University of Applied Health Sciences
Croatian Nursing Council

CROATIAN NURSING JOURNAL

CROATIAN NURSING JOURNAL

VOLUME: 9
NUMBER: 1
MAY 2025
https://doi.org/10.24141/2/9/1
ISSN: 2584-5659

www.cnj.hr

CROATIAN NURSING JOURNAL

PUBLISHER
University of Applied Health Sciences
Croatian Nursing Council

ADDRESS OF EDITORIAL OFFICE - CROATIAN NURSING JOURNAL
University of Applied Health Sciences
Mlinarska cesta 38, pp 901, Zagreb, Croatia • Website: www.cnj.hr
E-mail: info@cnj.hr • Telephone: + 385 1 5495 711

ENGLISH TRANSLATION AND PROOFREADING
SOVA®

GRAPHIC LAYOUT
studiog6h8

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

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

University of Applied Health Sciences
Croatian Nursing Council

CROATIAN NURSING JOURNAL

ISSN
2584-5659

UDC
614.253.5

YEAR OF PUBLICATION
2025.

VOLUME
9

ISSUE
1.

NUMBER OF PAGES
1-154

DOI
https://doi.org/10.24141/2/9/1

PLACE OF PUBLICATION
Zagreb

PUBLISHED BY
University of Applied Health Sciences

CIRCULATION
The journal is published twice a year

PUBLISHED BY
UNIVERSITY OF APPLIED HEALTH SCIENCES
Mlinarska cesta 38, 10 000 Zagreb, Croatia
www.zvu.hr

FOR THE PUBLISHER
Igor Filipčić

ENGLISH TRANSLATION AND PROOFREADING
SOVA®

GRAPHIC LAYOUT
studiog6h8

VOLUME: 9; NUMBER: 1; ZAGREB, MAY 2025

CROATIAN NURSING JOURNAL

Contents

Original scientific papers

Professional paper

Review

Croat Nurs J. 2025; 9(1): 5-18

Original scientific paper

The Presence of Suicidal Thoughts and Their Connection with Loneliness in Nurses in Social, Family and Romantic Context

[1,2,3] Tihomir Jovanović
[2,3,4] Marin Mamić
[2,4] Božica Lovrić
[2,3,5] Ivana Jelinčić
[3,4] Hrvoje Vidić
[2] Štefica Mikšić
[1,2] Jelena Tomac Jovanović
[2,4] Ivana Mamić
[3,4] Ivanka Zirdum
[6,7,8] Sandra Karabatić
[8,9] Mitar Saveljić
[10] Josip Samardžić
[2] Robert Lovrić

[1] General Hospital Pakrac and Hospital of Croatian Veterans, Pakrac, Croatia
[2] Faculty of Dental Medicine and Health Osijek, Josip Juraj Strossmayer University of Osijek, Osijek, Croatia
[3] Faculty of Medicine, Josip Juraj Strossmayer University of Osijek, Osijek, Croatia
[4] General County Hospital Požega, Požega, Croatia
[5] University Hospital Centre Osijek, Osijek, Croatia
[6] University Hospital Centre Zagreb, Zagreb, Croatia
[7] University of Applied Health Sciences, Zagreb, Croatia
[8] The Faculty of Health Studies Mostar, Mostar, Bosnia and Herzegovina
[9] Clinical Center of Montenegro, Podgorica, Montenegro
[10] General Hospital „Dr. Josip Benčević" Slavonski Brod, Croatia

Author for correspondence:
Marin Mamić
Tome Matica 20
34000 Požega, Croatia
E-mail: mmamic@fdmz.hr

Keywords: nurses, nursing students, suicidal thoughts, loneliness

Article received: 13.09.2024.

Article accepted: 13.12.2024.

https://doi.org/10.24141/2/9/1/1

Abstract

Aim. The aim of this research was to examine suicidal thoughts and their differences between nursing students and nurses, their correlation with sociodemographic variables and loneliness, and the contribution of sociodemographic factors to suicidal thoughts in both groups.

Methods. A cross-sectional study was conducted on a sample of nurses and nursing students. A total of 144 respondents participated in the online survey conducted in October 2023. A total of 113 (78.5%) employed nurses, who were not engaged in studies, and 31 (21.5%) nursing students participated in the research. The median age of the students was 20 years, while the median age of the nurses was 32 years. Suicidal thoughts were assessed using the Suicidal Ideation Attributes Scale, and loneliness was measured with the Social and Emotional Loneliness Scale.

Results. Significantly higher levels of suicidal thoughts were found in nursing students compared to nurses (p=0.047). It was shown that significant predictors of suicidal thoughts in nurses include the assessment of health status (p<0.001) and social loneliness (p=0.048), while significant predictors of suicidal thoughts in nursing students include the assessment of financial status (p=0.008), and family loneliness (p<0.001).

Conclusion. The results indicated that suicidal thoughts were low in both nurses and nursing students, but significantly higher in students. Family loneliness and financial status were significant predictors of suicidal thoughts in students, while social isolation and self-assessed health status were key predictors in nurses.

Introduction

The nursing profession is faced with various challenges, and the work of nurses has become extremely responsible, demanding and stressful. Nurses today are highly educated, taking on more and more complex work tasks. Sometimes this can have negative consequences on mental health. Certainly, the most common and the least severe problems that nurses face are burnout, anxiety, stress and depression (1, 2). However, all of the above factors may serve as precursors of a much severe mental health problem: the onset of suicidal thoughts (3). The Covid-19 pandemic has opened up a number of new questions and problems, one of which is the emergence of loneliness as a significant predictor of suicidal thoughts (4 - 6). This is largely attributed to extended overtime, increased professional demands, and stringent epidemic measures. Due to a number of individual, interpersonal and occupational factors, nurses find themselves uniquely vulnerable to the risk of suicide (7 - 9).

Suicidality

The most concise definition of suicide is the intentional taking of one's own life. A broader definition divides this term into suicidal thoughts and suicidal behaviors. Suicidal thoughts refer to any thought that a person has about ending their own life (planning to commit suicide or wanting the person to be dead) (10). Suicidal behaviors include a wide range of behaviors, such as obtaining large amounts of pills or other suicide paraphernalia. Most people who attempt, commit, or contemplate suicide experience feelings of hopelessness, helplessness, sadness, guilt, or shame. One of the strongest risk factors is an earlier suicide attempt (11). Research shows that suicidal thoughts are largely present in people who have been diagnosed with mental disorders, most often in depressive or bipolar disorder (12). However, it is important to emphasize that every person who has a depressive disorder does not necessarily think about suicide, nor does every person who commits or attempts suicide necessarily have to be depressed. One of the largest studies conducted in the USA on a sample of nurses revealed that nurses are at a higher risk of suicidal ideation compared to other workers. Moreover, nurses experiencing such thoughts are less likely to seek help than their counterparts without them (13). These findings are in line with research that has confirmed that all helping professions, in general, face an elevated risk of suicidal thoughts (14 - 16). Certain personality characteristics are also considered risk factors that can lead a person to commit suicide. Very often, impulsivity is associated with suicidality. Personality traits may make independent contributions to current suicidal ideation and previous suicide attempts in certain subgroups of suicidal individuals (17). A narcissistic person also has a hard time coping with the idea that others notice their imperfection, particularly through their own failures, which can, in some cases, contribute to the risk of a suicide attempt. Whether a person will attempt and/or commit suicide depends on the risk factors, but also on the protective factors present in their life. Some of the protective factors are: developed problem-solving skills, optimism, developed self-esteem and self-confidence, social support, self-confidence, social support, well-defined life goals, perceived high connection, parental cohesion and religious involvement (18). Research on nurses has revealed significant differences in suicidal thoughts based on age, years of service, marital status, living environment (urban vs. rural), and workplace settings (19, 20). Participants who tested positive for almost all measured mental disorders exhibited significantly higher rates of suicidal thoughts (21, 22). Numerous studies underscore the importance of recognizing suicidality and suicidal thoughts among nursing students, indi-

cating that education in this area could play a crucial role in suicide prevention (23). However, very few studies have specifically explored attitudes towards suicide risk among nursing students, and there is no existing data for the Republic of Croatia. A study conducted in China with 393 participants demonstrated that a sense of belonging to a school community can mitigate the negative effects of loneliness on suicidal thoughts and depression. The study found significant evidence of an interaction between loneliness and school belonging as predictors of both suicidal thoughts and depression (24). Additionally, adolescent suicidal behavior is associated with factors such as female gender, substance abuse, running away from home, being raised in a single-parent family, family member alcohol dependency, and experiences of violence (25). In the context of shift work and excessive overtime, some studies suggest that both sleep disturbances and short sleep duration can contribute to the development of suicidal thoughts (26).

