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Health-Related Quality of Life of the Patients with Chronic Obstructive Pulmonary Disease in Relation to Negative Psychological Emotional States: A Cross-Sectional Study

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Abstract

Background: Chronic obstructive pulmonary disease (COPD) is a long-term narrowing of the airways caused by emphysema or chronic bronchitis. In addition to physical symptoms, it affects psychological and social functioning.

Aim: This study aims to examine the correlation between specific aspects of the perceived health-related quality of life and the presence of negative emotional states - depression, anxiety and stress in individuals with COPD.

Methods: We conducted an observational cross-sectional study in 2023 on a convenience sample of patients with COPD who were treated at the Pulmonology Clinic of the General Hospital "Dr. Ivo Pedišić" in Sisak, Croatia. We collected data with a questionnaire that included questions on personal characteristics, general health status, and COPD burden, along with two standardized instruments: the Depression, Anxiety and Stress Scale (DASS) and the St. George's Respiratory Questionnaire (SGRQ-S). Statistical analysis included descriptive statistics and parametric tests, specifically Pearson's correlation coefficient.

Results: A total of 128 participants were included in the study. Limitations in health-related quality of life were significantly correlated with the level of stress ($r=0.80$; $p<0.01$), anxiety ($r=0.83$; $p<0.01$) and depression ($r=0.80$; $p<0.01$). Reduced quality of life was associated with participants' age ($r=0.49$, $p<0.01$) and the duration of the disease ($r=0.48$, $p<0.01$). Low to moderate coefficients of Person correlation (0.35 to 0.41) point to a significant correlation between age, duration of the disease, and the appearance of negative emotional states.

Conclusion: The reduced health-related quality of life and the occurrence of negative emotional states in patients with COPD represent a significant problem in the patient's life, especially in those with advanced disease. In the treatment of patients with COPD, in addition to assessing the physical condition, attention should also be paid to the psychosocial assessment. An interdisciplinary approach should be included in the assessment and treatment of people with COPD, to provide better quality of healthcare services.

Keywords: chronic obstructive pulmonary disease, health-related quality of life, stress, anxiety, depression

Introduction

Chronic obstructive pulmonary disease (COPD) is a partially reversible disease of the lung parenchyma, characterised by reduced airflow through the airways. It develops as a result of persistent inflammation caused by harmful particles, gases, and vapours. COPD is a progressive disease, with numerous symptoms e.g. difficulty breathing, persistent cough, mucus production, and fatigue (1-3). The number of people suffering from and dying from COPD is constantly increasing worldwide. The cause of high mortality is not the disease itself, but the existence of numerous comorbidities, such as cardiovascular diseases that are associated with oxidative stress of cells (4). Despite the availability of treatment, people living with COPD face multiple challenges. In addition to physical difficulties, they often face emotional, economic, and social problems (5). The physical aspects of COPD include difficulty breathing, reduced physical performance (physical weakening), and increased susceptibility to infections (6, 7). The occurrence of physical symptoms affects the subjective feelings and experiences of the patient, and the intensification of symptoms can lead to feelings of worthlessness, helplessness and loss of control due to a decrease in the patient's quality of daily life. Such a state can be a precursor to the development of anxiety and depression. Patients with COPD often face emotional distress due to limitations in physical activity, fear of worsening symptoms, and challenges in daily activities (8). Anxiety is noticeably more pronounced in patients with COPD. Patients may experience anxiety due to difficulty breathing, fear of choking attacks, or due to limitations in usual activities (9). Anxiety is a condition that is defined by changes in behaviour, feelings of panic, worry, fear and depression, and most often occurs due to a loss of security and control that the individual does not know or cannot cope with (10). In addition to the fact that the occurrence of anxiety disrupts the psychological state of an individual, it also greatly affects the physical state, health, and success of treatment of the disease itself.

The psychological status of patients is rarely examined, and the main focus is placed on physical symptoms (8). In patients with developed negative psychological emotions and anxiety, this adaptation is more difficult, and they increasingly focus on resolving and reducing the physical symptoms of the disease itself, since they are not successful in this despite pharmacological therapy, psychological symptoms worsen, and patients find it increasingly difficult to cope with the disease itself (11). Depression also poses a significant challenge for healthcare professionals working with patients, as well as for the patients themselves. Patients with COPD have an increased risk of depressive disorders, which further complicates the process of treatment and adaptation to the disease. Depression can affect adherence to therapy, reduce motivation to change lifestyle habits, and worsen the general condition of the patient (8).

Quality of life encompasses various areas of an individual's life. It refers to the socioeconomic status, physical and mental health, beliefs and attitudes, social support and living conditions of an individual. It is closely related to physical health because illnesses and the limitations that arise due to illnesses affect the overall experience of life and possibilities (5). Previous research has shown that patients who actively engage in physical and occupational therapy experience greater improvements in physical and mental health, such as improved cardiovascular function and reduced levels of depressive symptoms and anxiety (12). Overall psychosocial support for patients is also important due to the possibility of progression of symptoms of the disease itself and the need for increasing adaptation (13). Older patients have a harder time coping with psychological and physical changes and are therefore at greater risk of developing negative emotions and anxiety compared to younger patients (14). Previous research also indicates that female subjects have a lower quality of life and higher levels of anxiety and depression compared to male subjects (15).

Since there is no previous research about this topic in Croatia, it is believed that the results

could help raise awareness of the need to provide better and more comprehensive care for patients with COPD, which will include both health, social and psychological needs of the person.

The aim of this study is to examine differences in the severity of negative emotional states: depression, anxiety and stress and health-related quality of life, with regard to some personal characteristics of individuals with COPD.

Methods

Study design

This was a cross-sectional study.

Ethics

This research was conducted in accordance with the usual standards for ethical research, such as informing participants about the purpose of the research, the voluntary nature of participation, anonymity and confidentiality, and other. The study protocol was approved by the Ethics Committee of the General Hospital "Dr. Ivo Pedišić" Sisak, Croatia (decision dated February 27, 2023; Classification number: 2176-125-04-1278-5/23).

Participants

The research was conducted with 128 conveniently selected patients with COPD, who were treated at the Pulmonology clinic of the General Hospital "Dr. Ivo Pedišić" in Sisak. No specific inclusion or exclusion criteria were applied in the selection of participants.

Data collection and study tool

Data were collected from February to May 2023 in outpatient clinic admission of the Pulmonology clinic of the General Hospital "Dr. Ivo Pedišić" in Sisak, Croatia. Participants completed the questionnaire individually or through a structured interview with health workers if assistance was needed. The questionnaire included questions about personal characteristics, characteristics of general health status and burden with COPD. The questionnaire also contained two additional measurement instruments. The Depression, Anxiety and Stress Scale (DASS) (16, 17) and the St. George's Respiratory Questionnaire (SGRQ-S) (18). SGRQ-S was translated using the double translation method and adapted to the needs of the research. It consists of several units and indicators of the health-related quality of life. The total result refers to the level of limitations in health-related quality of life *(difficulties)*, and it is achieved in the differentially weighted and summed responses on all items together. The questionnaire consists of three subscales, namely the severity of symptoms, the severity of limitations in performing activities and the severity of the impact of the disease on quality of life *(symptom, activity and impact)*. The short version of DASS-21 is used to assess the severity of symptoms of stress, anxiety and depression. The total scores obtained on the subscales were multiplied by a factor of 2 (16). The DAS scale was translated and compared with previous translations. Both measurement instruments are freely available for use.

Statistical analysis

The research data were analysed using the SPSS statistical software package, version 24. Descriptive statistics were calculated, including frequencies, measures of central tendency, and dispersion. Pearson's correlation coefficient was used to assess the linear relationship between continuous variables, while t-tests were applied to evaluate mean differences between independent groups, consistent with the nature of our variables and research hypotheses. Cohen's d for t-tests and correlation coefficients for effect magnitude were calculated to facilitate the interpretation of the practical significance of the effect size measures. Before applying tests, the assumptions for the use of parametric statistical tests were verified. All p-values were two-sided, with the level of significance set at $\alpha = 0.05$.

Sample size

This was a cross-sectional survey conducted on a convenience sample of patients attending an outpatient clinic. The primary objective was to explore participants' opinions and

attitudes, as well as to examine differences in responses based on sociodemographic characteristics. As this was not an interventional or hypothesis-driven study designed to test specific treatment effects, a formal sample size calculation was not performed. Rather, we aimed to recruit as many participants as feasibly possible during the study period to provide a broad descriptive overview.

Results

The study included 128 participants, of whom 62 were male and 66 were female. The average age of the study participants was 62 years (C= 62; M= 59.99; sd=14.99; MIN=27; MAX=89). The majority of participants had completed secondary and high school education (38%) (The precise proportions are shown in Table 1).

Most participants have been living with COPD for 6 and 10 years (29%), rated their health as average (45%), and reported a moderate burden of COPD symptoms (50%). About 30% of them state that they experience significant or severe difficulties due to the disease. As many as 62% of participants reported having additional chronic illnesses for which they receive prescribed treatment, and approximately 59% reported taking medication for psychological disorders (Table 2).

According to norms (10), participants in this study, on average, experience severe anxiety (C=20; M=20.14±12.89), moderate stress (C=20; M=19.75±13.44) and moderate depression (C=16; M=17.20±13.59). The distribution of the results points to a significant difference from the normal distribution (Kolmogorov Smirnov test for individual scales ranges from 0.11 to 0.13; $p<0.01$). Cronbach alpha internal consistency coefficients indicate high to very high reliability of the measuring instrument (0.90 to 0.94).

On average, most participants reported fewer limitations and difficulties that impair their quality of life because of COPD. The participants achieved the minimum and maximum results expected in the theoretical range, as shown in Table 3. That is, from 0% to 100% of limitations that reduce the quality of life due to the disease according to the SGRQ-S manual (19). An average result of 43% was achieved on the estimated limitation (C=1391.80) (Table 3). On average, the percentage of symptom severity achieved was 60%. The percentage of the severity of activity limitations due to COPD was 45%, and the impact of the disease on quality of life was 39%.

Table 1. *Demographic data of the participants (N=128)*

	f	%
Sex		
Female	66	48
Male	62	52
Age (years)		
< 39	16	13
40-64	58	45
> 65	54	42
Education level		
Incomplete elementary school	7	5.5
Primary school	30	23
High school	48	38
College/university	23	18
Master's degree/doctorate	8	6.3

Table 2. *Distribution of respondents according to characteristics of living with COPD*

	f	%
Duration of disease		
Less than 6 months	9	7
7 months to 2 years	22	17
3 years to 5 years	26	20
6 years to 10 years	37	29
More than 11 years	34	27
Health self-assessment		
Very bad	10	7.8
Bad	30	23
Average	58	45
Good	26	20
Very good	4	3.1
Self-assessed difficulties living with COPD		
not at all	3	2.3
somewhat	22	17
moderately	64	50
quite	19	15
very	20	16
Additional chronic disease (in therapy)		
Yes	79	62
No	32	25
I don't know	17	13
Taking medication for mental disorders		
Never or almost never	15	12
Sometimes	20	16
Often	17	13
Uses prescribed therapy as needed	30	23
Uses prescribed therapy (daily)	46	36

Table 3. *Distribution of respondents according to characteristics of living with COPD*

	M	sd	C	min	max
$Difficulties_a$	1458.62	1001.22	1391.80	0.00	3201.90
$Symptom_b$	332.19	144.57	341.00	0.00	566.20
$Activity_c$	440.34	362.64	441.00	0.00	566.20
$Impact_d$	686.08	545.58	640.75	0.00	1652.80

Note: a. SGRQ total level of limitations in health-related quality of life; b. the severity of symptoms; c. the severity of limitations in performing activities; d. the impact of the disease on quality of life

Participants who report a higher level of limitations in health-related quality of life also report a higher level of stress (r=0.80; p<0.01), a higher level of anxiety (r=0.83; p<0.01) and a higher level of depression (r=0.80; p<0.01). The indicated Pearson correlation coefficients, as well as other intercorrelations between variables, are shown in Table 4.

Males and females equally report limitations in health-related quality of life and emotional states, which is confirmed by the statistically insignificant t-tests shown in Table 5. Only one significant difference was found. Compared to female participants (304.0±142.6), male participants (362.2±141.7) experienced significantly higher symptom severity, but with a small effect size (t=2.31; p<0.05; Cohen's d=0.41).

Since participants' age and the duration of the disease were moderately positively correlated (r=0.61; p<0.01), a partial correlation analysis was carried out. Results have shown a significant association between the age of the participants and the duration of the disease with health-related quality of life and negative emotional states.

Table 4. *Pearson correlation coefficients between the total level of limitations in health-related quality of life (difficulties, symptom, activity and impact) and negative emotional states (stress, anxiety and depression)*

	Difficulties	Symptom	Activity	Impact
Stress	0.80**	0.67**	0.70**	0.83**
Anxiety	0.83**	0.71**	0.73**	0.85**
Depression	0.80**	0.65**	0.70**	0.83**

*Note: **p<0.01*

Table 5. *Distribution of respondents according to characteristics of living with COPD*

	N	M	sd	t+	p
Difficulties					
Male	62	1531.08	1004.17	0.8	0.4
Female	66	1390.56	1001.30		
Symptom					
Male	62	362.18	141.67	2.3	0.02*
Female	66	304.02	142.60		
Activity					
Male	62	458.22	358.43	0.5	0.6
Female	66	423.55	368.51		
Impact					
Male	62	710.67	557.48	0.5	0.6
Female	66	662.99	537.40		
Stress					
Male	62	9.87	7.07	-0.01	1.0
Female	66	9.88	6.42		
Anxiety					
Male	62	10.42	6.84	0.6	0.6
Female	66	9.74	6.08		
Depression					
Male	62	8.74	6.96	0.2	0.8
Female	66	8.47	6.69		

*Note: *p<0.05; +df=126*

Older participants show a significantly higher level of limitations in health-related quality of life (r=0.28; p<0.01), higher severity of limitations in performing activities (r=0.32; p<0.01) and higher impact of the disease on quality of life (r=0.27; p<0.01), as indicated by the statistically significant Pearson correlation coefficients shown in Table 6. They also express higher levels of anxiety and depression, which are independent of the duration of COPD (controlled variable) (r=0.22; p<0.05). On the other hand, the duration of the disease, independent of the age of participants, is significantly associated with the perceived severity of symptoms (r=0.32; p<0.01) and stress (r=0.21; p<0.05) but not with the severity of limitations in performing activities, or depression. The remaining values of the correlation coefficients are similar to the association of age with the tested correlates (Table 6).

Table 6. *Pearson correlation coefficients between the total level of limitations in health-related quality of life (difficulties, symptom, activity and impact) and negative emotional states (stress, anxiety and depression) and characteristics of patient age and disease duration*

	Age$_a$	**Disease duration$_b$**
Difficulties	0.28**	0.27**
Symptom	0.10	0.32**
Activity	0.32**	0.17
Impact	0.27**	0.28**
Stress	0.17	0.21*
Anxiety	0.22*	0.23**
Depression	0.22*	0.17

*Note: **p<0.01; *p<0.05; a. control for disease duration; b. control for age*

Discussion

The results of this study showed that there is a significant relationship between certain aspects of the perceived health-related quality of life and the expression of negative emotional states: depression, anxiety and stress in people with COPD. The overall estimated limitations in health-related quality of life, as well as its individual components (symptom, activity and impact) were positively related to the expression of negative emotional states (depression, anxiety and stress).

The results of this research are consistent with previous findings. Eisner's research showed an extremely high risk of a decrease in the quality of life of patients who experience depressive, anxious or stressful changes due to the symptomatology of the underlying disease (19). A study by Murphy, Lau, and Agius found that age was associated with lower quality of life and higher levels of depression, anxiety, and stress (20). A study conducted by Schneider and colleagues on 35,000 subjects with COPD over a 10-year period, showed that people with severe COPD are twice as likely to develop depression compared to people with mild COPD (21).

In terms of the differences investigated among participants, a significant association was found between the age of participants and the duration of disease with the overall assessment of limitations in health-related quality of life and anxiety as an emotional state. Different significant associations were found when individual components were observed. Older age was associated with the severity of activity limitations and estimated higher level of depression. Duration of illness, unlike participants' age, was significantly associated with the level of symptom burden and expressed anxiety. Contrary to the assumed hypotheses and findings from previous research (15, 22),

only a significant difference in the burden of COPD symptoms was found according to the gender of the participants. Male participants reported more limitations in this aspect of health-related quality of life.

Although previous research indicated that female subjects have a lower quality of life and higher levels of anxiety and depression compared to male subjects (15), some other studies did not support that conclusion. A study conducted by Turan et al. to determine the impact of anxiety and depression on the treatment of patients with COPD showed that the anxiety sensitivity index increased at each check-up (10). Results have shown a higher level of anxiety and a higher level of depression, but no significant differences were found in relation to age, gender, level of education and the presence of comorbidities. More recent research suggests that gender differences may influence the development and progress in the treatment of diseases (23). Regarding the association between negative emotional states and the occurrence of symptoms of depression, anxiety and stress, the Matera study did not show a statistically significant difference with respect to the gender of the subjects (23, 24).

Schneider's data confirmed the association between reduced quality of life and higher levels of anxiety, depression, and stress with age. Younger subjects had higher quality of life and lower levels of anxiety, stress, and depression than older subjects (21). Older subjects had significantly more difficulty tolerating the physical symptoms of COPD and the association of symptoms with negative emotional states (25). A study by Eisner et al. found that subjects with COPD were 85% more likely to develop symptoms of anxiety disorders than matched healthy control subjects (19). Eisner's study included controlled variables based on demographic characteristics and disease stage. The data obtained showed a higher number of anxiety states in patients with longer and more severe disease (19). That was also shown in this study since a significant association was found between the duration of the disease and negative emotional states of stress, depression and anxiety.

The results from previous studies show a lower health-related quality of life and higher levels of depression, anxiety and stress in patients who have been treated for a longer period. In a study conducted by Maurer et al., the results showed that the prevalence of depression is higher in patients who have recently recovered from an acute exacerbation, which significantly affects the reduction of quality of life. The study focused on respondents with a more severe degree of illness in whom the prevalence of depression ranged from 37 to 71% and the prevalence of anxiety from 50 to 75%, which is higher than the prevalence rates in other advanced diseases such as cancer, AIDS, heart disease, and kidney disease (11). The results of Stage's study showed an association between the duration of illness and the occurrence of a lower quality of life and negative emotional states (26).

This study has several limitations that should be acknowledged. First, the sample was based on a convenience sample of patients attending a single outpatient clinic, which may limit the generalisability of the findings to broader populations. Additionally, no formal sample size calculation was conducted prior to data collection. As this was an exploratory, cross-sectional study without predefined hypotheses, we aimed to include as many participants as practically possible during the study period. Furthermore, data were collected by medical staff working in the outpatient clinic, which may have influenced participants' responses due to researcher reactivity. It is also possible that certain unmeasured factors specific to the place of residence or individual characteristics—such as poverty, and personal experiences contributing to severe emotional distress (e.g., PTSD in war veterans, or trauma and loss due to the 2020 earthquake in Sisak)—may have influenced both the emotional state and health-related quality of life of the participants as confounding variables.

Conclusion

The results of this study suggest that there is a significant correlation between health-related quality of life and psychological emotional states, as an indicator of mental health in patients with COPD. This relationship becomes more significant with the increasing age of the patients and the duration of the disease. COPD is a chronic incurable disease whose prevalence in the world is continuously increasing. With the increase in the number of patients and the extension of life expectancy, there is an increasing need to involve numerous experts from different professions (e.g. psychologists, social workers, clerics) in order to provide patients with a longer and higher quality of life. To improve the quality of healthcare services, in line with the theoretical assumptions of the biopsychosocial model of health, it is necessary to incorporate an interdisciplinary approach in planning medical care and treatment for patients with COPD.

Declarations

Aknowledgements: This study was part of Lucija Caren's Master of Nursing thesis, which was originally written and defended in Croatian. The thesis is available in the online repository: https://urn.nsk.hr/urn:nbn:hr:224:171597

Authors' contributions: LC and LS contributed to the study design; LC was responsible for data collection; LC and LS conducted the data analysis; LC, MČ, and LS participated in the interpretation of the data; LC wrote the first draft of the manuscript; LC, MČ, and LS revised the manuscript critically for important intellectual content. All authors approved the final version of the manuscript.

