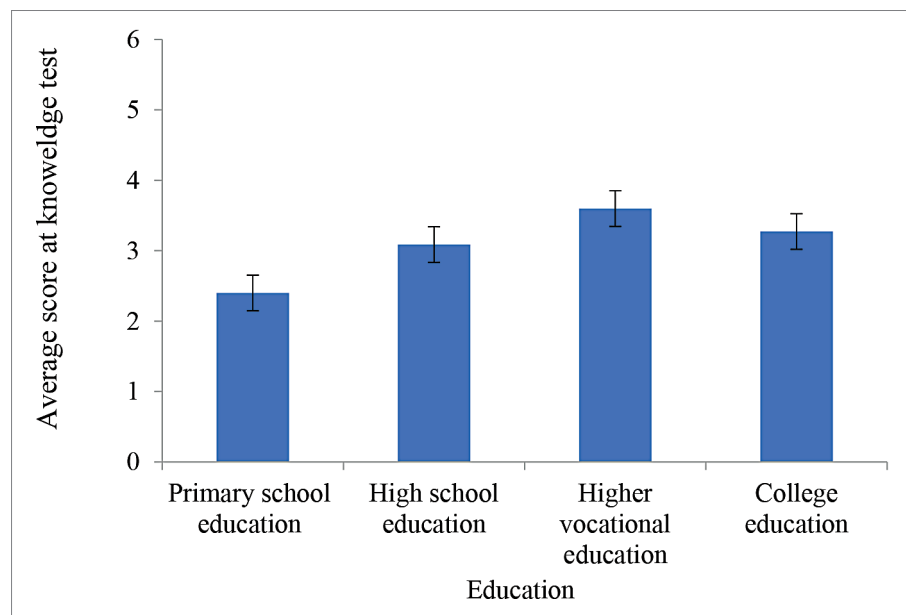
Graph 1. **Total score in knowledge related to basic life support according to their education**

Table 3. Distribution of correct answers to the questions on knowledge and awareness of the application of AED regarding education

n		Primary education		Secondary education		Bachelor's degree		Master's degree or PhD		p
		%	n	%	n	%	n	%		
What is the name of the device which saves lives by applying electric shock?	Incorrect	1	4	21	6.6	5	3.5	1	0.9	0.090
	Correct	24	96	299	93.4	137	96.5	109	99.1	
When AED is present, what is the next step?	Incorrect	18	72	190	59.4	78	54.9	58	52.7	0.259
	Correct	7	28	130	40.6	64	45.1	52	47.3	
Do you know who can use AED?	Incorrect	22	88	240	75	71	50	54	49.1	<0.001
	Correct	3	12	80	25	71	50	56	50.9	
Do you know what color the spot with AED is marked with?	Incorrect	15	60	171	53.4	68	47.9	55	50	0.566
	Correct	10	40	149	46.6	74	52.1	55	50	

Discussion

This research aimed to assess knowledge and awareness of resuscitation procedures and the use of automated external defibrillators. As previously mentioned, the importance of early recognition and initiation of resuscitation procedures cannot be overstated. The study aimed to ascertain the knowledge of citizens; thus, 597 participants were involved in the research, with 74.7% female and 25.3% male respondents. The majority of participants completed vocational secondary education (53.6%). Regarding the place of residence, the respondents from rural and urban areas were equally represented.

According to Gonzalez et al.'s research, 40% of respondents could not recognize an automated external defibrillator, and over 60% were unaware that laypersons could use an automated external defibrillator (11). The lack of training in the use of automated external defibrillators is evident. In countries like the United States, Sweden, and Japan, training has led to increased patient survival rates. However, there is still a significant lack of public knowledge and awareness regarding first aid (11). The first encounter with first aid occurs during attending driving school, where passing a first aid course is a requirement. Very often, this is the only exposure to a first aid course, especially if there is no requirement for first aid in the workplace (11).

Research conducted in Croatia by Atlagić (9) reported that 86.3% of respondents had completed a first aid course. Similarly, in our study, a comparable result was obtained, with 89.8% of respondents having completed first aid training. It was observed that 85.9% of individuals obtained their driver's license where they encountered first aid training.

Research conducted by Fan et al. in Hong Kong stated that the majority of respondents were not trained in providing first aid (65.8%), while 85.3% were not educated in using an automated external defibrillator (12). A significant majority of respondents would call for help (96.5%), but only 20.4% were willing to perform cardiopulmonary resuscitation, and merely 18% of respondents would use an automated external defibrillator (12). Furthermore, compared to Atlagić's work (9) regarding respondents' confidence in initiating cardiopulmonary resuscitation, it was noted that only 28.2% of respondents were ready to provide assistance (9). In our study, more than half of the respondents (56.3%) were willing to initiate resuscitation procedures on a person showing symptoms of cardiac arrest.

A study conducted in Vienna by Krammel et al. (13) indicated that 65% of respondents were aware of the importance of starting resuscitation procedures early, 52% would check the breathing of an injured person, while 31% would not check the breathing of an injured person. Concerning the importance of

chest compressions, only 58% of respondents indicated its importance in maintaining life during cardiac arrest (13).

In Al Haliq's study (10), a lack of knowledge about providing basic life support and using an automated external defibrillator was observed, as courses and education are conducted only in hospitals. They mention that poor knowledge is associated with a lack of education during schooling. In contrast, in other countries, it is mandatory to undergo basic life support and automated external defibrillator training before obtaining a driver's license, and in some countries, it is integrated into the high school curriculum (10). Almost all respondents (94.1%) believe that it is the moral obligation of every person to provide first aid to an unconscious person. A total of 47.1% of respondents consider using an automated external defibrillator during cardiac arrest (10). In their research, respondents would seek an automated external defibrillator: in a store 0.8%, at a bus station 3.4%, in a hospital 20.4%, at gatherings with a large number of people 20.6%, 26.8% do not know the answer, while 28% of respondents would seek it at all mentioned locations. A total of 4.5% of respondents had the opportunity to use an automated external defibrillator while providing first aid, and 18.8% tried it during a life support course (10). Very similar data were obtained in Atlagić's research (9), where only 13.3% had tried to use an automated external defibrillator during a first aid course, and 5% during the provision of first aid (9). More than half of the respondents (63.1%) know that the next step after confirming that a person does not respond to stimuli is to check for breathing (9). A high percentage of respondents, 87.4%, know that chest compressions are the most significant measure during cardiac arrest (9). Despite almost all respondents passing the first aid course, only 52.8% of respondents know that the compression-to-ventilation ratio is 30:2. Concerning the question of how deep compressions should be for an adult, only 34.8% of respondents answered correctly. Similarly, for hand placement during resuscitation, only 33.5% know that it is necessary to place two hands on the lower half of the sternum. Almost half of the respondents, 42.4%, know what to do when an automated external defibrillator arrives at the site of the accident. A total of 95.3% of respondents know that a defibrillator or automated external defibrillator is a device that can save a person's life by delivering an electrical impulse.

Only 35.2% of respondents believe that anyone can use an automated external defibrillator. Atlagić's research (9) yields similar results, with only 21.8% knowing the correct answer. Also, concerning the labelling of automated external defibrillators, our respondents demonstrate a higher level of knowledge. Slightly less than half of the respondents (48.2%) know that the location of an automated external defibrillator is indicated by the color green, while in Atlagić's study (9), only 33.9% identified it correctly. In the study by Krammel et al. (13) regarding the identification of automated external defibrillators, 97% recognized what it is, but only 57% stated that anyone can use it, and 21% believe that only doctors can use it. Out of the total number of respondents, 50% recognized the color of the standardized logo for an automated external defibrillator (13). Respondents showed an extremely high willingness to help, call emergency medical services (99.5%), provide first aid (97%), and even perform cardiac massage (92.1%). In this study, respondents demonstrate a higher level of knowledge related to the emergency number compared to Atlagić's research (9), where only 8.7% of respondents do not know the correct emergency number, while in Atlagić's study (9), 55.6% of respondents do not know the emergency number. Research conducted in Saudi Arabia by Al Haliq et al. mentions that over half of the participants (54.1%) were not aware of the emergency number (10).

Individuals with primary education levels are least ready to perform public resuscitation measures. Additionally, they are least prepared to use an AED and do not know what the device is used for. Conversely, individuals with higher vocational education demonstrate the highest readiness to apply an AED. Individuals with higher and university-level education have had the most opportunities to use an AED (during basic life support courses). There is a statistically significant difference related to education; individuals with primary education have a lower average score, while those with higher vocational education have a higher average score concerning knowledge.

Research in Australia found that individuals with higher education possess more knowledge about performing cardiopulmonary resuscitation. In the case of cardiac arrest, around two-thirds of respondents would perform resuscitation, while only 3% would locate a defibrillator (14). In Australia, community CPR training is not mandatory; it is only com-

pulsory in certain occupations (15-17). In Krammel et al.'s study (13) regarding gender differences concerning knowledge of life support and AED use, it was noted that women were more prepared to start basic life support. Regarding age, the youngest age group exhibited the best knowledge of applying basic life support measures and using an AED (13), and for future research it would be interesting to get deeper into gender and age differences. There was no gender difference observed in the conducted research, but a statistically significant difference was noted concerning age. The age group 65+ showed the least preparedness and confidence in using an AED. Individuals who attended a first aid course are more likely to be familiar with the device used to save a person's life by delivering an electrical impulse. Furthermore, they are more willing to provide assistance and start resuscitation compared to those who have not attended such a course.

This study identified that participants who attended a first aid course demonstrated greater readiness to seek help and initiate resuscitation procedures. From this, we can conclude that introducing educational programs for first aid is necessary to ensure that everyone has access to such education, regardless of whether they are drivers or not. It is important to note that although the participants had attended a first aid course and claimed readiness to start resuscitation procedures, slightly more than half of them were not familiar with the compression-to-massage ratio during resuscitation.

Limitations of the study

Research on the knowledge and awareness of the general population regarding resuscitation procedures and the use of automated external defibrillators may face several limitations:

Psychological factors: Feelings of discomfort or nervousness may limit people's readiness to participate in the research or openly share their views on resuscitation.

Demographic factors: Different groups of people may have varying levels of knowledge about resuscitation and AEDs, which could impact research outcomes.

Conclusion

One of the significant public health issues mentioned is out-of-hospital cardiac arrest. For a person to survive, the knowledge of the bystander encountering the injured person is extremely crucial. The key is recognizing cardiac arrest and initiating cardiopulmonary resuscitation. With the development of technology, automated external defibrillators have become accessible to the public, and their usage reduces the mortality rate of the injured person. There is a statistically significant difference concerning the level of education; individuals with primary education are the least prepared to apply resuscitation measures publicly. Additionally, they are the least prepared to use an automated external defibrillator. It is recommended to conduct education during schooling to reach the majority of the population.

The problem in Croatia is the lack of systematic first aid education, except during the process of obtaining a driver's license. Besides aiming to reduce mortality in emergencies, the goal of first aid education is also to reduce laypeople's fear. This study highlights the need to introduce mandatory citizen education. Ideally, education should be part of schooling, but it is also recommended to provide periodic citizen education to regularly refresh first aid knowledge and skills.

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ZNANJE O KARDIOPULMONALNOJ REANIMACIJI I UPOTREBI AUTOMATSKOGA VANJSKOG DEFIBRILATORA U OPĆOJ POPULACIJI

Sažetak

Uvod. Iznenadni srčani zastoj predstavlja znatan javnozdravstveni problem u cijelom svijetu. Laici su često prvi koji odgovaraju u hitnim slučajevima. Od presudne je važnosti pravodobno prepoznavanje unesrećene osobe i pružanje pomoći. Edukacija o osnovnim postupcima održavanja života ključna je za smanjenje smrtnosti među pogođenim pojedincima, uz rješavanje straha laika od izvođenja kardiopulmonalne reanimacije.

Cilj. Procijeniti znanje hrvatskih građana o osnovnim postupcima održavanja života i poznavanje upotrebe automatskoga vanjskog defibrilatora.

Metode. Provedeno je presječno istraživanje u kojem je sudjelovalo 597 ispitanika u Hrvatskoj od studenoga 2022. do travnja 2023. Istraživanje je provedeno s pomoću *online* upitnika distribuiranog putem platformi društvenih medija. U upitniku je primijenjena kombinacija anketa Atlagić K. i Al Haliq. Dobiveni rezultati prikazani su u frekvenciji i postotku ispitanika. Kontinuirane varijable prikazane su s pomoću srednje vrijednosti i standardne devijacije.

Rezultati. Većina ispitanika (89,9 %) pohađala je tečaj prve pomoći. Polovica ispitanika (56,3 %) izrazila je spremnost pružiti pomoć unesrećenoj osobi. Visoki postotak ispitanika (87,4 %) prepoznao je kompresiju prsnog koša kao najvažniju mjeru tijekom srčanog zastoja. Samo 52,8 % ispitanika bilo je svjesno omjera kompresije i ventilacije od 30 : 2. Kad je riječ o tome tko smije primjenjivati automatski vanjski defibrila-tor, samo 35,2 % ispitanika zna da ga može primjenjivati svatko. Uočena je statistički značajna razlika u stupnju obrazovanja ispitanika, pri čemu su oni s osnovnom školom najmanje spremni za primjenu mjera spašavanja života.

Zaključak. Ispitanici su pokazali spremnost za pružanje prve pomoći; međutim, postojala je praznina u znanju unatoč pohađanju tečajeva prve pomoći. To naglašava potrebu za uvođenjem edukativnih inicijativa usmjerenih na jačanje znanja građana o pružanju prve pomoći.

The Relationship between Parents' Personal Characteristics and Personality Traits and Their Satisfaction with the Quality of Nursing Care for Hospitalized Children in the Pediatric Department

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Abstract

Introduction. Patients' satisfaction with nursing care reflects the perception of care in relation to the level of care they expected before they were hospitalized in the department. However, satisfaction can be influenced by various factors that can change the actual image of the care provided.

Aim. To examine the relationship between parents' satisfaction with the nursing care provided to hospitalized children and the parents' personality traits.

Methods. The research was conducted at the General County Hospital Požega between 2022 and 2023, with 101 participants, parents of hospitalized children. The study employed a demographic questionnaire, the Croatian version of Patient Satisfaction with Nursing Care Quality Questionnaire (PSNCQQ – Cro), and the Big Five Inventory (BFI 44).

Results. The results show that parents' satisfaction with the quality of nursing care provided is negatively associated with the personality trait of neuroticism and the level of parents' education, and positively associated with the personality trait of extraversion and parents' age. The personality traits of neuroticism and extraversion, as well as age and level of education, were also found to be significant predictors of parents' satisfaction with the quality of care.

Conclusion. The results indicate that personality traits and certain demographic characteristics can play an important role in parents' satisfaction with the quality of nursing care, highlighting the importance of considering individual psychological factors of parents in the assessment and improvement of nursing care.

Introduction

Patients' satisfaction with certain care, including the quality of nursing care, reflects the perception of care in relation to the level of care they expected before they were hospitalized in the department (1). Therefore, it can be concluded from the above that satisfaction with care is not an objective assessment, and it can depend on many factors that can influence the expectations of the recipient of the same service before hospitalization (2). Different studies dealt with this issue in order to better understand satisfaction with the quality of nursing care, and thus it was shown that satisfaction with nursing care can be influenced by various demographic factors such as age, level of education and gender of the patient (3-5). However, not all stated results are consistent with research regarding the relationship between demographic aspects and satisfaction with the nursing care provided (3). Understanding satisfaction with the quality of nursing care is important because it is one of the indicators of the quality of nursing care (6). Nursing care quality indicators play a key role, not only in evaluating the quality of care provided, but also in achieving and evaluating organizational goals set for improving nursing care. They also provide evidence of the effectiveness and financial profitability of certain medical processes. They also provide a better possibility of measuring and analyzing the quality of the nursing care provided (6). So, although the patient's subjective assessment, satisfaction with the quality of care is very important in the overall picture of the provided nursing care. However, precisely because this assessment is subjective and plays an important role in further organizational procedures, it is necessary to better understand it and determine which factors can influence it.

Also, apart from being an indicator of nursing care, satisfaction with nursing care has been shown to be one of the main predictors of satisfaction with the overall care provided in a health facility (3, 7). As nurses spend the most time with the patient (3), the above results are not surprising, but they give added importance to monitoring and understanding satisfaction with nursing care, because in today's increasingly market-oriented health care system in the countries of Western Europe, ensuring the patient's arrival is very important for financial reasons. Satis-

fied patients will return to an institution where they feel that they received adequate care, they will recommend it to others, etc. (3). There is also an economic factor in patient satisfaction, because a satisfied patient will comply with the instructions given in the hospital and outpatient environment, and the path to their recovery will be faster and more successful, and the number of returns and repeated treatments caused by non-compliance with the instructions can be reduced (3,8-10).

Parents' satisfaction with nursing care provided to hospitalized children

However, when we talk about parents and their satisfaction, there is not much research on this subject. In addition to all the above that can affect the patient's satisfaction, parental expectations of nursing care can be conditioned by the clinical diagnosis, the health status of the child, but also by subjective factors on the part of the parents, the length of the child's stay and the final outcomes of treatment (11-15). It has also been shown that parents of hospitalized children require a high level of support from nurses during hospitalization, and if this is achieved, parents feel less anxious, less stressed, and it facilitates their adaptation to new parental roles, in the case of a newborn, and also encourages healthy interaction between the parent and the child (16-18). If pediatric nurses are supportive of parents and they are more satisfied with the service, this will have a positive effect because such parents will be more open to learning, care, better communication and will achieve healthier mutual relationships (16-18).

Personality traits and their relationship with satisfaction with nursing care

Examination of personal factors, such as parents' personality traits, was not conducted in relation to satisfaction with the quality of nursing care provided to their children. Personality traits are very important in interpersonal relationships because they can influence parents' experience and their evaluation of various services received, including nursing care. Different parental traits, such as openness, neuroticism or extraversion, can shape their expectations and reactions to the nursing care received. Therefore, personality traits could be a very important factor in modulating this subjective experience, because certain personality traits, such as neuroticism, can negatively affect

the very experience of interpersonal relationships, but people with more pronounced personality traits can actually create worse interpersonal relationships (3). On the other hand, a person with a more pronounced personality trait of agreeableness is characterized by cooperation, morality, sympathy, low self-confidence, a high level of trust in others, and they tend to be happy and satisfied because of their close mutual relationships (20), while extraversion is characterized by a higher level of self-confidence, positive emotions, enthusiasm, energy, seeking excitement and social interactions, openness, creativity, imagination, intellectual curiosity and originality (19).

Based on all of the above, it can be assumed that personality traits will also modulate parents' satisfaction with care, and a better understanding of this relationship will lead to the possibility to adapt the approach to parents, taking into account their personal characteristics and specific needs.

Aim

To examine the relationship between parents' satisfaction with the nursing care provided to hospitalized children and the parents' personality traits

Methods

In this study, a cross-sectional design was used. The research took place at the General County Hospital Požega in 2022 and 2023 at the Department of Pediatrics. To qualify for the study, the parents had to be with the hospitalized child in the hospital the entire time. The parents filled in the questionnaires when the child was discharged from the hospital.

The criteria for inclusion in the research were: stay in the hospital and the time of hospitalization, possibility to fill out the questionnaire independently, consent to the research and over 18 years of age.

Exclusion criteria were: parents not being with the child in the ward the whole time, refusal to participate in the research, under 18 years of age.

Participants

A total of 110 parents of hospitalized children participated, out of which 101 individuals completed the questionnaires and were included in the analysis.

Ethics

The research received approval from the Ethics Committee of the General County Hospital Požega (Reg. number: 02-7/2-2/1-4-2022), and all participants provided informed consent for their participation in the study. The research is fully compliant with the prescribed ethical standards for scientific research in medicine, including the fundamentals of good clinical practice, the Helsinki Declaration, the Health Care Act of the Republic of Croatia (NN 150/08, 71/10, 139/10, 22/11, 84/11, 154/11, 12/12, 35/12, 70/12, 144/12, 82/13, 159/13, 22/14, 154/14), and the Patient Rights Act of the Republic of Croatia (NN 169/04, 37/08).

All the procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all the patients for them to be able to be included in the study.

Instruments

In this study, three instruments were employed: a demographic questionnaire, PSNCQQ - Cro, and the BFI 44 questionnaire.

The demographic questionnaire was divided into two sections. The first part inquired about the gender, age and professional education of the parents.

The PSNCQQ - Cro (Patient Satisfaction with Nursing Care Quality Questionnaire - Croatian version) consists of 19 items that measure patient satisfaction with the quality of nursing care (3, 7). Participants respond by assessing their level of agreement with each statement on a Likert-type scale from 1 - "Excellent" to 5 - "Poor" (3, 7). The overall result of satisfaction with the quality of nursing care is the sum of all the items. The reliability level expressed by the Cronbach's Alpha coefficient of the Croatian version of the questionnaire was 0.97 (3), while in

this research it was $\alpha=0.91$, thus indicating a very high internal consistency of the questionnaire and confirming that the questions are largely aligned and measure the same construct.

Big Five Inventory (BFI 44) – BFI aimed to evaluate the personality dimensions through 44 items, structured by simple sentences, and rated in the Likert scale of 5 points, ranging from 1 – " Totally disagree" to 5 – "Totally agree". The questionnaire consists of five subscales, where 8 items refer to extraversion (possible score range from 8 to 40), nine items to agreeableness (possible score range from 9 to 45), nine items to conscientiousness (possible score range from 9 to 45), eight items to neuroticism (possible score range from 8 to 40) and ten items on extraversion (possible score range from 10 to 50) (21). The total score of each subscale is the sum of all items that refer to a particular subscale. In this study, the level of reliability of the BFI subscales, expressed by the Cronbach's Alpha coefficient, showed high internal consistency for the subscales of neuroticism ($\alpha=0.83$) and conscientiousness ($\alpha=0.89$), indicating a strong relationship between questions within these personality dimensions. On the other hand, the scales of agreeableness ($\alpha=0.64$), extraversion ($\alpha=0.65$) and openness ($\alpha=0.69$) have a moderate level of reliability, which suggests some variability among questions within these dimensions, but it is still acceptable for research purposes.

Statistics

Descriptive statistical methods were employed to present the frequency distribution of the investigated variables. Mean values are presented as arithmetic mean, minimum and maximum values, and standard deviation. The results of the Kolmogorov-Smirnov test of all numerical variables (parents' satisfaction with the quality of health care, age, and personality traits) were shown to deviate from the normal distribution ($p>0.05$), and non-parametric Spearman correlations were used. Linear regression analysis (enter method) was conducted to identify predictors of parents' satisfaction with the quality of nursing care. The prerequisites for regression analysis were met, with VIF values ranging from 1.032 to 1.400. Since VIF values below 5 are generally considered acceptable, this indicates the absence of significant multicollinearity. The normality of residuals is confirmed by the Kolmogorov-Smirnov test, where the p-value for unstandardized and standardized residuals is 0.159,

suggesting that deviations from normality were not statistically significant. The Durbin-Watson value is 1.669, which indicates a slight positive autocorrelation, but it remains within the generally acceptable range of 1.5 to 2.5, suggesting that autocorrelation is not a significant issue. A scatterplot of residuals for the overall regression shows randomly distributed residuals around the zero axis, with no discernible patterns, supporting the assumption of homoscedasticity. The dispersion is uniform, which suggests that the assumptions of linearity and homoscedasticity were met, with one deviation that may represent an outlier. A significance level of $p < 0.05$ was adopted.

The G*Power program determined that a minimum sample size of 85 subjects with 4 predictors, with a test power of 0.8, was required for linear regression analysis.

The statistical package JASP, version 0.17.2.1 (Department of Psychological Methods, University of Amsterdam, Amsterdam, The Netherlands) was used for data processing.

Results

Table 1. Sociodemographic data of parents of hospitalized children

		n (%)
Gender of parents	male	2 (2)
	female	99 (98)
Parents' level of education	primary school	1 (1)
	high school	45 (44.6)
	college education	28 (27.7)
	university education	27 (26.7)
	M (range)	SD
Parents' age	32.405 (18 – 46)	5.634

Note: n - Number of respondents, % - Percentage, M - Mean, SD - Standard deviation

A total of 99 (98%) women and 2 (2%) men participated in the research, most of them (45 respondents, 44.6%) completed secondary education, and the mean age was M=32.405 years (SD=5.634) (Table 1).

Table 2. Descriptive statistics of satisfaction with the quality of nursing care and personality traits of parents of hospitalized children

	M (range)	SD
Satisfaction with the quality of nursing care	78.881 (30 – 95)	11.905
Neuroticism	21.930 (8 – 40)	7.614
Extraversion	27.752 (17 – 40)	4.988
Openness	23.168 (11 – 42)	5.793
Agreeableness	31.118 (20 – 44)	5.637
Conscientiousness	35.188 (20 – 45)	6.599

Note: M – Mean; SD – Standard deviation

The results showed that the mean value of parents' satisfaction with the quality of nursing care was M=78.881 (SD=11.905), which can be considered a very high satisfaction of parents with the quality of health care provided to children (Table 2).