Loneliness

In situations where an individual's social relationships are deficient either in quality or quantity, a person experiences a feeling of loneliness (27). Loneliness is most often defined as an unpleasant and emotionally disturbing subjective experience, arising from a discrepancy between the desired and achieved level of social contact. It is accompanied by a feeling of rejection by those we care about, paired with a longing for their acceptance and inclusion in their lives (28). One of the main reasons we feel lonely is the feeling that we are psychologically alone, despite the fact that there are other people around us, because we have not established close relationships with them (29). Although some researchers believe that loneliness is a unique experience, that is, that we all feel the same regardless of the causes that led to loneliness and in what circumstances it occurred, there are also those who believe that loneliness has several dimensions (27). As social loneliness is a broad term, DiTomasso and Spinner proposed a new tripartite theory of loneliness by developing a measure that assesses loneliness in three aspects: friendship, family, and romantic love (29, 30). Thus, a person who is lonely in one area does not have to be lonely in another. It is assumed that sociodemographic characteristics, such as gender, age, education, geographical mobility, and economic, residential and marital status, precede loneliness because they affect the possibility of creating and maintaining an optimal social network, and thus the subjective experience of loneliness (31). The variables that describe the quantity and quality of social relationships – the number of close friends, the quality of friendships, reciprocity in relationships, social support, social skills, social strategies – stand out as one of the most important correlates of loneliness. Personality traits (traits from the five-factor model, shyness, locus of control, self-esteem) and indicators of physical and mental health (anxiety, depression) also play a significant role, and they are sometimes treated as determinants and sometimes as consequences of loneliness (29).

Aim

1. To examine the presence of suicidal thoughts and their differences between nursing students and nurses
2. To examine the correlation of suicidal thoughts with sociodemographic variables (gender, age, place of residence, self-reported health and financial status, and family relationships) and loneliness in nursing students and nurses
3. To examine the contribution of sociodemographic variables (gender, age, place of residence, self-reported health and financial status, and family relationships) to suicidal thoughts in nurses and nursing students

Methods

Respondents

A cross-sectional study was carried out involving nurses, and nursing students. A total of 165 participants were included, and after excluding respondents who failed to fully complete the questionnaire or who failed to meet the criteria, a total of 144 respondents remained. The research was conducted in October 2023. Respondents from various regions across the Republic of Croatia participated in the research. Before the respondents started to fill out the questionnaire, the reason for the research was explained to them in text form, and they were obliged to give their consent to the research. To ensure the anonymity of respondents, the respondents' personal data, such as name and surname, social security number, and email address, were not collected during the questionnaire process. However, in order to prevent multiple submissions of the questionnaire by the same individual, respondents were required to provide identification when completing the questionnaire, though their addresses were not collected. The research was conducted online via the Google Forms platform, while the respondents were recruited via various channels (Viber, WP, Facebook and similar platforms). Among the respondents, a total of 113 (78.5%) were employed nurses who were not pursuing further studies, while 31 (21.5%) were nursing students. The median age of the students was 20 years (interquartile range 19 to 23 years), while the median age of the nurses was 32 years (interquartile range 25 to 40.5 years). The inclusion criteria for nurses required them to be currently employed and not enrolled in studies. Respondents who indicated both 'employed' and 'currently studying part-time' were excluded. The same applied to students, only students who were actively studying were included. The criterion was assessed through the question 'Your current employment status: ' with response options of 'Employed', 'Studying', 'Unemployed' and 'Employed and studying'.

The second criterion was for the respondents to be from the territory of the Republic of Croatia. The respondents were filtered out through the question that followed after consent to the research 'Are you a nurse who is currently employed or studying nursing in the Republic of Croatia?'. The respondents who gave a negative answer were excluded from the research. The third criterion was consent to the research.

Instruments

Socio-demographic questionnaire - in this part of the questionnaire data on gender, age, place of residence, financial and health status, and an assessment of family relationships were collected. All questions were closed-ended, and respondents could choose one of the possible answers. Respondents answered questions on self-assessment of financial and health status and family relationships on a 5-point Likert scale, with '1' indicating very bad, while '5' indicating excellent.

Suicidal Ideation Attributes Scale (SIDAS) is intended to screen for suicidal thoughts within the community and evaluate their severity. It comprises five items, each addressing a different attribute of suicidal ideation: frequency, controllability, proximity to attempts, distress level associated with the thoughts, and impact on daily functioning (32). The SIDAS scale consists of 5 items that respondents answered on a 10-point Likert scale, with '0' indicating the absence of suicidal thoughts and '10' indicating the highest intensity of suicidal thoughts. If respondents answered the first question 'In the past month, how often have you had thoughts about suicide?' with '0', the total score was 0, regardless of other scores. The total score of the scale is the sum of all responses, while the range of possible scores was 0 to 50. The reliability level of the SIDAS is 0.91 (32).

The Social and Emotional Loneliness Scale includes three subscales that explore loneliness across different domains: friendships (social loneliness subscale, 13 items), family relationships (family loneliness subscale, 11 items), and romantic loneliness (love loneliness subscale, 12 items) (33). Participants rated their agreement level with each statement on a scale from 1, indicating 'strongly disagree', to 7, indicating 'strongly agree'. The total score for each subscale was calculated by summing the participant's ratings on the corresponding items. The possible range of results for the social loneliness subscale is 13 - 91, family loneliness 11 - 77 and romantic loneliness 12 - 84. A higher score on each subscale indicates greater loneliness in the specific domain. The reliability level is 0.89 for the social loneliness scale, 0.85 for family loneliness, and 0.91 for romantic loneliness (33).

Statistics

Descriptive statistical methods were employed to outline the frequency distribution of the variables examined. Mean values were reported using the median and interquartile range. The normality of the distribution was assessed using the Kolmogorov-Smirnov test. The Kolmogorov-Smirnov test values for all numerical variables were significant (p<0.001). Upon examining skewness and kurtosis, most values exceeded 1, except for the skewness of emotional loneliness and the kurtosis of age, which were below 1. However, for suicidal thoughts, the skewness value was greater than 2. Correlations were calculated using Spearman and Point Biserial correlations. The Mann-Whitney test was used to assess differences in suicidal thoughts scores between nurses and nursing students. To determine the variables' contribution to suicidal thoughts, Linear Regression Analysis (enter method) was applied. The prerequisites for linear regression analysis were met. On the sample of students, the VIF values ranged from 1,253 to 1,400, while on the sample of nurses it was in the range of 1,195 to 2,410. Since VIF values below 5 are generally considered acceptable, this indicates the absence of significant multicollinearity. The normality of residuals was confirmed by the Kolmogorov-Smirnov test, where the p-value for unstandardized and standardized residuals in the sample of students was 0,106, while in the sample of nurses it was p=0114, suggesting that deviations from normality are not statistically significant. The Durbin-Watson on the sample of students was 1,712, while on the sample of nurses it was 2.007 which indicates a slight positive autocorrelation, but it remains within the generally acceptable range of 1,5 to 2,5, suggesting that autocorrelation is not a significant issue. A scatterplot of residuals for the overall regression shows randomly distributed residuals around the zero axis, with no discernible patterns, supporting the assumption of homoscedasticity. The dispersion is uniform, indicating that the assumptions of linearity and homoscedasticity are met, with one deviation that may represent an outlier. A significance level of p<0.05 was adopted. Data analysis was conducted using JASP version 0.17.2.1 (Department of Psychological Methods, University of Amsterdam, Amsterdam, The Netherlands) (34).