Ethics considerations: The study protocol was approved by the Ethics Committee of the General Hospital "Dr. Ivo Pedišić" Sisak, Croatia (decision dated February 27, 2023; Classification number: 2176-125-04-1278-5/23). Participation was voluntary and anonymous. Participants did not receive any compensation for taking part in the study. All methods were carried out in accordance with relevant guidelines and regulations.

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Job Satisfaction Among Nurses in the Republic of Croatia: A Cross-Sectional Study

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Abstract

Background: Job satisfaction can be defined as a feeling of fulfilment or happiness related to all or specific aspects of work. It is generally assessed through certain job characteristics such as compensation, benefits, interpersonal relationships, and work organization. Employee dissatisfaction can lead to burnout syndrome as well as other mental and physical illnesses that negatively affect their quality of life.

Aim: The aim of this study was to examine the degree of job satisfaction amongst nurses at primary, secondary and tertiary level of healthcare in the Republic of Croatia.

Methods: The study was conducted using an online survey distributed to respondents via social media and email. The Job Satisfaction Survey (JSS), with 36 items and nine facets created by Spector P.E., was used to assess job satisfaction amongst nurses. We added six sociodemographic items to this survey.

Results: A total of 372 nurses participated in this study. The highest score was obtained for the facet nature of work (M = 16.4; SD = 3.3) and lowest for pay (M = 9.3; SD = 3.4). Only 10% of respondents reported overall job satisfaction, 54% were ambivalent, and 36% expressed dissatisfaction. There was no statistical difference between job satisfaction and the level of education ($P > 0.05$). More than 50% of participants were dissatisfied with pay, promotion and fringe benefits ($P < 0.001$) while 56% of participants felt that their work was not adequately appreciated.

Conclusion: Considering the results obtained from this study, we conclude that many nurses in the Republic of Croatia are quite dissatisfied in some facets of their job such as pay, promotion and benefits and satisfied or ambivalent in others such as job characteristics or supervisors. It's important to conduct job satisfaction studies and investigate the causes of dissatisfaction at a national level, involving a larger number of healthcare nurses, to proactively influence and prevent the consequences of dissatisfaction.

Keywords: job satisfaction, nursing, work environment

Introduction

Job satisfaction is one of the most important factors that influence nurses' performance at their workplace. Workers who are appreciated in their profession show greater job satisfaction, trust in the work organization, self-confidence, lower job change intention and absence from work (1). Job satisfaction is positively associated with a worker's mental health. Job dissatisfaction can contribute to burnout, lower productivity and healthcare quality (2). Factors that contribute to job satisfaction are work environment, relationship with management, participation in decision making, adequate staffing, patient improvement and recovery, support of co-workers and supervisors and safety of care for patients (3). Job dissatisfaction can be caused by insufficient resources, poor safety and organization, work overload and lack of support from co-workers. Healthcare organizations are more prone to stressful situations and conflicts, which can negatively affect both interpersonal relationships among staff and interactions with patients (4). Leadership plays a key role in enhancing job satisfaction by fostering a positive work environment, encouraging healthy interpersonal relationships, and promoting excellence in healthcare delivery and patient safety (3).

Satisfaction as an attitude contains cognitive, affective, and evaluative components (5). The cognitive component refers to a set of specific beliefs and assumptions about the job, the affective consists of feelings towards the job and the evaluative provides the final assessment of the job. Moreover, job satisfaction is not just an attitude but also a reflection of a person's inner state and it is related to a sense of achievement. It is subjective and individual because one person can feel satisfied with a job overall and another with just a part of it even if working in the same workplace (6). Motivation, achievement and positive attitude greatly determine job satisfaction of individual workers (5). In the nursing profession job satisfaction arises from a series of employee interactions that are linked to specific attitudes toward work and external factors that influence the work environment (7).

There are two main aspects of job satisfaction: personal or intrinsic and organizational or extrinsic (8, 9). The personal aspect contains important factors such as: personal disposition, mood, emotions, personal interest and work balance, age and work experience, status and overall satisfaction with quality of life (8, 10). Factors reflecting the organizational aspect originate from the healthcare institution itself or the broader work environment. These include job characteristics, opportunities for promotion, relationships with colleagues and supervisors, salary, rewards and recognition, working conditions, and job security. (8, 10).

A worker's personality, the situation at work, organizational values and culture, social influence and social groups are also determinants of job satisfaction (11, 12). Behaviour, thoughts and emotions as well as work tasks can shape how a worker perceives his job. Social values and culture can influence organizational values and culture and can modify a person's job satisfaction.

Motivation and job satisfaction are interrelated and not synonymous. Motivation is described as the desire and strong effort to achieve a goal, while satisfaction is the sense of fulfilment that results from attaining that goal. Motivation suggests a strong effort for a result, and satisfaction is the consequence of that result. Based on this, it can be concluded that employees can be motivated but simultaneously dissatisfied with their job, and vice versa (13). The ideal would be to have workers that are both motivated and satisfied with their jobs. Therefore, it is important for managers to understand motivation and keep workers motivated and happy in the workplace. Workers who are satisfied with their job are more efficient and effective and that means that organizational goals are achieved more easily (14).

Methods

Study design

We conducted a cross-sectional study. The aim of this study was to examine the degree of job satisfaction among nurses at the primary, secondary and tertiary level

of healthcare in the Republic of Croatia and to determine whether there is a difference based on gender, age, education level, and work experience.

According to the aim of this study we constructed the following hypotheses:

H1: Participants with a higher level of education show greater job satisfaction.

H2: More than 50% of participants employed in primary, secondary and tertiary healthcare feel that their work is not sufficiently valued.

H3: A positive correlation between years of work experience and job satisfaction is assumed.

Ethics

Ethics Committee of the Catholic University of Croatia approved this study protocol (document number 498-15-06-02-002).

Participants and data collection

The participants were nurses employed at primary, secondary and tertiary healthcare level in the Republic of Croatia. Participation in the study was anonymous and voluntary. The survey was distributed, and data were collected between March 4, 2023, and March 31, 2023.

Data were collected by an online questionnaire that was hosted on the Google Form platform. The link to the questionnaire was distributed on social media (Facebook groups: Medicinske sestre/tehničari – Glas sestrinstva, Medicinske sestre i tehničari – međusobna pomoć (pretrage, naručivanje, ankete), Medicinske sestre/tehničari Zadarske županije, Medicinske sestre – medicinski tehničari, Medicinske sestre/tehničari zajedno – Split i Medicinske sestre i tehničari – Slavonski Brod) and by electronic mail to personal contacts of authors (convenience sampling). The first part of the questionnaire consisted of five socio-demographic questions (sex, age, level of education, work experience and workplace). The Job Satisfaction Survey (JSS) designed by Spector (15) was used as the second part of the questionnaire for assessing job satisfaction of participants. JSS was available to use free of charge and contained 36 items. The original questionnaire was designed as a six-point Likert-based scale, but we changed it to a five-point scale where 1 meant *completely disagree* and 5 meant *completely agree*. Since survey scoring contains an ambivalent range of scores, we believe that it was important to allow participants to express their neutral opinion. That was only possible by changing an even-point to an odd-point Likert-based scale. Also, odd-point (five and seven) Likert based scales are more common in research (16) which makes it more comparable to other surveys (17). Finally, a five-point scale was preferred over a seven-point one because it was simpler and has less cognitive load. According to the scale change, we adapted the original scoring scale where 4 to 10 points meant dissatisfied, 10 to 13 points ambivalent and 13 to 20 points satisfied for single facets. For overall satisfaction, we adapted the original scoring scale so that 36 to 90 points meant a dissatisfied participant, 90 to 120 ambivalent and 120 to 180 satisfied.

Statistical analysis

Collected data were analysed with IBM SPSS Statistic 23.0. (SPSS, Chicago, IL, USA). For descriptive statistics, frequencies, percentages, means and standard deviations were used. Normality of data distribution was checked with Kolgomorov-Smirnov test. In case of numerical variables ANOVA was performed and Pearson correlation coefficient was calculated for testing correlation. Chi square test was performed where applicable (categorical variables).

Results

There were 372 participants in this survey which is very close to the calculated sample size of 380. Their socio-demographic data is presented in Table 1. Most of the participants were females (92%) and the largest age group was between 36 and 45 years old (37%). The largest group by work experience was between 11 and 20 years (33%) and more than 40% had a bachelor's degree. Groups formed by workplace healthcare level were almost equal in size.

Table 1. *The participants' sociodemographic data*

Variable		N (%)
Sex	Female	342 (92)
	Male	30 (9.1)
Age (years)	18-25	55 (15)
	26-35	117 (32)
	36-45	139 (37)
	46-55	41 (11)
	56-65	20 (5.4)
Work experience (years)	<5	52 (14)
	5-10	87 (23)
	11-20	121 (33)
	21-30	80 (22)
	31-40	25 (6.7)
	>40	7 (1.9)
Education level	High school	122 (33)
	Bachelor	156 (42)
	Master	90 (24)
	Doctorate	4 (1.1)
Workplace healthcare level	Primary	103 (28)
	Secondary	130 (35)
	Tertiary	139 (37)

Table 2 presents descriptive parameters for nine facets of job satisfaction as well as the overall job satisfaction. Mean score is the highest for *Nature of work* (16.4±3.3) and lowest for *Pay* (9.3±3.4). Overall job satisfaction is 115.6 ± 19.9 which means that participants are ambivalent about their job satisfaction on average. Although results of Kolgomorov-Smirnov test show significant differences from normal distribution we conducted our analysis with parametric statistical methods since they show robustness (18).

More than half of participants are ambivalent about job satisfaction (54%), 135 (36%) are dissatisfied and only 36 (10%) are satisfied. Table 3 shows a difference in the overall job satisfaction for different levels of education. ANOVA test results show that the difference is not significant ($P > 0.05$). A PhD level is excluded from this analysis since there were only few participants with a PhD degree.

We tested the difference of nine facets of job satisfaction and overall job satisfaction between participants who were dissatisfied and those who were ambivalent or satisfied (Table 4). Results show that significantly more than 50% of participants are dissatisfied in three facets, namely *pay*, *promotion*, and *fringe benefits*.

More than half (56%) of participants think that their job isn't adequately appreciated, and that difference is significant ($P < 0.05$) compared to participants who do not agree with that statement. We also obtained results which show weak but significant negative correlation between job satisfaction and work experience ($r = - 0.135$, $P < 0.05$). That means that participants with longer work experience are less satisfied with their jobs.

Table 2. *Descriptive parameters of job satisfaction*

Facet	Min	Max	M	SD	Skewness	Kurtosis	P*
Pay	6	20	9.3	3.4	0.9	0.0	< 0.001
Promotion	5	21	9.7	3.6	0.7	0.0	< 0.001
Supervision	6	22	15.4	4.1	-0.3	-0.7	< 0.001
Fringe benefits	6	19	10.2	3.2	0.4	-0.6	< 0.001
Contingent rewards	9	21	13.7	2.4	0.5	-0.3	< 0.001
Operating procedures	7	23	12.3	3.5	0.3	-0.6	< 0.001
Coworkers	6	22	14.0	3.3	0.1	-0.4	< 0.001
Nature of work	5	21	16.4	3.3	-0.7	0.2	< 0.001
Communication	7	23	14.6	3.5	0.0	-0.3	< 0.001
Overall job satisfaction	69	167	115	19	0.3	-0.3	< 0.05

* Kolmogorov-Smirnov test

Table 3. *Overall job satisfaction and level of education*

Education level	M	SD	F	Df	P*
High school	116	20.5	0.6	2	0.55
Bachelor	116.7	20.0			
Master	113.8	19.0			

*ANOVA

Table 4. *Difference between dissatisfied and ambivalent/satisfied*

Facet	Dissatisfied N (%)	Ambivalent/Satisfied N (%)	P*
Pay	307 (83)	65 (18)	< 0.001
Promotion	294 (79)	78 (21)	< 0.001
Supervision	89 (24)	283 (76)	< 0.001
Fringe benefits	283 (76)	89 (24)	< 0.001
Contingent rewards	124 (33)	248 (67)	< 0.001
Operating procedures	187 (50)	185 (50)	0.97
Coworkers	134 (36)	238 (64)	< 0.001
Nature of work	48 (13)	324 (87)	< 0.001
Communication	135 (36)	237 (64)	< 0.001
Overall job satisfaction	104 (28)	268 (62)	< 0.001

* Chi Square

Discussion

As anticipated, the sample was predominantly composed of female nurses, with the majority holding a bachelor's degree in nursing. Overall job satisfaction was reported by the smallest proportion of respondents, whereas the highest proportion expressed ambivalence. The analysis revealed no statistically significant differences in job satisfaction scores across the three levels of education, and consequently, the first hypothesis (H1) could not be confirmed. The second hypothesis (H2) proposed that more than 50% of nurses employed in primary, secondary, and tertiary healthcare settings feel that their work is not sufficiently valued. As 56% of participants agreed with this statement, the hypothesis was confirmed. Furthermore, we hypothesized a positive correlation between work experience

and job satisfaction (H3); however, the results indicated a negative and very weak correlation, contrary to expectations. A significantly greater proportion than 50% of participants reported dissatisfaction with pay, opportunities for promotion, and fringe benefits.

The nursing shortage and increased turnover represent the current global problem that is directly related to job satisfaction (19, 20). Healthcare organizations and nursing managers should determine strategies to improve job satisfaction among nurses. Job satisfaction among nurses is correlated with job stress, collaboration with physicians and autonomy pointing out importance of improving work environment (20). Contrary to our findings, the Swiss acute care hospital nurses are very satisfied with their jobs (21). Independence at work, professional status and sick leave were highly scored in that survey. Pay is highly appreciated among Swiss nurses (65%) which is also opposite to our survey results. A survey conducted among nurses in Osijek in 2015 presented findings comparable to those of the present study. Participants reported dissatisfaction with pay, promotion opportunities, and fringe benefits, as well as with communication and recognition. The mean overall job satisfaction score indicated ambivalence, and no significant differences were observed across different workplace settings" (22). Another study conducted in Rijeka Clinical Hospital Centre demonstrated a positive correlation between the length of work experience and the perception of human relationship. It also revealed that nurses working in operating rooms reported higher levels of job satisfaction compared to those employed in surgical departments (23). Although we used similar but not the same variables, these results are opposite from ours. A study conducted in two Croatian clinical hospitals (7) found that nurses with less work experience reported higher levels of job satisfaction. Additionally, a statistically significant difference in satisfaction levels was observed between the two hospitals, with only 5% of participants expressing overall job satisfaction. A study conducted among nurses working in palliative care (24) showed that those with higher levels of education reported greater job satisfaction. Overall job satisfaction in that study was also higher compared to the results of our research, although it was assessed using different measurement scales. Surgical nurses at Sestre milosrdnice University Hospital Centre reported dissatisfaction with work organization and, to some extent, with their assigned tasks (25). However, they expressed satisfaction with workplace safety and job security.

It can be observed that numerous surveys on job satisfaction have been conducted and published in the Republic of Croatia, with the majority indicating that nurses are generally dissatisfied with their jobs. While some of the reported correlations and differences are inconsistent with our findings, others support our results. However, it is important to note that the aforementioned surveys were conducted in one or, at most, two hospitals, and included a relatively small number of participants—often fewer than 70 and never exceeding 150–200. In contrast, our study included nearly 400 participants from various healthcare institutions across Croatia. Nonetheless, there remains significant potential for conducting a large-scale national study on job satisfaction among nurses, especially considering that there are over 30,000 nurses employed in the Republic of Croatia. We believe that our study provides valuable preliminary insights and serves as a useful screening tool for obtaining more representative national data.

It is important to acknowledge that the global context of nurses' job satisfaction may differ significantly from the results observed in our study. As we mentioned, Swiss nurses are more satisfied than Croatian ones (21). A Polish study (26) found that 26% of nurses reported being fully satisfied with their jobs, which is a considerably higher percentage than in our study. Another study conducted in Poland demonstrated a positive correlation between job satisfaction and work experience among family nurses (27). In Australia, among nurses working in rural hospitals, 28% reported full job satisfaction and 38% reported moderate satisfaction (28), indicating a relatively low

level of overall dissatisfaction, comparable to the situation in Switzerland. Findings from a study conducted in Brazil also contrast with the results of our research, as nearly 74% of participants reported being satisfied with their jobs, and their satisfaction was positively correlated with both education level and work experience (29). Finally, 44% of nurses in Ethiopia reported being satisfied with their jobs, with job satisfaction showing a positive correlation with perceived job security (30). Therefore, job satisfaction all over the world varies significantly between different countries and continents. The national economic strength, cultural context, and the social status of nurses may play a significant role in shaping job satisfaction. Additionally, differences in sample size and research methodology may account for the variations observed between studies. Still, it is important to continue exploring this topic and to find ways to improve job satisfaction among nurses.

This study has several limitations. Data collection was conducted over a period of approximately one month. The survey link was distributed through Facebook groups and personal email addresses, which limited our ability to verify that all respondents were Croatian nurses or that each individual completed the questionnaire only once. As the survey was conducted online, we could not entirely exclude the participation of nurses outside the Republic of Croatia. Nevertheless, this risk was minimized by the fact that the survey was written in Croatian. Furthermore, due to the anonymous nature of the survey, we did not collect any personal identifiers, which made it impossible to detect or prevent repeated participation by the same individual. Changing a six-point Likert scale into a five-point scale has some benefits but also some disadvantages such as lower scale sensitivity.

Conclusion

Job satisfaction is a complex yet an important issue for nurses in the Republic of Croatia. It should not be neglected by healthcare organizations and nursing managers. High rate of dissatisfied and ambivalent nurses shows that there is large opportunity area for improvement. The government and society should engage in facets that contribute externally to job satisfaction such as pay or appreciation. Pay, promotion and fringe benefits got the highest dissatisfaction scores. Supervisors, healthcare organizations and the government should have that in focus when developing strategies for human resources in nursing. Since pay is mostly out of supervisors' control in the public health system, they could focus on employee's personal development and a fair treatment of members in the healthcare team. Future research could investigate possible relationships between dissatisfaction facets and job quitting intentions.

Declarations

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Assessment of Dietary Habits Among Healthcare Workers in Morning and Shift Work: A Cross-Sectional Study

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Abstract

Background: A proper diet plays a major role in preserving the quality of life and health for each individual. For healthcare workers, shift work can result in irregular and poor-quality dietary intake, which can lead to the development of health problems and chronic diseases.

Aim: This study aimed to analyse dietary habits among healthcare workers based on their work schedules (morning shifts vs. rotating/shift work) using validated dietary assessment tools.

Methods: A cross-sectional study was conducted from December 2023 to March 2024 in various departments of the Merkur Clinical Hospital. A total of 147 participants (physicians, nurses, and healthcare assistants) were surveyed using two validated instruments: the Mediterranean Diet Adherence Screener (MEDAS) and the Mediterranean Diet Serving Score (MDSS). Descriptive statistics and t-tests were used to compare dietary patterns between groups, with p-values <0.05 considered statistically significant.

Results: A statistically significant difference was observed in dessert consumption, with morning shift workers consuming sweets more frequently ($M = 3.67$, $SD = 2.39$) than shift workers ($M = 2.70$, $SD = 2.21$; $p < 0.05$). In contrast, shift workers consumed significantly more wine than morning shift workers ($M = 1.04$, $SD = 1.71$ vs. $M = 0.41$, $SD = 0.75$; $p < 0.05$).

Conclusion: The findings suggest that work schedules are associated with distinct dietary patterns among healthcare workers. Morning shift workers show a preference for sweets, while shift workers consume more alcohol. These results highlight the need for targeted workplace dietary interventions, including improved access to healthy meals and strategies to promote balanced eating across all shifts.

Keywords: dietary habits, healthcare workers, rotating/shift work, morning shifts, Mediterranean Diet

Introduction

A proper diet plays a crucial role in ensuring quality of life and preventing chronic diseases. Among various dietary models, the Mediterranean diet stands out for its health benefits, as it emphasizes unsaturated fats, vitamins, and fibre while limiting the intake of saturated fats (1). In healthcare settings, dietary habits of workers—particularly those working in rotating or shift schedules—are often suboptimal. Shift work disrupts regular meal patterns, promoting the consumption of high-calorie snacks such as crisps, chocolates, and vending machine foods. This behaviour may support short-term alertness but compromises nutritional quality. Inadequate water intake and excessive consumption of stimulants like coffee and tea are also common (2, 3).