The results indicated that parents' satisfaction with the quality of nursing care has a low positive correlation with the age of the parents (ρ=0.356; $p<0.001$) and their level of extraversion (ρ=0.358; $p<0.001$). Additionally, there is a moderate negative correlation between parents' satisfaction and their level of education (ρ=-0.431; $p<0.001$), while the correlation with neuroticism is low and negative (ρ=-0.222; p=0.026), that is, the older the parents are and the more pronounced the personality trait of extraversion, the more satisfied they are with the health care provided to their children, while the higher their level of education and the more pronounced the personality trait of neuroticism, the less the satisfaction (Table 3).

Linear regression analysis was used to determine which personality traits of parents of hospitalized children serve as predictors of parental satisfaction with the quality of nursing care of hospitalized children. Only variables that proved to be significant in the correlation were included in the regression analy-

Table 3. Correlation of parents' satisfaction with the quality of nursing care with demographic variables and personality traits of parents

		1.	2.	3.	4.	5.	6.	7.
1. Satisfaction with the quality of nursing care	ρ							
	p*							
2. Age	ρ	0.356						
	p*	**<0.001**						
3. Parents' level of education	ρ	-0.431	-0.013					
	p*	**<0.001**	0.895					
4. Extraversion	ρ	0.358	0.049	-0.302				
	p*	**<0.001**	0.629	**0.002**				
5. Conscientiousness	ρ	0.048	-0.162	-0.053	0.376			
	p*	0.634	0.105	0.596	**<0.001**			
6. Agreeableness	ρ	0.079	-0.189	0.011	0.397	0.449		
	p*	0.435	0.058	0.914	**<0.001**	**<0.001**		
7. Neuroticism	ρ	-0.222	0.116	0.076	-0.448	-0.529	-0.412	
	p*	**0.026**	0.248	0.452	**<0.001**	**<0.001**	**<0.001**	
8. Openness	ρ	-0.126	0.083	0.073	-0.183	-0.550	-0.288	0.227
	p*	0.208	0.412	0.469	0.067	**<0.001**	**0.003**	**0.022**

Note: ρ – Spearman correlation coefficient; p - statistical significance

Table 4. Results of regression analysis - satisfaction with the quality of care as the dependent variable, demographic variables and personality traits as predictor variables

	Standardized Coefficients			95% CI for β		
	β	t	p	Lower Bound	Upper Bound	Adjusted R²
(Constant)		5.817	<0.001	40.637	82.732	0.340
Age	0.309	3.739	**<0.001**	0.306	0.999	
Parents' level of education	-0.268	-3.110	**0.002**	-6.163	-1.361	
Extraversion	0.226	2.348	0.021	0.083	0.994	
Neuroticism	-0.244	-2.658	**0.009**	-0.666	-0.096	

Note: p - statistical significance; β - regression coefficient; t - the size of the difference relative to the variation in your sample data; CI – Confidence interval; Adjusted R² – Adjusted coefficient of determination

sis. The variables included in the regression significantly explain 34% of the variance of parents' satisfaction with the quality of health care provided to children (Adjusted R²=0.340; $p<0.001$). Parents' age ($p<0.001$) and parents' level of education ($p=0.002$) and parents' neuroticism ($p=0.009$) and extraversion ($p=0.021$) proved to be significant variables. An insight into the β-coefficient shows that the level of education and neuroticism contribute negatively, while age and extraversion contribute positively to satisfaction with nursing care.

Discussion

The aim of this research was to examine the relationship between parents' satisfaction with the nursing care provided to hospitalized children and the parents' personality traits.

In terms of demographic variables, it was shown that age and level of parents' education contribute to parents' satisfaction with the quality of nursing care of

hospitalized children. The older age of parents contributes to greater satisfaction with the quality of care. This result is not consistent with previous research on this topic (15). However, possible reasons for the obtained results are that greater emotional stability comes with age, which consequently brings better stress regulation, and maintaining calmness and control in stressful situations that comes with hospitalization of a child (22). One of the reasons is also that older parents have more life experience and know what they can expect from the health system and nurses, which is important precisely in the context of satisfaction with care, which was previously defined as the range of expectations before admission to the hospital and later services provided.

The level of education of the parents proved to be a significant predictor of parents' satisfaction with the quality of health care provided to their children, i.e. parents with lower levels of education expressed greater satisfaction with their children's care. The results are consistent with previous research (15, 23, 24, 25). Possible reasons for this result are that less educated parents are not familiar with their child's and their rights in the hospital, they are also less familiar with the standards of nursing care, and consequently have lower expectations from nurses, and lower expectations can lead to greater satisfaction with care (15). It is also possible that this result is due to low level of knowledge among less educated patients, which may lead to low expectations of nurses and lack of judgment skills (2, 26).

Regarding parents' personality traits and their relationship with children's nursing care satisfaction, it was shown that neuroticism negatively contributes to satisfaction of parents with the quality of nursing care. Since there is no research on the mentioned topic, the results cannot be compared with the previous research. However, it can be said that the obtained result was expected due to the fact that people with the mentioned personality trait are characterized by anxiety, anger, insecurity, impulsiveness and vulnerability (27). Such individuals have higher levels of negative affect, they are easily irritated, and more likely to turn to inappropriate coping responses, such as hostility (28). More neurotic people tend to create interpersonal relationships, but also to perceive interpersonal relationships as worse than they really are (19). In such cases, bad interpersonal relations are generated, and in fact neurotics themselves create a bad climate around themselves,

and later they are dissatisfied with the whole situation, so they are probably also dissatisfied with the treatment of their children and the nursing care provided to them. Such persons may have difficulties in interpreting interactions with health professionals, including nurses, positively, regardless of their true quality. Experiencing and creating negative relationships with nurses can result in frustration, increased levels of stress and tension in mutual relationships (19), and it is possible that this dynamic can worsen the experience of satisfaction with care, although in reality it may be adequate, and thus creates a circle of dissatisfaction and mistrust. They may also perceive greater threats in their interactions than they do, even in cases where they do not actually exist. This way of experiencing mutual relationships with others can lead parents to exaggerate difficulties and misunderstandings in communication with nurses. In such cases, neurotic persons could focus on the feeling of conflict with the nurses, and consequently on their feeling of insecurity, which can contribute to a negative perception of the entire treatment, including the nursing care segment (29).

Extraversion also proved to be a significant predictor of parents' satisfaction with the quality of health care provided to children, however, unlike neuroticism, extraversion contributes positively to the aforementioned construct. Research on this topic has not been carried out, therefore it is not possible to check and compare this relationship with previous research. Extroverts are normally characterized by a higher level of self-confidence, positive emotions, enthusiasm, energy, thrill-seeking and social interactions. Extraverted people are creative, imaginative, intellectually curious, impulsive and original, open to new experiences and ideas (19). Extroverts start and maintain positive interactions with others more easily, while their sociability and openness in communication enables them to express their feelings, concerns and expectations so that there will generally not be any unresolved situations between interlocutors (30). It is possible that such communication enabled the parents of hospitalized children to get and partially achieve what they wanted for the child during hospitalization and were therefore more satisfied. Also, their tendency towards more positive emotions and optimism may have mitigated the potentially negative aspects of care if they were provided, i.e. due to their characteristics, it is possible that they were more tolerant in certain situations in which other per-

sons with differently distributed personality traits were not (31).

All of the above indicates that personality traits can play an important role in parents' satisfaction with the quality of nursing care, and together with the contribution of parents' demographic variables to children's satisfaction with care, this only confirms the fact that satisfaction with care is subjective but also complex, and that further research is needed in order to gain a deeper understanding of the said construct.

All the above results emphasize the importance of taking into account both individual and psychological factors in the assessment of parents of hospitalized children. Further research is needed in order to be able to improve the experiences of parents, regardless of their psychological characteristics, but also to be able to improve the interpersonal relationships of parents and health professionals, which can improve the overall care provided to children. The results are also important in understanding the whole construct of satisfaction with care, which, as one of the indicators of the quality of nursing care, can influence the overall evaluation of the care provided, as well as further procedures to improve it, and understanding the fact that parents' satisfaction with care does not necessarily have to be based on facts and to the care provided, but it can really depend on their personality, so that parents' assessments of the nursing care provided to their children should be taken with understanding, taking into account all the previously mentioned results, and they should be interpreted with caution.

Also, in future research, it would be good to examine how much the psychological and personal characteristics of the other party, the nurses, affect parents and their assessment, because nursing care is an interpersonal relationship, and psychological characteristics can affect both the service provider and the other side, the recipients of these same services, as can be seen in this paper.

Thus, it can be concluded that this research showed that significant predictors of satisfaction with the quality of parental health care from the demographic variables are the age and level of education of the parents, while neuroticism was the only predictor of the personality traits of the parents.

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POVEZANOST OSOBNIH KARAKTERISTIKA I CRTA LIČNOSTI RODITELJA SA ZADOVOLJSTVOM KVALITETOM ZDRAVSTVENE NJEGE PRUŽENE HOSPITALIZIRANOJ DJECI NA ODJELU PEDIJATRIJE

Sažetak

Uvod. Zadovoljstvo pacijenata zdravstvenom njegom odražava percepciju skrbi u odnosu na razinu skrbi koju su očekivali prije hospitalizacije na odjelu, no na zadovoljstvo mogu utjecati različiti čimbenici koji mogu promijeniti stvarnu sliku pružene skrbi.

Cilj. Ispitati povezanost zadovoljstva roditelja pruženom njegom hospitaliziranoj djeci s osobnim karakteristikama i crtama ličnosti roditelja.

Metode. Istraživanje je provedeno u Općoj županijskoj bolnici Požega od 2022. do 2023., a ispitan je 101 roditelj hospitalizirane djece. U istraživanju je primijenjen demografski upitnik, hrvatska verzija Upitnika o zadovoljstvu pacijenata kvalitetom zdravstvene skrbi (PSNCQQ) i Big Five Inventory (BFI 44).

Rezultati. Rezultati su pokazali kako je zadovoljstvo roditelja kvalitetom pružene zdravstvene njege negativno povezano s crtom ličnosti neuroticizma i stupnjem obrazovanja roditelja te pozitivno s crtom ličnosti ekstraverzije i dobi roditelja. Crte ličnosti neuroticizma i ekstraverzije te dob i stupanj obrazovanja također su se pokazali značajnim prediktorima zadovoljstva roditelja kvalitetom zdravstvene njege.

Zaključak. Rezultati pokazuju kako i osobine ličnosti i osobne karakteristike mogu igrati važnu ulogu u zadovoljstvu roditelja kvalitetom zdravstvene njege te da ih je važno uzeti u obzir u procjeni i poboljšanju zdravstvene njege.

Ključne riječi: hospitalizirana djeca, pedijatrija, roditelji, zadovoljstvo zdravstvenom njegom

Work-Life Imbalance in Mosul's Female Nursing Workforce: Societal Pressures and Professional Strain

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Abstract

Introduction. Work-life balance (WLB) is a crucial aspect of overall well-being, particularly for healthcare professionals such as nurses, who face the dual pressures of demanding professional responsibilities and personal life obligations. In post-conflict settings like Mosul, Iraq, female nurses encounter additional socio-cultural challenges that impact their ability to maintain WLB.

Aim. This study explores the factors connected to work-life balance among female nurses working in Mosul's teaching hospitals, focusing on professional and socio-cultural influences.

Methods. A cross-sectional descriptive survey was conducted on 250 female nurses employed in six teaching hospitals in Mosul. Data were collected using the Work-Life Balance (WLB) scale to assess participants' perceptions of their work-life balance. The mean age of the participants was 35.6 ± 7.8 years.

Results. The overall mean WLB score was 3.48, indicating moderate levels of perceived balance. Junior nurses reported lower WLB than senior nurses (3.31 vs. 3.72). Marital status was a significant predictor of WLB, with married nurses scoring lower than unmarried nurses. A negative correlation between years of experience and WLB (r=-0.43, $p<0.01$) was observed, suggesting a decline in WLB with increased job tenure. Strong support from family and colleagues was associated with better WLB, but structural challenges remained a key obstacle.

Conclusions. The findings highlight significant work-life balance challenges for female nurses in Mosul, particularly among junior and married nurses. Interventions such as flexible work schedules and enhanced organisational support are needed to improve WLB and reduce stress. Addressing the societal expectations placed on women in caregiving roles is also critical for fostering a more supportive work environment.

Introduction

Work-life balance (WLB) refers to the equilibrium between professional responsibilities, family obligations, and social activities aligned with an individual's personal life priorities (1). Achieving this balance is essential for maintaining overall well-being, as an imbalance can lead to significant negative consequences (2). When work-life balance is disrupted, it takes a toll on physical and mental health and diminishes the quality of life for individuals and their families (3). This imbalance can manifest in various ways, such as increased stress, burnout, and a decline in personal relationships. Additionally, a lack of work-life balance often reduces job satisfaction, weakening employees' connection to their organization (4). Over time, this dissatisfaction can result in lower organizational commitment, ultimately increasing employee turnover (5). Therefore, promoting work-life balance is crucial not only for the health and happiness of individuals but also for fostering a more engaged, productive, and loyal workforce (6). Work-life balance is a critical topic in occupational health psychology, especially when understanding women's experiences in the workforce (7). The concept is gaining increasing attention as more research highlights women's unique challenges in balancing their professional responsibilities with personal and family obligations (8). In occupational health psychology, work-life balance is about managing time and ensuring psychological well-being, job satisfaction, and overall quality of life (9). For women, achieving a harmonious balance between work and life is often complicated by additional factors such as societal expectations, caregiving responsibilities, and gender-based workplace dynamics (10). Therefore, exploring work-life balance among women is essential to developing strategies that promote healthier work environments, enhance productivity, and support women's mental and physical well-being across various professions (11). Nurses are fundamental to the healthcare system, serving as the frontline caregivers, often patients' first point of contact. Their role extends beyond initial interactions; they maintain long-term communication and build trust with patients, providing continuous care throughout the treatment process (12). On the healthcare frontlines, nurses are responsible for delivering immediate care and attention and play a vital role in life-saving interventions. Their expertise and dedication make them indispensable pillars within hospitals, ensuring that patients receive comprehensive and compassionate care (13). Whether in emergencies, routine check-ups, or chronic care management, nurses are essential to the functioning of healthcare institutions, embodying the core values of empathy, skill, and resilience in the medical field (14). Their contribution is integral to patient recovery and overall health outcomes, underscoring their crucial role in the success of healthcare systems worldwide (15). While numerous studies have explored work-life balance in the healthcare sector, a lack of research focuses specifically on female nurses in post-conflict settings like Mosul. Most existing studies are concentrated in developed countries or stable environments, where the challenges and resources differ significantly from those in Mosul. Furthermore, there is limited data on how Mosul's unique socio-cultural and economic conditions impact female nurses' work-life balance. This gap in the literature highlights the need for localized research to inform policy and practice that can effectively address the needs of this specific group.

Female nurses in Mosul face significant challenges in balancing their work and personal lives due to the demanding nature of their jobs, socio-cultural expectations, and the recovering state of the healthcare system. However, empirical data on the factors influencing their perceived work-life balance is lacking. Without this information, developing targeted interventions to support these nurses is difficult, potentially leading to increased job dissatisfaction, burnout, and turnover rates.

Aim

To explore the factors influencing work-life balance (WLB) among female nurses working in teaching hospitals in Mosul, Iraq, with a focus on both professional responsibilities and socio-cultural challenges unique to a post-conflict setting. By identifying these factors, the study seeks to provide insights that can inform strategies to enhance WLB for healthcare professionals in similar contexts.

Methods

Study design

A cross-sectional survey was conducted to collect participant data and explore the research topic thoroughly. The survey was administered systematically and without bias, ensuring that all participants were asked the same questions to facilitate easy comparison of their responses.

Study setting

The study encompassed government hospitals in the City of Mosul, including six teaching hospitals: Al Salam Teaching Hospital, Al-Khansa Teaching Hospital, Ibn-Sina Teaching Hospital, Mosul General Hospital, Al-Jamhory Teaching Hospital, and Ibn Al-Atheer Teaching Hospital.

Study sample

The study's sample comprised 250 female nursing staff from Mosul Teaching Hospitals, selected through a purposive sampling method to ensure a comprehensive understanding of work-life balance across various roles within the nursing profession. The mean age of participants was 35.6 years (± 7.8 years), with an age range from 22 to 55 years. The majority held a bachelor's degree in nursing, while some had diplomas or advanced degrees. Participants had an average of 10.2 years (± 5.3 years) of experience in the nursing field. In terms of marital status, approximately 60% were married, 25% were single, and 15% were widowed or divorced. On average, participants had 2.4 dependents, highlighting family obligations that could influence their work-life balance. The sample included nurses from various departments, such as emergency, surgery, pediatrics, and general medicine, reflecting a diverse range of professional roles and responsibilities. This demographic profile provides a rich context for understanding the challenges and factors affecting work-life balance among female nurses in Mosul's healthcare system.

Criteria for selecting the purposive sample

The purposive sample for this study was carefully selected based on specific criteria to ensure the participation of female nursing staff who could provide meaningful insights into work-life balance practices. The inclusion criteria were as follows:

1. **Gender-Specific Focus**: Only female nursing staff were included, as the study aimed to focus on the unique work-life balance experiences of women in the nursing profession.
2. **Current Employment**: Participants needed to be actively employed as nursing staff in one of the Mosul Teaching Hospitals during the study period, ensuring the data represented current work-life balance practices in this setting.
3. **Role and Experience Diversity**: Nurses from a range of roles and experience levels, from junior to senior nursing leaders, were included to capture diverse perspectives across the nursing hierarchy.
4. **Availability During the Study Period**: Nurses who were on leave or otherwise unable to participate were excluded to maintain the consistency and relevance of the data.
5. **Voluntary Participation and Informed Consent**: Only those who voluntarily agreed to participate, having been fully informed of the study's purpose and procedures, were included. This ensured adherence to ethical standards and a genuine interest from participants.
6. **Focused Healthcare Environment**: The sample was exclusively drawn from nursing staff at the six teaching hospitals in Mosul City, creating a consistent healthcare environment for data collection.

These criteria were established to select a sample that would provide valuable insights and support the study's objectives effectively.

Exclusion criteria

Several exclusion criteria were applied to ensure the integrity and relevance of the data collected for the study on work-life balance among female nursing staff in Mosul Teaching Hospitals. Male nursing staff were excluded, as the focus was on female nursing experiences. Part-time, temporary, or contractual

employees were also excluded to maintain consistency, focusing on full-time, permanent staff, whose work-life balance may be more representative of long-term employment. Female nurses on extended leave, such as maternity or medical leave, were excluded to reflect the experiences of those actively engaged in their professional roles. Newly hired nursing staff who worked for less than six months were not included to avoid data from individuals who may have yet to fully integrate into their roles. Additionally, nurses holding administrative or non-clinical roles were excluded, as their work-life balance experiences could differ significantly from those in clinical roles.

Instruments

Work-Life Balance (WLB) scale

The primary tool used for data collection in this study was the Work-Life Balance (WLB) scale, a comprehensive questionnaire of 22 statements designed to assess various dimensions of how individuals manage and maintain a balance between their work and personal lives. Participants responded to each statement using a Likert scale with the following options: Strongly Agree, Agree, Indifferent, Disagree, and Strongly Disagree.

The WLB scale demonstrated reliability, with a Cronbach's alpha coefficient of 0.87, indicating high internal consistency. The scale includes several subscales that measure different aspects of work-life balance, such as work demands, personal life fulfilment, and support systems, each showing acceptable reliability ranging from 0.75 to 0.83.

In interpreting the results, a higher total WLB score indicates a better work-life balance, meaning that participants are more effectively managing their professional and personal responsibilities.

It is important to note that some items in the scale had negative connotations; therefore, these statements were recoded to ensure a consistent interpretation of the overall results. After recording, higher scores consistently reflected a more favourable perception of work-life balance among participants. This approach allowed for more precise analysis and understanding of the factors influencing work-life balance in the context of female nurses in Mosul.

Key areas assessed by the WLB scale

1. **Communication and boundaries**: This section included **three statements,** such as "I clearly communicate my work hours to colleagues" and "I openly discuss work-life boundaries with my manager", which evaluated how effectively participants communicated their work-life boundaries to others.

2. **Time management**: **4 statements** like "I set specific times to check and respond to work emails" and "I have specific rituals to signal the end of my workday" were designed to measure participants' ability to manage their time and establish routines that separate work from personal life.

3. **Workspace and physical separation**: **3 statements,** such as "I have a designated workspace at home that helps me focus on work" and "I feel that my work and personal life are physically separated", assessed the degree to which participants created distinct physical environments for work and personal activities.

4. **Work interruptions and personal time**: This area included **three statements**: "I often get work-related calls or messages during personal time" and "I find it difficult to focus on personal activities due to work interruptions", which examined the impact of work-related intrusions on personal time.

5. **Support from family and colleagues**: The scale featured **two statements** such as "My family understands when I need to focus on work tasks" and "I feel supported by my colleagues when I need to leave work early for personal matters" to gauge the level of support participants received in maintaining a work-life balance.

6. **Flexibility and adaptability**: **3 statements**, "I can adjust my work hours to accommodate personal responsibilities better" and "I adapt my schedule as needed to maintain a balance", measured participants' flexibility in their work schedules and their ability to adapt to maintain balance.

7. **Stress and well-being**: **2 statements,** such as "I feel less stressed when I maintain clear boundaries" and "Maintaining work-life boundaries improves my overall well-being", were in-

cluded to assess the psychological impact of work-life balance on stress levels and overall well-being.

8. **Impact on productivity**: The item "I notice a decline in my productivity when my boundaries are blurred" was one of the **two statements** used to evaluate how a lack of work-life balance affected participants' productivity.

Statistics

The data collected from the study were analyzed using SPSS version 26.0, employing both descriptive and inferential statistical methods to address the research objectives. Descriptive statistics were used to summarize the data, including frequencies, percentages, means, and standard deviations. Inferential statistics included Pearson correlation analysis to explore relationships between WLB scores and demographic variables, while independent samples t-tests and one-way ANOVA were used to compare WLB scores across different groups, such as married vs. unmarried participants and job positions. Post-hoc tests were performed when significant differences were found. To ensure the appropriateness of the parametric statistical analyses, a Kolmogorov-Smirnov (KS) test was conducted to assess the normality of the distribution of WLB scores. The results indicated that the distribution was approximately normal, justifying the use of parametric tests for further analysis.

Finally, multiple regression analysis was conducted to identify predictors of work-life balance, with demographic factors such as age, marital status, and job position treated as independent variables and WLB score as the dependent variable. The conditions for the regression analyses were met, ensuring the validity of the results. This analysis provided insights into the significant factors influencing work-life balance among female nurses in Mosul.

Ethics

This study adhered to ethical standards to safeguard participants' rights and well-being. Prior to commencement, ethical approval was granted by the Institutional Review Board (IRB) at the University of Mosul (Reference Number: 43-CCMRE-NUR-24-14) on 28/10/2024. Participants received comprehensive information about the study's purpose, procedures, potential risks, and benefits. They provided written informed consent and were assured of their right to withdraw at any point without consequence. To maintain confidentiality, all responses were anonymized, and data access was restricted to authorized research personnel only. Data will be securely stored in a password-protected system for the duration required by institutional guidelines and responsibly disposed of thereafter.

Results

Demographic characteristics of participants

The sample included 250 female nursing staff from various teaching hospitals in Mosul. The mean age of the participants was 35.6 years (SD = 7.8), with the majority (62%) having between 5 and 15 years of work experience. Most participants (78%) were married, while 22% were unmarried. Regarding job positions, 55% were junior nurses, and 45% held senior nursing roles, providing a balanced representation across different levels of experience and responsibility.

Table 1. **Demographic characteristics of participants**	
Characteristic	**Value**
Mean Age (Years)	35.6 (SD=7.8)
Marital Status (Married)	78%
Marital Status (Unmarried)	22%
Job Position (Junior Nurse)	55%
Job Position (Senior Nurse)	45%

The results in Table 1 provide an overview of the demographic characteristics of the participants in the study. The Mean Age of participants was 35.6 years (SD=7.8), indicating a moderately young nursing workforce. In terms of Marital Status, 78% of participants were married, while 22% were unmarried, suggesting that most participants balance work responsibilities alongside family life. Regarding Job Position, 55% were identified as junior nurses, whereas 45%

held senior nursing roles. This distribution shows a slightly higher representation of junior nurses, though senior nurses still make up a significant portion of the sample. These demographic insights provide context for interpreting the work-life balance findings within the study.

SD=0.68) scores indicate moderate adaptability and productivity levels, respectively, while Stress and Well-being scored lowest (M=2.98, SD=0.83), suggesting that stress and well-being are significantly impacted by work-life boundary challenges. These findings suggest that while support and communication are strong, maintaining personal time and managing stress remain critical areas for improvement.

Table 2. **Work-Life Balance Scores**

Category	Mean Score	Standard Deviation
Overall WLB Score	3.48	0.76
Junior Nurses WLB	3.31	0.67
Senior Nurses WLB	3.72	0.72

The results in Table 2 present work-life balance (WLB) scores for nursing staff, indicating differences between overall scores and those of junior versus senior nurses. The Overall WLB Score had a mean of 3.48 (SD=0.76), suggesting a moderate level of work-life balance across all participants. Junior Nurses had a slightly lower mean score of 3.31 (SD=0.67), reflecting potentially greater challenges in achieving work-life balance compared to their senior counterparts. Senior Nurses, however, had the highest mean score of 3.72 (SD=0.72), indicating that experience and seniority may be associated with better work-life balance. This variation highlights that senior nurses, with more experience and likely greater role flexibility, tend to report stronger work-life balance than junior nurses.