Results

The study included 102 women (70,8%), 79 (54.9%) with secondary school education, and 103 (71.5%) living in the city. Most of them assessed their financial situation as good (79 respondents or 54.9%), family relationships as good (71 respondents or 49.3%), and family relationships as good (77 respondents or 53.5%). The median age of the respondents was 27 years (interquartile range 22 to 38 years) (Table 1).

The results show a relatively low prevalence of suicidal thoughts in both nurses and nursing students. However, there is a significant difference in suicidal thoughts between nurses and nursing students (Mann Whitney test; p=0.047), with significantly higher suicidal thoughts in nursing students compared to nurses (Table 2).

In the group of students, the results showed that there is a significant moderate positive correlation between suicidal thoughts and family loneliness (ρ=0.018; p=0.018) and a moderate negative correlation with the assessment of financial status (ρ=-0.420; p=0.019), the higher the family loneliness, the higher suicidal thoughts, while the worse the financial situation, the higher the suicidal thoughts in nursing students. In the group of nurses, the results showed that suicidal thoughts was moderately positively associated with social (ρ=0.385; p<0.001), emotional (ρ=0.302; p=0.001) and family loneliness (0.386; p<0.001) and low negative with age (ρ=- 0.216; p=0.022), financial status (ρ=-0.232; p=0.014), family relationships (ρ=-0.244; p=0.009) and self-assessment of their health condition (ρ=-0.294; p=0.002), that is, the higher the social, emotional and family loneliness, the higher the suicidal thoughts, while the lower the age, the worse the financial and health condition and relationships in the family, the higher the suicidal thoughts (Table 3).

In order to determine the contribution of the variable to suicidal thoughts in nurses, the Linear Regression Analysis was used. The regression analysis included variables that were found to be significant in correlations; social, emotional and family loneliness, age, self-rated financial status, family relationships and self-rated health status. It has been shown that significant predictors of suicidal thoughts in nurses are self-rated health status (p<0.001) and social

Table 1. **Sociodemographic characteristics of the total sample of respondents**				
		Total	**Students**	**Nurses**
			N (%)	
Gender	male	42 (29.2)	11 (35.5)	31 (27.4)
	female	102 (70.8)	20 (64.5)	82 (72.6)
Place of residence	city	103 (71.5)	22 (71)	81 (71.7)
	village	41 (28.5)	9 (29)	32 (28.3)
Self-assessment of financial status	extremely bad	1 (0.7)	0	1 (0.9)
	bad	5 (3.5)	1 (3.2)	4 (3.5)
	moderate	49 (34)	13 (41.9)	36 (31.9)
	good	79 (54.9)	15 (48.4)	64 (56.6)
	excellent	10 (6.9)	2 (6.5)	8 (7.1)
Self-assessment Family relationships	extremely bad	6 (4.2)	1 (3.2)	5 (4.4)
	bad	1 (0.7)	0	1 (0.9)
	moderate	30 (20.8)	7 (22.6)	23 (20.4)
	good	71 (49.3)	12 (38.7)	59 (52.2)
	excellent	36 (25)	11 (35.5)	25 (22.1)
Self-assessment of health status	extremely bad	2 (1.4)	0	2 (1.6)
	bad	4 (2.8)	1 (3.2)	3 (2.7)
	moderate	30 (20.8)	3 (9.7)	27 (23.9)
	good	77 (53.5)	16 (51.6)	61 (54)
	excellent	31 (21.5)	11 (35.5)	20 (17.7)
Employment	students	31 (21.5)		
	nurses	113 (78.5)		
			Me (IQR)	
Age		27 (22 - 38)	20 (19 - 23)	32 (25 - 40.5)

Note: n – number of respondents; % - percentage; Me – Median, IQR – Interquartile range

Table 2. **Differences in suicidal thoughts and loneliness between nurses and nursing students**			
	Nurses	**Nursing Students**	***p****
	Median (interquartile range)		
Suicidal thoughts	0 (0 - 4.5)	3 (0 - 10)	**0.047**
Social loneliness	26 (19.5 - 37)	28 (19 - 44)	0.712
Emotional loneliness	33 (22 - 52.5)	50 (26 - 60)	0.104
Family loneliness	17 (12 - 27.5)	20 (12 - 27)	0.932

Note: ***p*** - Statistical significance; * Mann Whitney test

Table 3. **The correlation of suicidal thoughts with demographic variables and loneliness in nurses and nursing students**

		Students	Nurses
		Suicidal thoughts	
Social loneliness	ρ	0.298	0.385
	p	0.104	**<0.001**
Emotional loneliness	ρ	0.152	0.302
	p	0.416	**0.001**
Family loneliness	ρ	0.423	0.386
	p	**0.018**	**<0.001**
Age	ρ	0.286	-0.216
	p	0.118	**0.022**
Gender	r	0.251	-0.076
	p	0.173	0.424
Place of residence	r	0.085	**0.041**
	p	0.648	0.664
Finance	ρ	-0.420	-0.232
	p	0.019	**0.014**
Relationships in the family	ρ	-0.333	-0.244
	p	0.067	**0.009**
Health Assessment	ρ	-0.198	-0.294
	p	0.285	**0.002**

Note: ρ – Spearman's correlation coefficient rho; r – Point Bisserial correlation coefficient; p – Statistical significance

Table 4. **Summary of the regression analysis - dependent variable suicidal thoughts in nursing students**

	Standardized Coefficients	t	*p*	95% CI β		Adjusted R^2
	β			Lower Bound	Upper Bound	
(Constant)		2.377	0.019	1.383	15.258	0.307
Family loneliness	0.271	3.034	**0.003**	0.053	0.252	
Financial status	- 0.242	- 2.712	**0.008**	- 3.929	- 0.611	

Note: ***p*** - statistical significance; β - regression coefficient; t - the size of the difference relative to the variation in sample data; Adjusted R^2 – adjusted coefficient of determination

Table 5. **Regression analysis summary - dependent variable suicidal thoughts in nurses**

	Standardized Coefficients β	t	*p*	95% CI for β		Adjusted R^2
				Lower Bound	Upper Bound	
(Constant)		2.106	0.038	0.743	24.701	0,307
Social loneliness	0.199	1.998	**0.048**	0.001	0.189	
Emotional loneliness	0.041	0.431	0.667	- 0.052	0.080	
Family loneliness	0.122	1.045	0.298	- 0.062	0.199	
Age	- 0.033	- 0.383	0.702	- 0.118	0.080	
Financial status	- 0.018	- 0.188	0.852	- 1.972	1.631	
Family relationships	- 0.023	- 0.221	0.826	- 1.675	1.339	
Health status	- 0.397	- 4.269	**<0.001**	- 4.718	- 1.725	

Note: *p* - statistical significance; β - regression coefficient; t - the size of the difference relative to the variation in sample data; Adjusted R^2 – adjusted coefficient of determination

loneliness (p=0.048). Variables significantly explain 28.4% of the variance in suicidal thoughts (Adjusted R^2 = 0.284; p<0.001). Insight into the β coefficient shows that the self-rated health status contributes negatively, while social loneliness contributes positively to suicidal thoughts in nurses (Table 5).