Shift work in Croatian hospitals typically includes 12-hour day or night shifts, often followed by 48 hours off. However, some workers are also engaged in 8-hour shifts, 24-hour on-call duties, or split shifts. Despite this diversity, the most common arrangement remains the 12-hour rotation (4). Extensive research links shift work to various health risks, including metabolic disorders, sleep disturbances, gastrointestinal problems, and even malignancies such as colorectal and breast cancer. These health risks may be mediated in part by poor dietary habits that accompany irregular work hours (5-7). Yet, less attention has been paid to how dietary behaviours themselves may affect the overall wellbeing of healthcare shift workers. Evidence suggests that improper diet and lack of physical activity among shift workers can lead to obesity, micronutrient deficiencies, and increased risk of cardiovascular, gastrointestinal, and endocrine disorders (6, 8). Understanding the dietary habits of healthcare workers across different shift types is therefore essential. This study aimed to investigate differences in dietary behaviours among those working rotating/shift schedules and those on regular morning shifts. Specific attention was given to meal regularity, type of food consumed, and food preparation practices during working hours. The study also utilized validated instruments to assess adherence to the Mediterranean dietary pattern.

Methods

Study design

This was a cross-sectional study.

Ethics

The study was approved by the Ethics Committee of the Merkur Clinical Hospital, Zagreb (Reference number: 03/1-8954). Participants provided written informed consent and were assured of anonymity, research-only data use, and the right to withdraw at any time.

Participants and data collection

Participants were physicians, nurses and healthcare assistants from various departments of the Merkur Clinical Hospital, including the University Clinic for Diabetes and Endocrinology; the Clinic for Internal Medicine; the Clinic for Surgery; the Department of Urology; the Clinical Department of Medical Biochemistry and Laboratory Medicine; the Clinical Department of Diagnostic and Interventional Radiology; the Department of Otorhinolaryngology; and the Department of Anaesthesiology, Intensive Care Medicine, and Pain Management. Participants were eligible for inclusion if they were actively employed at the hospital during the study period, provided written informed consent, and completed the dietary questionnaire in full. Individuals were excluded if they declined to participate, submitted incomplete questionnaires, or held administrative or non-clinical roles.

The study was conducted between December 2023 and March 2024. Participants were selected through direct distribution of paper-based questionnaires in hospital departments during working hours. In this study, various forms of shift work were represented, reflecting the operational organization of the hospital. These included morning and afternoon alternating shifts (typically consisting of 8-hour shifts rotating weekly or biweekly), regular rotating shifts involving

12-hour day and night duties, and extended on-call shifts that may last up to 24 hours. Although these formats differ in duration and frequency, they share several common characteristics such as circadian disruption, irregular meal timing, and restricted access to balanced meals during work hours. For analytical purposes, these work patterns were grouped under the collective category of "rotating/shift work" (n = 107), in line with previous literature that treats these formats as similarly disruptive to health-related behaviours and metabolic regulation. The comparator group (n = 40) consisted of participants working standard 8-hour morning shifts, usually scheduled between 07:00 and 15:00. These workers followed more structured daytime routines and had greater opportunity for regular meal planning. The division into "morning shift" and "rotating/shift work" categories enabled comparison of dietary habits in relation to work schedule, particularly regarding adherence to the Mediterranean diet. Data were collected using paper-based questionnaires. The primary instruments employed in this study were the Mediterranean Diet Adherence Screener (MEDAS) and the Mediterranean Diet Serving Score (MDSS). MEDAS is a 14-item tool developed as part of the PREDIMED study, specifically designed to assess adherence to the Mediterranean dietary pattern. MDSS consists of 15 items that measure the frequency of consumption of various food groups. In this study, the MDSS demonstrated internal consistency with a Cronbach's α of 0.558, while the MEDAS exhibited higher reliability, with a Cronbach's α of 0.829, based on its validation in the Croatian context (1, 8). The following variables were systematically recorded: demographic characteristics, including age, gender, professional qualification, length of service, and work shift type. Additionally, dietary habits were assessed, encompassing meal regularity, food types consumed, frequency of vending machine usage, and adherence to the Mediterranean diet.

Statistical analysis

Two hypotheses were formulated for the study. The first hypothesis (H1) posits that healthcare personnel working rotating or shift work consume a greater quantity of sweets than those working exclusively morning shifts. The second hypothesis (H2) suggests that healthcare personnel working rotating or shift work consume more alcohol, specifically wine, than those working only morning shifts.

For statistical analysis, participants were grouped into two categories: morning shift (n = 40) and rotating/shift work (n = 107), combining all forms of shift-based schedules for comparative purposes. Descriptive statistics were used to summarize participant demographics and dietary variables. Differences between healthcare workers in morning shifts and those in rotating/shift work were assessed using independent samples t-tests. A p-value of < 0.05 was considered statistically significant. No effect sizes were calculated, and assumptions of the t-test such as normal distribution were not tested. Statistical analysis was conducted using IBM SPSS Statistics for Windows, version 26.0 (SPSS Inc., Chicago, USA).

Results

A total of 147 healthcare professionals participated in the study. Table 1 presents detailed sociodemographic characteristics, including age, gender, educational attain-ment, years of service, and type of work schedule. In terms of age, 30% of participants were 50 years or older, followed by the 19–29 years group (25%). Most respondents were female (78%), while 22% were male. Regarding education, only 6.8% of participants reported having a postgraduate degree, while the majority held a bachelor's or secondary degree in healthcare. Work experience varied: 35% had 0–10 years, 29% had 11–20 years, and the remainder had over 20 years of service. Types of work schedules included: morning shift only (27%), morning and afternoon rotating shifts (25%), regular rotating/shift work (28%), shift work combined with on-call duty (20%).

The dietary habits of healthcare workers were assessed using the Mediterranean Diet Serving Score (MDSS) questionnaire, which

evaluates the frequency of consumption of food groups associated with the Mediterranean dietary pattern. The results are presented in Table 2, which compares mean consumption frequencies of individual food categories between participants working morning shifts and those working rotating/shift schedules. A statistically significant difference was observed in dessert/sweet consumption, with shift workers consuming more desserts/sweets (M = 3.39, SD = 1.70) than morning shift workers (M = 2.35, SD = 1.51), t (145) = -3.4, p<0.01. This finding contradicts the initial hypothesis (H1), which assumed that morning shift workers would consume more sweets. No other statistically significant differences were found between the groups in the consumption of grains, vegetables, legumes, dairy products, meats, or other Mediterranean food components. However, a trend was observed toward higher consumption of nuts and fish among morning shift workers, although these differences did not reach statistical significance.

The dietary habits of healthcare workers were further assessed using selected items from the Mediterranean Diet Adherence Screener (MEDAS), which measures specific food and drink consumption behaviours. The results are presented in Table 3, comparing mean responses between participants working morning shifts and those engaged in rotating/shift schedules. A statistically significant difference was found in wine consumption, with shift workers reporting higher intake (M = 1.04, SD = 1.71) than morning shift workers (M = 0.41, SD = 0.75), t (141) = -2.2, p < 0.05. Additionally, a statistically significant difference was observed in the consumption of non-homemade sweets/cakes, which were consumed more frequently by morning shift workers (M = 3.67, SD = 2.39) compared to shift workers (M = 2.70, SD = 2.21), t (143) = 2.3, p< 0.05. No other statistically significant differences were found between the groups for other dietary behaviours included in the MEDAS questionnaire.

Table 1. *Sociodemographic characteristics of study participants (N=147)*

Variable	Category	Frequency (n)	Percentage (%)
Age	19-29 years	37	25
	30-39 years	34	23
	40-49 years	32	22
	50+ years	44	30
Gender	Male	33	22
	Female	114	78
Educational attainment	Secondary education	49	33
	Bachelor's degree	88	60
	Postgraduate degree	10	6.8
Years of service	0–10 years	51	35
	11–20 years	42	29
	21–30 years	35	24
	31+ years	19	13
Shift work concept	Morning shift	40	27
	Morning and afternoon shift	36	25
	Shift work	41	28
	Shift work and on-call duty	30	20

Note: Values are presented as frequency (n) and percentage (%). Work schedule categories were self-reported.

Table 2. *Mediterranean Diet Serving Score (MDSS) by Work Schedule (N Morning Shift = 40; N Shift Work = 107)*

Food Group	Morning Shift (M ± SD)	Shift Work (M ± SD)	t (df)	p-value
Grains	1.68 ± 0.80	1.93 ± 1.03	-1.4 (145)	> 0.05
Potato	3.98 ± 0.92	4.16 ± 1.18	-0.9 (145)	> 0.05
Olive oil	3.30 ± 1.71	3.47 ± 2.04	-0.5 (145)	> 0.05
Nuts	4.33 ± 1.80	3.76 ± 1.65	1.8 (145)	> 0.05
Fruit	2.13 ± 1.31	2.65 ± 1.67	-1.8 (145)	> 0.05
Vegetables	2.10 ± 1.01	2.13 ± 1.20	-0.1 (145)	> 0.05
Milk and dairy products	2.17 ± 1.15	2.39 ± 1.43	-0.9 (145)	> 0.05
Legumes	4.00 ± 0.93	4.13 ± 1.22	-0.6 (145)	> 0.05
Eggs	4.22 ± 1.23	3.80 ± 1.32	1.8 (145)	> 0.05
Fish	5.35 ± 0.86	5.02 ± 1.15	1.7 (145)	> 0.05
White meat	3.55 ± 0.90	3.48 ± 1.25	0.3 (145)	> 0.05
Red meat	3.83 ± 0.84	3.89 ± 1.22	-0.3 (145)	> 0.05
Desserts/sweets	2.35 ± 1.51	3.39 ± 1.70	-3.4 (145)	< 0.01
Juice	4.38 ± 2.15	4.87 ± 1.96	-1.3 (145)	> 0.05
Wine	5.73 ± 1.85	5.29 ± 1.83	1.3 (145)	> 0.05

Note: M – Mean; SD – Standard Deviation; t(df) – t-value with degrees of freedom; p – p-value from independent samples t-test

Table 3. *Selected Mediterranean Diet Adherence Screener (MEDAS) Items by Work Schedule (N Morning Shift = 40; N Shift Work = 107)*

MEDAS Item	Morning Shift (M ± SD)	Shift Work (M ± SD)	t (df)	p-value
Use olive oil as main fat source (1 = No; 2 = Yes)	1.40 ± 0.50	1.44 ± 0.50	-0.4 (145)	> 0.05
Olive oil consumed daily (spoonfuls)	2.75 ± 2.01	2.11 ± 1.90	1.8 (143)	> 0.05
Daily vegetable servings (200 g)	1.21 ± 0.73	1.15 ± 0.74	0.4 (132)	> 0.05
Daily raw vegetable servings (e.g., salad)	1.24 ± 0.74	1.02 ± 0.62	1.6 (117)	> 0.05
Daily fruit consumption (pieces or cups)	1.79 ± 1.67	1.47 ± 1.03	1.4 (143)	> 0.05
Red/processed meat consumption (servings/day, 100–150 g)	0.88 ± 0.49	1.04 ± 0.85	-1.0 (132)	> 0.05
Butter, margarine, cream (servings/day, 12 g)	0.59 ± 0.56	0.60 ± 0.69	-0.1 (128)	> 0.05
Sugary/carbonated drink consumption (servings/day)	0.54 ± 0.68	0.49 ± 1.05	0.3 (143)	> 0.05
Wine consumption (glasses/week)	0.41 ± 0.75	1.04 ± 1.71	-2.2 (141)	< 0.05
Legumes (servings/week, 150 g)	2.00 ± 1.05	1.73 ± 1.20	1.2 (140)	> 0.05
Fish or shellfish (servings/week, 100–150 g or 200 g shellfish)	0.76 ± 0.64	0.76 ± 0.64	-1.7 (137)	> 0.05
Non-homemade sweets/cakes (times/week)	3.67 ± 2.39	2.70 ± 2.21	2.3 (143)	< 0.05
Nuts including peanuts (servings/week, 30 g)	1.95 ± 2.08	2.36 ± 2.15	-1.0 (142)	> 0.05
Preference for poultry/rabbit over red/processed meat (1 = No; 2 = Yes)	1.73 ± 0.45	1.64 ± 0.52	0.9 (145)	> 0.05
Dishes with vegetables/olive oil (e.g., pasta, rice, sauces) – times/week	3.15 ± 1.73	2.68 ± 1.67	1.5 (145)	> 0.05

Note: M – Mean; SD – Standard Deviation; df – Degrees of Freedom; t – t-statistic; p – p-value from independent samples t-test

Discussion

This study explored the dietary habits of healthcare professionals in relation to their work schedules, with a focus on differences between morning shift and rotating/shift work. Using two validated tools—the Mediterranean Diet Serving Score (MDSS) and the Mediterranean Diet Adherence Screener (MEDAS)—the analysis revealed two statistically significant findings: morning shift workers reported higher consumption of non-homemade sweets, while shift workers consumed more wine. These findings partially confirm the study's hypotheses, with Hypothesis H2 (greater alcohol consumption in shift workers) supported, while Hypothesis H1 (greater sweet consumption in shift workers) was not. The higher sweet consumption observed among morning shift workers was unexpected and diverges from much of the literature, which often links shift work with irregular and less healthy dietary patterns, including greater intake of high-sugar snacks and processed foods (2, 3). A potential explanation may lie in the demographic structure of the morning shift group, where most participants were female and aged 50 and older. Hormonal changes during the premenopausal or menopausal period may contribute to increased cravings for sweet foods, especially in women (4). Additionally, individuals in this age group may be more likely to maintain structured daytime routines, which could include frequent but less nutritionally balanced snacking. Although our results did not show statistically significant differences in sweet consumption across age groups, this demographic skew suggests a potential association that warrants further targeted investigation. In contrast, the finding that shift workers reported significantly higher wine consumption aligns with previous research indicating that irregular schedules, job strain, and circadian disruption are associated with increased alcohol use among healthcare workers (9-11). Qualitative studies suggest that shift work may foster maladaptive coping behaviours, including alcohol consumption as a method to decompress or induce sleep after demanding or night shifts (10). Although moderate wine intake can be consistent with Mediterranean dietary principles, its association with irregular work patterns and potential for negative occupational outcomes warrants concern. Even low levels of alcohol intake may impair cognitive and psychomotor function, increasing the risk for clinical error (9). While no statistically significant differences were found in the broader MDSS categories such as vegetable, legume, or whole grain consumption, these specific behavioural differences in sweets and alcohol point to nuanced effects of work schedule on dietary patterns. This reinforces the argument that individual food choices may be more responsive to shift-related stress and availability than overall diet quality scores alone (5, 6). The lack of general dietary differences, despite differences in individual items, suggests that broader adherence to healthy eating models such as the Mediterranean diet remains low across groups—echoing findings from other regional studies (12-14). These findings contribute to the literature in several ways. First, the simultaneous application of two validated Mediterranean diet adherence tools in a Croatian hospital-based population is, to our knowledge, novel. Second, rather than finding a general degradation in diet quality among shift workers—as seen in some earlier studies that identify specific risk behaviours associated with each work schedule (15). Morning shift workers may be prone to routine-based sugar consumption, while shift workers may face greater risk of alcohol intake, particularly in the context of psychosocial stress or irregular sleep patterns. There is, however, some inconsistency in findings when compared to earlier research. For instance, Knutsson (15) found significantly higher intake of macronutrients such as carbohydrates, fats, and proteins in shift workers. Similarly, Molzof et al. (5) and Shrivastava et al. (14) noted increased consumption of unhealthy foods among those working night or extended shifts. The absence of such trends in our results may reflect cultural, institutional, or infrastructural differences in healthcare environments—such as meal break structure or food availability during different shifts.

At the same time, several limitations should be acknowledged. The categorization of shift types lacked granularity; for instance, participants working combined 8-hour morning shifts and on-call duties were grouped under "morning shift," potentially blurring distinctions in actual dietary exposure. Similarly, no differentiation was made between 12-hour day and 12-hour night shifts, which may affect physiological and behavioural outcomes differently. The use of self-reported dietary data is subject to recall bias and social desirability bias, and the sample was not demographically balanced—with a predominance of older female participants and Bachelor-educated healthcare workers—potentially limiting generalizability. The study utilized a convenience sample, potentially introducing selection bias and limiting the generalizability of findings. The sample had gender and shift distribution imbalances, and dietary data were based on self-reported tools, which may introduce recall bias. Furthermore, no regression analysis or control for confounding variables (e.g., age, gender, profession) was performed. Despite these limitations, the study offers important practical implications. The observed differences in alcohol and sweet consumption point to the need for work-schedule-sensitive interventions in healthcare environments. Hospitals and institutions should consider providing healthier meal and snack options during all shift hours, including night shifts, and implement educational programs focused on stress-related eating, alcohol moderation, and healthy food preparation. These initiatives could be integrated into broader occupational wellness frameworks and tailored by age, gender, and professional role. Moreover, further institutional investment is warranted to assess the quality and availability of food in hospital cafeterias and during off-peak hours. An important clarification must also be made. While an earlier statement suggested no significant differences in dietary habits between groups, this applied specifically to overall Mediterranean diet adherence. In contrast, our results clearly indicate statistically significant behavioural differences in the consumption of wine and sweets. These differences may have important implications for staff well-being, occupational health planning, and dietary education. This study also draws attention to potential gender and age influences on eating behaviours, which may intersect with work schedule. While our results did not find statistically significant age-based differences in sweet consumption, the sample's demographic skew—toward older female workers in the morning shift—highlights a potential area for further investigation. Existing studies have found that younger participants are more likely to consume fast food and sugary snacks (16), which contrasts with our findings and suggests that workplace environment and cultural norms may moderate such age-related trends.

Conclusion

This study provides evidence that work schedules significantly influence specific dietary behaviours among healthcare professionals. By comparing morning shift workers with those working rotating or extended shifts, two statistically significant patterns were identified: greater consumption of non-homemade sweets among morning shift workers and increased wine consumption among shift workers. While overall adherence to the Mediterranean diet did not differ significantly between groups, these behavioural differences suggest that the structure and demands of different work schedules affect how, when, and what healthcare workers eat. These findings emphasize that dietary habits are not merely a matter of individual choice but are shaped by institutional factors such as shift timing, meal break structure, and access to food during working hours. Morning shifts may promote routine eating patterns that include sweet snacks, particularly among older female employees, while rotating and night shifts may contribute to alcohol use as a coping mechanism for fatigue and disrupted sleep. These results have direct implications for hospital management and occupational health policy. Institutions should consider implementing interventions such as ensuring the availability of balanced meals and healthy

snacks during all shifts, improving the nutritional quality and accessibility of hospital cafeteria offerings, and incorporating dietary education and counselling into employee wellness programs. Age- and gender-responsive strategies should also be considered to better address the distinct needs of different worker populations. Promoting healthy eating in hospital environments is not only a matter of staff well-being but also of operational efficiency and patient safety, as poor nutrition can impact energy, cognitive function, and long-term health. Ultimately, this research highlights the need for a systemic approach to nutrition in healthcare settings—one that acknowledges the intersection of organizational structure, occupational stress, and individual health behaviour—and calls for ongoing research and policy development to support sustainable dietary improvements among shift-based hospital staff.

Declarations

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Study design: MB, DR
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Data analysis and interpretation: MB, VK
Manuscript writing: MB
Critical review of the content: VK, DR
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Knowledge, Attitudes and Practices in Malaria Prevention Among the Residents of the Southern Part of Benin: A Cross-Sectional Study

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Abstract

Background: Malaria is a life-threatening parasitic disease transmitted by mosquitos which remains a major public health issue in Benin, leading to high consultation and hospitalisation rates, especially among children under five and adults.

Aim: This study aims to assess the knowledge, attitudes, and practices of residents and health workers in southern Benin regarding malaria prevention and the factors influencing these aspects.

Methods: This was a cross-sectional study, conducted in Benin, in 2022. Data were collected using a *Knowledge, attitudes and practice* (KAP) questionnaire which was adapted to the needs of this study Participants included both residents and healthcare workers.

Results: A total of 529 respondents participated in the study, including 124 health workers and 405 non-health workers. Among them, 96% had heard of malaria, primarily through health facilities (53%) and schools (50%). The majority (63%) were aware of the National Malaria Control Programme, while 75% believed malaria could be prevented, and 88% reported using mosquito nets. The findings indicate a high level of knowledge about malaria, its symptoms, treatment, and prevention measures, with no statistically significant differences in overall malaria knowledge ($r=0.11$; $p<0.01$). However, participants from rural areas were more likely to rely on alternative treatments ($r=0.14$; $p<0.01$), whereas health professionals demonstrated greater knowledge of malaria and its prevention ($r=0.15$; $p<0.01$). Additionally, awareness of the National Malaria Control Programme was higher among more educated individuals ($r=-0.28$; $p<0.01$), healthcare workers ($r=0.19$; $p<0.01$), and urban residents ($r=-0.23$; $p<0.01$).