The results in Table 3 provide a comprehensive overview of work-life balance among nursing staff, highlighting both strengths and challenges. Participants demonstrated effective Communication and Boundaries (M=3.50, SD=0.70) and Time Management (M=3.42, SD=0.65), indicating consistent efforts to manage their schedules and communicate work-life boundaries. Workspace and Physical Separation (M=3.25, SD=0.60) was moderately maintained, although Work Interruptions and Personal Time (M=3.11, SD=0.82) posed a common issue, suggesting frequent disruptions to personal time. The highest mean score was in Support from Family and Colleagues (M=3.95, SD=0.62), reflecting strong social support, which likely contributes positively to balance. Flexibility and Adaptability (M=3.40, SD=0.75) and Impact on Productivity (M=3.20,

Table 3. **Key areas assessed**

Category	Mean Score	Standard Deviation
Communication and Boundaries	3.50	0.70
Time Management	3.42	0.65
Workspace and Physical Separation	3.25	0.60
Work Interruptions and Personal Time	3.11	0.82
Support from Family and Colleagues	3.95	0.62
Flexibility and Adaptability	3.40	0.75
Stress and Well-being	2.98	0.83
Impact on Productivity	3.20	0.68

Table 4. **Regression Analysis Results**

Predictor	Beta Coefficient	p-value
Marital Status	-0.36	0.001
Job Position	0.29	0.004
Years of Experience	-0.24	0.011
Model summary	R	R^2
	0.65	0.42

The results in Table 4 present findings from the regression analysis, showing the influence of marital status, job position, and years of experience on work-life balance scores. Marital Status had a significant negative impact (Beta=-0.36, p=0.001), indicating that married participants reported lower work-life balance scores compared to their unmarried counterparts. Job Position had a positive effect (Beta=0.29, p=0.004), suggesting that those in senior roles

experienced better work-life balance. Years of Experience also showed a significant negative effect (Beta=-0.24, p=0.011), meaning that as years of experience increased, work-life balance scores tended to decrease. The overall model was significant, with an R value of 0.65 and an R² value of 0.42, indicating that approximately 42% of the variance in work-life balance scores can be explained by these predictors. These findings highlight the substantial influence of personal and professional factors on nurses' work-life balance.

Discussion

The findings from this study provide valuable insights into the work-life balance (WLB) challenges faced by female nurses in Mosul teaching hospitals. The results indicate that achieving an effective balance between professional responsibilities and personal life is a significant challenge for many nurses, particularly for those in junior positions and those with more years of experience. These findings align with previous research, which suggests that work-life imbalance is prevalent among healthcare workers, especially in high-demand environments such as hospitals, where long working hours, high patient loads, and emotional stress are standard.

Work-life balance challenges

Work-life balance (WLB) has been a critical issue in healthcare, particularly among nurses, where high workloads and emotional demands often lead to imbalance. The overall mean WLB score of 3.48 in this study reflects moderate levels of perceived balance, consistent with findings from similar research (16). Studies have shown that nurses, especially in high-demand environments, often struggle to maintain a healthy balance between work and personal life due to long shifts, emotional stress, and patient care demands (17-19).

The lower WLB scores among junior nurses compared to senior nurses (3.31 vs. 3.72) in this study likely reflect the limited control over work schedules and fewer coping resources available to junior staff – a

common challenge for early-career healthcare professionals. Research suggests that junior nurses often face greater difficulty establishing boundaries between work and personal life due to less experience and fewer support systems (20-23). Additionally, the significant negative correlation between years of experience and WLB scores (r=-0.43, $p<0.01$) indicates that, while senior nurses may report a higher sense of work-life balance, the increased responsibilities and potential for stress associated with greater tenure can impact balance negatively over time. Senior nurses benefit from job autonomy and role flexibility, which enhances WLB by allowing them more control in managing work and personal demands effectively. This supports findings from other studies, where job autonomy and role flexibility emerge as key factors in improving WLB, especially among more experienced healthcare workers (24).

Societal and cultural factors

Societal and cultural factors are critical in shaping work-life balance (WLB), particularly in regions where traditional gender roles are emphasized. In this study, marital status emerged as a significant predictor of WLB, with married participants reporting lower WLB scores than their unmarried counterparts, reflecting the dual burden of managing professional obligations and domestic responsibilities. This finding aligns with existing literature, which consistently highlights those married women, especially those in healthcare, face increased challenges in balancing work and family life due to traditional gender roles that prioritize women's caregiving and household duties (25-27).

Studies have demonstrated that women in many cultures, including in the Middle East, are often expected to manage both work and home responsibilities, making it harder for them to achieve WLB (28-31).

In the specific cultural context of Mosul, societal expectations around women's roles as caregivers and homemakers further exacerbate these challenges. Research has shown that in conservative societies, such as Iraq, women often experience heightened pressure to fulfill family obligations, which can negatively impact their professional lives (32-33).

The strong support from family and colleagues reported in this study (mean score=3.95) is a positive finding, as numerous studies indicate that social support is a protective factor against workplace stress

and is associated with improved work-life balance.

However, social support alone may not fully alleviate the structural and systemic challenges contributing to work-life imbalance. Research suggests that while social support can mitigate some aspects of stress, addressing deeper organizational and societal issues, such as rigid work schedules and unequal domestic responsibilities, is essential for meaningful improvements in WLB (34-35).

Implications for practice

The findings from this study have several practical implications. Firstly, healthcare administrators need to recognize the importance of flexible work schedules and support systems to help alleviate work-life imbalance, especially for junior nurses. Providing opportunities for job-sharing, flexible hours, or childcare support may help to ease the burden on nurses, particularly those with families.

Moreover, the significant role of marital status and years of experience as predictors of WLB highlights the need for targeted interventions that address the unique challenges faced by these groups. Senior nurses, for instance, may benefit from leadership training that includes strategies for managing work-life balance. In contrast, married nurses could benefit from family-friendly workplace policies that reduce the conflict between professional and personal responsibilities.

Limitations and future research

This study provides valuable insights into the work-life balance of female nursing staff in Mosul Teaching Hospitals; however, several limitations should be acknowledged. The use of convenience sampling and the reliance on self-reported data introduce potential biases, which may affect the generalizability of the findings. Although the sample size of 250 participants is substantial, it may still limit the applicability of the results to other regions or healthcare settings in Iraq. The cross-sectional design of the study prevents the establishment of causal relationships, and the findings are specific to Mosul's cultural and social context, which limits their transferability.

Additionally, the study did not account for factors such as organizational culture, leadership styles, or external stressors, all of which could significantly impact work-life balance. Non-response bias may also

be a concern, as the experiences of those who chose not to participate were not captured. Finally, the relatively short data collection period may not have fully reflected variations in work-life balance experiences over time or in response to different events. Future research should consider longitudinal studies to explore how work-life balance evolves over time and in response to organizational changes, as well as comparative studies in different regions or countries to provide a broader understanding of the factors affecting work-life balance in healthcare settings.

Conclusion

In conclusion, this study highlights the complex and multifaceted nature of work-life balance for female nurses in Mosul teaching hospitals. While many nurses report moderate levels of WLB, significant challenges remain, particularly for junior nurses, married nurses, and those with more experience. Addressing these challenges will require a combination of organizational support, flexible policies, and targeted interventions that consider the unique needs of this population. By promoting a healthier work-life balance, healthcare institutions can improve the well-being of their nursing staff and enhance job satisfaction, retention, and patient care quality.

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Roba Shaker Ghanim et al. Work-Life Imbalance in Mosul's Female Nursing Workforce... Croat Nurs J. 2024; 8(2): 141-151

151

NERAVNOTEŽA IZMEĐU POSLOVNOG I PRIVATNOG ŽIVOTA MEDICINSKIH SESTARA U MOSULU: DRUŠTVENI PRITISCI I PROFESIONALNI NAPOR

Sažetak

Uvod. Ravnoteža između poslovnog i privatnog života (WLB) ključni je aspekt sveukupnog blagostanja, posebno za zdravstvene djelatnike poput medicinskih sestara, koji se suočavaju s dvostrukim pritiscima zahtjevnih profesionalnih odgovornosti i osobnih životnih obveza. U postkonfliktnim okruženjima poput Mosula u Iraku medicinske sestre susreću se s dodatnim društveno-kulturnim izazovima koji utječu na njihovu sposobnost održavanja ravnoteže poslovnog i privatnog života.

Cilj. Ova studija istražuje čimbenike povezane s ravnotežom između poslovnog i privatnog života među medicinskim sestrama koje rade u nastavnim bolnicama u Mosulu, usredotočujući se na profesionalne i društveno-kulturne utjecaje.

Metode. Provedeno je presječno deskriptivno istraživanje na 250 medicinskih sestara zaposlenih u šest nastavnih bolnica u Mosulu. Podaci su prikupljeni primjenom ljestvice ravnoteže između poslovnog i privatnog života kako bi se procijenila percepcija sudionika o ravnoteži između njihova poslovnog i privatnog života. Prosječna dob sudionika bila je 35,6 ±7,8 godina.

Rezultati. Ukupni srednji WLB rezultat bio je 3,48, što ukazuje na umjerene razine percipirane ravnoteže. Mlađe medicinske sestre prijavile su niži WLB od starijih medicinskih sestara (3,31 u odnosu na 3,72). Bračni status bio je značajan prediktor WLB-a, pri čemu su udane medicinske sestre imale niži rezultat od neudanih. Uočena je negativna korelacija između godina iskustva i WLB (r = –0,43, p<0,01), što ukazuje na pad WLB s povećanjem radnog staža. Snažna podrška obitelji i kolega bila je povezana s boljim WLB-om, ali strukturni izazovi ostali su ključna prepreka.

Zaključci. Rezultati ističu znatne izazove ravnoteže između poslovnog i privatnog života za medicinske sestre u Mosulu, posebno među mlađim i udanim medicinskim sestrama. Potrebne su intervencije kao što su fleksibilni rasporedi rada i poboljšana organizacijska podrška kako bi se poboljšao WLB i smanjio stres. Rješavanje društvenih očekivanja koja se postavljaju ženama u ulogama njegovatelja također je ključno za poticanje radnog okruženja koje pruža veću podršku.

Ključne riječi: ravnoteža između poslovnog i privatnog života, medicinske sestre, profesionalni stres, bračni status

Prejudices of Nurses Towards Roma as Patients in the Healthcare System of the Republic of Croatia

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Abstract

Due to deeply rooted prejudices, the Roma are the most vulnerable and multiply discriminated ethnic group and national minority, facing discriminatory challenges in various spheres of society, including our healthcare system. These challenges limit the quality of healthcare, potentially increasing the risk of disease progression and premature death. The study aimed to analyze the prejudices of nurses and medical technicians towards members of the Roma national minority and to assess their correlation with certain socio-demographic characteristics and beliefs of the respondents.

The study included 536 nurses employed in the healthcare system across all three levels, working directly with patients. Based on the opinions collected on 29 provided statements about the status and treatment of Roma as patients, 19 statements were isolated through exploratory factor analysis and classified into four detected and interpretable reliable factors. These factors were named: "Roma within the healthcare system", "Protecting Roma from the consequences of discrimination", "General prejudices against Roma", and "Attitudes of nurses and medical technicians towards Roma patients", which together explain 60.7% of the total variance.

The analysis showed that some nurses share the same general prejudices towards Roma as the general population. Respondents with a higher level of education, older age, and those living in the Međimurje County and Northern Croatia expressed statistically significantly more negative attitudes toward Roma than younger, less educated individuals and those living in other parts of Croatia. Additionally, belong-

ing to the majority population resulted in more negative attitudes towards Roma compared to respondents from national minorities.

Respondents who had personal and professional contact with Roma on some factors exhibited less negative attitudes than those who had no such contact. Respondents from the right-wing political spectrum expressed more negative attitudes towards Roma, while religiosity did not show statistical significance.

Introduction

The Roma national minority (hereinafter: RNM) is a group characterized, as in most European countries and the Republic of Croatia, by deeply rooted negative perceptions and discrimination that manifest across various societal domains, including healthcare (1). This is substantiated by long-term reports from the public defender, which document attitudes, levels of awareness, and forms of discrimination, showing that the Roma are the group facing the most prejudice in Croatia (2). Specifically, as a result of cultural, ethnic, and racial prejudices prevalent among the majority population, the RNM experiences significant limitations in daily life, including access to high-quality medical care. This is particularly concerning given the RNM's multiple vulnerabilities, high prevalence of chronic non-communicable diseases, injuries, pregnancy and childbirth complications, and infant mortality rates exceeding the national average. Consequently, the RNM has a significantly shorter average life expectancy than the majority population – over 10 years shorter in Croatia compared to the general population, and even more significant discrepancies across most EU countries (3).

The relationship between healthcare workers and the RNM is further complicated by the specifics of Roma culture and their unique perspectives on health, illness, and treatment. Roma are often perceived as a distinct group that resists collaboration during medical care, with interactions frequently seen as problematic, time-consuming, and resource-draining (4).

Although healthcare systems emphasize the need for an individualized approach to every patient, gen-

eralized attitudes towards the Roma fail to account for individual differences. Such attitudes often arise without objective data about the subject of the attitude (5) or prior to or independently of personal experience (6).

Prejudice can be defined as a "logically unfounded, persistently held attitude toward various objects, accompanied by different emotions" (7). Ethnic prejudice, as part of the cognitive and emotional components of attitudes towards specific groups, is characterized by a relatively simplistic and rigid understanding of the characteristics of the RNM. This oversimplification reflects an inherent human tendency to reduce complexity for easier comprehension (7).

Prejudice is deeply ingrained in socialization processes, from primary family influences to secondary experiences in school, during formal education, through media, or from other sources (8). Healthcare professionals, including nurses, are not exempt from the influence prejudices and stereotypes have on their behavior towards patients in professional settings.

Studies on prejudice towards the RNM, particularly among nurses as the most prominent healthcare professionals within the healthcare system, are scarce globally and have yet to be conducted in Croatia. This research, therefore, represents a contribution to illuminating this issue (9).

Aim

To analyze the prejudices of nurses and nursing technicians toward members of the Roma National Minority (RNM). The secondary objective was to examine the relationship between specific sociodemographic characteristics, personal religious and political beliefs, and the presence of personal and professional contacts with members of the RNM and the expressed prejudices towards this group.

Methods

Participants

The study included 536 nurses and nursing technicians employed within the Croatian healthcare system at all three levels of healthcare provision. Of the total number of participants, 83.2% were women, and 16.8% were men.

The average age of the participants was 30.9 years (SD=10.181), with the youngest being 20 and the oldest 64. The most significant representation was within the 23–27 age group (40.1%), while 36 participants (8.7%) were aged 52 years or older.

Regarding place of residence, 59.7% of participants reported living in urban areas, while 40.3% resided in rural areas.

The majority of participants, 56.5%, were from Zagreb and its surrounding area, followed by participants from Slavonia (16.4%), Dalmatia (7.8%), Northern Croatia (8.4%), and Međimurje (4.3%), with the latter two regions being home to significant RNM populations. Fewer participants were from Lika, Kordun, and Banija (4.9%), with the lowest representation from Istria, Primorje, and Gorski Kotar (1.7%).

Most participants (95.3%) identified as members of the majority population, while 4.7% identified as belonging to other national minorities, though none identified as RNM.

In terms of work experience, the largest group had 2–5 years of service (35.3%), followed by 6–10 years (18.5%) and less than one year (14.6%). Participants with 11–15 years (6.9%), 16–20 years (6.3%), and 21–25 years of experience (6.7%) were similarly distributed, with a slightly higher proportion reporting 26 or more years of service (11.7%).

Regarding educational background, 75.2% of participants held secondary-level nursing qualifications, 16.8% had higher vocational qualifications, and 6.9% had university degrees. A small proportion (1.1%) had additional non-nursing qualifications, though this group was excluded from further analysis due to its size.

Political and Religious Beliefs

In terms of political orientation, 5.6% identified as left-leaning, either "slightly left of center" (3.7%) or "strongly left of center" (1.9%). Conversely, 13.2% identified as right-leaning, including 8.2% who "clearly supported center-right parties" and 5.0% who were "slightly right of center". The majority (52.4%) considered themselves "apolitical", while 25.2% chose not to disclose their political beliefs.

Regarding religious beliefs, 65.1% identified as religious, with 40.7% stating they were "religious but do not accept all teachings of their faith" and 24.4% fully adhering to their faith's teachings. Additionally, 12.5% identified as "non-religious but not opposed to religion", 5.2% were "indifferent to religion", and 3.7% stated they were "unsure about their beliefs". A minority (0.6%) identified as "non-religious and opposed to religion", while 12.9% did not answer this question. For clarity in analysis, religiosity was categorized into three groups: religious, non-religious, and other (those unsure, indifferent, or who did not respond).

Contact with the RNM

Personal and professional contact with the RNM was another critical area of inquiry. Among participants, 42.7% reported having acquaintances or friends who are members of the RNM, while 57.3% did not. Additionally, 75.6% had direct professional contact with the RNM, whereas 24.4% did not.

Instruments

The survey was conducted using questionnaires previously employed in published studies, with minimal modifications to address the specific characteristics of participants working in biomedicine and healthcare (10–14).

The first section of the questionnaire collected data on participants' sociodemographic characteristics, including gender, age, healthcare profession, length of professional experience, type of residence (urban/rural), and county of residence.

The second section asked participants to indicate whether they identified as members of a national minority. It also explored self-assessed political orientation and personal religiosity.

The third section focused on prejudices towards the RNM. Based on a literature review and findings on

typical prejudices against the Roma, 29 statements were developed, tailored to the specific context of participants employed in biomedicine and healthcare (10-14). Participants rated their agreement with each statement using a five-point Likert scale, ranging from 1 ("strongly disagree") to 5 ("strongly agree").

Procedure

The study was conducted online using Google Forms between April 1 and May 1, 2023, as a cross-sectional study conducted simultaneously. The sample was non-probabilistic, representing a limitation due to the inability to generalize findings to the entire population of nurses in Croatia. Data collection employed the snowball sampling method, initiated by public invitations to participate via Alumni clubs, the official websites of higher education institutions training nurses, and the official websites of professional chambers.

Statistics

Descriptive and inferential statistical methods were used to process the data. Given statistically significant deviations from normal distribution (as verified by the Kolmogorov-Smirnov test), non-parametric methods were applied to analyze differences and assess associations. These included the Kruskal-Wallis H test for differences across two or more groups (15), post hoc Dunn's test, and Spearman's rho correlation coefficient.

Results

The core theme of this study centers on prejudices regarding the Roma National Minority (RNM) 's position and relationship with the society they live in and their role as users of the Croatian healthcare system. Before analyzing the collected attitudes and examining the relationship between sociodemographic characteristics and prejudices, the factorial structure of the questionnaire was assessed.

An exploratory factor analysis (EFA) was conducted to reduce the initial set of 29 items to a smaller number of latent dimensions. This analysis aimed to identify the underlying structure of the relatively large number of variables (16). The analysis yielded a factor solution with Promax rotation, explaining 60.7% of the total variance. Four interpretable and reliable factors were identified, with Cronbach's alpha coefficients ranging from 0.77 to 0.92. A total of 19 items were retained from the original 29 statements.

Specifically:

- The first factor accounted for 38.7% of the explained variance and included items related to attitudes about how the healthcare system should interact with the RNM (see Table 1). This factor was labeled "Roma within the Healthcare System" (Extracted Factor 1).
- Items with the highest correlations with this latent dimension pertained to the treatment of RNM in hospitals or clinics within the healthcare system.

The table below presents the arithmetic means for the statements grouped under Factor 1, which reflects attitudes towards the treatment and integration of the Roma National Minority within the healthcare system.

The analysis of results from Table 2 shows that nurses/technicians generally disagree with the given statements. The least accepted statement among all those provided was *"During abortion procedures or gynecological surgeries, it is reasonable to discreetly perform sterilization to reduce the number of children born to Romani women"* (M=1.94) and *"Special clinics or restricted visiting hours for Roma should be established to avoid their mixing with other patients"* (M=2.10).

Table 1. **The first extracted factor "Roma within the Healthcare System"**	
Claims:	**Correlation with the 1st component**
It is justified to place Roma individuals in separate "Roma rooms" in hospitals.	0.98
Special clinics should be established or access to Roma patients should be time-restricted to avoid their mixing with other patients.	0.91
During abortion procedures or gynecological surgeries, it is reasonable to discreetly perform sterilization to reduce the number of children born to Romani women.	0.91
I am afraid that regular patients will leave if it becomes known that we accept Roma individuals as patients.	0.83
Spending public money on the treatment of Roma individuals is an unnecessary expense and waste of funds.	0.71
Roma individuals are illiterate and uneducated, and it is entirely pointless to discuss prevention and health with them.	0.62
Roma individuals do not earn income or pay taxes and contributions, so it is unfair for them to have access to the same level of healthcare as those who contribute to the healthcare system through their earnings.	0.37
The proportion of total explained variance: 38.70% Cronbach's alpha: 0.92	

Table 2. **Mean values for statements grouped under factor 1: "Roma within the healthcare system"**	
Claims:	**M**
It is justified to accommodate Roma individuals in separate "Roma rooms" in hospitals.	2.03
Special clinics should be established, or access for Roma patients should be time-limited to prevent their mixing with other patients.	2.10
During abortion procedures or gynecological surgeries, it is reasonable to discreetly perform sterilization to reduce the number of children born to Romani women.	1.94
I fear that regular patients will leave if it becomes known that we accept Roma individuals as patients.	2.16
Spending public funds on the treatment of Roma individuals is an unnecessary expense and waste of funds.	2.26
Roma individuals are illiterate and uneducated, and it is entirely pointless to discuss prevention and health with them.	2.44
Roma individuals do not earn income or pay taxes and contributions, so it is unfair for them to have access to the same level of healthcare as those who contribute to the healthcare system through their earnings.	2.73

Table 3. **The second extracted factor "Protecting Roma from the consequences of discrimination"**	
Claims:	**Correlation with the 2nd component**
Roma individuals require enhanced healthcare as they are an extremely vulnerable group.	0.76
It is shameful that Roma individuals in our country live up to 10 years less than the majority population.	0.67
Roma individuals receive less state and public funding than they should.	0.67
Greater support should be offered to Roma individuals than what is currently provided.	0.65
Roma individuals are more exposed to discrimination by healthcare professionals than any other national minority group.	0.46
Proportion of total explained variance: 11.50% Cronbach's alpha: 0.77	0.37

On the other hand, a moderate agreement was reached for the statement, *"Roma individuals do not earn income or pay taxes and contributions, so it is unfair for them to have access to the same level of healthcare as those who contribute to the healthcare system through their earnings."* (M=2.73), which may indicate that some believe RNM members should have a different approach in the healthcare system.

The next five items shown in Table 3 share a common theme: statements related to attitudes toward *"Protecting Roma from the Consequences of Discrimination"* (Extracted Factor 2).

This component accounts for 11.5% of the variance (Table 3). On the one hand, the factor is homogeneous as it gathers all statements formulated affirmatively and is also entirely consistent in content.

The table below presents the average values for the statements categorized under Factor 2, which reflects attitudes towards protecting the Roma National Minority from the effects of discrimination.

Table 4. **Mean values for statements grouped under factor 2: "Protecting Roma from the consequences of discrimination"**

Claims:	M
Roma individuals require enhanced healthcare as they are an extremely vulnerable group.	2.7
It is shameful that Roma individuals in our country live up to 10 years less than the majority population.	3.16
Roma individuals receive less state and public funding than they should.	2.58
Greater support should be offered to Roma individuals than what is currently provided.	2.81
Roma individuals are more exposed to discrimination by healthcare professionals than any other national minority group.	2.93

The highest average value, indicating moderate agreement among nurses/technicians, is expressed for the statement *"It is shameful that Roma in our country live up to 10 years less than the majority population"* (M=3.16), followed by *" Roma individuals are more exposed to discrimination by healthcare professionals than any other national minority group "* (M=2.93).

The third extracted component accounts for 8.0% of the variance, and the statements comprising it can best be characterized as general prejudices against the Roma National Minority. Therefore, this factor is called *"General Prejudices Against Roma"* (Extracted Factor 3) (Table 5).

These are four items related to negative characteristics that are often attributed to all members of the Roma National Minority, namely that they do not have a positive attitude towards work and that they have many children whom they do not take proper care of.

Table 5. **Third extracted factor "General prejudices against Roma"**

Claims:	Correlation with the 3rd component
Roma individuals do not have a positive attitude towards work.	0.88
Roma individuals usually have many children, for whom they do not provide adequate care.	0.79
There are very few responsible and reasonable Roma individuals.	0.77
The increasing number of Roma and the growth of the Roma population pose a threat to societal security.	0.66
Proportion of total explained variance: 8.00% Cronbach's alpha: 0.87	

Table 6. **Overview of average values for statements grouped under factor 3 "General prejudices against Roma"**

Claims:	M
Roma individuals do not have a positive attitude toward work.	3.10
Roma individuals usually have many children, for whom they do not provide adequate care.	3.55
There are very few responsible and reasonable Roma individuals.	3.08
The increasing number of Roma and the growth of the Roma population pose a threat to societal security.	2.74

The highest level of agreement was obtained for the statement "Roma individuals usually have many children, for whom they do not provide adequate care " (M=3.55), where it is evident that, on average, nurses generally agree with this statement (Table 6). Additionally, moderate agreement was found with the statement that "Roma individuals do not have a positive attitude towards work" (M=3.1) and that "There are very few responsible and reasonable Roma individuals " (M=3.08).