Discussion

The aim of this research was to examine the presence of suicidal thoughts and their differences between nursing students and nurses, correlation of suicidal thoughts with sociodemographic variables (gender, age, place of residence, self-reported health and financial status, and family relationships) and loneliness in nursing students and nurses and to examine the contribution of sociodemographic variables to suicidal thoughts in nurses and nursing students.

The results showed a significant difference in suicidal thoughts between female nurses and nursing students. The results are partly consistent with previous studies (35), which showed an elevated risk among female nursing students, paralleling the findings related to qualified nurses (35). However, the study revealed that female nursing students had a relatively high rate of hospitalization for self-harm prior to beginning their nursing education**.** It also suggests that increased risk of suicidality may partly be attributed to pre-existing vulnerabilities, although our study lacks this specific data. Healthcare professionals seem to have a heightened risk of suicidal thoughts, which is closely connected to the stressful nature of their work and the mental health impact of these stressors. Lower levels of work-related stress have been shown to provide a protective effect against suicidal thoughts (36).

Also, possible causes of the above result can lie in the fact that during their education, nursing students may encounter various stressors that are not typically faced by students in other fields. Clinical practice, a mandatory component of the nursing curriculum, can expose students to stressful and traumatic experiences. Interpersonal relationships within this demanding environment also play a significant role in students' stress levels (37). Institutions offering nursing degree programs have a duty to ensure that prospective students are thoroughly prepared for both the theoretical and practical demands of their education. It is also important to support students in making informed decisions about whether nursing education is the right choice for them. Moreover, students facing mental health challenges should receive appropriate support, and efforts should be made to reduce the stigma associated with seeking help. Faculty members responsible for students with mental health issues must be adequately trained and supported (38).

Beyond educational institutions, senior clinical staff or mentors should also take responsibility for student well-being by implementing necessary support strategies. This could include providing resources for adequate student support and fostering effective communication between educational institutions and mentors to ensure consistent support across different environments.

The recent COVID-19 pandemic, which involved some students during their studies, introduced new stressors such as isolation from family and friends, fear of the unknown, and the awareness of insufficient knowledge and skills to manage the threat of infection (39). The literature also documents the pandemic's impact on nursing students' well-being, including a high prevalence of depression, anxiety, and post-traumatic stress disorder (PTSD), all of which are recognized as risk factors for developing suicidal thoughts (40).

However, it should be noted that the results of suicidal thoughts in both groups are very low, including in the nursing student group. Although they are very low, they still indicate a higher level of suicidal thoughts in the student group, and therefore it is important to pay attention to this group, which might be potentially at risk in the future. Therefore, it would be good to conduct research that would follow nurses over a longer period of time, from studies through work, to see in which part of personal life or professional life there is an increase in suicidality in the aforementioned group. It is also important to consider many other factors that may play a role in the development of suicidal thoughts that were not included in the study. Possible reasons for such low results in nurses in particular, but also in nursing students, is a sense of professional purpose. This helps individuals to better cope with stressful situations and professional challenges, and may play an important role in reducing the risk of suicidal thoughts among nursing students and nurses, because the core of nursing as a profession is to help others and provide support to patients in their most difficult moments, which can strengthen the sense of self-worth and meaning in life. Helping others can foster a deep-rooted sense of personal satisfaction and achievement (41, 42). Professional purpose can also provide emotional resilience for nurses and students, because the feeling that their work has a positive impact on the community can act as a protective factor against negative emotions and thoughts, including suicidal thoughts. However, this sense of purpose can be compromised if individuals do not receive sufficient support or face burnout, which further emphasizes the importance of maintaining a positive work environment and the availability of mental health resources (43).

The results of the research show a significant link between suicidal thoughts and feelings of family loneliness, as well as poor financial condition among nursing students. Research on this topic has not been conducted and the results cannot be compared with previous research. However, possible reasons could be sought in a lack of emotional support and connection to family, leading to family loneliness, which reduces students' ability to cope with stress and difficulties, thus increasing the risk of suicidal thoughts. In addition to conflicts within the family, social isolation also stands out as an important factor in suicidal behavior (44). Studies highlight that social support is an important protective factor, with social integration associated with a lower risk of suicidal thoughts among qualified nurses (45). Furthermore, loneliness associated with suicidal thoughts, as confirmed in this study, has been recognized as a predictor of suicidal thoughts, especially among women aged 16 to 20 years (46). Interventions that promote social integration and support for nursing students can be beneficial, with peer support programs having positive personal and professional effects (47, 48) and may be more beneficial than professional help (49). The influence of family loneliness on suicidal thoughts in nursing students can be partly explained by the separation process that takes place during adolescence but does not necessarily end at that stage. It is questionable to what extent students are ready to cope with new life obligations, while for older nurses after the separation is completed, social loneliness becomes more important than family loneliness. A poor financial situation can cause chronic stress, insecurity, and feelings of hopelessness, which are known risk factors for suicidal thoughts. Students facing financial difficulties may feel additional pressure and uncertainty about the future, which can increase the risk of suicidal thoughts. Numerous studies confirm the link between economic hardship and suicidal thoughts. Our results are consistent with other studies that have also shown an association between suicidal thoughts and financial problems (50 - 52). A Danish study found that the risk of suicide increased as income decreased, but this ratio was not true for wealth and disappeared after psychiatric factors

were taken into account (53). Therefore, it is important to investigate how low socioeconomic situation is related to suicide risk, while controlling for key confounding factors. Another possible reason for this result is that students often rely on family, loans, or limited financial aid to cover living and academic expenses. Without a regular income, students may struggle to pay for basic necessities like housing, food, and transportation, leading to increased financial stress. This financial instability can exacerbate feelings of hopelessness, which are strongly linked to mental health problems such as depression and suicidal thoughts (54, 55).

Our research reveals that impaired health status is a significant predictor of suicidal ideation among nurses, which is consistent with the findings of other studies (56 - 58). Poor physical health can act as a source of stress that exacerbates psychological stress. Health problems, pain, and chronic illness can significantly reduce quality of life and increase feelings of hopelessness, which can contribute to suicidal thoughts. There is a strong correlation between physical and mental health, with poor physical health being able to cause depression, anxiety, and other mental difficulties. How individuals experience and assess their health can have a profound impact on their mental state. If nurses feel their health is poor, it can increase feelings of helplessness and stress. Working in healthcare often involves high physical and emotional demands, and if workers feel physically exhausted or sick, it can be more difficult for them to cope with daily stress. Long working hours, responsibilities, and emotional pressures in the healthcare sector are already contributing to high levels of stress, and poor health can further exacerbate these stressors. Frequent absences from work due to health problems can cause job insecurity, financial difficulties and a feeling of isolation from colleagues. These results highlight the need for a comprehensive approach to the health of nurses, encompassing both physical and mental health. Properly identifying and addressing health issues can reduce the risk of suicidal thoughts and improve the overall well-being of these key healthcare professionals. Implementing appropriate support programs and interventions can have a significant positive impact on their lives and the quality of healthcare they provide.

Social loneliness also proved to be a significant predictor of suicidal thoughts in the group of nurses. Research on this topic has not been conducted, but the results of this research can be observed through the nursing profession, which requires long hours, emotional exhaustion, and limited opportunities for social interaction. Although certain studies did not specifically investigate the relationships of the aforementioned constructs, they have highlighted that nurses often experience feelings of isolation due to the nature of their work. This isolation limits their ability to maintain and nurture personal relationships with friends (59, 60). Consequently, this sense of thwarted belongingness, which can become closest to social loneliness, is shown to be a key psychological precursor to suicidal ideation, which is caused by the aforementioned gender factors (59, 60). Furthermore, the Covid-19 pandemic exacerbated these challenges, disrupting social relationships and causing widespread social isolation (61). It is possible that precisely due to the nature of the work of nurses during Covid 19, their isolation from friends and the creation of social loneliness occurred. Studies have shown that worsened loneliness (increased isolation during the pandemic) had a greater impact on both the presence and onset of suicidal ideation than loneliness before the pandemic (61). However, a lot of time has passed since the lifting of isolation measures, therefore it is now difficult to speak from today's perspective to what extent the conditions at the time could have influenced loneliness and consequently suicidal thoughts among nurses.