Conclusion: Malaria remains a major health challenge in Benin. Strengthening professional efforts, continuous education of health workers, and targeted public awareness about the National Malaria Control Programme are essential for effective prevention and control.

Keywords: malaria, knowledge, attitudes, practices, Benin

Introduction

Malaria is a serious disease caused by parasites of the *genus Plasmodium*, which is transmitted to humans through the bite of an Anopheles mosquito (1). There are many types of *Plasmodium*, but the disease in humans is caused by P*lasmodium falciparum* (the most frequent), P*lasmodium ovale, Plasmodium malariae, Plasmodium vivax* and *Plasmodium knowlesi*. The development of the disease in humans depends on many factors such as health status, previous illnesses and living conditions. In Benin, malaria is the leading cause of mortality among children under five and a significant contributor to morbidity in adults. It accounts for 40% of outpatient consultations and 25% of all hospital admissions (2, 3).

The most common symptoms of malaria include fever, headache and chills, vomiting, nausea and muscle aches. Diagnosis is based on clinical presentation and laboratory tests. Early initiation of treatment is crucial, with treatment plans varying depending on the type of malaria. Disease prevention remains a major public health challenge in many African countries. Malaria has also a negative impact on family budgets. It has been noted that 47% of households in low- and middle-income countries faced catastrophic health expenditures, i.e., costs exceeding 40% of family income (4). Key strategies in the fight against malaria include preventing mosquito bites and implementing preventive chemoprophylaxis programmes (5). Prevention includes vector control which has a major role and preventive measures that include the use of insecticide-impregnated mosquito nets when sleeping, the use of mosquito repellents, the use of coils and sprays, the wearing of protective clothing and the installation of mosquito nets on windows. However, the results so far are not very encouraging due to lower coverage and the emergence of vector resistance to insecticides (2).

Benin also opted for free treatment of cases of simple and severe malaria in children under five and pregnant women. Since 2003, Benin has adopted a policy of Intermittent preventive treatment (IPT) using sulfadoxine-pyrimethamine (SP) (6). All eligible pregnant women can receive two doses during antenatal consultations in the public and private sectors. Likewise, there is regular procurement and distribution of RDTs (rapid diagnostic tests) in health centres, use of RDT in public and private health institutions; establishment of a framework for public and private sector consultations for the use of RDTs. Finally, from October 2023, the WHO recommends two malaria vaccines for preventing malaria in children, administered in four doses to infants aged five months and older (4).

Malaria is a major public health concern in African countries, not only impacting health outcomes but also placing a significant financial burden on communities and healthcare systems. Regarding the treatment, it is important to note that there is a certain number of people who do not go to the hospital due to financial difficulties. Beninese households spend about a quarter of their annual income on malaria prevention and treatment (3). It is similar in Bafang and Bakassa, where the monthly amounts that respondents spend on malaria prevention and treatment represent a third of the guaranteed minimum wage (SMIG) in Cameroon. This has also been observed in several African countries and calls into question the need for governments and global organisations (WHO, UNICEF), given the low income of the population, to fully subsidize the prevention and treatment of malaria if we want to effectively control this disease (7). This decision on malaria treatment was also made in Benin in October 2011, but it includes free treatment for pregnant women. This free policy is implemented by the National Malaria Control Programme (in French *Programme National de Lutte contre le Paludisme*). However, according to surveillance data and reviews conducted by the National Malaria Control Programme, the application of this initiative varies across health centres and public hospitals (8).

While effective national programmes to combat malaria are essential, it is equally important to focus on educating residents, promoting changes in harmful

lifestyle practices, and encouraging proper preventive measures. Additionally, raising awareness about the importance of seeking timely medical care is crucial in reducing the disease's impact (9). The aim of this study was to examine the general knowledge of the population and health workers in the southern part of Benin about malaria, its treatment, prevention measures, the frequency of malaria prevention method usage, and the factors influencing these aspects.

Materials and Methods

Study design

This was a cross-sectional study.

Ethics

The study was conducted in alignment with the institutional Codes of Ethics. All methods were performed in accordance with the relevant guidelines and regulations.

Written informed consent was obtained from all study participants.

The approval of the Ethics Committee of the Catholic University of Croatia was obtained. Based on the request submitted on July 10, 2022, the committee issued a certificate on July 20, 2022. The certificate is kept under CLASS No.: 641-03/22-03/030, Reg. No.: 498-15-06-22-001.

Participants

The study included both residents of Benin and healthcare workers. The inclusion criterion was a minimum age of 18 years.

Data collection and study tools

The study was conducted in the West African country of Benin, specifically in the cities of Porto-Novo and Cotonou, during July and August 2022. Data was collected using a questionnaire-based method during community events, at local hospitals, in participants' homes, or workplaces (convenience sampling). The survey questionnaire was adapted from the study Community Knowledge, Attitudes, and Practices (KAP) on Malaria in Swaziland: A Country Earmarked for Malaria Elimination by Hlongwana et al., with the author's consent (10). Modifications were made to suit the needs of this research, including the omission of some original questions and the addition of new ones related to access to medical care in case of illness, treatment methods, and the National Malaria Control Programme in Benin. The questionnaire was translated into French, the official language, to ensure accessibility. Participation was fully anonymous, and the collected data cannot be traced back to any individual participant.

Statistical analysis

Data was processed using Microsoft Excel and IBM SPSS. A p-value of 0.05 was considered the threshold for statistical significance. The Pearson correlation test was used to examine relationships between variables, with significance levels set at either $p<0.01$ or $p<0.05$, depending on the data.

Results

A total of 529 participants were included, 124 of whom were healthcare workers. The socio-demographic characteristics of the participants are shown in Table 1.

Table 1. *Socio-demographic characteristics of the participants*

		N	%
Sex	Male	252	48
	Female	273	52
	Blank	4	0.8
Age	18-25	166	31
	26-33	156	30
	34-41	93	18
	42-49	61	12
	50-57	32	6.0
	58-65	18	3.4
	Blank	3	0.6
Living area			
	Rural residents	261	49
	City residents	266	50
	Blank	2	0.4
Healthcare workers	Rural area	68	55
	City	56	45

The results reveal a moderate positive correlation between working in healthcare and knowledge of malaria, with healthcare workers more likely to understand the concept and its consequences (r=0.15–0.21; p<0.01 – Table 2.). A significant positive association was also found between rural residence and familiarity with malaria (r=0.11; p<0.01).

Most participants (92%) seek help at health institutions, while 26% turn to pharmacies. Additionally, being a healthcare worker is positively correlated with promptness in seeking medical help (r=0.19; p<0.01), as they are more likely to act within 24 hours. In contrast, rural residency is negatively correlated with promptness (r=-0.13; p<0.01), indicating delays in seeking care among rural populations (Table 3).

The analysis revealed significant associations between place of residence and malaria prevention. Rural residents are more likely to believe malaria cannot be prevented or to be unsure, while urban residents more often use preventive measures like mosquito sprays (r=0.20; p<0.01) and window nets (r=0.10; p<0.05). The question about malaria transmission was open-ended and 468 of the participants (89%) answered that mosquito or similar variations (for example: mosquito bite, female mosquito, insect) transmit malaria. Participants were asked about the symptoms, and the following were listed: fever, vomiting, diarrhea, weakness, jaundice, anaemia, headache, body aches.

The data reveal encouraging trends, with 92% of participants stating they would seek help at a health facility. Most participants (52%) reported that they would seek help within 24 hours, while 30% would do so within three days. Among those who would not seek help, 95% did not provide a reason. However, those who did cite a lack of financial resources or the distance to the healthcare facility as the main barriers. Results show that participants from rural areas were more likely to rely on alternative treatments (r=0.14; p<0.01).

Most participants (84%) use doctor-prescribed medicines for treatment, while 30% also rely on natural remedies. Only a few participants mentioned natural treatments, including boiled papaya leaves, lemon, horseradish, wormwood, boiled lemongrass, artemisia, and other local plants. Attitudes and practices related to prevention were also examined. Of the respondents, 75% believe malaria is preventable, while 15% expressed uncertainty. When asked about how malaria can be prevented (open-ended question), 360 participants mentioned measures such as using sleeping nets, maintaining cleanliness, installing window nets, applying natural remedies, wearing long-sleeved clothing, removing stagnant water, and using mosquito-repellent coils. Participants were also asked about the preventive methods they personally use, and the results are shown in Table 4.

Table 2. *Correlation of Variables: Gender, Healthcare workers, Place of residence, Recognition of the term Malaria, Mortality from malaria, and Awareness of malaria*

	1.	2.	3.	4.	5.	6.
1. Sex	-	-0.03	0.11**	-0.03	-0.08	0.01
2. Healthcare workers		-	0.06	0.15**	0.11*	0.21**
3. Place of residence			-	0.11**	-0.16**	-0.12**
4. Recognition of the term malaria				-	0.02	0.10*
5. Mortality from malaria					-	0.24**
6. Awareness of malaria						-

*r - the correlation coefficient ; **p<0.01*

Table 3. *Correlation between variables healthcare workers, place of residence and the promptness of seeking help (p<0.01)*

	1.	2.	3.
1 Healthcare workers	-	0.06	0.19**
2 Place of residence		-	-0.13**
3 Promptness of seeking help			-

*r - the correlation coefficient; **p<0.01*

Table 4. *Malaria prevention used by participants*

Which prevention methods do you use?	N	%
Mosquito sleeping net	465	88
Regular cleaning of the house and garden	393	74
Closing windows and doors	274	52
Mosquito nets on windows	249	47
Mosquito coils	175	33
Mosquito room spray	103	20
Repellents	93	18
Burning leaves or bark of plants and fruits	84	16
I don't use anything	10	2.0
Something else	5	0.9

When asked about the causative agent of malaria, it is worrying that as many as 18% of health workers either left the question blank or provided invalid responses. However, 81% (100 participants) correctly identified *Plasmodium* as the causative agent. Regarding the biggest barriers to eradicating malaria, respondents cited the non-observance of preventive measures (18%) and poor hygiene practices, such as not maintaining clean yards and failing to remove stagnant water (14%).

Knowledge of the national malaria control plan was also assessed, with 63% of respondents reporting awareness of its existence. Awareness of the national malaria control programme is higher among individuals with higher education, those in healthcare ($r=0.19$; $p<0.01$), and urban residents ($r=-0.23$; $p<0.01$) (Table 5.).

Table 5. *Correlation Between Demographic Data and Awareness of the National Malaria Control Programme*

Awareness of the National Malaria Control Programme		
	r	p
Sex	0.01	0.83
Age	0.02	0.64
Education level	-0.28**	0.00
Religion	0.07	0.13
Healthcare workers	0.19**	0.00
Place of residence	-0.23**	0.00

*r - the correlation coefficient; **p<0.01*

When asked about the type of information they would like to receive, 37% showed interest in learning about malaria prevention, while 35% sought details on treatment. Regarding preferred sources, 72% favoured healthcare workers or institutions.

Discussion

This study highlights a high level of malaria awareness among participants, with 95% reporting prior knowledge of the disease. Additionally, three-quarters believed it could be prevented, with many using mosquito nets while sleeping. Moreover, the findings indicate that participants have a high level of knowledge about malaria, including its symptoms, treatment, and prevention measures.

Other authors got similar results. In Cameroon, 94% to 100% of respondents demonstrated knowledge of malaria (11, 12), while in Gabon (13) and Ethiopia (14), this percentage reached 100%. The research conducted in Ethiopia shows that only 75% of respondents associate malaria transmission with mosquito bites (14). In western Cameroon, 77% of respondents associate malaria transmission with *Plasmodium* (11), while Mabiala et al. (13) reported a higher percentage of 83% in Gabon. A study conducted by Seck et al. (15) in Popoguine, Senegal, showed that 82% of the respondents knew the ways of malaria transmission. The results of this study conducted in southern Benin show that 87% of participants correctly identified malaria symptoms, such as fever, headache, vomiting, and anaemia. In comparison, Djoufounnae et al. (12) in Cameroon reported that 57% of participants could identify malaria symptoms accurately. Addis et al. (14) in Ethiopia found a higher percentage, with 95% of participants recognising the correct symptoms. Similarly, Manan et al. (16) in South Africa showed that 63% of household heads could identify at least three malaria symptoms. The high level of knowledge about malaria transmission observed in some populations may be linked to education levels. Raising awareness through various channels—such as radio,

television, newspapers, school programmes, health centres, and social media—plays a critical role in increasing awareness. Other impactful methods include advertising campaigns, interpersonal discussions in hospitals, and information dissemination via posters, pictograms, or discussions with healthcare providers (12). The study conducted in Dangbo by Kiniffo et al. (9) from 2000 highlights that knowledge about malaria is influenced by factors such as age, socioeconomic status, place of residence, and mother's education levels. Importantly, the level of knowledge about malaria transmission serves as a critical indicator for designing effective strategies to combat the disease (17).

While the high knowledge rates reported across various studies represent a positive foundation for malaria control, further efforts are necessary. Governments must invest in raising awareness, as some misconceptions persist. For example, respondents in some studies still attribute malaria to causes such as cold, dirt, fruit, seasonal changes, or exposure to the sun (9, 18, 19). Addressing these misconceptions through targeted education and awareness campaigns is essential to enhancing disease prevention efforts. The most common prevention method used by people in Africa is an impregnated mosquito net. The results of this study show that 92% of participants use impregnated mosquito nets. In a study conducted in Cameroon (12) in 2022, more than 92% of the people surveyed reported using a mosquito net as a method of protection against malaria. In contrast, the research study by Mabial et al. (13) in Gabon reveals that only 59% of respondents use impregnated mosquito nets as a preventive measure. Although this usage rate is unsatisfactory, it may be attributed to mass and free distribution campaigns initiated by public authorities and their development partners, aiming to provide impregnated mosquito nets to every household. However, numerous studies have shown that this tool has a meaningful environmental impact only when it is widely adopted at the community level, making the outcome heavily dependent on the local population's practices (20, 21). Furthermore, an analysis of the responses regarding the mode of transmission of malaria revealed that not all health workers are aware that *Plasmodium* is the causative agent of malaria. These findings are concerning and highlight the urgent need to organise nationwide education programmes for health workers on malaria. Given the ongoing devastation caused by this disease in African countries, it is imperative to ensure that all health workers possess the necessary and sufficient knowledge to effectively combat and manage it.

Self-medication, visits to traditional healers and the use of local herbs, as shown by Liheluka et al.'s (18) study in Tanzania, are not effective ways to manage simple and/or complicated/severe malaria. The reason for this lies in the impossibility of such practices to eliminate parasitemia and contribute to the progression of the disease, other undesirable phenomena, consequences and the possible transmission of parasites resistant to antimalarial drugs. Furthermore, self-medication is common in Tanzanian communities due to factors such as concerns about the declining effectiveness of antimalarial drugs, poor patient-provider relationships, high treatment costs, drug shortages, long waiting times, and limited access to healthcare facilities (18). Similarly, our study shows that residents of rural areas rely on traditional methods more often than those in urban areas.

The results indicate that a majority of participants (63%) included in our study were aware of the PNLP. This suggests a relatively high level of awareness, though there remains a significant portion of the population that is uninformed, highlighting the need for further outreach and education efforts. To ensure the programme reaches all segments of the population, targeted awareness campaigns should be implemented, particularly in rural and underserved areas. Additionally, efforts must focus not only on informing the public but also on ensuring the effective implementation of the programme through improved accessibility, healthcare infrastructure, and community engagement.

Limitations and strengths of the study

The key advantage of this research is that it provides valuable insights into the situation in the southern part of Benin, covering knowledge, attitudes, and practices among both residents and health workers. The findings serve as a foundation for organising educational programmes for both the general population and healthcare workers, guiding efforts to reduce malaria-related mortality and encouraging the use of modern biomedical prevention and treatment methods.

However, this study has certain limitations. The main weakness of the study is the relatively small sample size, particularly among health workers. The sample size may affect the generalizability of the results, and the length of the questionnaire may have contributed to some questions being left unanswered by a significant number of respondents, preventing the collection of all anticipated data. Furthermore, it should include individuals under the age of 18, especially schoolchildren, given the prevalence of malaria in the area and the importance of early education on malaria prevention.

Conclusion

This study reveals that a significant proportion of participants have a high level of knowledge about malaria, including its transmission and symptoms. They demonstrate positive attitudes and effective prevention practices, such as using insecticide-treated mosquito nets (LLINs) and residual home spraying. For treatment, many seek care at health centres and rely on medications prescribed by healthcare workers.

Despite these encouraging findings, African governments, including Benin, must continue investing in awareness campaigns and improving access to malaria prevention and treatment. A portion of the population still engages in harmful practices, such as self-medication, which poses health risks and contributes to the persistence of the disease and the development of *Plasmodium* resistance to antimalarial drugs.

To achieve Benin's ambitious goal of "zero malaria" by 2030, specific measures must be implemented:

1. Raising Awareness – Educating the population, healthcare workers, traditional healers, and mobile drug vendors on malaria causes, transmission, symptoms, prevention strategies, and certified treatments.

2. Promoting Early Treatment – Encouraging people to seek medical attention within 24 hours of the first symptoms to prevent complications.

3. Inclusive Education – Organising free training sessions in local languages to ensure that illiterate residents receive essential information on malaria preven-tion, diagnosis, and treatment.

Declarations

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Study conception and design: MNA, OGS, MČ. Data collection: MNA, TG, OGS. Interpretation of results: MNA, MA. Draft manuscript preparation: MNA, TG, OGS, MČ. All authors critically reviewed and approved the final version of the manuscript.

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Educational Needs in Palliative Care Among Health and Psychosocial Care Professionals in Croatia: A Qualitative Study

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Abstract

Background: The palliative care for individuals with life-threatening illnesses and their families involves complex, ongoing interventions that require specific competencies from both professionals and volunteers. In Croatia, the White Paper of the European Association for Palliative Care (EAPC) on education and core competencies has served as a key framework for training programs. Despite its broad application, variations in curricula and training approaches remain, underscoring the importance of adapting education to the specific needs of learners.

Aim: The aim of this study was to explore the educational needs in palliative care among nurses, physicians, psychologists, and social workers in order to develop training programs or modules tailored to the actual needs of these professionals.

Methods: Qualitative research was conducted in 2024 in the County of Međimurje, Croatia. Four focus groups were organised with each group representing a different profession: 8 nurses, 4 psychologists, 6 social workers and 6 general practitioners. All the participants worked in general palliative care services.

The data was analysed using thematic analysis.

Results: Two main themes emerged from the focus groups: 1) Challenges in working with patients and families facing life-threatening illness, and 2) Strengthening competencies through education.

Key areas for improvement included communication, decision-making, coping with death and bereavement, and identifying palliative care needs. Healthcare professionals also highlighted pain management and self-care. Social workers emphasized family dynamics, while psychologists focused on bereavement and end-of-life support.

Conclusion: The study highlights the need for structured and targeted educational programs in palliative care, adapted to the distinct roles and responsibilities of various professionals. Emphasis should be placed on enhancing communication skills, addressing ethical dilemmas, and strengthening psychosocial competencies to ensure comprehensive and compassionate care.

Keywords: palliative care, patients, physicians, psychologists, social workers, knowledge, education

Introduction

The palliative care of patients facing life-threatening illnesses and the support to their families necessitates complex and continuous care throughout the illness progression and in the bereavement process. This care involves physical, social, psychological and spiritual aspects in order to relieve suffering and maintain the quality of life. The provision of such care requires specific knowledge, skills and attitudes of professionals and volunteers providing the care (1-3). Education represents one of the quality indicators for palliative care development in the EAPC Atlas of Palliative care in Europe 2019 emphasizing that there are 6387 specialized palliative care services in 49 countries in Europe: 29 out of 51 countries have official specialization in palliative medicine, 22 out of 51 countries have some palliative care education in nursing schools, while in medical schools only 9 out of 51 countries have palliative care modules as mandatory (2). In Croatia, it is estimated that around 300 professionals work in specialist palliative care and all of them completed the palliative care course Fundamentals of Palliative Care, defined as mandatory by the Ministry of Health. Other educational activities such as workshops, round tables, courses, congresses, palliative care modules in nursing or medical schools do take place, both nationally and locally, but vary greatly.