The next three statements, which represent three items of factor component 4, all concern prejudices about Roma's behavior in direct communication with the healthcare team and as patients. This component explains only 2.8% of the variance (Table 7). Given the common theme of these three statements, this factor was named "Healthcare Workers' Attitude Towards RNM Members as Patients."

Table 7. Fourth extracted factor "Healthcare workers' attitude towards RNM members as patients"

Claims:	Correlation with the 4th component
Roma individuals do not listen to what healthcare professionals tell them, either because they do not understand or do not wish to understand the advice given, and instead act according to their own preferences.	0.96
Roma individuals are unlikely to take medication regularly or attend routine check-ups and therapy.	0.70
I must pay particular attention to Roma individuals as patients because communication with them is very challenging due to the language barrier.	0.49
Proportion of total explained variance: 2.80% Cronbach's alpha: 0.82	

Like the first component, this one also relates explicitly to Roma in the context of healthcare. Unlike the first component, which relates to the healthcare system, the fourth component pertains to the interpersonal level of the relationship between Roma and healthcare workers, including issues related to examinations and therapy, as well as difficulties that may arise in communication with them and some specific behaviors within healthcare interventions.

Table 8. Overview of mean values for statements grouped under factor 4 "Healthcare workers' attitude towards RNM members as patients"

Claims:	M
Roma individuals do not listen to what healthcare professionals tell them, either because they do not understand or do not wish to understand the advice given, and instead act according to their own preferences.	3.17
Roma individuals are unlikely to take medication regularly or attend routine check-ups and therapy.	2.96
I must pay particular attention to Roma individuals as patients because communication with them is very challenging due to the language barrier.	2.96

As shown in Table 8, the highest average agreement for this factor is with the statement, "Roma individuals do not listen to what healthcare professionals tell them, either because they do not understand or do not wish to understand the advice given, and instead act according to their own preferences" (M=3.17). However, the other two statements also indicate moderate agreement from healthcare workers regarding potential communication difficulties with RNM members (M=2.96) and questionable adherence to the instructions they receive from healthcare professionals (M=2.96).

Additional analyses were conducted to examine the relationship between the factors obtained and specific sociodemographic variables, and the results are presented in Table 9.

The analyses showed no statistically significant differences based on gender and the size of the settlement (city/village) where nurses/technicians live for all four extracted factors (Table 9). Furthermore, it was shown that respondents with an undergraduate professional or university nursing degree have more negative attitudes (except for Factor 2) than those with a high school or higher education.

For Factor 2, "General Prejudices towards Roma" the analysis of differences showed no statistically significant differences regarding religiosity or personal and professional contact with Roma (Table 9). However, it was found that those who are not members of a national minority and those positioned on the right side of the political spectrum (compared to those who positioned themselves on the left, as well as those who are apolitical or did not answer this question) have more negative attitudes, while the difference compared to those in the center was not statistically significant. Similar results regarding political orientation were obtained for the remaining factors. Respondents on the right side of the political spectrum have more negative attitudes.

Regarding other sociodemographic characteristics, it was found that for Factor 1, respondents from Međimurje and Northern Croatia had statistically significantly more negative attitudes (higher score on this factor) than all others. In contrast, respondents from Zagreb and its surroundings had more negative attitudes than respondents from all other regions (except for Međimurje and Northern Croatia, with respondents from Međimurje having the most negative attitudes). Factors 3 and 4 also found that respond-

Table 9. **Results of the analyses for individual sociodemographic characteristics with respect to the 4 extracted factors**				
	F1	**F2**	**F3**	**F4**
Gender	K-W=0.0334 df=1 p=0.8548	K-W=0.0004 df=1 p=0.9833	K-W=1.5872 df=1 p=0.2077	K-W=0.047 df=1 p=0.828
Education	K-W=15.371 df=2 p=0.0004	K-W=4.9887 df=2 p=0.08255	K-W=15.536 df=2 p=0.0004	K-W=29.721 df=2 p=0.000
Settlement	K-W=0.0466 df=1 p=0.829	K-W=0.0195 df=1 p=0.8889	K-W=0.737 df=1 p=0.3906	K-W=1.554 df=1 p=0.2125
Region - aggregated	K-W=23.434 df=2 p=0.0000	K-W=2.529 df=2 p=0.2824	K-W=24.962 df=2 p=0.0000	K-W=18.548 df=2 p=0.0000
Ethnic Minority Affiliation	K-W=12.135 df=1 p=0.0005	K-W=5.2598 df=1 p=0.0218	K-W=8.695 df=1 p=0.0032	K-W=1.501 df=1 p=0.2205
Religiosity - aggregated	K-W=13.319 df=2 p=0.0013	K-W=0.31211 df=2 p=0.8555	K-W=0.57406 df=2 p=0.7505	K-W=4.7408 df=2 p=0.0934
Political Engagement	K-W=64.611 df=6 p=0.0000	K-W=30.645 df=6 p=0.0000	K-W=69.07 df=6 p=0.0000	K-W=58.142 df=6 p=0.0000
Friendship with Ethnic Minority Members	K-W=30.46 df=1 p=0.000	K-W=0.687 df=1 p=0.4073	K-W=18.472 df=1 p=0.000	K-W=28.349 df=1 p=0.000
Personal Contact with Ethnic Minority Members	K-W=16.401 df=1 p=0.000	K-W=3.2247 df=1 p=0.07254	K-W=1.305 df=1 p=0.2533	K-W=5.361 df=1 p=0.02059
K-W – Kruskal-Wallis H test				

ents from Međimurje or the northern part of Croatia have more negative attitudes (compared to all other regions). In contrast, the differences among other regions were not statistically significant.

Looking at the religiosity of the respondents, statistically significant differences were found only for Factor 1, "Roma within the healthcare system", in the direction that those who are religious or non-religious have more positive attitudes (lower average factor score) on this factor compared to those who defined their relationship to religion in other ways ("I am indifferent to religion", "I think about it a lot, but I am not sure whether I believe or not", and "I do not wish to answer this question"). No statistically significant differences were found for the remaining three extracted factors.

Considering personal and professional contacts with Roma and belonging to a national minority, for Factors 1, 3, and 4, respondents who have no personal contact with Roma have more negative attitudes. In contrast, professional contact showed statistically significant results only for Factors 1 and 4. Negative attitudes were expressed by respondents who do not belong to a national minority (except for Factor 4).

Table 10 presents the results of additional analyses that examined the correlation between age and work experience with the four extracted factors. These analyses reveal how demographic factors such as age and years of work experience influence attitudes toward the different factors related to prejudices and perceptions of Roma within the healthcare system.

Regarding the relationship between age and work experience, statistically significant correlations were not found only for the 2nd factor (Table 10). Older respondents and those with more work experience

Table 10. **Overview of the relationship between age and work experience with the extracted factors**			
	F1	**F2**	**F3**	**F4**
Age	ρ=-0.149 *p*=**0.0005**	ρ=-0.003 *p*=0.9438	ρ=-0.1398 *p*=**0.0012**	ρ=-0.20629 *p*=**0.000**
Work experience	ρ=0.2005 *p*=**0.000**	ρ=0.03477 *p*= 0.4218	ρ=0.1647 *p*= **0.0001**	ρ=0.2115 *p*= **0.000**

show a more negative attitude towards the Roma National Minority (RNM) in terms of the remaining three factors. It is important to note that this correlation is very weak in both cases.

Discussion

This study aimed to explore the prejudices nurses have towards members of the Roma National Minority (RNM). To investigate these prejudices, a newly constructed questionnaire for assessing nurses' attitudes towards the Roma minority was used. After conducting exploratory factor analysis, four interpretable and reliable factors were identified, named "Roma within the healthcare system", "Protecting Roma from the consequences of discrimination", "General prejudices towards Roma", and "Nurses' attitudes towards members of the RNM as patients".

Roma are an ethnically, linguistically, and culturally diverse group with a long history of severe discrimination and marginalization (17, 18), which may present a challenge for healthcare professionals. The results indicate that nurses also exhibit prejudices in some aspects of their thinking about members of the RNM in the healthcare system. Although some statements point to slightly negative attitudes (e.g., "It is justified to place RNM in separate 'Roma rooms' in hospitals", M=2.03, or " During abortion procedures or gynecological surgeries, it is reasonable to discreetly perform sterilization to reduce the number of children born to Romani women", M=1.94), it is concerning that some respondents gave higher ratings. Separation of Roma during hospitalization was a practice in many European countries until recently (19). The statement regarding the sterilization

of Romani women describes a criminal, eugenics-inspired shameful practice that was systematically carried out in some countries, such as Slovakia and the Czech Republic, against the RNM in the 20th century (20), and such treatment of Romani women was also conducted in concentration camps (21). This is also the statement with the least agreement in our sample. The highest degree of agreement was found for the statement that Roma, on average, have more children than members of the majority population and that they do not take adequate care of them (M=3.55). Although a large number of children is a fact for most Romani families, especially those living in segregated Romani settlements, it does not necessarily mean that the parents do not care for their children. However, those Romani families assimilated into larger urban areas tend to have fewer children than "traditional" Romani families (22). Moderate agreement with certain statements likely reflects the general societal attitude towards the RNM, such as "Roma do not have a positive attitude towards work" (M=3.1) and "There are very few responsible and reasonable Roma" (M=3.08).

Regarding Roma as a patient in the healthcare system, nurses recognize the difficulties that may arise in communication due to the language barrier. They also moderately agree that Roma do not listen to healthcare workers' advice, either because they do not understand the instructions or because they prefer to act according to their own will. What is positive is that they find it shameful that Roma have a shorter life expectancy than the majority population. However, due to the formulation of the statement, it remains to be explored whether they consider this a shame for society or the Roma themselves.

Research on beliefs and prejudices in this population is rare, so the results of this study can only be tentatively viewed in light of the findings on the perception of Roma published in just a few studies. Heaslip et al. conducted a qualitative study involving nursing

students from four European countries (UK, Spain, Belgium, and Turkey), who articulated a broader societal stigma associated with the RNM in all four countries. Negative attributes were expressed through prejudices about the RNM as a group focused on crime, aggressive, violent behavior, or the choices these communities made regarding how they chose to live their lives. The study showed that the attitudes expressed were influenced by broader societal perceptions and personal and professional lived experiences (23).

Additionally, a study conducted in the Greek public health sector indicated that a significant portion of employees tended to exhibit prejudices towards Roma, which negatively affected their treatment of Roma when they tried to access necessary healthcare services (24). In our study, however, only 8.8% of respondents believe that "spending public money on treating Roma is an unnecessary expense and a waste of money". In comparison, more than half of the respondents (56.9%) disagree or largely disagree with this statement.

Previous research has shown that both adults and children and adolescents in our society express high levels of prejudice towards the Roma National Minority (RNM) (25,26). In many European countries, prejudices against Roma are widespread and severe on personal, institutional, and national levels, especially in Eastern Europe, where Roma represents a significant ethnic minority. This is confirmed by studies showing that unfavorable views of the Roma population are widespread in Central and Eastern Europe (worst rated in Italy, best in Sweden, with Poland in the middle) (27). Reports from Italy (28), Spain (29), Hungary, Slovakia (11), and the UK (30) also support this.

Research from Hungary and Slovakia reveals a generally high level of prejudice towards the RNM among the general population (31,32), specific ideological groups (33) such as the extreme right (34), and even professional groups like the police (35) and healthcare workers (36).

A particular goal of this study was to analyze the relationship between prejudice towards the RNM and some socio-demographic characteristics of the respondents, as well as the existence of personal and professional contacts with members of the RNM, affiliation with the majority nation or national minority, and self-assessment of the respondent's position on the political spectrum and religiosity.

Gender and place of residence (city/village) were not statistically significant, but a significant, though very weak, correlation was found with age (older respondents had more negative attitudes). Likewise, for most factors, no differences were found based on religiosity, except for the factor where there was no difference between religious and non-religious respondents. However, both groups had more positive attitudes compared to those who defined their relationship with religion in other ways ("I am indifferent to religion", "I think about it a lot, but I am unsure whether I believe or not", and "I do not want to answer this question"). Regarding political orientation, all factors showed that respondents who positioned themselves on the right side of the political spectrum had more negative attitudes.

The results can be partially compared with results from similar studies conducted among nurses, such as the one in Poland, which showed that the level of distance towards the RNM did not significantly correlate with age, work experience, life in another country, nursing specialization, working in another country, participation in cultural events, gender, or religion (37).

Research has shown that positive contact between members of different groups is one of the most effective ways to reduce prejudice (38). According to Allport's contact hypothesis, contact with an outgroup should lead to better intergroup relations and reduced social distance (39). This was only partially confirmed in our study. On the "General prejudices towards Roma" factor (F2), there were no differences in assessments based on prior personal or professional experience with the RNM. On the other hand, on factors 1, 3, and 4, respondents with no personal/friendship contact with members of the RNM had more negative attitudes. In contrast, professional contact was statistically significant only for factors 1 and 4. More hostile attitudes were expressed by respondents who were not members of national minorities (except on factor 3, where no statistically significant differences were found).

Positive intergroup contact generally leads to positive experiences with the out-group, exposing group members to information that challenges their existing stereotypes, which further leads to changes in beliefs, attitudes, and behavior towards the outgroup (40). However, we found more negative attitudes in regions of Croatia where more members of the RNM live. Consequently, there is a higher likeli-

hood that healthcare workers will have more personal and professional contact with Roma. Statistically, significantly more negative attitudes were found in respondents from Međimurje and Northern Croatia compared to all other regions. It also appeared that belonging to the majority nation was associated with more negative attitudes on most factors (except for factor 4, "Nurses' attitudes towards members of the RNM as patients"), which we can, among other things, link to fewer contacts with members of national minorities. The issue of attitudes and prejudices towards Roma is complex and requires further research.

Some studies have indicated a connection between religiosity and ethnic distance and intolerance, with prejudices expressed stronger towards national and ethnic groups arising from higher religiosity (41), which was not confirmed in this study.

Additionally, the results of this study do not fully align with the findings of studies that have established that as the level of education rises, the level of intergroup anxiety decreases (24). Nurses with bachelor's degrees showed more negative attitudes towards the RNM than those with a secondary education. This may suggest that under the influence of dominant societal attitudes, educated healthcare workers risk becoming carriers of the same anti-Roma prejudices and negative attitudes as the general population. However, it is positive that nurses with higher levels of education showed more positive attitudes. Since nurses with higher education also tend to have more extended work experience, be older, and show more negative attitudes towards the RNM than those with lower education and younger age, future analyses should investigate the interconnection between these three characteristics.

It was also confirmed that there is a significant relationship between political orientation (42) and prejudice towards certain marginalized groups in society. The results of this study showed that respondents who positioned themselves on the right side of the political spectrum expressed more negative attitudes toward the RNM across all four extracted factors.

The unacceptability or unwillingness of society to address the growing prejudices towards the Roma National Minority (RNM) in order to ensure equal opportunities for them, especially in the healthcare system (43), is unacceptable. Given the developments in Europe, including Croatia, where more members of other national minorities are entering the workforce and long-term becoming users of the healthcare system, the more negative attitudes we found on some statements should be viewed in a broader social context and the current climate toward people who are not members of the majority nation.

Roma, who have been subjected to multiple forms of discrimination for centuries due to prejudice, still often cannot enjoy the same rights and opportunities or the same level of protection that EU legal achievements provide to other EU citizens. To achieve this, intercultural awareness and dialogue need to be encouraged through training healthcare workers about the specific health needs of Roma.

Furthermore, it is necessary to confront negative stereotypes about the RNM, including those in the media and online platforms such as social media, where scientific research and publications can significantly contribute (44,45).

Only through targeted work can intercultural differences be overcome. This can be achieved by providing continuous training to healthcare workers on the health needs of the RNM while not forgetting past tragedies and immoral practices. This can be achieved by supporting scholarships and other incentives to attract more Roma into the healthcare sector while being mindful of the sensitivities of Roma men and women (22,46,47).

The limitations of this research include the convenience sample, which is reflected in the younger age structure of the sample, and the relatively small number of nurses from different regions of Croatia, which led to a small number of respondents in some categories. One reason might be the online data collection, which likely attracted those with higher digital literacy. Additionally, better operationalizing certain variables such as religiosity and political orientation should be considered.

Conclusion

Considering that nurses are often the first point of contact with patients and the largest subgroup within the healthcare worker population, it is crucial to identify their prejudices towards members of the RNM in the healthcare system.

A questionnaire on nurses' prejudices towards the Roma National Minority was applied, and through exploratory factor analysis, four interpretable and reliable factors were identified, named "Roma within the healthcare system", "Protecting Roma from the consequences of discrimination", "General prejudices towards Roma", and "Nurses' attitudes towards RNM members as patients". The results show that some nurses share the same general prejudices towards the RNM as the general population. Given that they are healthcare workers who encounter Roma both as patients and in the healthcare system, the existence of prejudices could result in inadequate care for RNM patients and lead to worse health outcomes.

The analysis of the relationship between specific socio-demographic indicators and beliefs and prejudices towards the RNM revealed that gender and the size of the settlement where respondents live were insignificant. Statistically significant differences were found based on the level of education and the region of residence, with respondents with higher education levels and those living in Međimurje County and Northern Croatia exhibiting more negative attitudes towards the RNM than those with lower education or living in other parts of Croatia. Additionally, belonging to the majority population was associated with more negative attitudes than those expressed by members of national minorities included in this study. Statistically significant differences in attitudes were also found between respondents who had personal and professional contacts with members of the RNM compared to those who did not, with such contacts contributing to less negative attitudes. Respondents from the right-wing political spectrum and those from the majority population expressed statistically significantly more negative attitudes, while religiosity did not show statistical significance.

To improve Roma's position in realizing their fundamental right to universal and free healthcare guaranteed by the Constitution, it is necessary to first elimi-nate prejudice among healthcare workers at all levels toward the RNM. This is essential to correct these prejudices and ensure full equality for all RNMs who have access to the same healthcare rights available to the majority population.

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167

PREDRASUDE MEDICINSKIH SESTARA O ROMIMA KAO PACIJENTIMA U SUSTAVU ZDRAVSTVA REPUBLIKE HRVATSKE

Sažetak

Zbog duboko ukorijenjenih predrasuda, Romi su najranjivija, višestruko diskriminirana etnička skupina i nacionalna manjina koja se u raznim sferama društva, pa tako i u našem zdravstvenom sustavu, suočava s diskriminacijskim izazovima koji ograničavaju kvalitetu zdravstvene skrbi, uslijed čega se može povećavati rizik od progresije bolesti i prerane smrti. Cilj istraživanja bio je analizirati predrasude medicinskih sestara prema pripadnicima romske nacionalne manjine, te analizirati njihovu povezanost s određenim sociodemografskim obilježjima i uvjerenjima ispitanika. Istraživanjem je bilo obuhvaćeno 536 medicinskih sestara zaposlenih u sustavu zdravstvene zaštite na sve tri razine, koje neposredno rade s pacijentima. Iz prikupljenih stavova o 29 ponuđenih tvrdnji o položaju i odnosu prema Romima kao pacijentima, eksploratornom faktorskom analizom izdvojeno je 19 tvrdnji razvrstanih u četiri detektirana i interpretabilna pouzdana faktora koji su nazvani „Romi unutar zdravstvenog sustava", „Zaštita Roma od posljedica diskriminacije", „Opće predrasude prema Romima" i „Odnos medicinskih sestara prema pripadnicima romske nacionalne manjine kao pacijentima", kojima se objašnjava 60,7 % ukupne varijance. Analiza je pokazala da dio medicinskih sestara dijeli iste opće predrasude prema Romima kao i opća populacija, pri čemu ispitanici s višom razinom završenog obrazovanja i starije životne dobi te oni koji žive na području Međimurske županije i/ili sjeverne Hrvatske iskazuju statistički značajno negativnije stavove prema Romima od mlađih, niže obrazovanih i onih koji žive u drugim dijelovima Hrvatske. Također, pripadnost većinskom stanovništvu donosi negativnije stavove prema Romima nego što ih iskazuju pripadnici nacionalnih manjina. Oni ispitanici koji su imali privatne i profesionalne kontakte s pripadnicima romske nacionalne manjine u dijelu faktora iskazuju manje negativne stavove od onih koji su ih nisu imali. Negativnije stavove prema Romima iskazuju ispitanici s desnog političkog spektra, dok se religioznost nije pokazala statistički značajnom.

Ključne riječi: Romi, predrasude, medicinske sestre, diskriminacija, zdravstveni sustav

Development of Attitude Scale Towards Caesarean Section: A Sample of Turkey

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Abstract

Introduction. Caesarean section is an alternative to normal birth and is performed through an incision. Caesarean section can be a method applied in cases of necessity, but it can also be applied in cases where it is not mandatory.

Aim. The aim of this study is to determine the attitudes of women towards caesarean section. **Methods.** In this regard, 437 women of reproductive age between 18-49 residing in Esenyurt district of Istanbul province were included in the study. In the study, a 42-question survey was first drafted. After receiving expert opinion and conducting a pilot study, a draft survey consisting of 32 questions was applied to the participants in person. Firstly, explanatory factor analysis was applied to the data. Following the analysis, 12 questions that were not collected under any dimension were removed from the scale and 5 factors including 20 questions were found. After this stage, Confirmatory Factor Analysis was applied to the identified factors.

Results. It was determined that the model obtained was a perfect fit for the data. Therefore, the scale developed by exploratory factor analysis was confirmed by confirmatory factor analysis. The Cronbach's coefficient of the developed scale was calculated as 0.820 and it was concluded that it was highly reliable.

Conclusion. It was decided that the developed scale could be used to measure women's attitudes towards caesarean section.

Introduction

In general, the process of removing the child from the mother's womb by performing a surgical intervention other than natural birth is called cesarean section. This surgical intervention may be due to obligatory reasons or non-obligatory reasons. The non-obligatory reasons include, inter alia, the mother's choice of cesarean section upon her own request, physician guidance, history of miscarriage, and fear of birth (1-6). While the World Health Organization considers the rate of cesarean section in the range of 10-15% to be acceptable according to the standards set by it, it is seen that the cesarean section rate is much higher than the desired level in many countries, including Turkey. This brings a serious financial burden to the country's health system (7). When the literature is examined in the Turkish sample, it is possible to see that there are various studies on cesarean section (2, 8-10). This study differs from the studies in the literature. The fact that the attitude scale towards caesarean section has not been directly included in the literature by sampling women between the ages of 18-49 in the fertility category in studies involving the Turkish sample reveals the unique aspect of this study. The aim of this study is to introduce the factors affecting attitudes towards cesarean section into the literature in the Turkish sample.

Conceptual framework

Pregnancy and subsequent birth cause several physical and psychological changes in women's lives. Although labour is a natural process, the interventions applied negatively affect the course of labour and may cause problems in some cases. To prevent all the negative effects that may occur in labour, it is important to choose the method of delivery carefully in terms of both mother and baby health (11). One of the existing delivery methods other than normal delivery method is caesarean section.

It is seen that there are many definitions of caesarean section. According to one definition, caesarean section is a major abdominal surgery performed on women in both developed and underdeveloped countries (12). Veef and Van de Velde (2022) define caesarean section as a surgical operation performed worldwide (13). Caesarean section is an important maternal health service (14). Caesarean section is defined as a preferred mode of delivery in cases where vaginal delivery is not possible or is risky for the mother or fetus (10-11). When the history of caesarean section is examined, it is seen that it has been used since ancient times and is a part of human culture (15). The term caesarean section is derived from the Latin word 'caederal' meaning 'to cut'. It is narrated that it was first applied during the Roman period to extract the baby in the last trimester of pregnancy from the mother's womb (16).

The indications for caesarean section are listed as multiple pregnancies, presentation disorders, maternal medical problems, presence of infection that can be transmitted from mother to baby, placental disorders such as placenta previa or ablatio placentae, fetus weighing 4.5 kg due to maternal diabetes, history of shoulder dystocia, Cephalopelvic disproportion, previous uterine surgery and maternal request (17-18).

Caesarean section rates have increased significantly over time. The optimisation of caesarean section rates is a global priority. Excessive caesarean sections can lead to poor outcomes for both mother and child (7,19-20). In addition, high rates of caesarean section are considered a public health problem worldwide (21). Although caesarean section is seen as a life-saving surgery for mother and fetus, when necessary, it also carries various risks as in all surgical interventions (22-23). Complications such as bleeding, need for blood transfusion, increased risk of uterine rupture and pelvic infections may develop during or after caesarean section. Caesarean section increases the length of hospital stay and causes urinary tract injuries, anaesthesia complications and thromboembolic events. Caesarean section may also adversely affect breastfeeding, as there may be a delay in the bringing together of mother and baby. In addition, challenges in adapting to the role of motherhood after caesarean section, prolongation of the mother's recovery period, and difficulties associated with the care of the mother and the baby are also complications of caesarean section (24).