Research contribution

This research provided us with valuable data and emphasized the significance of addressing suicidal thoughts among both future and current healthcare professionals. Predisposing factors of suicidal thoughts have been observed, however there is space for new research to include more variables such as previous mental disorders, academic success, ways of coping with stress with the aim of designing quality interventions that will contribute to the timely detection of vulnerable groups in need of timely assistance. Further research should explore the mechanisms through which family loneliness and poor financial status affect suicidal thoughts. It would also be useful to develop and evaluate intervention programs that provide social and economic support to students at risk.

Limitations

This research includes several potential limitations. First, the sample of 144 participants may be too small to generalize the results to the broader population of nurses and nursing students, and the fact that the sample is limited to a specific geographical area reduces its representativeness. Also, one of the limitations of this research is the large difference in the sample of nursing students and employed nurses. Additionally, the cross-sectional design of the study captures data at a single point in time, limiting the ability to assess causal relationships between variables and preventing the tracking of changes in mental health or suicidal ideation over time. Relying on self-reported data can lead to bias and inaccuracies, as participants may underestimate or overestimate their mental health and experiences due to stigma or other reasons. The study focuses on certain factors, such as loneliness and financial status, but may omit other relevant variables like previous mental disorders, coping strategies, social support, and work stress. Uncontrolled variables, such as personal history of mental illness or family dynamics, could have also influenced the results. The findings may not be applicable to other populations due to the specific focus on nursing students and professionals and the cultural and healthcare context of the participants. The absence of qualitative data limits the depth of understanding of participants' experiences and perspectives, which could provide additional insights into the emotional and psychological aspects. Addressing these limitations in future research could provide a more comprehensive understanding of the factors influencing suicidal thoughts among nursing students and healthcare professionals.

Conclusion

The results showed that the presence of suicidal thoughts in the groups of nurses and technicians and nursing students is low. However, although low, it is significantly higher in the group of nursing students compared to nurses. In terms of predictors of suicidal thoughts, it was shown that in the group of students, family loneliness and financial status are significant predictors, while in the group of nurses, social isolation and self-assessed health status are significant predictors.

Author contributions

Conceptualization (MM, TJ, BL, IJ); Methodology (TJ, MM, HV, RL); Investigation (MM, ŠM, JTJ, IM, IZ, SK); Writing—original draft preparation (TJ, MS, JS, RL); Writing—review and editing (IM, JTJ, IZ, RL). All authors have read and agreed to the published version of the manuscript.

Conflict of interest

The authors declare no conflicts of interest.

Acknowledgments

The authors would like to thank all the participants.

Funding

This research received no external funding.

References

1. Chin WS, Chen YC, Ho JJ, Cheng NY, Wu HC, Shiao JSC. Psychological work environment and suicidal ideation among nurses in Taiwan. J Nurs Scholarsh. 2019; 51(1):106-13. https://doi.org/10.1111/jnu.12441
2. Kabir H, Chowdhury SR, Roy AK, Chowdhury SA, Islam MN, Chomon RJ, et al. Association of workplace bullying and burnout with nurses' suicidal ideation in Bangladesh. Sci Rep. 2023; 13(1):14641. https://doi.org/10.1038/s41598-023-41594-4
3. Dutheil F, Aubert C, Pereira B, Dambrun M, Moustafa F, Mermillod M, et al. Suicide among physicians and health-care workers: A systematic review and meta-analysis. PLoS One. 2019;14(12):e0226361. https://doi.org/10.1371/journal.pone.0226361
4. García-Iglesias JJ, Gómez-Salgado J, Fernández-Carrasco FJ, Rodríguez-Díaz L, Vázquez-Lara JM, Prieto-Callejero B. Suicidal ideation and suicide attempts in healthcare professionals during the COVID-19 pandemic: A systematic review. Front Public Health. 2022;10:1043216. https://doi.org/10.3389/fpubh.2022.1043216
5. Groves S, Hawley M, Lascelles KM, Hawton K. News reporting of suicide in nurses: A content analysis study. Int J Ment Health Nurs. 2022;31(6):1513-22. https://doi.org/10.1111/inm.13057
6. Yang Y, Wang R, Zhang D, Zhao X, Su Y. How loneliness worked on suicidal ideation among Chinese nursing home residents: Roles of depressive symptoms and resilience. Int J Environ Res Public Health. 2021;18(10):5472. https://doi.org/10.3390/ijerph18105472
7. Basu N, Barinas J, Williams K, Clanton C, Smith PN. Understanding nurse suicide using an ideation-to-action framework: An integrative review. J Adv Nurs. 2023;79(12):4472-88. https://doi.org/10.1111/jan.15681
8. Groves S, Lascelles K, Hawton K. Suicide, self-harm, and suicide ideation in nurses and midwives: A systematic review of prevalence, contributory factors, and interventions. J Affect Disord. 2023;331:393-404. https://doi.org/10.1016/j.jad.2023.03.027
9. Rees H, Hallett N. Reducing the risk of suicide among healthcare staff. Nurs Stand. 2023;38(11):26-33. https://doi.org/10.7748/ns.2023.e12178
10. Harmer B, Lee S, Rizvi A, Saadabadi A. Suicidal Ideation. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024.
11. Ngwena J, Hosany Z, Sibindi I. Suicide: A concept analysis. Journal of Public Health. 2016;25(2):123–34 https://doi.org/10.1007/s10389-016-0768-x
12. Lange M, The hidden crisis of nurse suicide. Nursing. 2023;53(11):28-32. https://doi.org/10.1097/01.NURSE.0000978856.91159.41
13. Kelsey EA, West CP, Cipriano PF, Peterson C, Satele D, Shanafelt T, Dyrbye LN. Original research: suicidal ideation and attitudes toward help seeking in U.S. nurses relative to the general working population. Am J Nurs. 2021;121(11):24-36. https://doi.org/10.1097/01.NAJ.0000798056.73563.fa
14. Lewitzka U, Knappe S. [Suicidal behavior]. Dtsch Med Wochenschr. 2022;147(22):1487-94. German. https://doi.org/10.1055/A-1752-4837
15. Hofstetter T, Mayer NL. CE: Suicide prevention: Protecting the future of nurses. Am J Nurs. 2023;123(12):30-36. https://doi.org/10.1097/01.NAJ.0000996556.74490.80
16. Atreya A, Nepal S, Menezes RG, Marhatta A, Ghimire S, Shah P. Suicidal ideation among medical and nursing students. J Nepal Health Res Counc. 2023;20(4):852-8. https://doi.org/10.33314/jnhrc.v20i4.4147
17. Brezo J, Paris J, Tremblay R, Vitaro F, Zoccolillo M, Hébert M, et al. Personality traits as correlates of suicide attempts and suicidal ideation in young adults. Psychol Med. 2006;36(2):191-202. https://doi.org/10.1017/S0033291705006719
18. Dardas LA, Price MM, Arscott J, Shahrour G, Convoy S. Voicing Jordanian adolescents' suicide. Nurs Res. 2021;70(1):E1-E10. https://doi.org/10.1097/NNR.0000000000000476
19. Pons-Baños J, Ballester-Ferrando D, Riesco-Miranda L, Escoté-Llobet S, Jiménez-Nuño J, Fuentes-Pumarola C, et al. Sociodemographic and clinical characteristics associated with suicidal behaviour and relationship with a nurse-led suicide prevention programme. Int J Environ Res Public Health. 2020;17(23):8765. https://doi.org/10.3390/ijerph17238765
20. Ding C, Duan Z, Luo W, Li L, Li G, Li X, et al. Pathways linking workplace violence and suicidal ideation/non-suicidal self-injury among nurse staff: the mediating role of loneliness and depressive symptoms. BMC Nurs. 2024;23(1):363. https://doi.org/10.1186/s12912-024-02044-2
21. Stelnicki AM, Jamshidi L, Angehrn A, Nicholas Carleton R. Suicidal behaviors among nurses in Canada. Can J Nurs Res. 2020;52(3):226-36. https://doi.org/10.1177/0844562120934237
22. Wang M, Wei Z, Wang Y, Sun L. Mediating role of psychological distress in the associations between medical errors, adverse events, suicidal ideation and plan among operating room nurses in China: a cross-sectional study. BMJ Open. 2023;13(6):e069576. https://doi.org/10.1136/bmjopen-2022-069576
23. Ferrara P, Terzoni S, Ruta F, Poggi AD, Destrebecq A, Gambini O, et al. Nursing students' attitudes towards suicide and suicidal patients: A multicentre cross-sectional survey. Nurse Educ Today. 2022;109:105258. https://doi.org/10.1016/j.nedt.2021.105258
24. Zhou C, Gao M, Shi X, Zhang Z. Suicidal behavior, depression and loneliness among college students:

the role of school belonging. Psychol Health Med. 2023;28(6):1520-6. https://doi.org/10.1080/13548506.2022.2113105

25. Zygo M, Pawłowska B, Potembska E, Dreher P, Kapka-Skrzypczak L. Prevalence and selected risk factors of suicidal ideation, suicidal tendencies and suicide attempts in young people aged 13-19 years. Ann Agric Environ Med. 2019;26(2):329-36. https://doi.org/10.26444/AAEM/93817
26. Mao F, Wan J, Sun Y, Yang B, Wang Y, Cao F. Association between transition patterns of sleep problems and suicidal ideation in Chinese female nurses: A prospective study. J Clin Psychol. 2023;80(2):279-90. https://doi.org/10.1002/jclp.23612
27. Železnik D. Comparison of loneliness of adolescents and the elderly in social welfare institutions. Health Herald [Internet]. 2016;2(2):14-26. https://doi.org/10.47960/2303-8616.2016.4.14
28. Tucak IJ. Comparison of the relationship between loneliness and preferred loneliness with some sociodemographic variables and aspects of subjective and psychological well-being of adults. Social Psychiatry. 2019; 47(1):3-27.
29. Lacković KG. Usamljenost: Fenomenologija, Teorije i Istraživanja. Jastrebarsko; Naklada Slap: 2008. Croatian.
30. DiTomasso E, Spinner, B. The development and initial validation of the Social and Emotional Loneliness Scale for Adults (SELSA). Personality and Individual Differences, 1993;14(1):127-34. https://doi.org/10.1016/0191-8869(93)90182-3
31. Medved A, Keresteš G. Loneliness in early adolescence: sex and age differences and association with social relationships. Social Research [Internet]. 2011;20(2(112)):457-78. https://doi.org/10.5559/di.20.2.09
32. Van Spijker BA, Batterham PJ, Calear AL, Farrer L, Christensen H, Reynolds J, et al. The suicidal ideation attributes scale (SIDAS): Community-based validation study of a new scale for the measurement of suicidal ideation. Suicide Life Threat Behav. 2014;44(4):408-19. https://doi.org/10.1111/sltb.12084
33. Proroković A, Lacković KG, Ćubela AV, Penezić Z, urednici. Zbirka psihologijskih skala i upitnika, Svezak 2. Zadar: University of Zadar; 2004. Coroatian.
34. JASP Team. JASP (Version 0.19.3)[Computer software]. 2023. Available at: https://jasp-stats.org/download/
35. Goetz CS. Are you prepared to S.A.V.E. your nursing student from suicide? J Nurs Educ. 1998;37(2):92-5. https://doi.org/10.3928/0148-4834-19980201-10
36. The Squirrel, CA. A Call to Intervene: Suicide Risk Among Nursing Students. Creat Nurs. 2020;26(4):253-55. https://doi.org/10.1891/CRNR-D-20-00024
37. Davidson JE, Accardi R, Sanchez C, Zisook S, Hoffman LA. Sustainability and outcomes of a suicide prevention program for nurses. Worldviews Evid Based Nurs. 2020;17(1):24-31. Erratum in: Worldviews Evid Based Nurs. 2020;17(2):179. https://doi.org/10.1111/WVN.12418
38. Black MH, Scott M, Baker-Young E, Thompson C, McGarry S, Hayden-Evans M et al. Preventing suicide in post-secondary students: a scoping review of suicide prevention programs. European Child and Adolescent Psychiatry. 2023;32(5):735-71. https://doi.org/10.1007/s00787-021-01858-8
39. Windsor-Shellard B, Gunnell D. Occupation-specific suicide risk in England: 2011-2015. Br J Psychiatry. 2019;241(4):594-99. https://doi.org/10.1192/bjp.2019.69
40. Hong S, Ai M, Xu X, Wang W, Chen J, Zhang Q, et al. Immediate psychological impact on nurses working at 42 government-designated hospitals during COVID-19 outbreak in China: a cross-sectional study. Nurs Outlook. 2021;69:6-12. https://doi.org/ 10.1016/j.outlook.2020.07.007
41. Moreno-Milan B, Cano-Vindel A, Lopez-Dóriga P, Medrano LA, Breitbart W. Meaning of work and personal protective factors among palliative care professionals. Palliat Support Care. 2019 Aug;17(4):381-7. https://doi.org/10.1017/S147895151800113X
42. Oliveros B, Agulló-Tomás E, Márquez-Álvarez LJ. Risk and protective factors of mental health conditions: impact of employment, deprivation and social relationships. Int. J. Environ. Res. Public Health 2022;19:6781. https://doi.org/10.3390/ijerph19116781
43. Dyrbye LN, West CP, Johnson PO, Cipriano PF, Beatty DE, Peterson C, et al. Burnout and satisfaction with work-life integration among nurses. J Occup Environ Med. 2019;61(8):689-98. https://doi.org/10.1097/JOM.0000000000001637
44. Chernomas WM, Shapiro C. Stress, depression, and anxiety among undergraduate nursing students. Int J Nurs Educ Scholarsh. 2013;10(1):255-66. https://doi.org/10.1515/ijnes-2012-0032
45. Ramluggun P, Lacy M, Cadle M, Anjoyeb M. Managing the demands of the preregistration mental health nursing programme: The views of students with mental health conditions. Int J Ment Health Nurs. 2018;27(6):1793-804. https://doi.org/10.1111/inm.12486
46. Swift A, Banks L, Baleswaran A, Cooke N, Little C, McGrath L, et al. COVID-19 and student nurses: A view from England. J Clin Nurs. 2020;29(17-18):3111-4. https://doi.org/10.1111/jocn.15298
47. Mendez-Pinto I, Antuña-Casal M, Mosteiro-Diaz MP. Psychological disorders among Spanish Nursing students three months after COVID-19 lockdown: A cross-sectional study. Int J Ment Health Nurs. 2023; 32(2):479-89. https://doi.org/10.1111/inm.13086
48. Van Orden KA, Witte TK, Cukrowicz KC, Braithwaite SR, Selby EA, Joiner TE. The interpersonal theory of suicide. Psychol Rev Psychol Rev. 2010;117:575-600. https://doi.org/10.1037/a0018697