Palliative care can be delivered on three levels: the palliative care approach by all professionals, general palliative care by those professionals often involved in care towards the end of life and specialist palliative care for people with more complex needs. The educational needs may differ and are discipline-specific (4), with professionals requiring different degrees of knowledge and education. However, the European Association for Palliative Care (EAPC) emphasizes that there are some elements of knowledge and some competencies relevant to all professionals involved in palliative care: core constituents of palliative care, physical, psychological, social and spiritual care, care for the patient's family, ethical issues, interdisciplinary teamwork, communication skills and self-care (5, 6). The White Paper on education and core competencies in palliative care on education and core competencies in palliative care summarizes global expert opinions and defines ten core interdisciplinary competencies in palliative care as educational guidelines and a framework, and it was intended, created and developed for practitioners and educators (5, 6).

The literature provides a great range of other guidelines and education frameworks, which all advocate the same philosophy, principles, and areas of knowledge needed in palliative care (7-10). Some emphasize a broader approach to education, such as the latest World Health Organization Framework, which encourages interdisciplinary learning and collaborative practice, and the guide produced by the University of Edinburgh and partners, which integrates palliative care into health professional education (7, 8). Others explore in greater depth the content of documents intended for various professional groups or other stakeholders within palliative care (4). Many European countries follow the EAPC White Paper and other guidelines on education and have developed different training programs based on the guidelines, supplemented by their own research studies (9, 10).

The EAPC White Paper has also been widely used in Croatia in the development of most education programmes, both for professionals and volunteers (11-13). Although specialized educational programmes for different professional groups have been created, there is no formal framework for education in palliative care in Croatia and educational programs are not necessarily recognised.

While programmes for general palliative care and palliative care approaches have not been developed yet, many educational activities at different levels have been carried out in Croatia throughout the years: university-level education, college and nursing school education, courses and conferences, short educational activities such as round tables, workshops, public forums, online learning and self-learning (14-20).

The aim of this study was to gain insight into the educational needs of nurses, physicians, psychologists, and social workers working in general palliative care. The findings will serve as a foundation for developing education and training programs/modules that align with current guidelines while also addressing the specific needs of professionals in the County of Međimurje, Croatia.

Methods

Study design

A qualitative study was conducted, including 4 focus groups.

Ethics

The research was conducted in accordance with ethical guidelines and principles. The study was approved by the Ethics Committee of the Čakovec Primary Care Health Centre (Dom zdravlja Čakovec), under no. 2109-69-25-2.

Participants

Participants were professionals that work in general palliative care services in the area.

The participants were divided into four professional groups based on their roles in palliative care. The focus group of nurses consisted of eight district nurses and home care nurses providing both medical and personal care to patients. The physicians' group included six general practitioners (GPs) involved in palliative care. Six social workers were from primary care social work services. Lastly, the psychologists' group comprised four professionals who occasionally support palliative care patients and their families, particularly during the bereavement period.

Data collection and analysis

This study is part of a larger research project which will be conducted in the subsequent phases of the EU project "Strengthening Comprehensive Palliative Care in the Cross-Border Regions of Croatia and Slovenia – PALI CARE". Focus groups were held during meetings organized by the county's palliative care service coordinator with the author moderating all four groups. Open ended, semi-structured questions were used, allowing participants to talk about and emphasize challenges in their work with palliative patients and their families, as well as to define areas of knowledge and forms of education that would strengthen their competences and improve their work and care for patients (Appendix 1).

The EAPC White Paper on education and core competencies was used to help participants identify key knowledge, skills, and attitudes essential for palliative care professionals in Europe

The data was analysed using thematic analysis. Detailed notes were taken during the discussions with a colleague's assistance to ensure accuracy and capture key elements. The notes included full sentences, highlighted keywords, and specific aspects relevant to the topics discussed. Thematic analysis was performed manually following an inductive approach. Data were categorized based on emerging themes and specific characteristics identified within each focus group. To enhance the credibility of the findings, the grouped data were later presented to selected participants from each focus group for revision, allowing them to check whether the categorization accurately reflected their perspectives and experiences.

Results

The study included 24 participants across four focus groups, each representing a different professional group: 8 nurses, 4 psychologists, 6 social workers, and 6 physicians.

Two main themes were identified:

- Challenges working with people who face life-threatening illnesses and their families
- Competencies that need improvement and strengthening by education

These themes differed across the professions, and they will be considered separately (Table 1).

Table 1. *Results of the study; Themes and subthemes*

	Theme 1 Challenges working with people who face life-threatening illnesses and their families	**Theme 2** Competencies that need improvement and strengthening by education
	Subthemes	Subthemes
Physicians	• Increasing workload (legislation, paperwork, task shifting to primary care services, etc.) • Complexity of palliative care provision and symptom management • Ethical issues in palliative care • Communication in palliative care • Unrealistic expectations and requests of patients	• Pain treatment • Treatment of other specific symptoms in palliative care Ethical issues in palliative care • Communication about prognosis, plan of care, end of life • Self-care
Nurses	• Emotional and psychological burden • Attitudes toward death and dying influence nurses' practice • Practical skills (specific and rare medical procedures • Effective and therapeutic communication	• Identification of patients that need palliative care • Specific communication in palliative care (patient, family) • Symptom management within the framework of nursing competencies • Essential support in bereavement • Self-care
Social workers	• Resource issues in providing social aspects of care (place of care, timeline in realization of patient's rights) • Wide range of jobs, can provide only some parts of the support for the patients and family in care and bereavement • Challenges in effective communication regarding end of life, care plans and bereavement	• Family care specific for palliative care • Bereavement support within a certain workplace of a social worker • Communication regarding death, dying, care plan and bereavement • Self-care
Psychologists	• Lack of time and continuity of support for each person in care due to the number of people in need of support • Organizational challenges (more experienced psychologists) Lack of experience in complex psychological situations (younger psychologists) • Collaboration with other services in the identification of palliative care patients/ families and cooperative care • Challenge of developing specialized skills such as bereavement for children due to the wide range of support needs	• Essentials in identification of patients that need palliative care • Bereavement support for the family • Support at the end of life • Communication regarding death, dying, coping, loss and bereavement • Self-care

1. Physicians

1.1. Challenges working with people who face life-threatening illnesses and their families

The physicians in the study acknowledged their roles and responsibilities in palliative care while also recognizing the challenges associated with its complexity. One of the challenges that all the participants emphasized was the increasing workload that included not only a larger number of patients but also more tasks in the care of a single patient: more paperwork, more legislation, an increase in diagnostics and task shifting to primary health care. They all stressed that there was increased responsibility due to the complexity of care, numerous ethical issues, lack of time for each patient and their family during a visit to the clinic. They also talked of the increased challenges in communication about the diagnosis, prognosis and topics such as life threatening illnesses, care plan and difficult decisions.

„It is a part of my job to talk to patients about their health, their illness and treatment, but when there are no options and cure, I just don't know what to say. I want to help, but nothing sounds right." (Doctor 1)

One of the great challenges for physicians was coping with the unrealistic expectations of patients and their families and their requests from physicians.

„I can understand that everyone wants the best for their loved ones, but if expectations and requests are not realistic, you need to follow your professional guidelines and that will not be enough for that family." (Doctor 2)

Treating symptoms and patients' conditions is also challenging as patients with palliative care needs require a different approach and different care goals.

1.2. Competencies that need improvement and strengthening by education

The physicians reported numerous challenges particularly with specialized knowledge, skills, and approaches required for working with palliative care patients.

The physicians identified several areas for improvement, including pain management in palliative care, symptom management in the final stages of illness (such as dyspnoea, vomiting, nausea, and agitation), ethical considerations, communication about diagnosis and prognosis, end-of-life care and coping with the dying process, decision-making regarding treatment and care options, and communication with the patients' families.

When the competences defined by the EAPC were mentioned, all the physicians strongly agreed they lacked knowledge and needed to consider the practice of self-care, to help them face the challenges at work (Table 1).

„I am very glad that more and more physicians talk about self-care, because firstly we need to admit that we need support. In some places, that is just a normal part of a doctor's job. But we need to make those changes as a profession." (Doctor 3)

2. Nurses

2.1. Challenges working with people who face life-threatening illnesses and their families

Nurses expressed experiencing a significant emotional and psychological burden as they frequently witness patient suffering (Table 1). This was particularly evident when patient care did not lead to recovery and improvement as unlike the other patients they visit who do improve, palliative care patients deteriorate and they become involved with death and bereavement.

„Sometimes, I just get into the office at the end of the day, and I am drained. With palliative care patients, it is different. You know that things are not going to be better, but you cannot do anything. You don't even know what to say." (Nurse 1)

Nurses also acknowledged the challenges arising from their attitudes towards death, dying, treatment and difficult communication which affects the care they provide and the way they feel about it. They noticed that adapting their approach directly influenced their practice as they identify patients with palliative care needs earlier, pay greater attention to other symptoms rather than

just physical, and they work more as a team with other professionals. This reflection was only seen in the focus group conducted with nurses and may reflect their role in the discussion and planning of patient care with palliative care services on an everyday basis, as their workplaces are located close to the specialist palliative care team.

„We talk about death and dying a lot now, every day. About how people suffer, how they grieve, what the customs around death are, does one need to take children to the funeral and so on. We comment on and plan things that need to be done for the patient together with colleagues from palliative care services. And it is normal. I feel like I can understand people's needs better now." (Nurse 2)

Nurses also emphasized the lack of certain competencies in their work. There are some specific medical procedures that nurses rarely encounter and therefore do not have enough experience to provide this care adequately. Furthermore, they feel responsible towards their patient's needs and understand the patient's wish to be cared for at home, but often some forms of care and medical procedures cannot be carried out in the patient's home due to legal regulations and the defined competences of the nurses, leaving them with no choice except hospital admission.

„Sometimes patients just cannot understand or accept that it is not possible to provide certain parts of care and procedures at home. But again, there are still many skills we should learn to do our work more efficiently. It is just that one person cannot do much alone, we need to improve things together." (Nurse 3)

Communication was recognized as the most valuable tool in patient care—not only for those receiving palliative care but also for their families, whose involvement often includes a range of emotions, reactions, and decisions that may require open discussion as well as psychosocial and spiritual support.2.2. Competencies that need improvement and strengthening by education.

Nurses identified areas for improvement in palliative care to enhance their skills, strengthen their role, and provide more effective, patient-centred support for both patients and their families. Nurses identified essential educational themes in palliative care, including symptom management, practical skills, and specific medical procedures. They also highlighted the importance of ethics, professional well-being, and family support, including in bereavement.

„Indeed, I want to learn! We approach everyone in the same way, but when you are faced with a specific situation whic is frequent in palliative care, then you want to know more "(Nurse 3)

Identifying patients in need of palliative care is a crucial responsibility for all healthcare professionals and the nurses emphasized that recognizing palliative patients is a fundamental aspect of their education. All nurses in the focus group recognized the challenges of communication in palliative care and expressed strong interest in training and professional development in this area.

„I speak about symptoms and physical care normally with the patients and their families. But when I get to the themes such as progression of illness or the obvious end of life, I get off-topic even though I know the family and have looked after them for a long time. What to say to a dying person - everything will be fine?" (Nurse 4)

3. Social workers

3.1. Challenges working with people who face life-threatening illnesses and their families

The main challenge identified among social workers was finding the appropriate care settings for the patients who may require enhanced support but are unable to care for themselves and lack family assistance due to social circumstances (Table 1). Social workers face significant difficulties in securing placements as there is a severe shortage of government-funded health care institutions and nursing homes, and most patients lack the financial resources to afford private care.

„It is really stressful! Yes, that is your job, but you just cannot find a nursing home for that patient who cannot be alone at home. Times are really changing, and place of care is becoming a really huge issue!" (Social Worker 1)

A further challenge was realization of social rights, mainly financial support for patients due to delays in obtaining this essential support. The procedures are undertaken by a separate body and take a very long time as there are no special regulations for the procedure for palliative care patients. Therefore, social workers are not able to help the patients obtain the support they need and are entitled to in an appropriate timescale, even though they are aware that time is limited for people with a life-threatening illness.

„There should be some priorities in the realization of patients' social rights because palliative care patients really do not have as much time as everybody else! Why? We all know why!" (Social Worker 2)

Social workers recognized that providing psychological support to individuals and groups, including bereavement care, is part of their role. However, due to their broad responsibilities across various citizen groups, they can offer general palliative care but lack the capacity to provide specialized palliative care for more complex issues, due to time restraints.

3.2. Competencies that need improvement and strengthening by education

Social workers were very open to the idea of education on palliative care, especially undertaking modules that would be useful for their work. Although social workers focus on the family care as part of their role on an everyday basis, they indicated that the care for the family in palliative care was one of the most important areas for their education.

Another significant education need for social workers was bereavement support, which does not exist in Croatia as a special service within health and social care.

„It is a shame that bereavement is actually a part of our training in social work, but due to the wide range of jobs, you cannot develop more specific knowledge about that subject and when you need it, you wish you knew more!" (Social Worker 3)

They saw communication as the main tool in their work as social workers, but they expressed the need for more education on specific communication in palliative care in all its aspects.

Social workers are also familiar with benefits of supervision and self-care, and they supported the need of care for professionals as one of the necessary educational needs.

„Supervision or other types of formal support are something every person who works with continuous psychological stress should have because it is good for you!" (Social Worker 4)

4. Psychologists

4.1. Challenges working with people who face life-threatening illnesses and their families

Within the focus group of psychologists, there were differences in the length of work in the profession and the amount of experience, and this resulted in a varied response from the study participants (Table 1).

While more experienced psychologists emphasized organizational challenges as a major issue, since mental health services are new services which face the challenges of becoming established with clearly defined roles, the less experienced and younger psychologists reported their lack of experience as a challenge in complex psychological situations.

„Preparing a child for the death of his mother is something I just do not know how to do."(Psychologist 1)

All psychologists recognized a major issue – lack of time and continuity of support for each person in care. Most of the people in need of support caused by illness, loss and grief require continuous care, but psychologists struggle to enable this due to the large number of people that require professional help.

„I can squeeze them somewhere in my schedule if it is urgent, but I know that without continuity of care I will not help them much. (Psychologist 2)

One of the challenges recognized through the focus group was the lack of collaboration with other services about people that require palliative care. Psychologists acknowledged

that collaboration with palliative care and other services would benefit to all involved in the care, and this was even more important as there are no formal bereavement services or professionals working within palliative care in Croatia.

Another challenge that psychologists faced in their work was similar to the one experienced by social workers. They provide support to every person within the community that is in need, and so they cannot develop specialized skills for one group of service users, which would be the case if they worked in specialized palliative care service or some other specialized service.

4.2. Competencies that need improvement and strengthening by education

While discussing the EAPC White Paper and the importance of interdisciplinary collaboration in palliative care, psychologists recognized the need for education on identifying individuals who may require palliative care. This knowledge would enhance their ability to work effectively within the team and provide better support to those in need.

„Now I understand why I should be able to recognize patients with palliative care needs. Not only can we help them more together, but I can provide them with some very useful information about palliative care services." (Psychologist 3)

Psychologists identified bereavement support and support at the end of life as major educational needs so that they could improve their work with palliative care patients.

They identified communication and self-care as valuable educational areas, not only for enhancing their skills in palliative care but also in other aspects of their professional work.

„Communication is our tool for work, but even so, one can never stop learning how to think or speak about feelings at the end of life, decisions about life, losing yourself or others and so on. Simultaneously, we all have our own attitudes, values and fears which should not stop us form helping people in our care." (Psychologist 4)

Discussion

The results of this study were presented through two recurring themes for every focus group: the main challenges of working in generalist palliative care and the competencies that need improvement. There was a commonality in the areas of work for all professionals with differences across the professions.

All the professionals emphasised that to facilitate the provision of generalist palliative care there was a need to develop their knowledge and skills in the identification of patients who need palliative care, communication, coping with ethical issues and enabling self-care. Pain treatment in palliative care was seen as important for physicians and nurses, whereas psychologists and social workers identified family dynamics and bereavement as areas for development.

One of the most important findings gained through this research, supported by earlier studies, was the acknowledgment of all the participants that development of their knowledge, attitudes and skills in palliative care is of great importance (21). Furthermore, the study highlights the deep connection between the challenges and difficulties professionals face and education as a form of strengthening their capacities, enabling them to improve the palliative care they provide.

Nurses participating in the study emphasized that their workplace is at the same location where the mobile palliative care team is located, and this enables collaboration and learning about palliative care daily. They had noticed the change in their thinking and attitudes and how this influenced their practice for the better. Numerous studies emphasize a significant correlation between the competences and education of professionals and their well-being as well as the quality of palliative care they provide (22). Sanghe and many other authors recognize that nurses or other professionals who are skilful, knowledgeable and comfortable with their work in palliative care can improve the quality of care and satisfaction of patients and their families. However, research

showed that if they did not have confidence in the care they were providing due to lack of knowledge and skills, this can result in both moral distress and burnout syndrome for the professionals and inadequate care for patients and their families (22, 23).

These studies have also suggested that common themes include workload, emotional and psychological burden due to the outcome of care, complexity of care, ethical issues, unrealistic expectations of patients and families, challenges with effective communication and lack of resources in providing palliative care (22, 23).

Research has shown that education in different areas of palliative care not only reduces some of the negative issues but also encourages elements of palliative care such as interdisciplinary work, joint decisions, care plans, and peer supervision (23).

One of the milestones in interdisciplinary work and good palliative care is the identification of patients that need palliative care, and this was underlined as an area for education and development by all focus groups in the study. A study conducted by Kochems at al. emphasizes that palliative care depends on the early identification of patients that may need palliative care, which relies on education and knowledge. If the identification is not optimally performed, this may result in undertreatment or overtreatment and the lack of multidisciplinary care and support (24).

General palliative care services face a huge responsibility of early identification of patient needs as collaboration with physicians and nurses who have an interest in and knowledge of palliative care may lead to the referral of patients in a more timely way and result in better care outcomes.

Good care outcomes in palliative care are always related to good therapeutic communication. It has been demonstrated both in the literature and in everyday practice that if the approach, interactions and relationships between professionals, patients and family members in palliative care are based on the philosophy of palliative care this may affect not only the way a person dies but the way in which the family experiences the loss (25). Discussions within the focus groups indicate a growing awareness of effective communication skills as a key tool in palliative care, benefiting not only patients and families but also healthcare professionals in their work. Similarly to the results of our study, research highlights that nurses and doctors as the primary professionals in palliative care play a crucial role in pain and symptom management. The findings emphasize the need for improvement in competencies to provide a unique approach and management required in palliative care (26, 27).

Other significant findings that emerged from all focus groups in this study, especially from groups of social workers and psychologists, are the challenges of working in general services that provide a wide range of services to the general population with different needs. This may disable the professionals from developing specialized skills within palliative care. However, they do need to gain new knowledge and skills for them to provide care within their professional role.

The need for education in palliative care has been suggested in many areas. For instance, the European Academy of Neurology / EAPC consensus paper suggested that education about palliative care principles within neurology teams would help to improve skills regarding the communication and understanding of the end of life care and thus result in better overall care (28). Other studies outline their needs for education in specific fields of medicine which require different knowledge within palliative care important for their speciality (28, 29).

Despite the existing frameworks, guidelines and programmes for education in palliative care, there is a constant interest in research in this field, focusing on the specifics of different countries, professions, resources, and regulations. These guidelines encourage and emphasize continuous activity in the advocacy, professional empowerment, education and research in palliative care due to the variability in access to and ongoing changes in palliative care development (30, 31).

This study has both strengths and limitations. One limitation is that it was conducted in the Međimurje County so the findings may not fully apply to other regions of Croatia or beyond. The study also had a relatively small number of participants so that some perspectives may not have been fully captured. Additionally, because the study focused on what professionals think they need in terms of education, it may not completely reflect the actual gaps in their knowledge and skills.

Despite these limitations, the study has several strengths. Research on palliative care knowledge in Croatia has mostly been conducted through small studies as part of Master's theses by nursing students, and no studies have explored the educational needs of healthcare professionals. To the best of our knowledge this is the first study conducted in Croatia to explore the educational needs of professionals working in general palliative care, which might fill an important gap in research. By using focus groups, the study allowed for open discussions providing valuable insights into real-life challenges and needs. The findings can be used to develop training programmes within the PALI-CARE Project, ensuring that education is tailored to the actual needs of professionals.