The rates of caesarean sections in developed and emerging countries are not encouraging at all. The World Health Organisation (WHO)'s recommendation for caesarean section rates is 10-15%. In the last 25 years, it has been reported that there has been an increase of over 30% in caesarean section rates in Egypt, Dominican Republic, China, Georgia and Turkey (25). According to 2015 WHO's data, Brazil with 55.6%, Do-

minican Republic with 56.4%, Turkey with 50.4%, Iran with 48%, China with 47% and Egypt with 51.8% are the five countries with the highest caesarean section rates. In the same year, Turkey ranked first in caesarean section rates among OECD countries (26). When the caesarean section in Turkey Health Statistics is analysed, the following rates are obtained: 51.1% in 2014; 53.1% in 2015-2016-2017; 54.9% in 2018; 54.4% in 2019. It is seen that the caesarean section rates in Turkey are considerably higher than the recommendation of the WHO's caesarean section rate. The reasons for this dramatic increase today are listed as increased age at first pregnancy, continuous application of fetal monitoring, the misconception that cesarean delivery is safer for the baby, the increase in the socio-economic level of families, mothers' desire for a painless, effortless birth, and physicians' guidance for caesarean delivery. The reasons why women prefer caesarean section are factors such as fear of normal delivery, lack of adequate information about normal vaginal delivery, women's fear and avoidance of birth pain, inadequate conditions in the delivery room, lack of adequate psychological support during labour and offering the option of epidural anaesthesia. Unfortunately, caesarean section is perceived as a comfortable delivery method by families, society and physicians (27). Perner et al. (2022) examined the caesarean section rates and social inequality in 305 cities in the Latin American region including Brazil, Colombia, Guatemala, Mexico and Peru, and found that there is a relationship between the mother's education level, age and gross domestic product and caesarean section rates (28). In another study conducted by Okyere et al. (2022), the caesarean section rates of women were analysed based on official data in Gana between 1998-2014. After the examination, it was concluded that factors such as the city of residence, gross domestic product and education affect caesarean section (29). In the study performed by Özkan et al. (2013), 1159 women between the ages of 18-49 with a history of pregnancy were included in the sample. It was determined that 43.2% of women gave birth by cesarean section. Factors affecting the situation of having a cesarean section were determined as the mother's living in the city, her last birth in the private sector, physician referral, and compulsory cesarean section. In addition, the fact that women are not fully informed about cesarean section is another factor that increases the risk of cesarean section (1). One of the factors affecting the choice of cesarean section is that the day when the baby will be born is determined in advance by cesarean section. Couples can choose a cesarean section to have the child on the day they plan. In the study performed by Liang et al. (2018) which included 1169 pregnant women, it was found that only 8% of pregnant women had a preference for cesarean section, and when the factors affecting this situation of pregnant women who preferred cesarean section were examined, it was found that the most important factor was the desire for the baby to be born on a special day. Other factors are the couples' desire for this option and the fact that cesarean section is less painful than vaginal birth (30). Fuglenes et al. (2011) used the data of the mother-child study, which included a sample of 58881 people and was published by the Norwegian Institute of Public Health in 2010. In the study, it was found that only 6% of the sample group preferred cesarean section to vaginal birth. Factors such as previous cesarean section experience, fear of birth, and negative birth experience affect the choice of cesarean section (31).

Present study

This study aims to determine the factors affecting the cesarean section attitudes of women aged 18-49 in the Turkish sample, through scale development. The unique point of this study is that the factors determining the attitude towards caesarean section in the Turkish sample were not determined through scale development. When the literature is examined, although there are qualitative and quantitative studies on cesarean section preferences, precautions to be taken to prevent anxiety and depression that develop with cesarean section, and studies on the financial burden that cesarean section brings to the country's health system, it was determined that a cesarean attitude scale that takes a group directly at birth age as a sample is missing. has been made. It is anticipated that this scale will fill an important gap and guide future studies.

Methods

Ethics

In this study, permission was obtained from the ethics committee of Istanbul Esenyurt University with the decision dated December 1, 2022 and numbered 2022-11/11. While obtaining data within the scope of the study, the principles in the Declaration of Helsinki were followed.

Participants

Sample included women in reproductive age between 18-49 years residing in Esenyurt district of Istanbul/Turkey province. In the study, 437 women were reached using convenience sampling. When the literature is examined, it is seen that there are different opinions about sample size in scale development studies. The number of participants to be reached should be 5 times, and if possible 10 times, the number of statements (32-33). Hinkin (1995) argues that 4 to 10 times as many individuals as the scale items will be sufficient (34). While Kline (1994) stated that at least 100 people are sufficient for scale development studies (35), Gorsuch (2014) determined this number ranges from 50 to 200 (36). This information adequately represents the liberation of 437 individuals for the scale consisting of 20 items, and the universe within the framework of these views. Demographic information of the women included in the study (age, reproductive status, childbearing status, etc.) were not considered.

Conceptual framework in research

The conceptual framework of the research discusses the structural relationships between the factors (alternative choice, preference, negative effect, facilitating attitude and special choice) that are effective in the caesarean section attitude, which are the main variables of the research.

Explanations regarding the scale sub-dimensions that emerged after the conceptual model are as follows;

Alternative Choice: In cases where normal birth is impossible and the excessive pain is present, the birth preference is cesarean section.

Preference: It is the factor that expresses the individual's preference for cesarean section even if there is a possibility of normal birth.

Negative Effect: Dimension that expresses that cesarean section is a negative situation for the mother, baby and family.

Facilitative Attitude: It states that cesarean section is simpler and more comfortable than vaginal birth.

Special Choice: The individual's body aesthetics is the dimension that expresses the individual's choice of cesarean section so that the child is born on an important day for him/her and/or his/her partner.

Negative Effect: This is the dimension that expresses that cesarean section is a negative situation for the mother, baby and family.

Procedure

The data were collected by face-to-face survey method between 1 January 2023 and 30 July 2023. While preparing the survey of the research, the conceptual framework was created based on the literature (17, 27-31). In accordance with this conceptual structure, the question pool was created by the researchers.

Results

Reliability of research data and pilot study

Firstly, the conceptual framework for the scale to be developed was created by reviewing the relevant literature. In the next stage, an item pool consisting of 42 questions was developed. Following this stage, the opinions of 10 experts (CVI: 0.62) who serve as faculty members in the faculties of health sciences (4 people), educational sciences (2 people), and business sciences (4 people) of universities in Turkey were consulted using the Lawshe technique. After the expert opinions, the number of questions in the pool was reduced to 32. The content validity of the remaining 32 questions was found to be 84%. A pilot study was conducted on a group of 20 people, so that errors in the items such as expression errors,

misunderstanding by the respondents, spelling errors, spelling mistakes, etc. were corrected. For test-retest reliability, the draft scale was administered to 25 people twice at 3-week intervals and the total scores obtained from the scale are given below. The level (degree) of Pearson correlation coefficient between the first and second application is 0.82 (82%). There is a very strong (very high) positive correlation between the first and second application. That is to say, the measurements made at different times are very similar. Therefore, the scale is highly reliable. Finally, the survey was administered to a target group of 437 people.

Reliability analysis was performed on the data obtained from the target group using "item analysis based on item-total correlation" and the reliability coefficient for the remaining 20 statements in the final scale was found to be α= 0.820. Since this value is between $0.80 \leq \alpha < 1.00$, the scale is highly reliable. In addition, for the sub-factors of the scale, namely Alternative Choice Factor, Preference Factor, Negative Impact Factor and Facilitating Attitude Factor, $0,80 \leq \alpha < 1,00$ is valid and the factors are highly reliable. For the Special Choice Factor, $0,60 \leq \alpha < 0,80$ is valid. This indicates that the factor is reliable.

An explanatory factor analysis was conducted for the data. In the analysis, the items (7, 8, 9, 14, 15, 16, 17, 18, 19, 27, 30, 31) that did not fit were removed from the scale and the results in Table 1 were obtained.

Since the Keiser Meyer Olkin Test (KMO) value is 0.844, the result is excellent. The high KMO value indicates that the sample size is sufficient for factor analysis. The result of Bartlett's test is also significant ($p < 0,05$). In other words, there are high correlations between the variables and the data come from Multivariate Normal Distribution (42). In accordance with both findings, the data are suitable for factor analysis and the sample is sufficient. A factor loading value above 0.30 is sufficient. The smallest factor loading value of the analysis was found to be 0.448. The cumulative variance explained by the eigenvalues is 67.35% of the total variance.

As a result of the analyses of the items whose rotated (rotation type: Varimax) factor loadings were calculated, it is seen that the scale consists of 20 items and 5 dimensions. While determining the factor loadings as a result of the explanatory factor analysis, care was taken to ensure that the factor loading of

each statement was at least 0.30 and above (Table 1 can be examined for detailed information). Additionally, there are at least 3 statements under each dimension. The dimensions obtained by taking into account the meaning of the items in the factors by utilising the rotated factor loadings were named as "Alternative Choice Factor, Preference Factor, Negative Impact Factor, Facilitating Attitude Factor and Special Choice Factor" respectively.

Findings related to confirmatory factor analysis

In this section, confirmatory factor analysis (CFA) was applied to the factors affecting the attitude towards caesarean section through IBM AMOS package programme and the degree of fit of the data for the assumed model was tested. Confirmatory factor analysis and structural validity analysis were performed, and the diagram of model fit is given in Figure 1.

Acceptable values of the fit indices are χ^2/df <5, GFI >0.85, AGFI >0.90, CFI >0.90, RMSEA <0.08 and RMR <0.08 (37-39).

The adaptive values given in Table 2 show that the model fit is good. The good fit of the data for the model shows that the model has construct validity.

The results of confirmatory factor analysis (CFA) of the optimised measurement model are as shown in Table 3.

Regression values show the power of observed variables to predict latent variables, i.e. factor loadings. Since the "p" values for each binary relationship above are less than 0.001, the factor loadings are significant. The significant p values indicate that the items are loaded correctly on the factors. In addition, standardised regression coefficients of 0.452 and above indicate that the ability to predict latent variables, i.e. the factor loadings of each item are high.

Even if the AVE value is less than 0.50, the convergent validity is ensured when the CR is greater than 0.60 (40). Since the AVE values calculated in the table above are 0.52 and above and the CR value is 0.62 and above, the model provides convergence validity.

	Table 1. **Results of the explanatory factor analysis of the study**		
Factor	**Variables**	**Factor Loadings**	**Variance Explained**
Alternative Choice	I20: I prefer a cesarean section because I am very afraid of vaginal birth.	.468	29.761
	I21: If I had pelvic stenosis (narrowness of the birth canal) for birth, I would definitely prefer a cesarean delivery.	.669	
	I22: If I had a twin pregnancy, I would definitely prefer a cesarean delivery.	.784	
	I23: During my pregnancy, if the doctor told me that my baby was a big baby, I would definitely prefer a cesarean delivery.	.813	
	I24: If the process did not progress during birth, I would definitely prefer a cesarean section to avoid any trouble.	.769	
	I25: Since I don't think I will be able to push for a long time during birth, I definitely prefer a cesarean section.	.589	
	I26: Since I do not want to suffer pain for a long time during birth, I definitely prefer cesarean delivery.	.601	
Preference	I4: In any case, I would like to give birth by cesarean section.	.728	14.138
	I5: I would like to give birth by cesarean section, whether my doctor recommends it or not.	.853	
	I5: I would like to give birth by cesarean section, whether my wife and family want it or not.	.796	
Negative Impact	I10: Caesarean section negatively affects communication between mother and baby.	.770	9.292
	I11: Caesarean section negatively affects women's life for life.	,783	
	I12: Caesarean section negatively affects communication between spouses.	,821	
	I13: Caesarean section negatively affects the mother's breastfeeding.	.774	
Facilitating Attitude	I1: Cesarean section is usually easier than vaginal birth method.	.862	8.143
	I2: Cesarean section is generally easier than vaginal birth method.	.899	
	I3: Cesarean section is usually more comfortable than vaginal birth method.	.833	
Special Choice	I28: I would definitely prefer a cesarean section to give birth to my baby on a special date for me.	.828	6.018
	I29: I prefer cesarean section because I consider my body aesthetics after birth.	.861	
	I32: If my doctor recommended a cesarean birth, I would prefer a cesarean birth without hesitation.	.627	
Evaluation Criteria	Kaiser-Meyer-Olkin Measure of Sampling Adequacy: 0.844 Approx. Chi-Square: 4249.725 Barlett's Test of Sphericity: 0.000 Cronbach Alpha's: 0.820 Extraction Method: Principal Components Rotation Method: Varimax Total Variance Explained: 67.350		

Table 2. **Results of the model fit of the study**	
Acceptable Fit Indices	**Calculated Fit Indices**
CMIN/df (χ^2/sd)	3.451
GFI	0.876
IFI	0.906
CFI	0.905
RMSEA	0.077
SRMR	0.0612
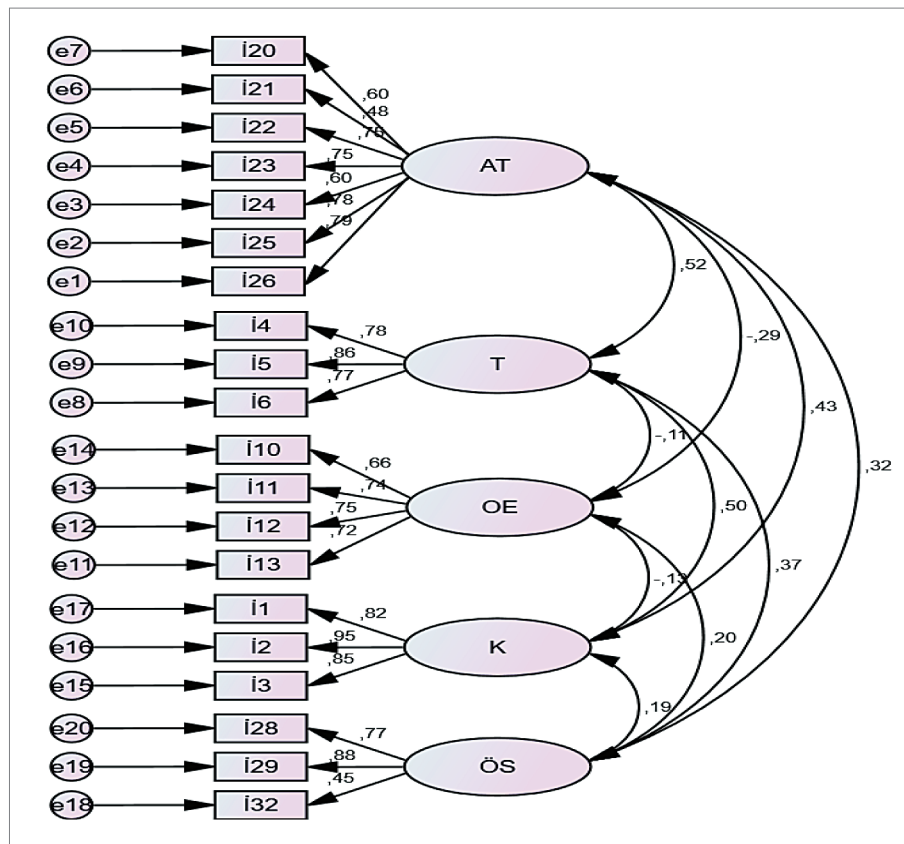
Figure 1. **Results of measurement model and goodness of fit**

Table 3. **The results of confirmatory factor analysis for the optimised measurement model**									
Factors	**Statement**	**Standardised Value**	**Estimate**	**Standard Value**	**T value**	**p**	**Cronbach's α**	**AVE**	**CR**
Alternative Choice	I20	.597	.777	.062	12.476	***	0.857	.50	.79
	I21	.477	.576	.059	9.743	***			
	I22	.749	.923	.057	16.231	***			
	I23	.749	.932	.057	16.219	***			
	I24	.595	.741	.060	12.437	***			
	I25	.778	.932	.055	16.967	***			
	I26	.794	1.000			***			
Preference	I4	.785	1.046	.065	16.091	***	0.841	.65	.76
	I5	.855	1.072	.063	17.050	***			
	I6	.774	1.000			***			
Negative Impact	I10	.663	.965	.080	12.043	***	0.810	.52	.73
	I11	.742	1.076	.082	13.189	***			
	I12	.749	1.040	.078	13267	***			
	I13	.723	1.000			***			
Facilitating Attitude	I1	.820	1.037	.049	21.032	***	0.900	.76	.83
	I2	.946	1.110	.045	24.584	***			
	I3	.846	1.000			***			
Special Choice	I28	.769	1.538	.177	8.706	***	0.714	0.52	.62
	I29	.875	1.714	.201	8.527	***			
	I32	.452	1.000			***			

Discussion

Although there is no study on the development of a direct psychometric measurement tool related to cesarean section in the Turkish sample, it is possible to say that there is literature on this field. Antoine and Young (2021), Opiyo (2022), Torloni et al. (2011) reported that cesarean section has a negative effect (19-21) on both mother and child health, which is like the "negative impact" sub-factor of the scale developed within the scope of this study. Liang et al. (30) when the findings of the study introduced to the field are examined, among the factors affecting the choice of cesarean section is the desire for the baby to be born on a special day for the family. This finding is similar to the "Special Choice" factor, which is one of the sub-dimensions of the scale developed within the scope of this study. When the literature is examined, there are findings that individuals are directed to cesarean section, especially by physicians, and their preference for cesarean section is due to fear of birth (2-5). These findings are like the preference factor of the measurement tool introduced to the field within the scope of this study. When the literature is examined, there are findings (6,9,31) that the individual must choose cesarean section as an alternative in cases where normal birth is not possible. These findings are like the alternative preference factor, which is one of the sub-dimensions of this study. Situations such as the individual's previous miscarriage or fear of childbirth are explained by the facilitating attitude factor, which is one of the sub-dimensions within the scope of this study. This factor is like studies in literature (1,28-29).

Conclusion

In this study, a valid and reliable measurement tool was developed that includes all stages of the scale development process (41-43) in the literature. The developed scale consists of 5 factors and 20 statements (alternative choice factor - 7 items, preference factor - 3 items, negative impact factor - 4 items, facilitating attitude factor - 3 items, special choice factor - 3 items). The developed measurement tool can be used to determine the attitudes of women of childbearing age and adulthood towards cesarean section in the Turkish sample. It is anticipated that this study will guide future studies.

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RAZVOJ SKALE STAVOVA PREMA CARSKOM REZU: ISTRAŽIVANJE PROVEDENO NA TURSKOM UZORKU

Sažetak

Uvod. Carski rez alternativa je normalnom porodu i izvodi se kroz rez. Carski rez može biti metoda koja se primjenjuje u slučajevima nužde, ali se može primijeniti i u slučajevima kada nije obvezan.

Cilj. Cilj je ovog istraživanja utvrditi stavove žena prema carskom rezu.

Metode. U istraživanje je bilo uključeno 437 žena reproduktivne dobi, u dobi od 18 do 49 godina koje žive u okrugu Esenyurt u pokrajini Istanbul. Prvo je sastavljena anketa od 42 pitanja. Nakon dobivenoga stručnog mišljenja i provođenja pilot-studije, nacrt ankete koji se sastojao od 32 pitanja primijenjen je u istraživanju. Prvi korak u analizi podataka bila je eksploratorna faktorska analiza. Nakon analize, iz skale je uklonjeno 12 pitanja koja se nisu svrstala ni u jedan faktor, a utvrđena je struktura od pet faktora koja sadržava 20 pitanja. Potom je provedena konfirmatorna faktorska analiza.

Rezultati. Utvrđeno je da dobiveni model savršeno odgovara podacima. Stoga je skala razvijena eksplorativnom faktorskom analizom potvrđena konfirmatornom faktorskom analizom. Cronbachov koeficijent razvijene skale iznosi 0,820 te je zaključeno da je skala vrlo pouzdana.

Zaključak. Zaključeno je da se razvijena skala može upotrebljavati za mjerenje stavova žena prema carskom rezu.

Association Between Fecal GIP Concentrations and Tissue Transglutaminase in Celiac Disease Patients

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Abstract

Introduction. Celiac disease (CD) is an autoimmune disorder triggered by gluten ingestion in genetically predisposed individuals. Gluten immunogenic peptides (GIP) in feces and tissue transglutaminase (tTG) are key biomarkers for monitoring gluten intake and immune response, respectively. Despite the increasing use of GIP for assessing gluten-free diet (GFD) adherence, its correlation with tTG remains unclear. Understanding their relationship could enhance CD monitoring.

Aim. To evaluate fecal GIP concentrations in CD patients, examine their correlation with tTG levels, and assess the utility of combining these biomarkers for CD management.

Methods. This cross-sectional study included 60 CD patients adhering to a GFD and 10 healthy controls. Fecal and serum GIP levels were quantified using ELISA tests, and tTG concentrations were measured. Statistical analyses included Mann-Whitney U tests for group comparisons and Spearman's rank correlation for assessing relationships between biomarkers.

Results. Median fecal GIP concentration in CD patients was significantly lower (39.0 ng/g) compared to controls (474.2 ng/g; $p<0.001$), confirming GFD adherence. Similarly, serum GIP was lower in the CD group ($p<0.001$). No significant correlation was found between GIP and tTG levels (Rho=0.114, $p=0.387$), indicating they measure distinct aspects of CD activity.

Conclusion. This study specifically evaluated fecal GIP concentrations in patients with celiac disease and their correlation with tTG levels. Our findings indicate no significant correlation, demonstrating that these biomarkers assess different aspects of disease activity. This study confirms the sensitive nature of GIP for detecting gluten intake and tTG's role in reflecting immune response and mucosal damage. Hence, the integrated use of these biomarkers, as suggested by our results, can improve the management and monitoring of celiac disease, providing a more precise assessment of dietary adherence and immune activity.

Introduction

Celiac disease (CD) is a chronic autoimmune disorder triggered by the ingestion of gluten - a protein found in wheat, rye, and barley. The disease occurs in genetically predisposed individuals and is mediated by tissue transglutaminase (tTG), a ubiquitous enzyme that serves as the primary autoantigen in CD. The resulting immune response leads to structural damage in the small intestine, characterized by villous atrophy, crypt hyperplasia, and infiltration of intraepithelial lymphocytes, disrupting nutrient absorption and contributing to a range of gastrointestinal and systemic symptoms (1,2).

The prevalence of CD has increased significantly over recent decades and is now estimated at 1–2% globally (3). This rise is largely attributed to enhanced diagnostic capabilities, including the availability of highly sensitive and specific serological tests such as those detecting tTG antibodies. Improved screening has also facilitated the identification of subclinical cases, even among elderly populations (4). Environmental and dietary factors, including increased gluten consumption (up to 20 g/day in certain populations) and changes in gluten quality due to agricultural innovations, are thought to contribute to this trend (5). Moreover, the "hygiene hypothesis" suggests that reduced exposure to pathogens in industrialized societies has led to a dysregulated immune response, further increasing the prevalence of autoimmune conditions like CD (6).

The mainstay of CD management is strict, lifelong adherence to a gluten-free diet (GFD), which alleviates symptoms, promotes intestinal healing, and reduces the risk of complications such as refractory CD and small intestinal lymphoma (7). However, maintaining adherence remains challenging due to the ubiquitous presence of gluten in processed foods and the social and economic burdens associated with dietary restrictions. The availability of gluten-free products has increased dramatically over the past five years, with such products now widely accessible in major supermarkets, health food stores, and online retailers (8). Nonetheless, these products remain significantly more expensive than their gluten-containing counterparts (9,10).

The assessment of GFD compliance traditionally relies on self-reports, dietary interviews, serological tests (e.g., anti-tTG antibodies), or small bowel biopsies. However, these methods have significant limitations. Self-reports are often unreliable due to intentional or unintentional inaccuracies, while serological markers correlate poorly with mucosal healing (10). Small bowel biopsies, although the gold standard for assessing mucosal recovery, are invasive and not routinely performed, particularly in asymptomatic patients who show clinical improvement (11,12).

Gluten immunogenic peptides (GIP) are a promising new biomarker for monitoring dietary adherence. These peptides, derived from immunotoxic fragments of gluten such as the -gliadin-33-mer, are resistant to enzymatic digestion and are excreted intact in stool or urine. Their detection directly reflects gluten ingestion, providing an objective measure of dietary transgressions (13,14).

Research has shown that fecal GIP concentrations can remain detectable for up to four days after gluten ingestion, making them a highly sensitive indicator of recent dietary lapses (13). For example, one study demonstrated that 30% of CD patients on a GFD for at least one year had detectable fecal GIP, indicating dietary noncompliance. In comparison, serological tests identified dietary infractions in only 18% of patients, underscoring the superior sensitivity of GIP detection (14).

Despite these advances, the relationship between fecal GIP concentrations and traditional markers of CD activity, such as tTG, remains unclear. Investigating this correlation is critical to understanding how GIP testing can complement existing diagnostic tools in CD management.

Aim

This study aims to:

- Assess fecal GIP concentrations in CD patients.
- Analyze the relationship between fecal GIP levels and tTG concentrations.

Methods

Study Design

This observational, cross-sectional study was conducted at the Clinical Nutrition Outpatient Department of the Clinical Hospital Center Zagreb over a 12-month period. The study involved a total of 70 participants, including 60 adult patients diagnosed with celiac disease and a control group of 10 healthy volunteers who eat food containing gluten.