49. Tsai AC, Lucas M, Kawachi I. Association between social integration and suicide among women in the United States. JAMA Psychiatry. 2015;72(10):987-93. https://doi.org/10.1001/jamapsychiatry.2015.1002
50. 50. McClelland H, Evans JJ, Nowland R, Ferguson E, O'Connor RC. Loneliness as a predictor of suicidal ideation and behaviour: a systematic review and meta-analysis of prospective studies. J Affect Disord. 2020;274:880-96. https://doi.org/10.1016/j.jad.2020.05.004
51. Carey MC, Kent B, Latour JM. Experiences of undergraduate nursing students in peer assisted learning in clinical practice: a qualitative systematic review. JBI Database of Systematic Reviews and Implementation Reports. 2018;16(5):1190-219. https://doi.org/10.11124/jbisrir-2016-003295
52. Cust F, Guest K. Peer support for undergraduate children's nursing students. J. Nurs. Educ. Pract. 2019;10(4):21-5. https://doi.org/10.5430/jnep.v10n4p21
53. Morton C. Nursing students' experiences of seeking mental health support: A literature review. Mental Health Practice. 2022;26(5):20-6. https://doi.org/10.7748/mhp.2022.e1604
54. Mathieu S, Treloar A, Hawgood J, Ross V, Kõlves K. The role of unemployment, financial hardship, and economic recession on suicidal behaviors and interventions to mitigate their impact: A review. Front Public Health. 2022;6(10):907052. https://doi.org/10.3389/fpubh.2022.907052
55. Ryu S, Fan L. The relationship between financial worries and psychological distress among U.S. adults. J Fam Econ Issues. 2023;44(1):16-33. https://doi.org/10.1007/s10834-022-09820-9
56. Gunnell D, Lofving S, Gustafsson JE, Allebeck P. School performance and risk of suicide in early adulthood: follow-up of two national cohorts of Swedish schoolchildren. J Affect Disord. 2011;131:104–12. https://doi.org/10.1016/j.jad.2011.01.002
57. Nyberg J, Gustavsson S, Aberg MAI, Kuhn HG, Waern M. Late-adolescent risk factors for suicide and self-harm in middle-aged men: explorative prospective population-based study. Br J Psychiatry. 2020;217(1):370-6. https://doi.org/10.1192/bjp.2019.243
58. Oien-Odegaard C, Hauge LJ, Reneflot A. Marital status, educational attainment, and suicide risk: a Norwegian register-based population study. Popul Health. 2021;19:2-11. https://doi.org/10.1186/s12963-021-00263-2
59. Davis MA, Cher BAY, Friese CR, Bynum JPW. Association of us nurse and physician occupation with risk of suicide. JAMA Psychiatry. 2021;78(6):651-8. https://doi.org/10.1001/jamapsychiatry.2021.0154
60. World Health Organization. Social determinants of mental health: Addressing loneliness in healthcare professions [Internet]. World Health Organization; 2021. Available at: https://www.who.int/teams/social-determinants-of-health/demographic-change-and-healthy-ageing/social-isolation-and-loneliness Accessed: 08.08.2024.
61. Tachikawa H, Matsushima M, Midorikawa H, Aiba M, Okubo R, Tabuchi T. Impact of loneliness on suicidal ideation during the COVID-19 pandemic: findings from a cross-sectional online survey in Japan. BMJ Open 2023;13:e063363. https://doi.org/10.1136/bmjopen-2022-063363

Croat Nurs J. 2025; 9(1): 19-28

Original scientific paper

Primary Caregivers' Satisfaction with Healthcare of Children and Adolescents with Type 1 Diabetes Mellitus

[1] Elmedina Mrkulić
[2] Jasmina Mahmutović
[2] Suada Branković
[2] Hadžan Konjo
[2] Vedran Đido

[1] Department of Nursing, Pediatric Clinic, Clinical Center University of Sarajevo, Sarajevo, Bosnia and Herzegovina
[2] Department of Nursing, Faculty of Health Studies, University of Sarajevo, Sarajevo, Bosnia and Herzegovina

Article received: 09.09.2024.

Article accepted: 27.01.2025.

https://doi.org/10.24141/2/9/1/2

Author for correspondence:
Elmedina Mrkulić
Department of Nursing, Pediatric clinic, Clinical Center University of Sarajevo
E-mail: elmamrkulic@gmail.com; elma.mrkulic@fzs.unsa.ba

Keywords: children, adolescents, diabetes mellitus, parents, healthcare satisfaction

Abstract

Aim. The aim of this study is to investigate the satisfaction of primary caregivers of children and adolescents with type 1 diabetes mellitus regarding healthcare services.

Methods. The study was conducted within the Association of Children and Youth with Diabetes in the Sarajevo Canton from October 23, 2021, to February 28, 2022. The study included 50 primary caregivers, 49 mothers and one father, with an average age of 41.28 ± 5.64. A generic questionnaire for assessing parental satisfaction with healthcare provided to their children, the PedsQLTM Healthcare Satisfaction Generic Module, was used. The statistical analyses used to analyze the data included multiple linear regression, ANOVA test, and t-test.

Results. Satisfaction with healthcare services was assessed with average ratings on a scale of 0 to 100 but with wide ranges of scores (59.46±24.34, ranging from 16.67 to 98.96). The results showed that two variables play a crucial role in predicting satisfaction with healthcare services: meeting emotional needs (relative contribution=29.8) and satisfaction with information (relative contribution=27.3).

Conclusion. An individualized approach and a collaboration with parents of children and adolescents with type 1 diabetes mellitus are necessary to improve the parental experience and their satisfaction with healthcare services.

Introduction

Assessing the quality of healthcare is an essential component of measuring progress towards equitable health outcomes globally (1, 2). Traditionally, a healthcare system's quality was assessed by clinical outcomes, accessibility, and efficiency. However, there is a growing recognition that these factors alone are inadequate for providing a comprehensive patient experience (3). Patient satisfaction has become a pivotal element of a high-quality healthcare system. Patient satisfaction refers to their perception and experience of the healthcare provided, encompassing aspects such as the kindness and empathy of healthcare professionals, respectful and timely communication, patient involvement in decision-making about their treatment, and provision of information about their condition and procedures (4). Patient data (satisfaction, preferences, outcomes, and experience) are increasingly studied with the aim of providing patient-centered healthcare. Collecting data on patient experiences is becoming an increasingly vital component in assessing the quality of healthcare services provided. Understanding patient experiences presents an opportunity for designing healthcare delivery (5), as active engagement and collaboration between patients and healthcare professionals are key to providing quality healthcare services (6,7). The existing literature indicates that the most influential factor directly affecting patient satisfaction with hospital care is patient satisfaction with healthcare professionals. Patient satisfaction depends on the patient's trust in doctors and nurses, the availability of an adequate number of nurses providing care, and effective communication between healthcare professionals in the presence of the patient (4). Type 1 Diabetes Mellitus (T1DM) is one of the most common chronic diseases occurring during childhood and adolescence. Managing the disease requires the active involvement of parents, particularly mothers. The active involvement of mothers in managing a child's diabetes is emphasized due to their central role in caregiving, decision-making, emotional support, knowledge dissemination, and advocacy within the context of the family and healthcare system. Their continuous presence and guidance help ensure that the child receives appropriate care, adheres to the treatment plan, and maintains good glycemic control. The active participation of parents, particularly mothers, is vital in successfully managing T1DM in children and adolescents (8). T1DM diagnosis is subtle, with profound psychological and physical demands on mothers and implications for the extended family. To cope with their child's illness, mothers emphasize that the presence of competent and empathetic healthcare professionals is significantly helpful as essential support factors (9). Parental expectations are often influenced by the overall level of healthcare provided, including the professional qualifications of healthcare providers. When parents have higher expectations regarding the quality of healthcare services, they are more likely to evaluate their experiences based on those expectations (10).

The treatment of Type 1 Diabetes Mellitus (T1DM) in young children up to the age of eight is challenging for parents due to their unpredictable behavior, rapid growth and development, frequent infections, and dietary considerations. Often, both children and parents may not recognize symptoms of changes in blood glucose levels or signs of hypoglycemia, adding to parental concerns, especially when children are in daycare, school, or under the care of others (11). On the other hand, the adolescent period represents a critical phase due to the more demanding metabolic control. The increasing independence of adolescents reduces parental supervision, which can contribute to strained family relationships (12).