This research also supports efforts to improve teamwork and communication among different professions involved in palliative care, ultimately leading to better care for patients and their families.

Implications for Future Research

Future research should focus on a broader sample of healthcare professionals to gain a more comprehensive understanding of their educational needs in palliative care. Conducting anonymous online surveys can provide quantifiable data and enable comparisons across different regions and healthcare settings. Further research is needed to explore how education may lead to real-life changes in clinical practice and in the care of patients and their families.

Conclusion

This study provides an insight into the educational needs of professionals working in general palliative care. The areas of specific concern were the identification of patients who need palliative care, self-care and pain treatment in palliative care for doctors and nurses whereas psychologists and social workers identified family dynamics and bereavement. All professionals identified therapeutic communication and ethical issues.

These issues should be considered in developing education and training programmes, that will be truly tailored to the real needs of professionals but also in accordance with the European and Croatian guidelines.

Declarations

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The MECA Matrix: A New Framework for Analysing Media Appearances of Healthcare Professionals

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Abstract

Background: The increasing media presence of healthcare professionals significantly influences public health perception, trust in healthcare systems, and the spread of health information, necessitating a systematic approach to evaluate and optimize their communication strategies.

Aim: To develop and present an innovative methodological framework—the MECA (Media Exposure Content Analysis) matrix—for the systematic analysis of media appearances of healthcare professionals, integrating both qualitative and quantitative approaches to assess verbal, nonverbal, and paraverbal communication elements.

Methods: A total of 181 statements made by healthcare professionals—including physicians, nurses, medical technicians, pharmacists, and psychologists—were analysed. Statements by the Minister of Health were also included, given their systemic relevance. The dataset was compiled from television news reports aired on TV chanels between January 1 and January 31, 2024. A comprehensive review of existing content analysis methodologies was conducted to inform the analytical framework. The MECA matrix was validated through rigorous procedures to ensure its reliability and consistency.

Results: The MECA matrix was designed and implemented to categorise and code media appearances. It integrates both qualitative and quantitative approaches to systematically assess communication elements across these dimensions to assess verbal, nonverbal, and paraverbal communication elements.

Conclusion: The MECA matrix offers a novel, multidimensional approach for evaluating healthcare communication in media settings, addressing a crucial gap in existing methodologies by including ethical criteria and enabling cross-modal analysis. While the model has limitations—such as the need for linguistic competence and the inability to analyse purely visual or non-contextual audio content—it significantly advances the systematic evaluation of public health communication, supporting professional development, trust-building, and public health policy formation.

Keywords: media appearances of healthcare professionals, content analysis, public appearance, rhetoric analysis

Introduction

Healthcare professionals (HCPs) occupy positions of great responsibility, and the way they communicate in public carries significant weight for individuals, families, society, and even the state. The media presence of HCPs has far-reaching implications (1). On one hand, it helps raise awareness about key health issues, improves health literacy, and combats misinformation (2). On the other hand, poor communication can spread inaccurate information or reduce public trust in the healthcare system.

Because their media presence directly influences healthcare outcomes, HCPs—especially physicians—must communicate responsibly and clearly. Their public statements are not just informational; they shape public perception, trust, and health-related behaviours (3, 4).

Given their responsibility and the sensitive nature of their messages, it is essential to systematically analyse how HCPs appear in the media. Such analysis can:

1. Evaluate communication effectiveness – Identify which strategies promote healthy behaviours and which may unintentionally spread misinformation or reduce trust, especially during crises (5).
2. Improve public perception – Shape a positive and trustworthy image of both individual professionals and the healthcare system through clear, evidence-based communication (6).
3. Strengthen crisis communication – Provide insights into how HCPs can effectively inform and mobilize the public during emergencies, using traditional and digital media (7).
4. Counter misinformation – Reveal common pitfalls and support the development of strategies to address false health information effectively (5).
5. Inform policy and guidelines – Offer evidence for creating professional communication standards that are ethical, clear, and impactful (8).
6. Promote professional development – Help HCPs improve their media and public speaking skills, enhancing communication with both the public and patients (9).

Therefore, systematic analysis of healthcare professionals' media appearances helps evaluate communication strategies, improve public perception, and develop clear professional guidelines. It also helps identify and counter misinformation, providing a basis for policy and standard development.

Content analysis is a systematic method used in communication science to identify patterns and trends in textual, visual, or audio content from various media formats. It involves coding data based on a predefined matrix (10, 11). Unlike discourse analysis, which examines meaning and context, content analysis focuses on what appears in the content—such as term or theme frequency (12). Although widely applicable, it can be time-consuming due to manual coding.

Several established methods are used to analyse media content and communicative interactions, each offering specific strengths: Media Content Analysis (MCA) focuses on the accuracy of reporting, which is useful in journalism, but is costly and timeconsuming, limiting broader use (13); Video/Qualitative Content Analysis (VCA/QCA) explores deeper meanings in video content, offering rich insights but requiring expert interpretation and significant time investment (14); Visual-Verbal Video Ana-lysis (VVVA) combines visual and verbal cues to study multimodal communication. Though supported by modern technology, it remains interpretative and time-intensive (15); Conversation Analysis (CA) examines spontaneous communication, especially turn-taking and nonverbal behaviour, with high precision but also high resource demands (16).

The MECA matrix introduces a new, multidimensional approach. It integrates communication and ethical elements into one structured and adaptable framework. This model fills important gaps in existing methods, offering a clear and reliable tool for analysing media appearances—especially

in ethically sensitive or persuasive health communication. Table 1 presents a detailed comparison between traditional models and the MECA matrix.

Table 1. *Comparison between traditional models and the MECA matrix*

Method		**New Model for Media Content Analysis**	**Video Content Analysis**	**Visual-Verbal Video Analysis (VVVA)**	**Conversation Analysis (CA)**	**Media Exposure Content Analysis (MECA)**
Application purpose		Improve accuracy and alignment of media coverage with public relations objectives	Analyses textual, visual, or audio data in media, social sciences, and communication research	Qualitative framework for analysing visual, verbal, emotional, and discursive elements in video	Focuses on interaction structure and speaker strategies in communication	Media analysis tool that combines qualitative and quantitative methods for video content evaluation
Parameters taken into account	Verbal	Included	Included	Included	Included	Included
	Non-verbal	Not mentioned	Not mentioned	Included	Included	Included
	Paraverbal	Not mentioned	Not mentioned	Included	Included	Included
	Rhetoric	Included	Not mentioned	Included	Not mentioned	Included
	Medical ethics	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Included
Validation and reliability, verification mechanics		Rigorous training of human coders; reliance on subject matter experts for accurate coding	Techniques such as inter-coder agreement and statistical validation, use of triangulation	Systematic data collection, transcription, and coding procedures, predefined extraction matrices	Natural data analysis, transcription, "unmotivated looking", "next-turn proof procedure"	Defining theoretically grounded criteria with clear indicators, employing multiple independent evaluators and confirming coding consistency through systematic comparison
Method limitations		High cost; dependency on human expertise; inability to automate due to complexity of context-based analysis	Subjectivity in coding, challenges with large datasets, bias in category selection, and difficulty capturing context and deeper meaning	Limitations include the time-intensive process of transcription and coding, and the potential subjectivity in interpreting visual and verbal data despite the systematic approach	It is difficult to achieve complete neutrality; transcription methods require detail and precision	Limited to video content, requires coders to be proficient and neutral in the language used, and may be less applicable in contexts involving other media forms or unfamiliar languages
Measuring instrument (index, scale)		No fixed scale; coding based on qualitative evaluation of message accuracy and omissions	Software tools (e.g. NVivo, ATLAS.ti) for textual analysis, coding frames and structured data sheets, statistical test for reliability and validity	Structured extraction matrices, coding frameworks, transcription systems, and multimedia analysis tools to capture and analyse visual and verbal data	Jefferson transcription system, qualitative analysis of speech and gestures	The MECA Matrix and accompanying codebook are designed to enable both qualitative and quantitative analysis through a structured, comprehensive, and methodologically robust framework

While these methods contribute valuable perspectives, they have notable limitations. Many focus narrowly on factual accuracy, rely on subjective interpretation, or lack clear coding frameworks. They are often time-consuming, overlook nonverbal and emotional nuances, and are mostly developed within English-speaking contexts, limiting cross-cultural applicability. Recognising these limitations, the MECA matrix was developed as an integrative tool that unifies key communication dimensions into a coherent framework. This study aims to present the development of this analytical instrument and to introduce the MECA matrix as a methodological framework for the systematic analysis of healthcare professionals' appearances in the media.

Materials and methods

The MECA matrix was developed following a detailed review of established content analysis methods. It codes media appearances across five dimensions. First three dimensions are common in communication analysis: verbal, nonverbal, and paraverbal communication. The analytical framework incorporated the medical ethics point of view. It is a logical and necessary approach when examining the consequences of media exposure involving healthcare professionals. The persuasion dimension emerged during the creation of the matrix and the realisation that all categories included in the matrix affect persuasiveness.

A coding framework was developed based on three primary dimensions of communication:

- Verbal Communication: Evaluated in terms of structure (introduction, main points, conclusion), clarity, logical argumentation, and use of evidence.
- Non-verbal Communication: Assessed via the speaker's posture, gestures, facial expressions, and overall appearance.
- Paraverbal Communication: Considered elements such as pronunciation, tone, speed of speech, and emphasis.

Additional parameters such as stage fright, empathy, sex, and somatotype (categorised as endomorph, ectomorph, or mesomorph) were also coded. It is aligned with established perspectives that ethical analysis in public health often requires a broader, applied approach beyond traditional biomedical ethics. Using parameters and indicators derived from established theoretical frameworks in communication sciences, rhetoric, public relations, and media studies (17–29), we developed a set of coding anchors that facilitated a systematic and replicable content analysis. These indicators provided a structured foundation for identifying, categorising, and interpreting relevant patterns within the material, ensuring methodological consistency and analytical reliability.

Validation Process and Data Sources

The validation process was carefully designed to ensure the credibility, clarity, and reliability of the analytical matrix. For each parameter, theory-based criteria and indicators were clearly defined in alignment with established frameworks in communication, media, and ethics. These criteria served as anchors for coding and guided the systematic evaluation of media content.

To assess inter-coder reliability, multiple independent evaluators applied the defined criteria to identical media segments. Discrepancies in coding were then analysed to identify potential sources of inconsistency. In cases where categories were ambiguous or overlapping, they were further clarified, consolidated, or, if necessary, removed. This iterative refinement process contributed to the enhanced discriminative power and internal coherence of the matrix.

Key validation steps included: the operationalisation of theoretical constructs into measurable indicators, engagement of independent coders, resolution of coding disagreements through consensus, and confirmation of coding consistency. The evaluation was carried out by a panel of three communication experts and two ethics specialists—none of whom had been involved in the development of the matrix—to ensure objectivity and methodological rigour. The overall approach was grounded in methodological principles drawn from foundational works on content analysis (10).

For empirical validation, a total of 181 statements made by healthcare professionals were analysed. These statements encompassed contributions from physicians, nurses, medical technicians, pharmacists, and psychologists. In addition, statements by the Minister of Health were included and specially marked, recognising their systemic importance and inseparable connection to the healthcare system as a whole. The dataset was drawn from audio-visual news reports aired on three major Croatian television channels—HRT1, RTL, and Nova TV—within the time frame of January 1 to January 31, 2024.

As a result of this comprehensive and systematic validation process, the matrix emerged as a robust and tested analytical tool capable of supporting reliable, reproducible, and insightful evaluations of media communication—particularly in contexts where ethical dimensions and persuasive strategies are of critical importance.

Results

Additionally, the MECA matrix enables categorisation and numerical coding of speech elements, allowing both qualitative assessment and quantitative analysis. Unlike traditional models focused primarily on textual data, it provides detailed, theory-based categories suitable for manual and AI-assisted coding, ensuring systematic and replicable evaluation (Table 2).

Table 2. *MECA matrix: components, parameters, and coding scheme*

Parameter	Description	Possibility
Video is accepted	Does the video fit the criteria?	YES/NO
Type of statement	What is the type of statement?	Scientific or imposed
Sex	Sex of the speaker?	M/F
Verbal component		
Verbal level of persuasiveness	Is persuasiveness recognised in the verbal part of the speech?	Clear argumentation, consistency in messages, emotional connec-tion with the audience, credibility
Structure	How is the speech organised (introduction, body, conclusion), and is the structure logical?	Clearly defined introduction, developed main points, logically connected arguments, conclusion that summarises key messages
Soundbite	Is a soundbite used?	YES/NO
Argumentation	What arguments are used and how are they presented?	Statistics, scientific evidence, practical examples, personal experiences, authoritative sources, analogies, logical constructions, unnecessary use of complex medical terminology, is there enough information, tone (negative, neutral, and positive)
Political connotation	Does the statement have a political connotation?	YES/NO
Instils confidence in the system	Does the speaker instil confidence in the system?	YES/NO
Technical level of persuasion	Does the person seem empathetic?	YES/NO and was it needed?
	Does the person appear prepared to give a statement?	YES/NO
	Who is speaking?	It is not mentioned or person does represent an institution, department
Rhetoric	How does the speaker use rhetorical figures and techniques to persuade or motivate the audience?	Use of metaphors, anecdotes, rhetorical questions, repetition of key terms, appeal to emotions, use of authoritative speech

The role of public speaking	What is the purpose of the public performance, and how is communication with the audience achieved?	Informing the audience, education, motivation, promoting ideas or practices, building trust, establishing authority
	Does the speaker achieve its goal?	Accurate public information, giving the impression of a competent and professional individual, contributing to calming the public, enhancing reputation (personal, institutional, and professional reputation), showing readiness for such situations, presenting the patient's perspective while protecting the right to confidentiality and privacy
	The reason for giving the statement.	Accident, emergency, positive news, state of the profession, crisis in the institution, politics
	Additional objectives*	YES/NO; if yes they can be written down on the side
Emphasis	Which words or phrases does the person emphasise and why?	Key words, key phrases, emphasis on relevant information, emphasis on emotional importance - emphasises the essential/non-essential, does not emphasise
Non-verbal component		
Posture	What is the speaker's posture like during the speech?	Upright, leaning forward, leaning backward, overly relaxed, relaxed, tense (swaying from one foot to the other?), open, closed (e.g., arms crossed, hands while waiting for a question, no crossed fingers), dominant, subordinate
Frame	What is included in the shot?	Passers-by, hospital, hospital sign, flag... Are they content-wise and thematically connected or not?
Position	Where is the person positioned in the shot during the performance?	In the centre, on the side, at the beginning, at the end, in the foreground, in the background, among other people, in front of or behind a table
Gestures	What kind of gestures does the person use and how do they affect communication?	Strong, overly aggressive, non-existent, restrained
	Does the gesture align with the speech?	Temporally and content-wise - YES/NO
Signs of performance anxiety	Are there clear signs of performance anxiety?	YES/NO
Non-verbal persuasiveness	Is persuasiveness recognised in the non-verbal part of the speech?	Confident posture, self-assured gestures, relaxed facial expression, eye contact with the audience, minimal signs of discomfort, somatotype, appearance
Facial expression	What are the person's facial expressions like and how do they contribute to communication?	Smile, serious facial expression, surprise, interest, doubt, concern, confidence, discomfort, determination (adapted to the topic or not)
Paraverbal component		
Pronunciation	How does the person pronounce words?	Clearly, unclearly, fast, slow, dynamics (monotone, expressive, emphasised)
Speech level of persuasion	Does intonation, articulation, and energy affect the persuasiveness of the speech?	Variation in intonation, clear articulation, energetic tone, emotional sincerity, authoritative voice without any distractions (buzzwords, pauses...), paraverbal signs of empathy (slower speech, lower tone, softer and more calming voice...)
Medical ethics		
Professional relationship with colleagues	Is professional relationship with colleagues present?	YES/NO
Professional relationship with the institution	Is professional relationship with the institution present?	YES/NO
Protection of patient privacy	Does the medical professional protect patient privacy?	YES/NO

Statements free from political and commercial influence	Are the statements free from political and commercial influence?	YES/NO
Avoiding the creation of fear	Does the speaker try to instil fear?	YES/NO
Avoiding stigmatization and discrimination	Is the speech free from stigmatization and discrimination?	YES/NO
Preserving the reputation of the profession	Is the profession's reputation preserved?	YES/NO
Care for the well-being of the patient's family	Are there signs of care for the well-being of the patient's family?	YES/NO
Persuasiveness		
	How persuasive is the speaker based on the previous report?	Not persuasive, partially persuasive, completely persuasive

The MECA approach enables a systematic analysis through a structured set of theoretically defined categories (Table 3):

1. Verbal component - assesses the structure, clarity, emotional impact, credibility, and persuasiveness of speech by evaluating argumentation, rhetorical strategies, tone, use of evidence, and the speaker's ability to connect with the audience and convey confidence.
2. Nonverbal component - evaluates posture, gestures, facial expressions, framing, and other visual cues to assess the speaker's confidence, authenticity, and overall impact beyond spoken words.
3. Paraverbal component – examines pronunciation, intonation, tone, and speech dynamics to evaluate how delivery influences persuasiveness, emotional impact, and audience perception.
4. Medical ethics – this parameter evaluates whether communication upholds professional standards, including respect for patient privacy, neutrality, and non-maleficence. Ethical adherence is essential for maintaining public trust and preserving both institutional integrity and the credibility of individual speakers.
5. Persuasiveness - following the assessment of all prior categories, an integrative evaluation is conducted to determine the overall persuasiveness of the communication.

Table 3.