Participants

The inclusion criteria required participants to be over 18 years of age, have a confirmed diagnosis of celiac disease, and provide written informed consent. Exclusion criteria encompassed individuals under 18 years of age, as well as those diagnosed with gastrointestinal diseases such as diverticulitis, enterocolitis, or ischemic colitis. Additionally, patients with liver dysfunction (e.g., cirrhosis or active hepatitis), chronic kidney disease, severe hypertension, coronary artery disease, or peripheral arterial disease were excluded. Other exclusion criteria included hematological, malignant, or autoimmune disorders, as well as pregnancy.

Procedure and Instruments

Demographic and anthropometric data were gathered through a structured questionnaire, medical records, and direct measurements. Blood samples were analyzed for complete blood count and routine biochemical parameters. Fecal and urinary gluten immunogenic peptides were detected using the iVYLISA GIP ELISA test (Biomedal SL).

Ethics

The study protocol was approved by the Ethics Committee of the Clinical Hospital Center Zagreb (Approval No. 02/21 AG, Class: 8.1-19/153-2). All participants provided written informed consent prior to enrolment, and the study was conducted in accordance with the principles of the Declaration of Helsinki.

Statistics

Data were presented in tables and figures. The normality of data distribution was evaluated using the Kolmogorov-Smirnov test, which revealed that most continuous variables did not follow a normal distribution. As a result, nonparametric tests were used in further analyses. Differences between continuous variables in independent groups were analyzed using the Mann-Whitney U test, and significant results were displayed with Box-and-Whisker plots. Fisher's exact test was employed for categorical data. Spearman's rank correlation coefficient (Rho) was used for correlational analyses.

A significance level of $p < 0.05$ was used for all analyses. Statistical analyses were performed using MedCalc® Statistical Software version 20.022 (MedCalc Software Ltd, Ostend, Belgium; https://www.medcalc.org; 2021).

Power analysis for Fisher's exact test was based on pilot study results, estimating a 100% positive GIP biomarker detection rate among non-compliant participants and a 30% detection rate among compliant participants. For a power of 90% and a significance level (α) of 0.05, with a case-to-control ratio of 6:1, a minimum of 35 participants was required (30 in the study group and 5 in the control group). Power analysis was performed using MedCalc® Statistical Software version 20.022.

Results

Descriptive statistics of anthropometric indicators for the included celiac disease patients (N=60) are presented in Table 1.

Table 1. **Descriptive statistics of anthropometric indicators for the included celiac disease patients (N=60)**							
	Arithmetic Mean	**Standard Deviation**	**Min**	**Max**	**Centile**		
					25.	**Median**	**75.**
Age	45.52	12.91	19.00	77.00	3725	44.00	55.00
Body Mass (kg)	67.68	15.34	45.60	128.50	57.55	62.70	75.80
Height (cm)	168.56	8.93	143.00	188.00	163.00	169.00	174.00
Body Mass Index (BMI) (kg/m²)	23.73	4.40	18.10	37.80	20.80	22.60	25.75
Lean Mass (kg)	47.74	9.86	37.30	82.90	41.85	44.50	49.50
Muscle Mass (kg)	45.32	9.39	35.40	78.80	39.75	42.20	47.00
Bone Mass (kg)	2.42	0.47	1.90	4.10	2.10	2.30	2.50
Basal Metabolic Rate (BMR) (kcal)	1429.37	295.14	1111.00	2556.00	1260.00	1367.00	1458.00
Visceral Fat Index	5.54	3.70	1.00	18.00	3.00	5.00	7.00

The median Body Mass Index (BMI) of our study participants, which was recorded at 22.6 kg/m² with an interquartile range of 20.8 to 25.8, classifies them within the "Normal Weight" category according to the World Health Organization standards. This categorization is defined for BMIs ranging from 18.5 to 24.9 kg/m² (15). The median muscle mass of the participants was 42.2 kg (39.8–47.0), which is within the range for healthy adults, considering variations due to age, gender, and body size. Similarly, the median basal metabolic rate (BMR) of 1367.0 kcal (1260.0–1458.0) is in line with expected values for a population of similar demographic characteristics, factoring in the influences of age, sex, and muscle mass. Both measurements indicate a healthy physiological status among the participants, similar to the median visceral fat index value, which was within the acceptable range (<13) and amounted to 5.0 (3.0–7.0). These results shows that physical condition of the participants does not exhibit deviations that would likely impact the study's outcomes related to celiac disease biomarkers.

Descriptive statistics of biomarkers in celiac disease patients (N=60) are presented in Table 2 and Figures 1 - 3. The median serum GIP concentration was 0.78 (0.78–0.78) /mL, while the median fecal GIP concentration was 39.0 (39.0–39.0) /g. The median tissue transglutaminase (tTg) concentration was 5.20 (0.85–14.70). Serum GIP values showed a perfect correlation with fecal GIP values (Rho=1.000, $p<0.001$), allowing these biomarker concentrations to be treated as a single variable.

Table 3 presents an analysis of differences in the distribution of GIP biomarker results between the study and control groups, treated as categorical variables (positive vs. negative findings). Positive results were defined as any detectable GIP concentrations using the applied analytical method. The control group, consisting of participants not adhering to a gluten-free diet, exhibited a significantly higher frequency of positive results.

These analyses reveal significantly higher GIP biomarker concentrations in participants from the control group, who were not on a gluten-free diet ($p<0.001$). This finding supports the conclusion that the study group, comprising celiac disease patients, adhered to a gluten-free dietary regimen, unlike the control group (Table 4).

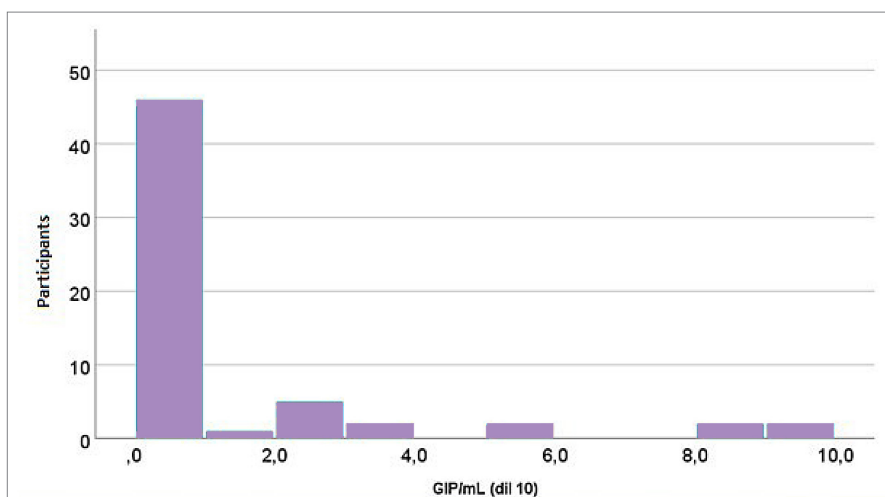| Table 2. **Descriptive statistics of biomarkers in celiac disease patients (N=60)**							
	Arithmetic Mean	**Standard Deviation**	**Min**	**Max**	**Centile**		
					25.	**Median**	**75.**
GIP/mL (dil 10)	1.74	2.27	0.78	9.95	0.78	0.78	0.78
GIP/g in stool	86.96	113.43	39.00	497.70	39.00	39.00	39.00
tTg (IgA)	111.12	634.52	0.85	4861.10	0.85	5.20	14.70

Figure 1. **Distribution of measured GIP concentrations (GIP/mL, dilution 10) in the study group (celiac disease patients)**
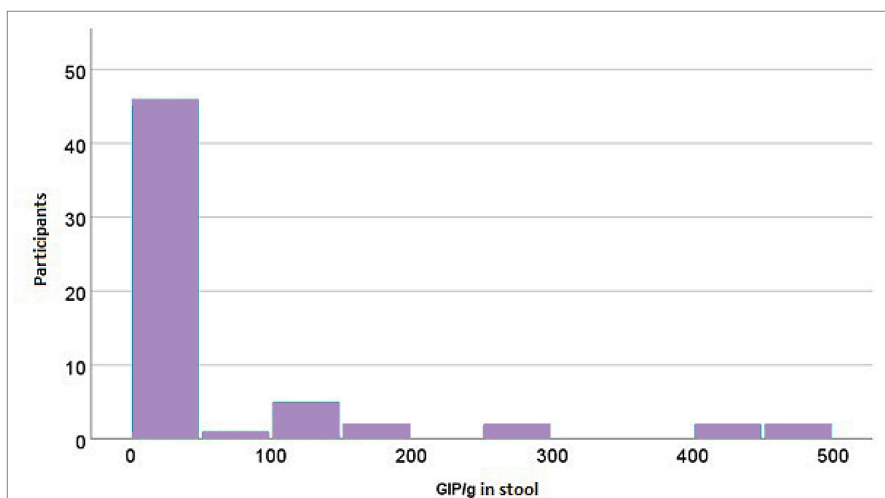

Figure 2. **Distribution of measured GIP concentrations (GIP/g) in fecal samples from the study group (celiac disease patients)**
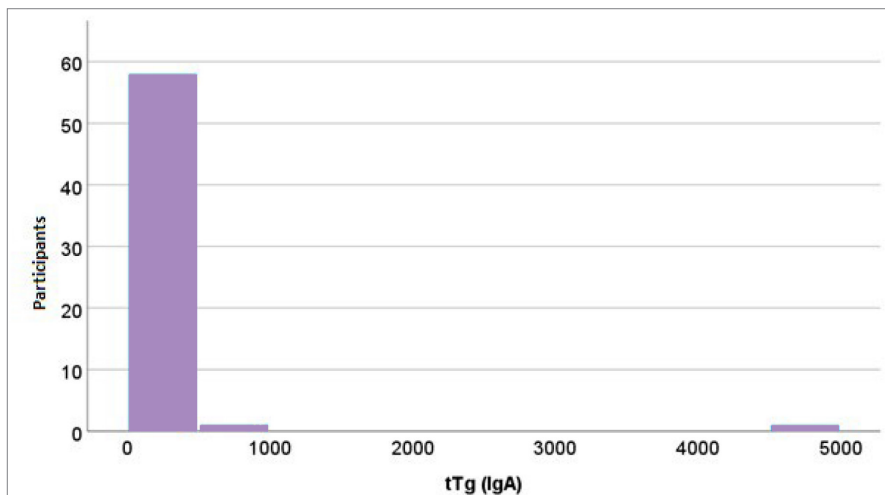

Figure 3. **Distribution of measured tissue transglutaminase concentrations in the study group (celiac disease patients)**

Table 3. Analysis of differences in GIP biomarker distribution between the study and control groups: Fisher's exact test

		Groups				p
		Study group		Control		
		N	%	N	%	
GIP / mL (dil 10) categories	Normal Level	47	78.3	0	0	<0.001
	Elevated	13	21.7	10	100	
GIP / g in stool categories	Normal Level	47	78.3	0	0	<0.001
	Elevated	13	21.7	10	100	

Table 4. Analysis of differences in GIP serum and GIP fecal concentrations between the study and control groups

	Groups	Min	Max	Centile			Mann-Whitney U	Z	p
				25.	Median	75.			
GIP / mL (dil 10)	Study group	0.78	9.95	0.78	0.78	0.78			
	Control	4.39	14.22	7.80	9.49	13.16	21.000	-5.533	<0.001
GIP / g in stool	Study group	39.00	497.70	39.00	39.00	39.00			
	Control	219.43	711.23	390.38	474.20	658.32			

The correlation between GIP biomarker concentrations and tissue transglutaminase levels using Spearman's rank correlation coefficient (Rho) indicate no significant correlation between GIP concentrations and tissue transglutaminase (Rho=0.114, p=0.387).

Discussion

The results of this study demonstrate that the median fecal concentrations of gluten immunogenic peptides in celiac disease patients were significantly lower compared to the control group not adhering to a gluten-free diet (Table 5). Similarly, serum GIP concentrations were also significantly lower in the study group (Table 4), confirming the adherence of the study group to the gluten-free diet. These findings underscore the high sensitivity of GIP as a biomarker for detecting gluten intake in individuals with CD. Previous studies have confirmed that GIP is a reliable tool for quantitative monitoring of dietary infractions, even with occasional gluten exposure, surpassing traditional monitoring methods such as serological tests (14-17).

The association between fecal GIP concentrations and tissue transglutaminase was examined using Spearman's rank correlation coefficient (Table 6). The results indicated no significant correlation between these two biomarkers, suggesting that GIP and tTG measure different aspects of disease activity. GIP directly reflects gluten intake, while tTG represents the immune response and potential mucosal damage. These findings are in line with prior studies showing that tTG does not reflect occasional dietary infractions, whereas GIP enables precise detection of actual gluten ingestion, including its effects on intestinal mucosa (13,18,19). Furthermore, studies have confirmed a significant association between fecal GIP detection and future histological changes, highlighting GIP as an extremely valuable biomarker in clinical practice (14,17).

The graphical representation of GIP concentration distributions in serum and stool (Figures 1 and 2) further supports these findings, showing highly uniform values in patients adhering to the GFD and wide variability in the control group. This uniformity among adherent patients corroborates findings demonstrating the high specificity of GIP in detecting gluten in-

take, as consistently observed in studies across various age groups (14,17). For example, research has shown that younger children (<3 years old), under strict parental dietary supervision, exhibit lower GIP levels compared to adolescents, where dietary non-adherence is more common. Conversely, the distribution of tTG (Figure 3) reveals significant variability in this marker among patients but no clear association with GIP concentrations. This confirms that tTG better reflects long-term immune activation, while GIP accurately measures recent gluten exposure (16).

These results highlight the potential complementarity of GIP and tTG in CD monitoring. GIP offers an immediate assessment of gluten intake, while tTG, particularly when combined with other indicators, aids in evaluating immune responses and chronic disease activity. The combination of these two biomarkers could enable more accurate and comprehensive monitoring of CD patients, as supported by studies emphasizing the benefits of integrating both methods into clinical practice (17,19).

Further studies with larger and more diverse cohorts are needed to validate these findings and establish standardized thresholds for GIP and tTG concentrations in clinical settings. Longitudinal research should also explore the relationship between GIP levels, tTG concentrations, and clinical outcomes, such as symptom severity and mucosal healing, to refine their combined use in CD monitoring.

Limitations

This study has several limitations. The sample size may restrict the generalizability of the findings, particularly when evaluating the variability of GIP and tTG biomarkers across different subgroups. Additionally, while GIP is highly sensitive to recent gluten intake, its short detection window may not capture long-term dietary adherence, unlike tTG, which reflects cumulative immune response. This temporal difference may explain the lack of significant correlation between the two biomarkers. Variability in dietary habits, including inadvertent gluten consumption, could have influenced GIP levels and affected the interpretation of results.

Conclusion

This study rigorously evaluated fecal GIP concentrations in celiac disease patients and examined their correlation with serum tTG levels. Our findings reveal no significant correlation between these biomarkers, indicating they assess different dimensions of celiac disease pathology. This study confirms GIP's efficacy in detecting gluten intake and tTG's capacity to reflect immune response and mucosal damage. Integrating these biomarkers can thus enhance the accuracy of dietary compliance assessments and improve the monitoring of immune activity in the management of celiac disease. These findings suggest the potential for developing more nuanced strategies that utilize both biomarkers to tailor patient management more effectively.

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POVEZANOST KONCENTRACIJE FEKALNOG GIP-A S TKIVNOM TRANSGLUTAMINAZOM KOD BOLESNIKA S CELIJAKIJOM

Sažetak

Uvod. Celijakija je autoimuni poremećaj uzrokovan unosom glutena kod genski predisponiranih osoba. Glutenski imunogeni peptidi (GIP) u stolici i tkivna transglutaminaza (tTG) ključni su biomarkeri za praćenje unosa glutena i imunosnog odgovora. Unatoč sve češćoj primjeni GIP-a za procjenu pridržavanja bezglutenske prehrane (GFD), njihova povezanost s tTG-om nije u potpunosti razjašnjena. Bolje razumijevanje ovog odnosa moglo bi unaprijediti praćenje bolesnika s celijakijom.

Cilj. Procijeniti koncentracije fekalnog GIP-a kod bolesnika s celijakijom, ispitati njihovu povezanost s razinama tTG-a te procijeniti korisnost kombiniranja ovih biomarkera za upravljanje celijakijom.

Metode. Ovo presječno istraživanje uključilo je 60 bolesnika s celijakijom na GFD-u i 10 zdravih kontrola. Koncentracije fekalnih i serumskih GIP-a kvantificirane su testom ELISA, dok su razine tTG-a mjerene serološki. Za statističke analize primijenjeni su Mann-Whitneyjev U-test za usporedbu skupina te Spearmanov koeficijent korelacije za procjenu odnosa između biomarkera.

Rezultati. Medijan koncentracije fekalnog GIP-a kod bolesnika s celijakijom bio je značajno niži (39,0 ng/g) u usporedbi s kontrolnom skupinom (474,2 ng/g; $p<0,001$), što potvrđuje pridržavanje BGP-a. Slično tome, serumski GIP bio je niži kod bolesnika s celijakijom ($p<0,001$). Nije utvrđena značajna povezanost između razina GIP-a i tTG-a ($\rho=0,114$, $p=0,387$), što ukazuje na to da mjere različite aspekte aktivnosti bolesti.

Zaključak. Ova studija posebno je procjenjivala koncentracije fekalnog GIP-a u bolesnika s celijakijom i njihovu korelaciju s razinama tTG-a. Naši rezultati ne pokazuju značajnu korelaciju, što ukazuje na to da ovi biomarkeri procjenjuju različite aspekte aktivnosti bolesti. Studija potvrđuje osjetljivu prirodu GIP-a za detekciju unosa glutena i ulogu tTG-a u reflektiranju imunosnog odgovora i oštećenja sluznice. Integrirana upotreba ovih biomarkera može poboljšati upravljanje i praćenje celijakije, omogućujući precizniju procjenu pridržavanja prehrane i imunosne aktivnosti.

Ključne riječi: celijakija, bezglutenska prehrana, transglutaminaze

Perception of the Influence of Lymphedema on the Everyday Activities and Mental Health of Women with Breast Cancer

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Abstract

Introduction. Breast cancer is still the most common malignant disease in women, although its mortality is lower thanks to aggressive treatment and prevention. Secondary lymphedema of the upper limbs is the most common consequence of breast cancer treatment, but due to external factors, it can also occur years later. Lymphedema is a chronic, inflammatory, lymphostatic disease that, along with pain and discomfort, leads to limitation of arm mobility. Considering that the lymphedema of the arm is visible, and still cannot be corrected aesthetically in Croatia, women have difficulties in finding adequate clothes, and it also affects their everyday activities.

Aim. To examine the perception of the impact of arm lymphedema caused by breast cancer therapy on everyday activities, and mental health of women.

Methods. We used the LYMQOL questionnaire to assess the quality of life of women with upper limb lymphedema and the DASS-21 questionnaire to assess their mental health. A total of 100 women with lymphedema with an average age of 52.3 participated in the research, all members of breast cancer associations.

Results. Results on all subscales of the DASS-21 questionnaire are increased. A large percentage of respondents have severe symptoms of anxiety and depression, which should not be ignored.

Conclusion. Women estimate that lymphedema affects their everyday and leisure activities, whereby they most often mention sports, cycling, driving, hiking, being out in the sun, socializing, but they also indicate the very unpredictability of how the arm will react in certain conditions.

Introduction

Breast cancer remains the most common malignant disease among women, accounting for 24% of all malignant diseases (1-3). In the Republic of Croatia, 2,500 women are diagnosed with breast cancer annually (4). The mortality rate is declining due to prevention, which raises awareness among women about self-examinations and regular check-ups, as well as aggressive and radical breast cancer treatments that often lead to arm lymphedema. In Western Europe, lymphedema primarily occurs because of breast cancer treatment. The first treatment choice for cancer is surgery, which largely depends on the size of the tumour and the breast itself. The most radical form of surgery is a mastectomy, where the breast and nipple are removed, although reconstruction can be performed during the first operation or later. Segmentectomy or quadrantectomy is a breast-conserving surgery where only the tumour area is removed (5). However, since the breasts are rich in lymphatic vessels that extend to the axillary lymph nodes, cancerous cells may spread to that region. Therefore, axillary lymph node dissection is often performed, which can lead to arm lymphedema (4,6).

Lymph nodes play a crucial role in the biological filtration of the body, destroying harmful substances, regulating proteins in the lymph, and depositing harmful substances that cannot be eliminated (7). The lymphatic system also collects cerebrospinal fluid and has an immune function by destroying harmful substances through phagocytosis. Thus, the removal of lymph nodes from the axillary region can result in complications such as loss of sensation in the operated area, discomfort in the back of the arm, swelling in the axillary region immediately after surgery, and lymphedema. Lymphedema is defined as a chronic inflammatory lymphostatic disease caused by mechanical insufficiency. The increasing volume of lymph accumulating in the tissue, which the lymphatic system cannot remove, creates a burden that results in edema. Damage to lymphatic vessels disrupts antigen transport, which can lead to infection.

The incidence of upper limb lymphedema is 17% and increases in the two years following the breast cancer diagnosis or surgery. However, it is highly variable, and the timing of lymphedema onset is un-predictable. Lymphedema may develop immediately, a few days, months, or even years after surgery as a result of an external factor. Swelling in the axillary region may subside within days after surgery or become permanent (8). The incidence is four times higher in patients who had axillary lymph node dissection compared to those who had sentinel lymph node biopsy (9-11). In addition to surgery, which is the most common cause of lymphedema, radiation therapy can damage part of the lymph nodes in the affected region, as can individual factors such as excessive activity, inactivity, infection, injury, or weight gain (1).

The onset of lymphedema is characterized by a tight wristwatch or tight sleeve. Patients may complain of a feeling of heaviness and fullness in the affected region, stiffness in the upper limbs, and mild swelling that subsides. Dry skin can also be a significant issue, as it may lead to infections, requiring proper skin care. Patients also complain of pain and difficulty performing everyday activities, as well as challenges in finding appropriate clothing. Lymphedema also visually deviates from the standard concept of beauty, which can negatively affect the psychological state of a person and may influence their social life (10).

Lymphedema can have various stages, ranging from the initial latent phase, where edema is not yet visible, to the final stage, where atrophic changes to the skin occur, and the edema becomes irreversible (12).

Physical illnesses are often accompanied by unpleasant emotional states such as stress, anxiety, and depression, particularly when dealing with life-threatening diseases. Besides the threat to life, breast cancer treatment can provoke intense negative emotions in women, especially when it involves partial or complete removal of the breast, as breasts are associated with motherhood and feminine beauty. If treatment includes chemotherapy, hair loss (alopecia) can occur, which many women also find difficult to cope with, in addition to the possible onset of lymphedema. Therefore, the diagnosis and treatment process bring a multitude of negative emotions that women must confront. The occurrence of lymphedema has a detrimental effect on performing everyday activities, which can further negatively impact both physical and mental health, leading to stress, anxiety, and even depression. Daily activities are crucial for every individual's mental well-being. Patients who have undergone breast cancer surgery and have had axillary lymph node dissection are forced to adjust their daily

activities, and in some cases, avoid certain activities to prevent worsening of their arm condition. It is important to educate patients to detect lymphedema as early as possible and to start rehabilitation to prevent lymphedema escalation (1), as well as to teach them how to live with lymphedema and adapt their everyday activities to this condition.

Avoiding injury in the lymphedema-affected area includes avoiding injections, depilation, and any activities that might worsen the condition. Heat, not only during the summer months, as well as steam from cooking and baking, can be harmful. For example, ironing can be risky due to the potential burns and strains on the arm. Patients with lymphedema should avoid wearing tight clothing and anything that might cut into the skin, as this restricts lymph flow. Patients should be informed about precautionary measures, including avoiding blood pressure measurement on the arm with lymphedema. Overexertion, such as household chores like window washing or gardening, should also be avoided. Patients need to be made aware of the benefits of regular exercise, maintaining a healthy body weight, and proper skin care (12). Shaving and depilation can damage the skin, so the use of depilatory creams is recommended. During cooking or baking, it is advisable to place a wet cloth on the arm, and if tingling occurs during activities, rest is required. Additionally, patients should be educated about self-bandaging, which significantly eases the performance of daily activities (12).

Aim

To determine the perception of the impact of arm lymphedema on the performance of everyday activities and the mental health of women who developed lymphedema due to breast cancer treatment. Additionally, the aim is to examine the correlation between these variables and different sociodemographic characteristics, as well as certain aspects of the disease.

Methods

Participants

The sample in this research includes 100 participants who, after breast cancer treatment, were diagnosed with arm lymphedema. The average age of the participants is 52.3 years (SD=9.69), with the youngest participant being 31 years old and the oldest 74 years old. The sample consists of members of associations that gather women diagnosed with breast cancer which include: "Sve za nju" and "Nismo same" from Zagreb, "Caspera" from Split, and the "Nada" association from Rijeka. Table 1 shows the sociodemographic data of the participants. The mentioned frequencies also represent percentages.

Table 1. **Sociodemographic data of participants with arm lymphoedema (N=100)**		
		Frequency
Marital status	single	6
	in a relationship	5
	married	69
	divorced	15
	widowed	5
Education	primary education education	2
	secondary education	51
	higher education	21
	high education	26
Place of living	village	18
	small town	144
	town	68
Income	below average	17
	average	72
	above average	11

Instruments

Two validated measuring instruments were used in this study: the Lymphedema Quality of Life Questionnaire (LQOLQ) for the Upper Limb and the Depression, Anxiety, and Stress Scale (DASS-21), along with additional questions about sociodemographic data and some aspects of the disease and the onset of lymphedema.

The Lymphoedema Quality of Life Questionnaire for the Upper Limb by Keeley et al., from 2010, was translated by the authors for the purposes of this study. The questionnaire contains 21 statements grouped into 4 domains: questions 1 (a-h), 2, and 3 relate to function (e.g., "How much does your swelling arm affect your daily activities such as work, housework, or leisure and social activities?"), questions 4-8 pertain to appearance (e.g., "How much do you feel the swelling affects your appearance?"), questions 9-14 describe symptoms (e.g., "Have you had trouble sleeping?"), and questions 15-20 describe mood (e.g., "Have you felt worried?"). The overall quality of life is assessed by question 21. Participants rate on a 4-point scale how much lymphedema affects a particular daily activity, where 1 means *"not at all"* and 4 means *"a lot"* (13). The total result is expressed as the average value of all statements within each subscale, with a higher score indicating a worse condition. For overall quality of life, a lower score indicates lower quality, and it is rated on a scale from 0 (poor) to 10 (excellent).

The validation of this questionnaire was conducted by Wedina et al. (2019) on a Swedish sample. The research showed that the questionnaire is simple, clear, and not too long for use with patients with arm lymphedema, making it a useful tool in clinical practice. The validity of the questionnaire was found to be high, and the perceived lymphedema was significant in the domains of function and appearance. The reliability of the questionnaire ranged from 0.53 to 0.87 (14). Pas et al. (2015) demonstrated good internal consistency and reliability for the second part of this questionnaire, focused on the lower extremities, and a good correlation with the physical component of the SF-36 short form, indicating good validity (15). Borman et al. (2018) also found high reliability of the questionnaire on a Turkish population (16). This study also showed high reliability for all subscales: function (0.91), appearance (0.92), mood (0.91), symptoms (0.92).

The Depression, Anxiety, and Stress Scale (DASS-21), by Lovibond and Lovibond (1995), with a Croatian adaptation by Jokić-Begić, Jakšić, Ivezić, and Suranyi (2012), was used to measure mental health. The DASS-21 assesses the frequency and intensity of negative emotions over the past week and contains 21 statements, with 7 statements in each of the three subscales (stress, anxiety, and depression). Each subscale is rated on a 4-point scale, where 0 means "does not apply to me at all," and 3 means "applies to me very much or most of the time" (17-19). The maximum score on each subscale is 42, and the scales are divided into categories: normal, mild, moderate, severe, and extremely severe. Each subscale has its critical value; for depression, a score above 9 is critical, for anxiety above 7, and for stress above 14. Scores below the critical value are considered normal. According to Cronbach's alpha, the reliability for depression is 0.90, for anxiety 0.89, and for stress 0.91, with the overall scale reliability being 0.96 (20-21).

Procedure

The survey was conducted online from March to June 2023. The representatives of the associations forwarded the questionnaire to their members, who, after breast cancer treatment, were diagnosed with arm lymphedema, along with a request to participate in the research. All participants voluntarily took part in the study. The survey was conducted anonymously, and filling out the questionnaire took 10 to 15 minutes. Approval was obtained from the Ethics Committee of the University of Applied Health Sciences Zagreb, as well as consent from all associations whose members participated in the research.

Statistics

Descriptive and inferential statistical measures were used in data processing. The normality of distribution for nine quantitative variables (age and total scores on the subscales) was tested using the Kolmogorov-Smirnov test, which showed that the distributions of seven variables significantly deviated from normal. However, additional checks of skewness and kurtosis showed that skewness did not exceed recommended values (22), as the highest skewness score was -0.65, and the highest kurtosis was -1.361. Therefore, given the relatively large sample size, we decided to apply parametric statistical procedures.

Results

The average time elapsed since the diagnosis of a breast cancer was 5.77 years, while the median was 4 years. The range of results was from 4 months to 25 years. Information related to arm lymphedema is shown in table 2. Frequencies also represent a percentage since the number of participants is 100.

Lymphedema occurs on both left and right arm, and 9% of women have lymphedema on both arms. Most of the participants are involved in some form of therapeutic treatment for lymphedema. Relapse is not very frequent; it occurs in only 6% of the participants. The following is a presentation of the average results of the quality of life subscales obtained by the LYMQOL questionnaire, as well as of mental health obtained by the DASS-21 questionnaire.

From Table 3, we can conclude that the women's function or daily life activities, appearance and mood are impaired to a lesser extent, while the symptoms are somewhat more present in the majority of the sample. The overall assessment of the quality of life is slightly above the theoretical average, which indicates moderate satisfaction (M=5.49; SD=2.12).

Arithmetic values for all three subscales of the DASS-21 questionnaire are higher than their critical values. In order to check what proportion of female respondents achieves high results on that questionnaire, Table 4 shows the distribution by categories from normal to very serious for all subscales (in percentages).

Table 2. **Information on arm lymphedema**		
		frequency
Dominant hand	right	95
	left	5
Arm with lymphedema	right	46
	left	45
	both	9
Therapy for lymphedema	yes	72
	no	28
Relapse	yes	6
	no	94

Table 3. **Average scores of subscales of the quality of life questionnaire (LYMQOL) and mental health (DASS-21) of women with arm lymphedema (N=100)**					
Questionnaire	Subscale	Mean	SD	Minimum	Maximum
LYMQOL	Function	2.01	0.607	1	3.7
	Appearance	2.21	0.808	1	4
	Mood	2.39	0.704	1	4
	Symptoms	2.62	0.775	1	4
	Quality of life	5.49	2.12	0	10
DASS-21	Stress	22.56	10.847	0	42
	Depression	16.92	12.386	0	42
	Anxiety	16.52	11.373	0	42
	Total	56.00	32.345	0	122

Table 4. Proportion of respondents by subscale categories of the DASS-21 questionnaire

	Stress	Anxiety	Depression
normal	23	23	40
mild	4	12	5
moderate	20	9	10
severe	42	11	11
extremely severe	11	45	34

Almost half of the respondents have a severe to extremely severe state of depression (45%), while in terms of stress, the proportion of women in these categories is 53%, and in terms of anxiety, even 56%. In order to check the relationship of certain sociodemographic variables with aspects of quality of life and mental health, additional analyses were conducted. We used the analysis of variance to check whether there are statistically significant differences regarding to women's financial situation. There were 72 respondents in the group with below average incomes, 11 female respondents with average, while the group with above average incomes included 17 women.

Significant differences were obtained for all three subscales of the DASS-21, and for the quality of life of the LYMQOL. Post hoc Scheffe test showed that for anxiety, depression, stress, and quality of life there is a difference between women with below-average and above-average incomes; significances are 0.017 for stress, 0.025 for anxiety, 0.037 for depression and 0.043 for quality of life. Respondents with below-average incomes have a lower stress, anxiety, and depression, with stress also showing a difference compared to women with average incomes. It is interesting that they are more satisfied with the quality of life than respondents with above-average incomes. Arithmetic means are shown in the Table 5. It should be kept in mind that these categories are not based on objective criteria given the fact that the participants assessed which category they belong to. Also, there is a considerable disproportion in the size of the comparison groups, so these findings should be taken with some caution. For place of living and marital status, no statistically significant differences were obtained in relation to the observed variables. Regarding the level of education, two low-educated participants were excluded from the comparison, and a significant difference was found only for the overall quality of life (F=4.093; p=0.009): women with a higher education (M=6.23) are significantly more satisfied with the overall quality of life compared to those with secondary education (M=4.82).

The subscale *mood* is significantly related to age (r=-0.329; p=0.001): older respondents rate their mood as better than younger respondents. Age is also statistically significantly related to depression (r=-0.220; p=0.028), anxiety (r=-0.287; p=0.004) and stress (r=-0.247; p=0.013), but the correlations are low: older women show lower levels of depression, anxiety, and stress. All subscales of the DASS-21 questionnaire correlate with the subscales of the quality of life questionnaire in such a way that a more pronounced unpleasant emotional state is associated with a worse status of various aspects of quality of life. The more pronounced the anxiety, the worse the function, symptoms and appearance of the women are. Overall quality of life is negatively related to stress (r=-0.489; p=0.00), anxiety (r=-0.461; p=0.00) and depression (r=-0.485; p=0.00). Appearance is related to stress (r=0.495; p=0.00),

Table 5. Descriptive statistics and ANOVA results for subscales of depression, anxiety, stress, and quality of life regarding women's financial status

	Below average income		Average income		Above average income			
	Mean	SD	Mean	SD	Mean	SD	F	p
Anxiety	14.61	10.581	19.27	10.555	22.82	13.040	4.203	0.018
Depression	14.83	11.461	20.73	13.864	23.29	13.171	4.024	0.021
Stress	20.25	10.583	28.73	5.884	28.35	11.118	6.481	0.002
Quality of life	5.78	2.118	5.36	2.111	4.35	1.835	3.271	0.042

anxiety (r=0.512; *p*=0.00) and depression (r=0.549; *p*=0.00): the more pronounced the women's perception that lymphedema affects their appearance, they experience unpleasant emotions to a greater extent. The correlation is also present in the function in relation to stress (r=0.542; *p*=0.00), anxiety (r=0.520; *p*=0.00) and depression (r=0.540; *p*=0.00).

Discussion

In this research, we were interested in how women with arm lymphedema caused by breast cancer perceive the impact of lymphedema on their lives. The results of the quality of life questionnaire for women with arm lymphedema indicate low to moderate impairment in daily life activities: appearance, and mood. Symptoms are somewhat more prevalent, but still moderate. The impact of lymphedema on functioning is relatively small, although, by comparing the average values with the results of other authors, we can conclude that our participants score higher on all subscales (23-25). Even among patients with the 2nd and 3rd stages of arm lymphedema, the average values usually range from 1.0 to 2.0, while among our participants, the average values on all subscales are above 2, with ranges going up to a maximum of 4. Authors do not find statistically significant differences in certain aspects of quality of life regarding the stage of lymphedema, except in the appearance subscale, where participants with higher stages report more difficulties in body image, and higher average values are obtained for these groups (2.6 and 2.2) (23, 24). The overall quality of life is average, indicating moderate satisfaction among participants, which is generally in line with the results of other authors (23, 24), while moderate to high satisfaction with overall quality of life and relatively low scores on other subscales were obtained in the Swedish sample (14).

In this study, we did not track changes during therapy; instead, participants assessed how much arm lymphedema affects them in performing certain daily activities using a questionnaire specifically focused on evaluating the quality of life in individuals with arm lymphedema.

The Lymphoedema Quality of Life Questionnaire included open-ended questions, which participants were not required to answer, concerning leisure activities that are limited or harder to perform due to the presence of lymphedema. A variety of responses were received. Most often, the limitations relate to sports activities, particularly cycling, hiking, walking, and swimming. In addition, participants mention aesthetic concerns, specifically the reduced selection of clothing available for various occasions due to the difference in arm circumference, and difficulties in being accepted in social situations where people stare at the arm, which can be very uncomfortable and can negatively affect mental health. Participants also noted limitations in everyday activities such as brushing hair, bathing, carrying items, and driving a car, along with getting tired quickly. Furthermore, summer months or higher temperatures exacerbate the swelling, increase the feeling of heaviness in the arm, and cause pain. Exposure to the sun can also worsen lymphedema. Beyond the limitations tied to daily and leisure activities, lymphedema can hinder reintegration into society. In Croatia, lymphedema is still not something that can be surgically corrected or concealed like breast reconstruction or the use of bras with inserts. This condition is visible to everyone, which, along with the difficulty of finding suitable clothing, leads to stares from people and constant questioning. Society imposes norms and has certain expectations regarding female beauty, establishing standards for what a woman should look. Departing from these standards may result in societal rejection and a feeling of exclusion, regardless of age. Because of this, women with lymphedema often struggle with a lack of self-confidence and feelings of inferiority, viewing themselves through the lens of their impairment.

Bojinović-Rodić and colleagues highlighted a decrease in arm mobility, or arm dysfunction, as a greater issue in terms of quality of life than the actual circumference of the lymphedema. Their research also showed that lymphedema has a greater impact on quality of life than on mental health (11), which somewhat differs from the results of our study. This is undoubtedly an interesting finding, although a significant impact on quality of life could become a major issue for the individual's mental health over time.

Surprised looks, difficulty finding desired clothing, and constant questioning about what happened can lead to uncomfortable emotions, feelings of discom-

fort, and societal rejection. These attitudes create additional challenges for the social reintegration of women who have survived breast cancer, as visible lymphedema further complicates acceptance and socialization. It is not surprising, therefore, that a high percentage of participants in this study experience psychological difficulties: 42% of participants face a serious degree of stress, 45% deal with very severe anxiety, and 34% struggle with very serious depression, which is certainly alarming and necessitates professional help. Although the correlations between symptoms, appearance, and function associated with lymphedema are statistically significantly linked to participants' emotional difficulties, we presume that lymphedema is not the sole cause of their condition, as the primary illness itself, along with other difficulties caused by various therapeutic procedures, probably disrupts women's emotional stability. The findings confirm our assumptions regarding the participants' emotional states. Even though the study lacks a control group or comparison with the general population, based on previous studies mentioned in the introduction, increased values are observed, leading to the conclusion that a portion of participants has compromised mental health. These findings emphasize the importance of professional psychological support in coping with lymphedema, as well as in facilitating acceptance and life adjustments that would ease the return to daily and social activities, both of which are crucial for mental health.

Our results are in line with the findings of Morgan and colleagues (2005), who compared various studies indicating poor psychological adjustment to lymphedema and difficulties in physical and social functioning. Higher anxiety and depression levels have also been observed in patients with lymphedema compared to those without it. However, it has also been demonstrated that a coordinated approach to care and treatment, as well as patient education, has a positive effect on improving quality of life and developing a positive self-image (26).

The age of the women proved to be significantly related to their emotional state. Older women experience less stress, anxiety, and depression and score better on the mood subscale. This finding can be explained by the fact that with age and experience, women learn different ways of coping with life's problems, including illness. In our study, age is also significantly related to the time elapsed since the breast cancer diagnosis and given that unpleasant emotions are certainly not caused only by lymphedema but also by the primary diagnosis, therapy-related difficulties, and other challenges, this may be why age acts as a "protective" factor. A difference in quality of life was also observed in terms of financial status: women with below-average incomes report lower levels of stress, anxiety, and depression, and they assess their quality of life more positively compared to women with above-average incomes, which was an unexpected finding. This result could be explained by the fact that women themselves determined their income category, which may not fully reflect their actual economic status. Another reason could be that women of higher socio-economic status may have higher expectations regarding their own quality of life and thus experience the decline in quality more dramatically than women of lower socio-economic status. However, this finding should be further verified in future studies.

We are aware of certain limitations of our study. For example, we were unable to consider some objective indicators of the state of lymphedema, such as the duration of the condition or the stage of lymphedema. Additionally, the self-assessment of participants' income may not accurately reflect their actual economic status. Caution should also be exercised regarding the critical values and categories set by the authors of the DASS-21 questionnaire, as they themselves note that the DASS-21 does not have direct implications for placing respondents into discrete classification categories, such as those found in diagnostic and statistical manuals for mental disorders (DSM, ICD), and the categories of serious and very serious do not necessarily indicate the clinical status of women.

Conclusion

The research was conducted on 100 participants, members of associations that gather women who have been diagnosed with lymphedema. The women rated their quality of life as moderate, and among the various aspects of life affected by lymphedema, symptoms were the most prominent, although the women reported only a moderate impact on their lives. The study shows that lymphedema is related to the mental health of women, particularly anxiety, where the highest percentage of women falls into the category of very severe anxiety, which is concerning and requires professional help. Everyday activities and leisure activities, such as cycling, are limited as they worsen the condition of lymphedema. These limitations contribute to the mental health outcomes of women with arm lymphedema.

This condition is complex and leaves a mark not only on the physical but also on the mental health of the individual, as demonstrated in the study. The involvement of various specialists in treatment is necessary to help and contribute to reducing the consequences of lymphedema.

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199

PERCEPCIJA UTJECAJA LIMFEDEMA NA AKTIVNOSTI SVAKODNEVNOG ŽIVOTA I MENTALNO ZDRAVLJE ŽENA OBOLJELIH OD RAKA DOJKE

Sažetak

Uvod. Rak dojke još je uvijek najčešća zloćudna bolest kod žena, premda je smrtnost od njega manja zahvaljujući agresivnom načinu liječenja, ali i prevenciji. Sekundarni limfedem ruke najčešća je posljedica liječenja raka dojke, ali može nastati i godinama kasnije kao rezultat vanjskih faktora. Limfedem je kronična upalna limfostatička bolest koja uz bol i nelagodne senzacije dovodi do ograničenja pokretljivosti ruke. S obzirom na to da je limfedem ruke vidljiv i u Hrvatskoj se još uvijek ne može estetski korigirati poput dojke, ženama je problem pronaći adekvatnu odjeću, a utječe i na svakodnevne aktivnosti.

Cilj. Ispitati percepciju utjecaja limfedema ruke na aktivnosti svakodnevnog života te mentalno zdravlje žena koje su suočene s dijagnozom limfedema, nastalog uslijed terapije raka dojke.

Metode. Primijenjen je upitnik o kvaliteti života s limfedemom ruke LYMQOL i upitnik DASS-21 za procjenu mentalnog zdravlja. U istraživanju je sudjelovalo 100 žena s limfedemom ruke prosječne dobi od 52,3 godine, inače članica udruga koje okupljaju žene oboljele od raka dojke.

Rezultati. Rezultati su povišeni na svim podljestvicama upitnika DASS-21, što ukazuje na narušeno emocionalno stanje žena. Veliki postotak ispitanica pati od ozbiljnih simptoma anksioznosti i depresije, što se ne bi trebalo zanemariti.

Zaključak. Žene procjenjuju da limfedem ima utjecaj na provođenje svakodnevnih aktivnosti i aktivnosti slobodnog vremena, a kao otežane najčešće navode sportove, vožnju bicikla, automobila, planinarenje, izlazak na sunce, općenito druženja, ali i samu nepredvidivost kako će ruka reagirati u određenim uvjetima.

Ključne riječi: limfedem, rak dojke, svakodnevne aktivnosti, mentalno zdravlje

The Most Frequent Errors and Error Causes in Intravenous Medication Administration: A Literature Review

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Abstract

Introduction. Intravenous medication administration is a critical component in healthcare, which is utilized for delivering medications directly into the bloodstream to achieve immediate therapeutic outcomes. It is essential to ensure that this method of medication delivery is both safe and effective.

Aim. This literature review aims to identify the most frequent intravenous medication errors and their causes.

Methods. Literature search was performed in March 2024 utilizing PubMed, ScienceDirect, and Scopus, covering the period from February 2018 to January 2024.

Results. This literature review included 17 articles. The articles were selected to overview the most frequent intravenous medication errors, their causes, and prevention possibilities. Results have shown the most frequent types of intravenous medication errors which occur during the stages of preparation and administration: insufficient hand hygiene and not adhering to aseptic mode while preparing the medication, dose calculation errors, patient identification errors, as well as not adhering to the rules of safe medication administration.

Conclusions. Intravenous administration is a common nursing intervention and it is prone to high error rates. Nurses bear a significant amount of responsibility regarding the right way of administration and preparation of intravenous medicine. According to our review, several factors are more prone to be the cause of medication administration errors, and they include the lack of nurse knowledge, attitude and behavior, lack of hand hygiene, and distractions while preparing the medication coming from other nurses and patients or telephones. The outcomes of these factors are the most common cause of the intravenous medication errors which include incorrect dose and labeling errors.

Introduction

A medication is any substance which is introduced into the body and aims to treat or prevent diseases. For the application and preparation of the medication to be safe and to avoid possible errors, it is necessary to adhere to the medication's application rules and the 3 checks (1). The intravenous medication belongs to the group of parenteral medication administration which means it avoids the digestive tract. Intravenous delivery includes administration of the medication directly into the vein using a needle or a tube. Some medications can be administered through intravenous injection or infusion when the patient cannot take liquids and pills orally or needs fast absorption of the medication. Medications which are administered intravenously are widely used in hospitals, especially in critical care settings and emergency departments because of their immediate therapeutic effect, precise dosing and high bioavailability (2). Intravenous medication administration via infusion devices is also at high risk of errors which can compromise patient safety. Smart pump devices are used for intravenous systems and reduce critical administration errors. They are integrated with the information systems and medication libraries which set safe limits on the administrated medication (3). The preparation is a complex process which requires an aseptic mode of operation and involves multiple possibilities for errors. Literature suggests that medication errors are the most common type of medical error, and intravenous medicines are at higher risk because they are complex both to prepare and administer (4). Intravenously administered medications are particularly associated with the highest medication error frequencies and more serious consequences for the patient than any other administration route. Administration, prescription, and preparation are the process phases most prone to systemic errors (4-5). Some of the errors are: wrong drug selection, dosage calculation errors, using the incorrect diluent for dilution of a certain medication, incorrect infusion rate, and administration to the wrong patient, which could lead to a number of complications (1). The prevalence of medication errors is problematic due to the different definitions and classification systems which are typically used to measure them (3). Depending on the type of error, there are different outcomes for patients, ranging from fewer and smaller complications to larger ones. The negative effects of incorrect intravenous administration are difficult to mitigate due to immediate and complete absorption and distribution into the bloodstream (4). Errors associated with intravenous medication are especially worrisome given their immediate therapeutic effects (6). Numerous factors within the system and individual factors contribute to the occurrence of medication errors. Some of the main factors which affect the process of preparation and administration are: overworked hospital units, employee fatigue, insufficient knowledge and unsuitable environment conditions which include distractions, lack of organization and similarities in packaging. Nurses are frequently interrupted during medication administration, which can lead to administration errors. Furthermore, medication errors have been related to low-quality medical care, longer hospital stays, and significant additional medical costs, as well as the loss of patients' trust in the services offered by the hospital (4). Each of these errors can directly affect patient safety. It has been noted that some populations are more prone to be at risk of medication errors, for example children, because of their limited ability to communicate and express their complaints. Literature suggests that medication errors may be three times more common in the pediatric population than in adults. When administering medication to children, nurses need to make individual dosage calculations based on the patient weight, age and body surface area and their condition, which can lead to calculation and dosage errors. Many medications used to treat children are not available in suitable dosage formulations, but often have to be manipulated and prepared by the nurse at ward. These practices include cutting, grinding up tablets or mixing medications with food. Such manipulations are associated with high risk of errors as the bioavailability of the drugs is often unknown and unpredictable. Lack of standardization has caused confusion resulting in serious medication errors. Most of the medication are not licensed for the use in children (7). To ensure the safe application of intravenous medications, healthcare providers need to have sufficient knowledge and skills, while continuous participation in training programs can increase the knowledge and awareness of nurses (3). Intravenous medication administration is a critical component in healthcare, utilized for delivering medications directly into the bloodstream to achieve immediate therapeutic outcomes. It is essential to ensure that this method of medication delivery is both safe and effective. It should be critically considered which strategies can effectively improve safety during high-risk nursing tasks involving intravenous medication administration (8).

Aim

This systematic review aimed to identify the most frequent intravenous medication errors and their causes. By systematically reviewing the literature, it is possible to identify gaps in current knowledge and highlight areas which require further research.

Methods

A systematic literature search was performed in March 2024 utilizing PubMed, ScienceDirect, and Scopus covering the period from February 2018 to January 2024. Following the PRISMA guidelines for presenting systematic literature reviews, systematic reviews, cross-sectional studies, and multicenter observational studies were targeted. By employing a structured guideline, the authors outlined the aims, defined the study scope, and established inclusion and exclusion criteria (Table 1). During the search, the authors used the following keywords for the inclusion criteria: "nurse", "intravenous administration", and "medication error", which all needed to appear in the included articles.

Table 1. Inclusion and exclusion criteria

	Inclusion criteria	Exclusion criteria
Type/ category of the article	Systematic review Literature review Cross-sectional study Multicenter observational study	Letters Editorials
Content (keywords)	Nurse Intravenous administration Medication error	Other
Publication date	2018-2024	Articles published before 2018
Language	English	Other

Studies which reported on the use of intravenous medication administration published between February 2018 and January 2024 were searched. The studies were included if they were published in English language and available as free full text articles. The articles which identified causes in relation to errors or mistakes from hospital staff were included. After the removal of duplicates, using the Zotero application, the search produced 1,103 relevant publications. Two reviewers (M.T, K.K.) independently selected the studies based on their titles (n=1,103). The articles fulfilling the inclusion criteria were selected for further review based on the abstracts (n=79). The abstracts were excluded if they did not provide enough relevant data (n=40). A total of 12 publications met the inclusion criteria. In addition, reference lists of the included articles were searched manually for relevant articles (n=5), giving a total of 17 included studies. The reason for including these studies is that they presented key findings, evidence, and critical insights relevant to the authors' aim. By incorporating these studies, the authors enriched and completed their systematic review.

Results

This systematic review included 17 articles published in the last 6 years (2018-2024). These articles were selected to provide an overview of the most frequent intravenous medication errors, causes, and prevention possibilities. Table 2, includes a detailed compilation of the results from these articles, including information about the authors, the year the paper was written, the aim, the type of study, the population of the research, and the country in which the article was developed.