Parameter	Description	Code
Video is accepted		0.
	Cannot be determined	0
	NO	1
	YES	2
Type of statement		0.1.
	Cannot be determined	0
	Imposed	1
	Scientific	2
Sex		0.2
	Cannot be determined	0
	M	1
	F	2
Verbal component		1.
Level of persuasion		1.1.
Clear argumentation		1.1.1.
	Cannot be determined	0
	NO	1
	YES	2
Consistency in messages		1.1.2.
	Cannot be determined	0
	NO	1
	YES	2
Emotional connection with the audience		1.1.3.
	Cannot be determined	0
	NO	1
	YES	2
Credibility		1.1.4.
	Cannot be determined	0
	NO	1
	YES	2
Structure		1.2.
Clearly defined introduction		1.2.1.
	Cannot be determined	0
	NO	1
	YES	2

Elaborated main points		1.2.2.
	Cannot be determined	0
	NO	1
	YES	2
Logically constructed arguments		1.2.3.
	Cannot be determined	0
	NO	1
	YES	2
A conclusion that summarizes the message		1.2.4.
	Cannot be determined	0
	NO	1
	YES	2
Soundbite		1.3.
	Cannot be determined	0
	NO	1
	YES	2
Argumentation		1.4.
Statistics		1.4.1.
	Cannot be determined	0
	NO	1
	YES	2
Scientific evidence		1.4.2.
	Cannot be determined	0
	NO	1
	YES	2
Examples from practice		1.4.3.
	Cannot be determined	0
	NO	1
	YES	2
Personal experience		1.4.4.
	Cannot be determined	0
	NO	1
	YES	2
Authoritative source		1.4.5.
	Cannot be determined	0
	NO	1
	YES	2
Analogies		1.4.6.
	Cannot be determined	0
	NO	1
	YES	2
Logical constructions		1.4.7.
	Cannot be determined	0
	NO	1
	YES	2
Use of complex medical terms		1.4.8.
	Cannot be determined	0
	NO	1
	YES	2

Is there enough information		1.4.9.
	Cannot be determined	0
	NO	1
	YES	2
Tone		1.4.10.
	Cannot be determined	0
	Negative	1
	Neutral	2
	Positive	3
Political connotation		1.5.
	Cannot be determined	0
	NO	1
	YES	2
Instils confidence in the system		1.6.
	Cannot be determined	0
	NO	1
	YES	2
Technical level of persuasion		1.7.
Empathy		1.7.1.
	Cannot be determined	0
	NO, but necessary	1
	NO, but unnecessary	2
	YES	3
Readiness		1.7.2.
	Cannot be determined	0
	NO	1
	YES	2
Identity		1.7.3.
	Cannot be determined	0
	Not mentioned	1
	Person represents an institution/ department?	2
Rhetoric		1.8.
Metaphor		1.8.1.
	Cannot be determined	0
	NO	1
	YES	2
Anecdote		1.8.2.
	Cannot be determined	0
	NO	1
	YES	2
Rhetorical questions		1.8.3.
	Cannot be determined	0
	NO	1
	YES	2
Appealing to emotions		1.8.4.
	Cannot be determined	0
	NO	1
	YES	2

Using authoritative speech		1.8.5.
	Cannot be determined	0
	NO	1
	YES	2
The role of public speaking		1.9.
Reason for the statement		1.9.1.
	Cannot be determined	0
	Accident	1
	Emergency	2
	Positive news	3
	Situation in the profession	4
	Crisis in the institution	5
	Politics	6
Primary purpose (required)		1.9.2.
	Cannot be determined	0
	Informing the audience	1
	Education	2
	Motivation	3
	Promoting an idea or practice	4
	Creating trust	5
	Building authority	6
Primary objective		1.9.3.
	Cannot be determined	0
	Accurate information to the public	1
	Giving the impression of an expert and professional person	2
	Contribution to calming the public	3
	Increasing reputation	4
	Demonstration of readiness for such situations	5
	Presenting the patient's perspective	6
Additional objectives		1.9.4.
	Cannot be determined	0
	NO	1
	YES*	2
Emphasis		1.10.
Generally		1.10.1.
	Cannot be determined	0
	No emphasis	1
	Emphasises irrelevant	2
	Emphasises relevant	3
Emphasis on emotional importance		1.10.2.
	Cannot be determined	0
	NO	1
	YES	2
Non-verbal component		2.
Posture		2.1.
Pose		2.1.1.
	Cannot be determined	0
	Upright	1
	Leaning forward	2
	Tilted backwards	3
Relaxation		2.1.2.
	Cannot be determined	0
	Tense	1
	Relaxed	2
	Overly relaxed	3
Openness		2.1.3.
	Cannot be determined	0
	Enclosed	1
	Open	2
Dominance		2.1.4.
	Cannot be determined	0
	Subordinate	1
	Dominant	2
Frame (substantively/thematically related)		2.2.
	Cannot be determined	0
	NO	1
	YES	2
Position		2.3.
Placement in the frame		2.3.1.
	Cannot be determined	0
	NO	1
	YES	2
In the foreground		2.3.2.
	Cannot be determined	0
	NO	1
	YES	2
Gestures		2.4.
Description of gestures		2.4.1.
	Cannot be determined	0
	Strong	1
	Too aggressive	2
	Non-existent	3
	Restrained	4
Time and content matching of gestures		2.4.2.
	Cannot be determined	0
	NO	1
	YES	2
Signs of performance anxiety		2.5.
	Cannot be determined	0
	NO	1
	YES	2
Persuasion		2.6.
Secure posture		2.6.1.
	Cannot be determined	0
	NO	1
	YES	2

Confident gestures		2.6.2.
	Cannot be determined	0
	NO	1
	YES	2
Appearance		2.6.3.
	Cannot be determined	0
	No work uniform, untidy appearance	1
	No work uniform, neat appearance	2
	In a work uniform, untidy	3
	In a work uniform, neat	4
Eye contact with the audience		2.6.4.
	Cannot be determined	0
	NO	1
	YES	2
Minimal showing of signs of discomfort		2.6.5.
	Cannot be determined	0
	Has signs of discomfort	1
	No signs of discomfort	2
Somatotype		2.6.6.
	Cannot be determined	0
	Endomorph	1
	Ectomorph	2
	Mesomorph	3
Facial expressions		2.7.
Smile		2.7.1.
	Cannot be determined	2
	NO	1
	YES	2
Serious facial expression		2.7.2.
	Cannot be determined	0
	NO	1
	YES	2
Surprise		2.7.3.
	Cannot be determined	0
	NO	1
	YES	2
Interest		2.7.4.
	Cannot be determined	0
	NO	1
	YES	2
Doubt		2.7.5.
	Cannot be determined	0
	NO	1
	YES	2
Concern		2.7.6.
	Cannot be determined	0
	NO	1
	YES	2
Self-confidence		2.7.7.
	Cannot be determined	
	NO	
	YES	
Paraverbal component		3.
Pronunciation		3.1.
Clarity		3.1.1.
	Cannot be determined	0
	NO	1
	YES	2
Speed		3.1.2.
	Cannot be determined	0
	Quick	1
	Slow	2
	Variable speed	3
Dynamics		3.1.3.
	Cannot be determined	0
	Monotonous	1
	Dynamic	2
	Accentuated	3
Speech level of persuasion		3.2.
Variation in intonation		3.2.1.
	Cannot be determined	0
	NO	1
	YES	2
Clear articulation		3.2.2.
	Cannot be determined	0
	NO	1
	YES	2
Energetic tone		3.2.3.
	Cannot be determined	0
	NO	1
	YES	2
Emotional honesty		3.2.4.
	Cannot be determined	0
	NO	1
	YES	2
Authoritative voice		3.2.5.
	Cannot be determined	0
	NO	1
	YES	2
Distractions (buzzwords, pauses...)		3.2.6.
	Cannot be determined	0
	NO	1
	YES	2
Paraverbal signs of empathy		3.2.7.
	Cannot be determined	0
	NO	1
	YES	2
Medical ethics		4.

Professional conduct toward colleagues		4.1.
	Cannot be determined	0
	NO	1
	YES	2
Professional conduct toward the institution		4.2.
	Cannot be determined	0
	NO	1
	YES	2
Protection of patient privacy		4.3.
	Cannot be determined	0
	NO	1
	YES	2
Statements free from political and commercial influence		4.4.
	Cannot be determined	0
	NO	1
	YES	2
Avoidance of fearmongering		4.5.
	Cannot be determined	0
	NO	1
	YES	2
Avoidance of stigmatization and discrimination		4.6.
	Cannot be determined	0
	NO	1
	YES	2
Preservation of the profession's reputation		4.7.
	Cannot be determined	0
	NO	1
	YES	2
Care for the well-being of the patient's family?		4.8.
	Cannot be determined	0
	NO	1
	YES	2
Persuasiveness		5.
	Cannot be determined	0
	Not persuasive at all	1
	Partially persuasive	2
	Completely persuasive	3

Discussion

The MECA matrix is the first systematic model designed to evaluate the quality of public speaking of healthcare professionals. Existing methods for media content analysis offer useful tools, each with specific strengths (13-16). However, they also have notable limitations. Many of them focus mainly on factual accuracy, which is helpful in journalism, but less applicable to other forms of media. These methods often rely on subjective interpretation, lack clear coding frameworks, and are time-consuming due to manual transcription and analysis. They rarely consider nonverbal cues, emotions, or context, and are mostly developed in English-speaking settings, which limits their use across cultures. Michaelson and Griffin critically examined existing approaches to media content analysis, highlighting their methodological limitations. They pointed out that some models rely merely on collecting and counting media clips, while others attempt to assess more complex aspects such as emotional tone or the perceived credibility of the media outlet in which the content appears (13).

The MECA matrix enables systematic qualitative analysis of media appearances across five dimensions: verbal, nonverbal, paraverbal, medical ethics, and persuasiveness. While qualitative analysis allows for the identification of themes, meanings, and contextual interpretations, the quantitative component introduces numeric coding to measure frequency, patterns, and correlations. Each component captures a key aspect of communication—ranging from message clarity and delivery style to ethical standards and overall impact—providing a comprehensive framework for evaluating public speeches. This dual-layered approach enables researchers to examine not only what is being communicated but also how often and in what manner, making MECA particularly valuable in studying patterns of media exposure.

Unlike methodologies that are limited to specific professional groups, types of discourse, or media formats, the MECA matrix is not restricted to healthcare professionals, formal statements, or traditional news reporting. It can be applied to a broad range of disciplines beyond information and library science (ILS), including health and medical research, media and communication studies, and the social sciences. Moreover, its application is not confined to news segments or media interviews, as it can

analyse various forms of public speech, including presentations, lectures, and panel discussions.

Another distinctive feature of MECA is its ability to analyse both audio and video content, whereas methods such as Visual-Verbal Video Analysis (VVVA) often emphasize multimodal interactions without an integrated coding structure for systematic analysis. By focusing on video and audio elements, MECA enables researchers to capture a more nuanced understanding of verbal and nonverbal communication, an aspect that is often overlooked in traditional text-based analyses.

Furthermore, MECA incorporates both positive and negative connotations in its analytical framework. This feature allows researchers to distinguish between constructive and detrimental discourse, facilitating a deeper understanding of the impact of media messages on public perception. This structured polarity assessment sets MECA apart from methodologies like Conversational Analysis (CA), which primarily focuses on the mechanics of interaction rather than on evaluating the semantic and emotional dimensions of communication.

The systematic nature of MECA ensures that its analytical framework is structured, replicable, and adaptable to various research needs. Unlike Qualitative Content Analysis (QCA), which may rely on inductive category development, MECA provides a predetermined coding structure that maintains methodological consistency while still allowing for emergent themes in qualitative analysis. This balance between structure and flexibility enhances its applicability across different media studies.

Limitations

The MECA model exhibits several limitations. Primarily, it is designed exclusively for video recordings, which means that it cannot be applied to still photographs or audio-only materials. In addition, the model relies on the content being in a language known to the coder; therefore, the coder must have sufficient proficiency in that language to accurately interpret and code the material and must remain neutral across all coding categories—a requirement that can be challenging to maintain consistently. Although MECA is versatile in that it is not restricted solely to healthcare professionals or to formal media statements (it can also be applied to speeches and presentations), these constraints regarding the type of media and language proficiency can limit its broader applicability in contexts where multiple media forms or fewer familiar languages are involved. These limitations underscore the need for careful consideration of both the content and the coding environment when employing the MECA model in research.

Implications for future research

The MECA matrix enables researchers to compare media appearances systematically, making it suitable for use in large-scale studies to identify strengths and areas for improvement in communication. Such research could further validate the matrix's capacity to objectively assess media performance and offer evidence-based recommendations for enhancing communication strategies. Future studies should also expand beyond the healthcare sector to include disciplines such as media studies, public relations, and rhetoric. This broader application would offer deeper insights into how media messages are constructed and interpreted, contributing to the advancement of communication analysis across fields.

Conclusion

Previously established methods for media content analysis represent a powerful research toolkit; however, their practical application depends on the specific research objectives and the resources available to researchers. However, MECA stands out as an advanced and comprehensive tool for media content analysis due to its precise coding system, dual qualitative-quantitative framework, broad interdisciplinary applicability, focus

on video content, structured evaluation of positive and negative connotations, and systematic methodology. These attributes make it a superior alternative to traditional methods, offering greater analytical depth, consistency, and adaptability for research in media, communication, and public discourse.

Declarations

Authors' contributions: KS designed the study, contributed to the theoretical framework, and critically reviewed the manuscript. AF developed the theoretical framework and critically reviewed the manuscript. MM developed the matrix, the comparison of communication models, and the coding scheme, and critically reviewed the manuscript.

All authors approved the final version of the manuscript, meet the authorship criteria, and hold rights to the intellectual content.

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Validation of the Croatian Translation of Perceived Professional Preparedness of Senior Nursing Students' Questionnaire

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Abstract

Background: Numerous studies highlight the importance of monitoring the preparedness of final-year nursing students for entry into the profession. Although various questionnaires assessing professional preparedness among students have been developed, most of them have not yet been translated into Croatian or validated for use among Croatian nursing students.

Aim: The aim of this study was to present the Croatian translation of the Perceived Professional Preparedness of Nursing Students Questionnaire (PPPNS), evaluate its construct validity, and determine its reliability for application among Croatian nursing students in their final year of study.

Methods: A cross-sectional observational study was conducted among 200 final-year students of Bachelor of Nursing (BN) and Master of Nursing (MN) studies. Data were collected using the Professional Preparedness of Nursing Students questionnaire during January 2024. Confirmatory factor analysis was performed.

Results: The initial 19-item model did not demonstrate satisfactory fit indices; therefore, four items with low factor loadings were removed. After revision, the modified 15-item questionnaire demonstrated good psychometric properties with acceptable model fit indices and high overall internal consistency.

Conclusion: The results indicate that the Croatian version of the PPPNS-15 questionnaire is a reliable and valid instrument for assessing nursing students' perceived preparedness for independent clinical practice. Its use can significantly contribute to enhancing the quality of nursing education for future nurses in Croatia.

Keywords: professional preparedness, students, nursing, PPPNS

Introduction

The transition from nursing education to professional practice represents a significant challenge for nursing students necessitating an effective application of both theoretical knowledge and clinical skills within a complex healthcare environment (1, 2). The educational journey equips students with diverse nursing competencies. However, the actualization of these skills in practice is heavily influenced by their subjective perception of readiness for independent work, self-confidence, and the ability to adapt to specific healthcare settings (3). Research indicates that final-year nursing students' perceptions of their professional preparedness critically impact their self-esteem, job satisfaction, and motivation for professional development, eventually affecting their long-term career trajectories and retention in the nursing field (4). Notably, a study reported that more than 50% of graduating nursing students expressed feelings of unpreparedness for clinical practice, struggling particularly with effective communication and problem-solving in real-life scenarios; this reflects a gap between theoretical knowledge acquired and practical competencies required (4).

Monitoring nursing students' preparedness for professional practice is crucial, as it enables timely identification of areas where students feel uncertain or lack competencies, thus facilitating targeted educational interventions (5). Accurate evaluation of perceived preparedness can be performed using various methods, with validated questionnaires being among the most effective tools. These instruments provide detailed insights into students' subjective evaluations of their clinical skills, theoretical knowledge, and emotional readiness. Systematic use of these questionnaires contributes significantly to improving the quality of nursing education, assisting institutions in designing curricula that align more closely with the demands of future professional practice (6).

The Perceived Professional Preparedness of Senior Nursing Students (PPNS) questionnaire (7) is a tool in the assessment of nursing students' readiness for professional practice. It provides valuable insights into students' subjective perception of their preparedness, thereby identifying competency gaps and evaluating the effectiveness of nursing education programmes. This tool has been widely adopted in various international studies, revealing significant trends regarding students' confidence and readiness levels upon transitioning to professional roles (7, 8).

However, it is crucial to note that a validated Croatian version of this questionnaire does not currently exist, which poses a substantial limitation for educational assessments and outcomes comparisons within Croatia. The lack of a Croatian version of the PPNS limits not only the local assessment of nursing students but also the potential for comparative research with international cohorts. Establishing a validated version of this questionnaire could facilitate deeper insights into the unique challenges faced by Croatian nursing students and allow for a more significant contribution to global discussions on nursing education and preparedness (9).

Considering the importance of subjective assessment of professional readiness, it is essential to have a reliable and valid instrument to evaluate this crucial aspect of nursing education. Validation of the PPNS questionnaire in the Croatian language would enable educators and institutions to better understand the areas where students feel prepared or identify their perceived shortcomings, thus serving as a basis for directing educational interventions and enhancing curricula. This would ultimately contribute to better preparing nursing students for the challenges awaiting them in professional practice. Therefore, the aim of this study was to validate the Croatian translation of the PPNS questionnaire. Additionally, the study aimed to investigate whether there are differences in the perception of professional readiness between full-time and part-time students, thereby deepening the understanding of factors affecting perceived readiness. The results of this study aim to enable a more accurate assessment of students' readiness for professional practice and provide a foundation for further research and improvement of nursing education in Croatia.

Methods

Participants

The participants were full-time and part-time students in their final years of Bachelor of Nursing (BN) and Master of Nursing (MN) studies from the Catholic University of Croatia and the University of Applied Health Sciences in Zagreb. The study sample consisted of students enrolled in the current academic year, specifically third-year undergraduate students and second-year graduate nursing students. Exclusion criteria included students who did not officially enrol in the current academic year and students participating in international mobility programmes.

Instrument

The instrument used in this study was the Perceived Professional Preparedness of Senior Nursing Students Questionnaire (PPPNS), originally developed by Shahsavari, et al. published in 2020 (7). Initially, the questionnaire consisted of 45 items, but following psychometric evaluation, it was reduced to a final version comprising 19 items grouped into four distinct factors: clinical competency, evidence-based practice, framework-oriented performance, and patient-centred care. It is a multifactorial instrument that measures four theoretical constructs:

1. Clinical Competency (5 items): assesses knowledge and skills related to disease management and treatment (e.g., "I think that I know medicines and their common complications.").
2. Evidence-Based Practice (5 items): evaluates the student's ability to apply current scientific evidence in nursing care (e.g., "I consider myself scientific and up to date on providing care.").
3. Framework-Oriented Performance (4 items): includes indicators related to understanding and applying professional standards and regulations (e.g., "I have the ability to enforce laws and regulations related to my profession.").
4. Patient-Centred Care (5 items): measures ethical behaviour and sensitivity to patient needs (e.g., "I feel that I can remain focused during providing care services.").

Responses were recorded on a 5-point Likert scale, ranging from 1 ("not prepared at all") to 5 ("fully prepared"). After collecting all responses, the total raw score is converted into a standardised value on a scale from 0 to 100 using a linear transformation (10): (Obtained raw score – Lowest possible raw score) ÷ (Highest possible raw score – Lowest possible raw score) × 100. Based on the resulting percentage score, the level of perceived professional preparedness is categorised as follows:

- less than 25% indicates low preparedness,
- 25% to 50% suggests moderate preparedness,
- 50% to 75% reflects good preparedness,
- more than 75% indicates excellent perceived professional preparedness.

According to the authors, the PPPNS is freely available for academic use, and no special permission is required for non-commercial research purposes. However, proper citation of the original source is necessary when using the tool.

The questionnaire was translated from English into Croatian using the forward-backward translation method. Initially, two independent bilingual translators translated the instrument into Croatian separately (forward translation). The two versions were then compared, and discrepancies were discussed until a consensus was reached to create a single Croatian version. Subsequently, this consensus version was translated back into English by two different independent bilingual translators neither of whom had access to the original questionnaire nor had prior knowledge of the tool's content or objectives. Finally, an expert panel—consisting of two nursing educators, one nursing researcher experienced in psychometrics, and one professional translator—compared the back-translated English version with the original PPPNS questionnaire. Minor differences were reviewed and adjusted, resulting in a final, culturally adapted Croatian version of the instrument.

Procedure

Data were collected during January 2024 online via electronic survey distribution to final-year nursing students of BN and MN studies. Participation was voluntary and anonymity was guaranteed. The data were collected over a period of one month during the final semester of the academic year. In our study construct validity of the PPNS questionnaire was assessed using confirmatory factor analysis (CFA) with the maximum likelihood estimation method via the IBM SPSS Amos 7 and JASP 0.18.3.0 software.

The analysis regarding differences in perceived preparedness based on student status and prior work experience, including measurement invariance testing, was addressed in a previous publication and is not replicated in this paper (11).

Ethics

This study was approved by the Ethics Committee of the Catholic University of Croatia. The approval code is 602-04/23-11/049, issued prior to the initiation of data collection. All participants provided informed consent, and their confidentiality was ensured throughout the research.

Results

Descriptive statistics and item analysis

A total of 350 students were invited to participate in the study, of whom 200 agreed, resulting in a response rate of 57.1%. Participants had a mean age of 26.38 ± 7.64 years and consisted of 180 women and 20 men. The distribution of full-time (n = 98) and part-time (n = 102) students was nearly equal.

The final Croatian version of the PPPNS scale consisted of 15 items. Descriptive indicators for each item are presented in Table 1. The mean total scale score was 4.04 (SD = 0.39) on a 5-point scale, indicating a generally high level of perceived professional preparedness

Table 1. *Descriptive statistics for the PPPNS-15 questionnaire items and subscales*

	M	SD	Min.	Max.
Clinical competencies (KL)	3.79	0.53	2	5
P1 I believe I have sufficient knowledge about diseases, their diagnosis, and treatment.	3.31	0.76	1	5
P2 I can prepare medications without the risk of error.	3.49	1.02	1	5
P3 I can provide nursing care for patients with various illnesses.	4.21	0.80	1	5
Evidence-Based Practice (EBP)	4.12	0.60	1	5
P4 I can create a nursing care plan for the patient in accordance with their cultural and spiritual needs.	3.91	0.95	1	5
P5 I am familiar with and apply evidence-based nursing practice.	3.93	0.78	1	5
P6 I consider myself educated and up-to-date in planning and providing nursing care.	4.01	0.92	1	5
Administration (JC)	3.85	0.64	2	5
P7 I am familiar with laws and behave according to those related to my profession.	4.12	0.79	2	5
P8 I can remain calm under any circumstances.	3.76	0.87	1	5
P9 I know how to correctly write an incident report.	3.24	1.12	1	5
P 10 Patients and their families can have complete trust in me.	4.31	0.77	2	5
Patient-centred care (POS)	4.40	0.46	1	5
P11 While providing nursing care, I remain focused on the patient and their needs.	4.56	0.54	2	5
P12 I adhere to all ethical principles.	4.47	0.63	1	5
P13 I am tolerant toward all patients.	4.26	0.69	1	5
P14 I can recognize changes in the patient's psychological condition (stress, anxiety, fear).	4.38	0.66	1	5
P 15 I notice changes in the patient's physical condition.	4.39	0.59	2	5

among participants. The highest ratings were for patient-centred care (M = 4.40, SD = 0.46), particularly in focusing on patient needs (M = 4.56, SD = 0.54). Evidence-Based Practice was also rated highly (M = 4.12, SD = 0.60). Administration showed moderate scores (M = 3.85, SD = 0.64), with lower confidence in incident reporting (M = 3.24, SD = 1.12). Clinical competencies scored lowest (M = 3.79, SD = 0.53), particularly regarding medication preparation (M = 3.49, SD = 1.02) and disease knowledge (M = 3.31, SD = 0.76).