This systematic review was based on 17 publications. These studies were conducted in the Netherlands (n=3), Jordan (n=2), Spain (n=2), England, the United Kingdom, India, Brazil, The Czech Republic, Finland, Italy, Iran, South Korea, and the United States. Seven of the studies were cross-sectional studies, five were observational studies, two were systematic literature reviews, one was scoping review, one was descriptive study, and one was a comparative study. The studies
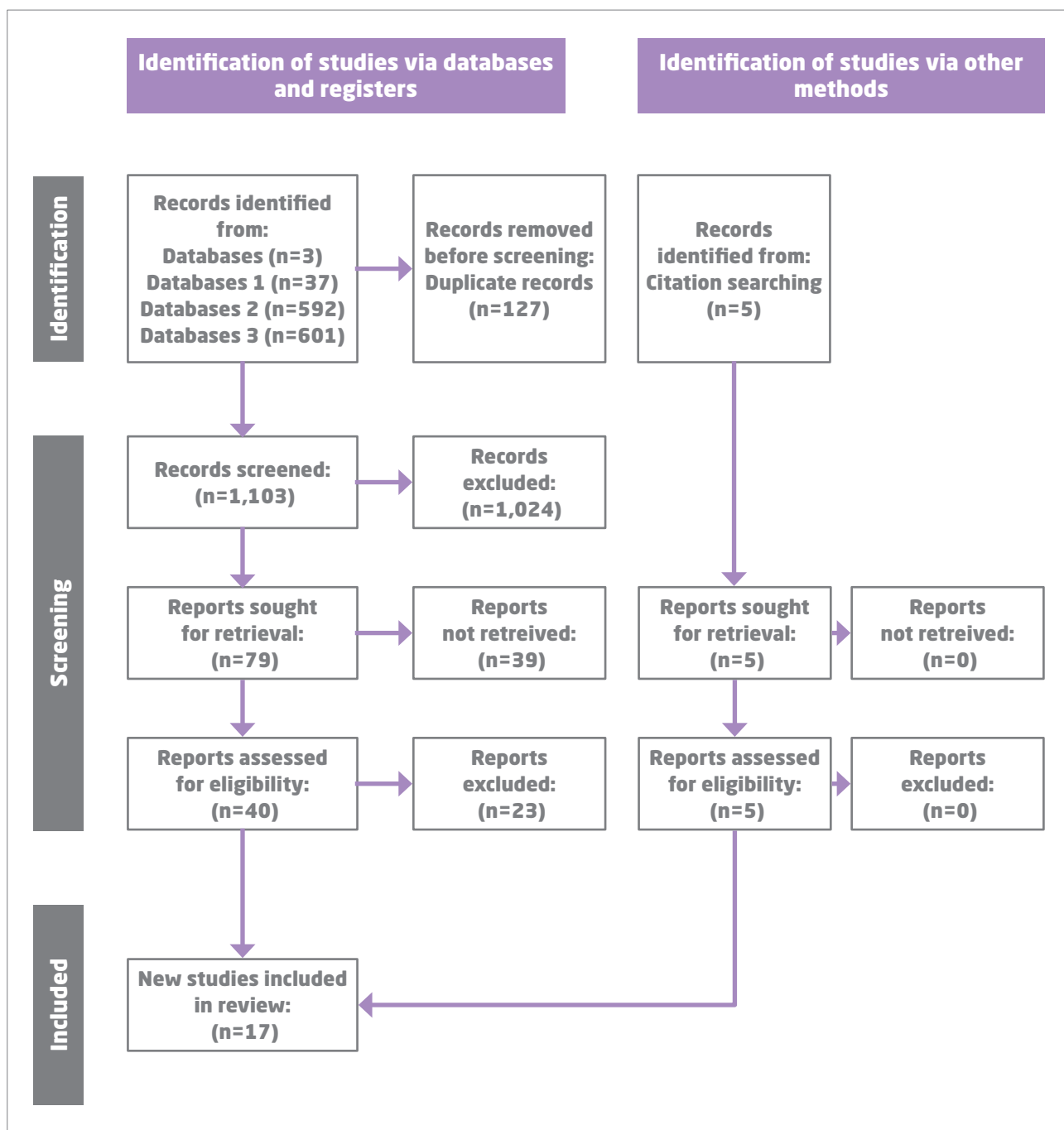
Identification of studies via databases and registers

Identification of studies via other methods

Identification

Records identified from:
Databases (n=3)
Databases 1 (n=37)
Databases 2 (n=592)
Databases 3 (n=601)

Records removed before screening:
Duplicate records (n=127)

Records identified from:
Citation searching (n=5)

Screening

Records screened:
(n=1,103)

Records excluded:
(n=1,024)

Reports sought for retrieval:
(n=79)

Reports not retreived:
(n=39)

Reports sought for retrieval:
(n=5)

Reports not retreived:
(n=0)

Reports assessed for eligibility:
(n=40)

Reports excluded:
(n=23)

Reports assessed for eligibility:
(n=5)

Reports excluded:
(n=0)

Included

New studies included in review:
(n=17)

Figure 1. **PRISMA flow chart**

identified the most common medication errors: dose calculation, insufficient hand hygiene and not adhering to aseptic mode, not adhering to the rules of safe medication administration and patient identification errors. The selected articles include topics about the most common intravenous medication errors, meth-ods for preventing intravenous medication errors, and the most common causes of intravenous medication errors.

Dosage calculation errors are a common error dur-ing preparation of the intravenous medication for administration. Márquez-Hernández et al. reported

Table 2. Overview of the most frequent intravenous medication errors, causes, and prevention possibilities

Authors, year	Aim	Type of study	Population	Country	Results
Sutherland A, Canobbio M, Clarke J, Randall M, Skelland T, Weston E. (2018) (1).	To estimate the number of intravenous medication errors per 1000 administrations	a systematic review	-	UK	The majority of errors detected during intravenous medication administration were wrong rate errors. The next most common error type associated with intravenous administration errors was wrong time administration with a mean rate. However, this was only identified in two studies. The remaining error types (wrong dose, wrong diluent, wrong volume, wrong pump setting, and dose omission) contributed less than 20% of the remaining error types.
Márquez-Hernández VV, Fuentes-Colmenero AL, Cañadas-Núñez F, Di Muzio M, Giannetta N, Gutiérrez-Puertas L. (2019) (2).	Culturally adjust and validate a questionnaire regarding knowledge, attitudes, and behaviors in administering intravenous medication	cross-sectional study	N=276 nurses	Spain	The most frequent error is dosage calculation. The majority of participants strongly believed that understanding intravenous medication dosage calculation could decrease medication errors. Furthermore, nearly half of them believed that computerized physician order entry systems could minimize errors in the medicine preparation stage.
Blandford A, Dykes PC, Franklin BD, Furniss D, Galal-Edeen GH, Schnock KO, et al. (2019) (3).	Investigate similarities and differences in practices and error types involving intravenous medication administration in the United States and England	comparative study	N=3,172 observation of intravenous medication administration	The United States, England	Patient identification errors are more prevalent in England than the United States study. This error is mostly attributed to the widespread use of barcode administration of medication. In this study, it is also revealed that there is a higher risk for potential harm for patients during gravity administration of infusion compared to infusion devices.
Kuitunen S, Niittynen I, Airaksinen M, Holmström AR. (2021) (4).	Identify systemic causes of in-hospital intravenous medication errors	a systematic review	-	Finland	The phases of administration, prescribing, and preparation were highly susceptible to systemic errors, particularly due to inadequate safety measures with high-alert medications, and lack of knowledge about the drug.
Schutijser BCFM, Klopotowska JE, Jongerden IP, Spreeuwenberg PMM, De Bruijne MC, Wagner C. (2019) (6).	To determine the frequency and causes of interruptions during intravenous medication administration	multicenter observational study.	-	The Netherlands	Frequent interruptions during the preparation and administration from patients and nurses.
Yousef AM, Abu-Farha RK, Abu-Hammour KM (2022) (9).	To determine the prevalence, types, severity, and other factors associated with medication administration errors	cross-sectional study	-	Jordan	Most medication administrations had one or two errors. Adherence errors were found to be the most frequent followed by incorrect drug preparation.
Brabcova I, Hajduchova H, Tothova V, Chloubova I, Červeny M, Prokešova R, et al. (2023.) (10).	Identify the reasons for medication administration errors and the reasons for non-reported medication administration errors	cross-sectional study	N=1,205 nurses	The Czech Republic	The most common reason for medication administration errors was the similarity in the appearance of drugs, followed by name similarity and packaging similarity.

Table 2. Overview of the most frequent intravenous medication errors, causes, and prevention possibilities

Authors, year	Aim	Type of study	Population	Country	Results
Mendes JR, Lopes MCBT, Vancini-Campanharo CR, Okuno MFP, Batista REA. (2018) (11).	To identify the frequencies and types of medication errors in the emergency department	cross-sectional	-	Brazil	The most frequent errors were: no hand hygiene and no use of an aseptic technique. Indicating the need to develop programs focused on patient safety.
Di Simone E, Giannetta N, Auddino F, Cicotto A, Grilli D, Di Muzio M. (2018) (12).	To outline how nurses' knowledge, training, behavior, and attitude can prevent medication errors during the administration of intravenous medications in the emergency department	descriptive study	N=103 nurses	Italia	The most common error occurred because of heavy workloads. Drug dosage and calculation skills are essential to reduce errors during drug preparation. Computerized prescriptions could reduce drug preparation errors.
Mukherjee M, Karkada R. S, Vandana K.E. S. (2020.) (13).	To evaluate current healthcare professionals' practices in intravenous medication management and pinpoint the obstacles hindering safe intravenous medication handling among them	observational study	N=30 healthcare professionals	India	The majority of healthcare professionals cited heavy workloads as a barrier to safe intravenous medication management, while only a few mentioned the absence of colleagues for double-checking or lack of supervision.
Cousins DH, Otero MJ, Schmitt É. (2021) (14).	To adapt systems for preparing and administering injectable medications to meet evolving priorities in European hospitals	observational study	N=2,238 patients	Spain	Frequent errors are drug checking, preparation, and labeling
Hamdan KA, Abeer MS. (2022) (15).	To examine the ICU nurses' knowledge, behaviors, training, and attitudes when preparing and administering intravenous medications	a cross-sectional-correlational design study	N=206 nurses	Jordan	About 81.6% of the ICU nurses considered dosage calculation of intravenous drugs to reduce preparation errors. A total of 81.1% of respondents agreed that clinical skills in the safe management of drug therapy should be regularly evaluated. Only 87.9% of the ICU nurses agreed that handwashing is necessary before drug preparation and administration. Education is essential to nurses' feeling safe at administering medications, especially in critical care units, which may affect their attitudes and behaviors.
Schutijser B, Klopotowska JE, Jongerden I, Spreeuwenberg P, Wagner C, de Bruijne M (2018) (16)	Identify nurse non-compliance with safe intravenous medication administration	observational study		The Netherlands	Medical errors are inadequate hand hygiene and lack of medication verification by a second nurse.
Park J, You SB, Ryu GW, Kim Y. (2023) (17).	To show the latest evidence concerning the characteristics of errors, factors which aid or hinder, and obstacles associated with the rate control of intravenous medications	scoping review	N=22 studies were included	South Korea	Medical error factors are policy and procedures in medical administration and interruption and distractions. It is important to establish effective risk-reduction strategies.

Table 2. **Overview of the most frequent intravenous medication errors, causes, and prevention possibilities**					
Authors, year	**Aim**	**Type of study**	**Population**	**Country**	**Results**
Beaudart C, Witjes M, Rood P, Hiligsmann M. (2023) (18).	Investigate ICU nurse's views on the frequency of medication administration errors during continuous infusion therapies	cross-sectional study	N=91 nurses	The Netherlands	The most common errors were the administration of the medication at the wrong time, the administration of a non-prescribed medication, and the wrong infusion rate.
Hertig JB, Degnan DD, Scott CR, Lenz JR, Li X, Anderson CM. (2018) (19).	Compare medication administration errors between ready to administered the product and intravenous administration traditional push practice	observational study	-	The United States	Ready-to-administer products were associated with fewer observed errors than intravenous push traditional practice. The most common medication errors were: disinfection errors, dilution errors, and labeling errors with traditional intravenous push practice.
Lyons I, Furniss D, Blandford A, Chumbley G, Iacovides I, Wei L, et al. (2018) (20).	Determine the prevalence, types, and severity of errors and discrepancies in English hospitals	observational study	N=1,326 patients	England	The most frequent types of deviation errors were rate deviation, unauthorized medication, and administration start time discrepancy. It was found that 1 in 10 intravenous infusions involved an error, and one in two involved a discrepancy.

the results that wrong dosage calculation is a leading error in intravenous administration. Nursing staff recognizes that improving knowledge of dosage calculation can reduce the frequency of errors. Another common error is the wrong rate of administration which happens when administering intravenous medication and leads to dosing errors like overdosing and underdosing (1-12). Dose calculations can be a significant risk to patient safety, and errors can cause complications. Research findings suggest that dose calculation is the most common error (3-14). To prevent this type of error, it is important to double-check the medication and perform a check by the second nurse. Literature suggests that hospital nurses are frequently interrupted during the preparation and administration of medications, which significantly contributes to the occurrence of errors. Most interruptions occur externally by other nurses or patients (5, 6). Interruptions during preparation and administration contribute to errors (9-18). Blandford et al. recognized that patient identification errors were more prevalent in England than in the United States. This error is mostly attributed to the widespread use of barcode administration of medication (3). Research findings reported that the massive workload of nurses due to shortages of working staff is in correlation with the high frequency of medication ad-

ministration errors, particularly dosage calculation and drug preparation. Implementation of new organizational strategies to reduce workload is suggested (12, 13). Aseptic technique failures and inadequate hand hygiene are frequent errors (11). In the study conducted by Hamdan et al., most nurses agreed that handwashing is necessary before drug preparation and administration (15).

Discussion

The results of this research have shown the most frequent types of intravenous medication errors which occur during the stages of preparation and administration: insufficient hand hygiene and not adhering to aseptic mode, dose calculation errors, patient identification errors, adhering to the rules of safe medication administration. Interruptions during medication preparation and heavy workloads of nurses were the most common causes for these errors. The following errors occur mostly because of the lack of nursing staff and big workloads which tend to increase the stress level

of nurses as well as lower their concentration because of the large amount of multitasking which happens on an everyday basis. Heavy workloads of nurses are a big issue because of the lack of healthcare professionals. Healthcare professionals expressed excessive workload as a barrier to safe intravenous medication management practices (13). To administer and prepare the medication nurses must have a lot of skills, patience, knowledge, and concentration. Heavy workloads increase the chances of medication errors because of the need to perform multiple tasks at once which all require a lot of focus and concentration. To prevent these types of errors, there is a need to increase the number of staff working in a shift and the amount of workload per nurse. Massive workloads on nurses, due to shortages of working staff, can cause errors. Almost all nurses find it necessary to improve organization strategies. All of that can lead to errors which have a take on patient safety.

Hand hygiene and aseptic method

Hand hygiene is one of the most common errors which occur during the process of intravenous medication preparation and administration. Hand hygiene is the first step which must be taken before preparing and administering the medication. This is an error which occurs commonly because of many distractions, heavy nurse workloads, and a lack of nursing staff. Hand hygiene errors can happen when nurses do not wash their hands at all, don't wash them adequately, or are not at the right time. Healthcare professionals' hands are the most common transmission route for infections (21, 22). Research findings suggested that hand hygiene and aseptic methods are particularly important and most of the nurses in their studies confirm that. The analyzed literature suggests that there is a need for education and a change in the attitude of nurses toward hand hygiene. After the implementation of training programs, there was an increased adherence to hand hygiene from nurses (22). Furthermore, the literature suggests practices to prevent healthcare-associated interventions through hand hygiene (23).

There has been a relationship established between better hand hygiene and fewer cases of cross infections. Literature suggests that education and adherence to hand washing behavior should begin in the academic institutions because they are optimal environments to encourage good habits and provide skills to become competent for professional life for all student nurses (24).

Dose calculation errors

Intravenous medication administration is an everyday task for nurses which involves knowledge about the medication and its doses. There are different formulas used to ensure safe and correct dose calculations (25). Dose calculation errors happened during the preparation of intravenous medication. The most common dose calculation errors include dilution errors; too much or too little dilutant, wrong dilutant, and the wrong drug. It can occur because of a lack of knowledge, distractions coming from patients and other nurses, and because of the similarity of name and packaging of medications. All nurses must know how to calculate the right dose and which dilutant for medication to use. When calculating a medication dose, it is best to use a calculator or write the calculation down, particularly in a stressful situation (25). This error can be a significant patient safety risk because of the fast absorption of the intravenous medication. Research evidence suggests that dose calculation errors are a common occurrence. To prevent this type of error, it is important to prepare the medication with no distractions, to check the dose by another nurse, and to perform double checking of the medication. The double checking includes the following: checking the name of the medication, the time of order by physician, the amount of medicine prescribed by physician, and the expiration date (3-14). Every medication has instructions on what to dilute and what their use is. Nurses need to be especially cautious when converting different units (26). Research shows that nursing students find dosage calculation difficult. Some of the most common errors which nursing students made were related to unit conversion, more complex concepts such as maximum concentration and minimum dilution, calculating IV infusion rate, infusion time, and the volume of solution in which the drug should be dissolved (27). It was found that 40.6% of second-year students made a mistake when converting units (27). It is important to educate nurses on dose calculations and to perform regular knowledge checks so that patient safety can be improved, and all nurses remain updated with knowledge.

Patient identification errors

Patient safety displays healthcare quality and harmless service through the correct patient identification. Patient misidentification can cause harm to the patient because of incorrect medical diagnosis and treatment (28).

Patient identification must be done before the preparation and administration of the medication. Patient identification errors can occur in different areas, such as drug administration, blood transfusions, and surgeries which result in incorrect diagnoses and treatments (28). The causes for patient identification errors are nurse fatigue, heavy workload, the possibility of having two patients with the identical name, distractions, and lack of patient identification policy such as failure to check the patient's name (28). To prevent this type of error, it is necessary to check on the patient's list what medication and dose must be prepared. Everything that is prepared for the patient must carry a label with their name. Before administration, it is necessary to check if it is the right patient and the right medication. The patient's name is checked by asking them what their name is, never by addressing them by name because patients can confirm even if it is not them. After that, the name given by the patient should be compared with their identification bracelet. Literature suggests that identification errors occur because of the widespread use of barcode administration of medication. It is important to check the patient's name and the name on their wrist bracelet to prevent this type of error and to improve patient safety (2). Wrong patient identification can lead to the wrong medication being administered, which can cause complications and lead to an extended hospitalization. Literature suggests these recommendations to improve identification errors: healthcare professionals need to be educated on the hospital information system, review of the employees' working hours to reduce fatigue, increase the culture of patient safety, and implement a clear policy for patient identification (28).

Not adhering to the rules of safe medication administration

Nurses are responsible for intravenous medication administration and preparation. They are the last person to check what medication is prescribed to the patient, in what dose, by which route of administration, and at what time. To safely apply and prepare the medicine, six rules for the safe use of the medication are distinguished. These rules include the right patient, the right medicine, the right medication dose, the right time of administration, the right administration route, and the right documentation (26). Different hospitals have defined a policy for double-checking, whereby a second nurse verifies, in the presence of the first nurse who

prepared the medication: the medication order, the correct dose for patient weight, time of the last dose administration, medication and diluents when applicable, dose calculation, preparation and patient identification. Independent checking required nurses not to tell each other details about the medication before or during the check, so as not to prime the checker with potentially incorrect information (29). Similarities in the appearance of the medication, unsafe preparation environment, or lack of knowledge and skills can lead to errors such as the wrong dose, wrong diluent, wrong volume, wrong pump setting, and dose omission which puts the patient at risk. To prevent these errors, it is necessary to educate nurses and increase their knowledge about different medications, especially when two medications are similar in appearance and packaging. It is important to provide continuous education for nurses to increase their knowledge and skills. Reporting medication errors is the first step to raising awareness and preventing them from occurring again (4,18-20). Nurses should never administer a medication which they have not prepared by themselves. The medication always needs to be prepared by the same nurse who is administering it. Before the preparation, nurses need to perform adequate hand hygiene, use personal protective equipment (gloves, mask, eyeglasses) depending on the medication, perform the six checks, plan the administration intervention, and avoid distractions. While preparing the intravenous medication, an aseptic environment and safe pulling up of the medication from the vial or ampule must be ensured. Before pulling up the intravenous medication with a needle and syringe, the name, dose, and route of administration must be verified. The patient always needs to be informed about the medication uses and possible side effects (26). Before the medication administration, the nurse always must inform the patient about the signs and symptoms of side effects. It is also important to check if the patient understood everything the nurse informed them about. After the medication administration, the nurse has to monitor the patient's condition in case of changes in the condition, disturbance of the vital signs, and the occurrence of adverse reactions, and if any of these happen, the nurse should notify a doctor immediately (26). Every step and change in the patient's condition has to be documented. Documentation is an important part of nurse work and needs to include: the name of the administered medication, dose of the administered medication, route of administration, time of administration, patient condition, interventions done,

occurrence of adverse reactions, methods of patient education about the medication and recommendations about future care plan (24). Prescribed medication must be administered at the right time because of its therapeutic effect.

Interruptions during medication preparation

Errors during the preparation and administration of the drug, as well as during other nursing interventions often occur because of distractions. Most hospitals use different devices to reduce different types of medical errors. Devices alert healthcare workers if something is not as it should be. Most of the errors happen because there are too many alarms. Furthermore, these devices can be a distraction and must be used with care (30). Distractions like devices, noises, and questions from patients and healthcare workers are the main causes of these types of errors (10). Also, medications are often administered under challenging conditions, which creates opportunities for distractions and interruptions (31). In order to prevent that, it is necessary to ensure a safe environment to prepare the medication and only use the devices which are necessary for patient care and health. It is necessary to support a multifactorial approach to reduce errors. Only one nurse should prepare and administer the medication. A second nurse can help and double-check the medication which is prepared to increase patient safety and reduce the harm which can be caused if the wrong medication is administered. Literature suggests that interruptions during preparation and administration contribute to errors, but that there are also fewer interruptions happening in the evening. It also suggests that the number of distractions is seemingly larger before the administration and during the process of preparation than after the administration of the medication. It is necessary to reduce the number of distractors to ensure better and highest quality in the preparation and administration of the drug for the patient and to improve their health condition (32).

Limitations and strengths

Limitations of this review were that only the articles which were full free version available and in the English language were used. Another limitation was that PubMed, Scopus and ScienceDirect databases were searched. This review is based on new literature from the period 2018-2024.

Conclusion

Intravenous administration as a common nursing intervention is prone to high error rates. Nurses bear a significant amount of responsibility regarding the right way of administration and preparation of intravenous medicine. According to this review, several actions are more prone to be the cause of medication administration errors, and those include the lack of nurse knowledge, heavy workload attitude and behavior, as well as several distractions while preparing the medication coming from other nurses and patients. The outcomes of these actions are the most common intravenous medication errors which include: insufficient hand hygiene and not adhering to aseptic mode, dose calculation errors, patient identification errors, not adhering to the rules of safe medication administration. This literature review gave an insight how to create possible strategies for preventing errors during intravenous medication administration.

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NAJČEŠĆE POGREŠKE I UZROCI POGREŠAKA U INTRAVENSKOJ PRIMJENI LIJEKOVA: PREGLED LITERATURE

Sažetak

Uvod. Intravenska primjena lijeka ključna je komponenta zdravstvene skrbi koja se upotrebljava za primjenu lijekova izravno u krvotok kako bi se postigli trenutačni terapijski učinci. Iznimno je važno osigurati da ovaj način primjene lijekova bude siguran i učinkovit.

Cilj. Cilj je ovog pregleda literature identificirati najčešće pogreške pri intravenskoj primjeni lijekova i njihove uzroke.

Metode. Istraživanje je provedeno u ožujku 2024. upotrebom baza podataka PubMed, ScienceDirect i Scopus koja je uključivala razdoblje od veljače 2018. do siječnja 2024.

Rezultati. Ovaj pregled literature uključuje 17 članaka. Ovi su članci odabrani kako bi se prikazale najčešće pogreške pri intravenskoj primjeni lijekova, njihovi uzroci i mogućnosti prevencije. Rezultati su pokazali najčešće vrste pogrešaka pri intravenskoj primjeni lijekova koje se javljaju tijekom faza pripreme i primjene: higijena ruku i aseptični način, pogreške u izračunu doze, pogreške u identifikaciji pacijenta, pridržavanje pravila sigurne primjene lijekova, distrakcije, radno opterećenje medicinskih sestara.

Zaključak. Intravenska primjena lijeka česta je intervencija u sestrinstvu koja je sklona čestim pogreškama. Medicinske su sestre odgovorne za pravilnu primjenu i pripremu intravenskih lijekova. Prema našem radu, uočeno je više pogrešaka u primjeni nego u pripremi lijekova; što uključuje nedostatke u znanju, stavovima i ponašanju medicinskih sestara, izostanak higijene ruku te različite distrakcije tijekom pripreme lijekova od strane drugih medicinskih sestara i pacijenata. Navedeni su postupci uzroci najčešćih pogrešaka pri intravenskoj primjeni lijeka, koje uključuju pogrešnu dozu i pogreške u označavanju.

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