CFA model

The following model fit indices were examined: a) Chi-square (χ2) and its ratio relative to degrees of freedom (χ2/df), where a relative chi-square value between 2 and 5 is commonly accepted as indicative of good model fit; b) the root mean squared error of approximation (RMSEA;), with values < .05 indicating good model fit, values from .05 to .08 indicating moderate fit, values from .08 to .10 indicating marginal fit, and values > .10 suggesting poor fit between empirical data and the tested model; and c) the comparative fit index (CFI), where values between .90 and .95 indicate acceptable fit, and values above .95 indicate good or excellent model fit, d) Tucker-Lewis index (TLI), and e) SRMR.

To test the four-factor structure of the PPPNS questionnaire on the Croatian student sample, a confirmatory factor analysis was performed, with the proposed model presented in Figure 1. Empirical data did not support the PPPNS model with 19 items.

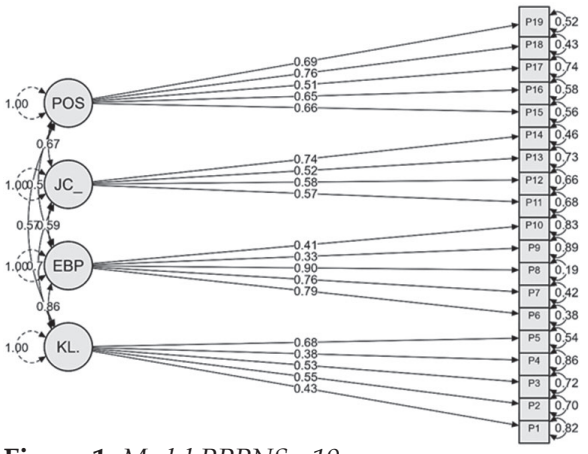

Figure 1. *Model PPPNS - 19*

The ratio of X^2 to degrees of freedom was acceptable at 3.19 (X^2 = 466.2, df = 146; p < 0.001). However, other fit indices were unsatisfactory: CFI = 0.76, TLI = 0.73, RMSEA = 0.105, and SRMR = 0.09.

Since certain items exhibited low factor loadings, four questions (item: 1, 4, 9, 10) with factor loadings below 0.50 were removed from the questionnaire. This revised model demonstrated good model fit indices. The ratio of X^2 to degrees of freedom was 2.05 (X^2 = 160.5, df = 78; p < 0.001), with CFI = 0.93, TLI = 0.90, RMSEA = 0.073, and SRMR = 0.062. Internal consistency coefficients for subscales were as follows: Clinical Competence Assessment Scale = 0.568; Evidence-Based Practice Skills = 0.857; Administrative Tasks = 0.672; and Patient-Centred Care = 0.789 (Figure 2). The internal consistency of the PPPNS-15 questionnaire, assessed using Cronbach's alpha coefficient, was 0.864.

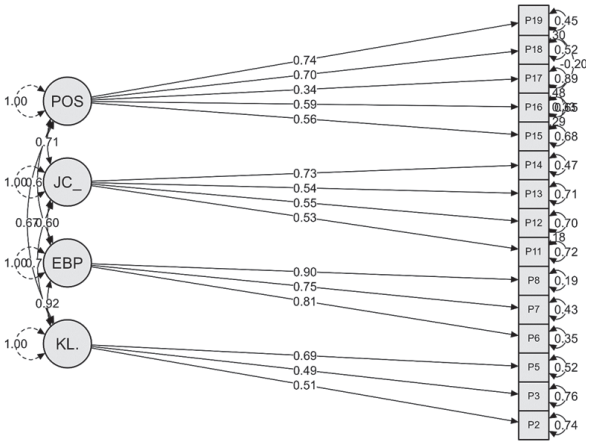

Figure 2. *Model PPPNS – 15*

Discussion

The findings of this study indicate that the Croatian version of the Perceived Professional Preparedness of Senior Nursing Students (PPNS) questionnaire with 15 items exhibits strong psychometric properties, confirming its factorial structure and reliability. The confirmatory factor analysis supported the four-factor structure consistent with the original instrument, highlighting the questionnaire's robustness and appropriateness for assessing professional preparedness among Croatian nursing students.

The high internal consistency (Cronbach's alpha = 0.92 for the total scale and ranging from 0.85 to 0.91 for the subscales) further underscores the reliability of the instrument. Such robust internal consistency suggests that the Croatian PPNS effectively captures the multifaceted construct of perceived professional preparedness, thus providing educators and policymakers with reliable insights into areas where students feel adequately prepared or perceive deficiencies.

Based on the descriptive statistics for the PPPNS-15 students in their final year of BN and MN studies rated themselves highest in patient-centred care, indicating strong patient orientation, adherence to ethical principles, and a high level of empathy and tolerance during clinical practice. This finding is congruent with contemporary nursing programmes that emphasize a holistic approach to patient care, recognising the emotional, physical, and psychological needs of patients. However, despite the strengths demonstrated in patient-centred care, students expressed notable concerns regarding their clinical competencies. Specifically, they reported feeling less confident in their knowledge related to diseases, diagnoses, treatment protocols, and the safe preparation of medications (12). This perceived inadequacy indicates a potential gap between the theoretical knowledge acquired in nursing education and the practical skills necessary for effective clinical practice.

Similar studies have shown that nursing students frequently underestimate their preparedness for specific clinical competencies, thus suggesting a misalignment between their self-assessment and actual capabilities (13, 14). These findings highlight the urgent need for targeted educational interventions and specialised practical training aimed at bolstering both theoretical knowledge and clinical competencies. Programmes that incorporate simulation-based learning and hands-on clinical experiences can significantly enhance student confidence and the competence in performing clinical tasks (15).

The findings of our study are consistent with the original validation by Shahsavari et al. (7), who also identified four dimensions of preparedness—clinical competency, evidence-based practice, framework-oriented performance, and patient-centred care. Similar to their results, our participants reported the highest perceived preparedness in the domain of patient-centred care, which may reflect a strong emphasis on humanistic and ethical aspects in our nursing curriculum. However, unlike Shahsavari et al., who reported moderate scores in clinical competency (7), our students rated this domain the lowest, particularly in areas related to disease knowledge and medication preparation. This discrepancy may indicate curriculum differences or variations in clinical training intensity and exposure between educational systems.

As such, nursing curricula should emphasize the development of critical thinking and practical skills alongside patient-centred practices to ensure that students are well-prepared for the complexities of modern healthcare environments (15). By reinforcing clinical training and theoretical foundations, nursing education can better support students in their transition to successful professional practice (16).

Limitation

This study focused primarily on assessing the internal consistency, test-retest reliability, content validity, and construct validity of the Croatian version of the PPPNS instrument. Other important psychometric properties such as objectivity, criterion-related validity, and discriminative validity were not examined in this phase. Objectivity was assumed due to the structured self-report format and standardised instructions, but not empirically tested. Future research should aim to assess these additional properties using diverse samples and designs in line with international standards for psychological and educational measurement.

Conclusion

In conclusion, the validation of the Croatian PPNS questionnaire not only fills a gap in existing assessment tools but also offers valuable insights into nursing students' preparedness for practice. By using the validated Croatian PPNS questionnaire, educational institutions can identify specific areas requiring improvement in curriculum design, clinical training, and practical placements, ultimately enhancing students' professional preparedness. Continued use and further investigation of this instrument can support ongoing improvements in nursing education and professional practice readiness, ultimately benefiting the healthcare system as a whole.

Declarations

Acknowledgments: The validation of the Croatian translation of the Perceived Professional Preparedness of Senior Nursing Students' Questionnaire was conducted as part of Katarina Fofić's Master's thesis in Nursing, originally written and defended in Croatian. The thesis is available in the online repository at: https://urn.nsk.hr/urn:nbn:hr:224:118828."

Authors' contributions: Each of the undersigned authors confirms that they have contributed significantly to the work in the following ways (please put the appropriate author's initials in the appropriate brackets to specify the individual contribution to the manuscript): KF, and IM contributed to the study design; KF was responsible for data collection, MČ, KF, IM participated in analysis and interpretation of the data; MČ, KF, IM contributed to manuscript writing. KF, MČ and IM revised the manuscript critically for important intellectual content. All authors approved the final version of the manuscript.

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Data sharing statement: data can be obtained dy contacting the corresponding author

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Supplementary 1. The Croatian translation of the PPPNS questionnaire

Responses were recorded on a 5-point Likert scale, ranging from 1 ("not prepared at all") to 5 ("fully prepared").

Pitanje		1	2	3	4	5
Kliničke kompetencije						
1.	Imam odgovarajuće znanje o bolestima, njihovom dijagnosticiranju i liječenju.					
2.	Mogu pripremiti terapiju bez rizika za pogrešku.					
3.	Mogu obaviti zdravstvenu njegu pacijenata koji boluju od različitih bolesti.					
Praksa utemeljena na dokazima						
4.	Mogu izraditi plan zdravstvene njege za pacijente prema njihovom					
5.	kulturnim i duhovnim potrebama.					
6.	Dobro poznajem zdravstvenu njegu utemeljenu na dokazima.					
Sigurnosno orijentirana izvedba						
7.	Poznajem i ponašam se u skladu sa zakonima koji se odnose na moju profesiju.					
8.	Mogu ostati miran/na pod bilo kojim okolnostima.					
9.	Spreman/na sam ispravno napisati izvješće o incidentu.					
10.	Pacijent i njegova obitelj mogu imati potpuno povjerenje u mene.					
Skrb usmjerena na pacijenta						
11.	Tijekom pružanja zdravstvene njege usredotočen/a sam na pacijenta.					
12.	Pridržavam se etičkih načela pod bilo kojim okolnostima svoga rada.					
13.	Tolerantan/na sam prema svim pacijentima.					
14.	Lako mogu uočiti promjene pacijentova mentalnog stanja.					
15.	Primjećujem promjene fizičkog stanja pacijenta.					

Complete Molar Cervical Previal Pregnancy with a Viable Co-Twin and Placental Percreta Following Corporal Hysterotomy: A Case Report

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Abstract

Background: Cases of coexistence of a twin molar pregnancy with a living second fetus are known in the literature, with different outcomes and treatment options, from uterine preservation procedures and cesarean section to hysterectomy due to the vital threat to the pregnant woman. Later pregnancies are dependent on uterine preservation - evacuation procedures in the first pregnancy.

Aim: Obstetrics forensic commentaries on the management of two different trophoblastic diseases.

Methods: This extremely rare case of previal cervical molar pregnancy in a twin pregnancy and primary completion by laparotomy in the first pregnancy is directly related to the occurrence of placental percretism with hematoperitoneum at 30 weeks of pregnancy due to distension and rupture of a placental blood vessel and supracervical hysterectomy. Conclusion: Thus, these problems became professional failures with an irreversible "domino effect". After such decisions and treatment, menstruation and reproduction were prevented by hysterectomy, and the possible treatment options for such conditions in the first and second pregnancies are discussed in the text with a forensic perspective.

Keywords: molar pregnancy, cervical pregnancy, placenta accreta spectrum, hysterectomy, treatment, medicolegality

Introduction

Cases of coexistence of a twin molar pregnancy with a living second fetus are known in the literature, with different outcomes and treatment options, from uterine preservation procedures and cesarean section to hysterectomy due to the vital threat to the pregnant woman. Later pregnancies are dependent on uterine preservation - evacuation procedures in the first pregnancy (1-4). I present an example from my own clinical and forensic practice, but with a completely different trophoblastic entity (cervical previal gestational trophoblastic disease and morbid placentation – placental percretism) in a second pregnancy with a bad perinatal outcome, along with a comment on the procedures in the treatment of both pathological pregnancies.

Case report

A 33-year-old healthy nulliparous woman with a history of one artificial abortion was treated for infertility: hysteroscopic polypectomy and laparoscopic chromopertubation were performed five months before successful one blastocyst artificial homologous insemination. Early combined screening indicated the absence of significance for chromosomal abnormalities with extremely high MoM free BHCG, and in the 14th week ultrasound showed inhomogeneous chorial tissue cervicoisthmically with a vital fetus in a separate gestational sac intracavitary, so it was decided to perform early amniocentesis. So, it was a monozygotic biamniotic pregnancy with trophoblastic degeneration of the first pregnancy and a second healthy fetus. In the 17th week of pregnancy, the pregnant woman bled profusely and was admitted to the clinic, where ultrasound found a dilated cervix filled with a mass similar to inhomogeneous molar tissue with numerous anechoic inclusions with an unclear border towards the wall of the cervix (Figure 1.) with an intact second gestational sac and healthy fetus. The ultrasound findings suggested a suspected complete mole probably after a missed abortion of the first twin with a normal pregnancy of the second twin. Due to laboratory findings of hyperthyroidism, propylthiouracil 3x200 mg and propranolol 2x20 mg were prescribed. Other laboratory findings and blood pressure were normal. Considering the above, the gynaecologists, in agreement with the patient, decided on a laparotomy approach to evacuate both pregnancies, so they performed a corporeal hysterotomy and evacuation of the uterine cavity under general anaesthesia at the 19th week of pregnancy. The surgical procedure and the postoperative course went well with the prescribed 3 doses of concentrated erythrocytes (KE) without bleeding from the cervix. The pathohistological findings indicated complete molar degeneration of the first conceptus and the normal anatomy of the second fetus. The karyotype of the healthy twin was normal.

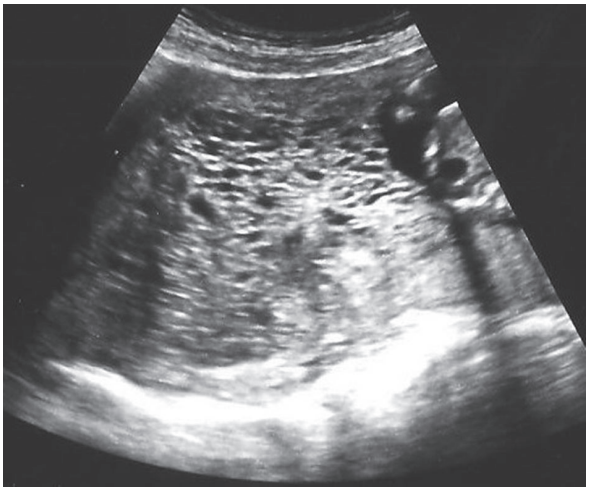

Figure 1. *Ultrasound pictures of cervical previal molar pregnancy: inhomogeneous mass with multiple anechogenic areas in the dilated cervix. Above the cervix, an intact gestational sac with a healthy fetus.*

A year later, the patient became pregnant spontaneously with an orderly course of pregnancy until the 30th week, when she was admitted to the clinic due to peracute and continuous abdominal pain without vaginal hemorrhage. On admission, signs of an acute abdomen are evident, and free fluid in the abdomen is found on ultrasound, along with an orderly biophysical profile of the fetus and cardiotocography and the finding of anterior invasive malplacentation – placental percretism. Due to the acute abdomen, an

emergency cesarean section is indicated, and after the Pfannenstiel relaparotomy, 1000 mL of fresh blood and clots are found in the abdomen with a 5 cm zone of percretism in the scar from the previous corporeal hysterotomy, which is actively bleeding. A fundal hysterotomy was performed on a freshly dead male newborn 1530 g/ 44 cm, without the effect of resuscitation. With regard to cicatricial placental percretism, the gynaecologist on duty decides on a supracervical hysterectomy, which is performed with the transfusion of 4 KE, 2 fresh frozen plasm and 2 cryoprecipitates. The pathohistological findings of the uterus indicated a placenta percreta through the scar, and the autopsy findings of the stillborn showed a premature morphological finding of the organs with signs of asphyxia.

In the case of these two different trophoblast entities that became directly conditioned: molar cervical pregnancy in the first pregnancy and morbid (invasive) placentation (placenta accreta spectrum - PAS) in the next pregnancy from the clinical and forensic aspects. According to previous works, about 300 cases of coexisting complete molar twin pregnancy with a living second fetus have been published as an extremely rare obstetric phenomenon. Obstetrical complications such as bleeding and spontaneous abortions, hyperthyroidism, preeclampsia and fetal death are not rare in such cases and are related to the metabolic-hormonal disorder of such pathological pregnancies (placental tissue). Molar trophoblast degeneration can be partial or complete, as described in rare case reports, but also the development of persistent intermediate or malignant forms of gestational trophoblastic disease. Ultrasonography is the basic method of early diagnosis and monitoring of pregnancies along with biochemical monitoring of HCG (5-7).

Wang et al. have recently published a case report of a coexisting molar pregnancy with a healthy fetus and several episodes of bleeding during pregnancy. A live eutrophic newborn with a normal karyotype was born by cesarean section, and the diagnosis of a complete placental hydatid tumor was confirmed pathohistologically (6). Rodriguez et al. presented a case of complete hydatidiform mole and coexisting fetus with premature delivery at 28 weeks due to chorioamnionitis (7). Gupta presented a similar case but with termination of pregnancy in the 1st trimester due to persistent gestational trophoblastic disease (8). The same case discovered in the second trimester with the birth of a healthy child was presented by Lin et al. (9) but with suspected choriocarcinoma that was treated with chemotherapy and relapsed with suspected intermediate trophoblastic tumor.

In modern literature, cervical ectopic pregnancies, even if they are rare or molar, are solved very successfully with preservation procedures, such as cerclage with evacuation curettage, evacuation curettage with gauze or balloon tamponade (9-10), and hysterectomy is reserved only for severe refractory hemorrhage and invasive cervical malplacentation with obstetric shock development (11-12). PAS is today an iatrogenically conditioned modern disease of the 21st century in direct correlation with the extremely high incidence of cesarean sections and other uterine procedures and thus increased maternal morbidity and mortality due to hemorrhage and peripartum hysterectomies (12-16). Although the outcomes of such pregnancies in more than 50 cases are completed with the birth of healthy children, the outcomes of such bizarre pregnancies depend on the place of placentation, the type of molar degeneration, the comorbidity that developed during the pregnancy, and possible PAS (16). Although there were no consequences in terms of litigation, as a clinician and gynaecological-obstetrical forensic expert, I am of the opinion that a transvaginal procedure to evacuate the cervical molar pregnancy should have been performed after placement of the cerclage with local anemization and ligation of the cervical branches, when the integrity of the second twin would have been preserved with a high probability. Furthermore, even when percretism was noticed during relaparotomy and cesarean section with, unfortunately, a recently deceased child due to most likely asphyxia, resection of the uterine wall and sutures with preservation of the uterus should have been performed.

This extremely rare case of previal cervical molar pregnancy in a twin pregnancy and primary completion by laparotomy in the first pregnancy is directly related to the occurrence of placental percretism with hematoperitoneum at 30 weeks of pregnancy due to distension and rupture of a placental blood vessel and hysterectomy. Thus, these problems became professional failures with an irreversible "domino effect". Because of the above, I consider sharing this presentation as a contribution to the importance of a collegial approach and the forgotten Hippocrates' "primum nil nocere".

Declarations

Authors' contributions: Dubravko Habek designed the study, wrote the main manuscript and critically reviewed the manuscript.

Ethics: Ethical approval and informed consent statements: Ethics Committee of Clinical Hospital Sveti Duh Zagreb. Nbr. 01-03-2089/4 from May 12, 2022. The patient gave verbal consent to the publication of data from her case report.

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Competing interests: The authors have nothing to disclose and no conflict of interest to declare.

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