It is crucial for healthcare professionals to adopt a partnership approach with both children/adolescents and their parents. This approach allows them to feel secure and supported throughout the treatment and healthcare process. A partnership approach enables open communication and information exchange among all involved parties. Healthcare professionals can better comprehend the specific needs, preferences, and goals of the patient and tailor the treatment approach accordingly (13). Therefore, healthcare professionals should exert extra effort to provide support to children and adolescents with type 1 diabetes, as well as their parents, to ensure better health outcomes, improved quality of life, psychological well-being, empowerment, and long-term health management.

Aim

1. To examine the satisfaction of primary caregivers of children and adolescents with type 1 diabetes mellitus regarding healthcare services in the Sarajevo Canton, Bosnia and Herzegovina according to the PedsQL TM Healthcare Satisfaction Generic Module
2. To identify the most significant predictors of overall satisfaction with healthcare services
3. To determine the impact of the duration of the child's treatment on the satisfaction of primary caregivers with healthcare services

Methods

Study design

The study is a cross-sectional research conducted using a descriptive-analytical method.

Sample

Participation in the study was offered to 69 parents who were members of the Association of Children and Youth with Diabetes at the time of the research and who had children/adolescents aged 2 to 18 years who had been diagnosed with Type 1 Diabetes Mellitus for more than six months. Parents were informed that the study required the participation of the primary caregiver of the child/adolescent. The objectives of the study were explained to the participants. Out of the total of 69 parents, 51 parents agreed to participate in the research, while 18 parents declined to participate. One participant was excluded from the study because their child had been diagnosed with the disease for less than six months. The study included 50 primary caregivers (72,46 % response rate): 49 (98%) mother, and one (2%) father with an average age of 41.28 ± 5.64.

Data obtained from the Institute of Public Health of Sarajevo Canton indicates that, over the past three years, an average of 101 cases of type 1 diabetes mellitus have been reported annually among children and adolescents up to 18 years old. However, not all of them are members of the Association of Children and Youth with Diabetes in which the research was conducted.

Instruments

PedsQL TM Healthcare Satisfaction Generic Module

A generic questionnaire was utilized to assess parental satisfaction with healthcare provided to their children. The questionnaire comprised 24 items divided into six subscales: information (5 items: the amount of information about the disease, the course of treatment, side effects during treatment, the timeliness of information about tests, and the frequency of receiving information), family involvement (4 items: sensitivity towards the family, willingness to answer questions, efforts to involve the family in discussions about the child's treatment, and the time allocated for asking questions about the child's treatment), communication (5 items: how well the child's condition is explained to them in a way they can understand, the time dedicated to parents in order to explain the child's health condition and treatment clearly, whether the staff listens to parents' concerns, satisfaction with preparing parents for what to expect during medical examinations and tests, and satisfaction with preparing the child for what to expect during examinations and tests), technical skills (3 items: whether the medical staff responded to the child's needs, whether they made efforts to ensure the child was comfortable and pain-free whenever possible, and the time dedicated to assisting with the child's transition back home), emotional needs (4 items: the amount of time for play and talking with the child about their feelings, the amount of time dedicated to helping the child transition back to school, the amount of time devoted to the child's emotional needs, and the amount of time dedicated to the parents' emotional needs), and general satisfaction (3 items: comprehensive care, how friendly and helpful the staff is, and the manner in which the child was treated). Each item is scored on a Likert scale (0 = never; 1 = sometimes; 2 = often;

3 = almost always; 4 = always; N/A). The items were reverse-scored and linearly transformed into a scale of 0-100 (0=0, 1=25, 2=50, 3=75, 4=100), with higher scores indicating higher satisfaction. The original questionnaire Cronbach's alpha: average α=0.92 (14); α=0.94 (15). A questionnaire, provided by Mapi Research Trust and available in multiple languages, including Croatian, one of the official languages in Bosnia and Herzegovina, was used.

Data collection procedure

The study was conducted within the Association of Children and Youth with Diabetes in the Sarajevo Canton from October 23, 2021, to February 28, 2022. After obtaining consent from the Association and gaining access to the Association's Viber group, data of the members were accessed, and appointments were scheduled for interviewing the participants. After contacting the parents, meetings were scheduled with primary caregivers who agreed to participate in the study. The investigation took place at strategically chosen venues, accommodating the participants, intermittently spanning public locales and private residences. Individualized sessions were conducted with each primary caregiver. The study's objectives were systematically elucidated to the participants, and subsequent to the procurement of written informed consent, participants underwent the survey procedure. Written consent and a license from Mapi Research Trust were obtained for the use of the questionnaire. The required time for completing the questionnaire was between 8 and 10 minutes; however, after completing the questionnaire, parents expressed a strong desire to share their opinions about the healthcare system in Canton Sarajevo.

Ethics

The research was approved at the 10th meeting of the Ethics Committee of the Faculty of Health Studies, number 04-7-12/21, held on February 12, 2021. The implementation of the doctoral dissertation project was approved on September 29, 2021, by the Senate of the University of Sarajevo, under reference number 01-14-169/21. Written consent was obtained from the president of the Association of Children and Youth with Diabetes of Sarajevo Canton, provided that each parent independently decides on participation in the study.

Statistics

Statistical analysis was conducted using IBM SPSS Statistics 26.00 software (IBM Corporation, Armonk, New York). The questionnaire's reliability was tested using Cronbach's alpha. Normality of data distribution was tested with Shapiro-Wilk test due to the small number of subjects (N=50). A total of 24 variables were tested for normality, of which 15 had normal distribution. After testing kurtosis and skewness, it was determined that 9 variables exhibited slightly right-skewed distributions. However, the deviations were not substantial, and therefore, a t-test was applied. The results of descriptive statistical analysis were presented using the following parameters: mean value with standard deviation. Multiple linear regression was employed to test and model relationships between one dependent variable (Y) and one or more independent variables (X). Additionally, in this study, the IBM SPSS Automatic Linear Modeling module was incorporated to determine which variable has the highest predictor importance for overall points. To test differences between three groups based on duration of disease, the ANOVA test was utilized. Sum points of every segment of satisfaction were tested with overall total grade using paired sample t test. Pearson correlation was used to determine connection between age and examined variables. Statistical significance was set at a p-value < 0.05.

Results

A total of 50 primary caregivers participated in the study. In 98% of cases, the primary caregiver was the child's mother. The average age of the respondents was 41.28 ± 5.64. The results of Pearson correlation indicate that as respondents age, their overall satisfaction with healthcare services tends to decrease (r=-0.302, *p*=0.039). Specifically, older respondents reported lower satisfaction in key areas such as communication (r=-0.299, *p*=0.041), technical skills (r=-0.401, *p*=0.005) and general satisfaction (r=-0.346, *p*=0.017).

Table 1. **Participant characteristics**

Participant characteristics	N	%
Primary caregiver		
Mother	49	98
Father	1	2
Educational level of the primary caregiver		
Elementary school	2	4
Secondary school	33	66
University degree	15	30
Employment status of the primary caregiver		
Employed	32	64
Unemployed	18	36
Marital status		
Married	45	90
Divorced	2	4
Single parent	3	6

Most primary caregivers had completed secondary education (66%), while 64% were employed. Most primary respondents were married, making up 90%.

Satisfaction with healthcare services had an overall average score of 59.46. Satisfaction with information and involvement in treatment averaged around 59.80 and 60.46, respectively, while meeting emotional needs was the lowest-rated aspect, with the lowest scores given by primary caregivers, that is 40.82. General parental satisfaction was the highest, with an average of 72.67. Reliability analysis showed high overall reliability (Cronbach's alpha=0.971), with all sections demonstrating strong consistency. The sections on general satisfaction and communication had slightly lower reliability (Cronbach's alpha=0.875 and 0.877, respectively), but still exhibited acceptable levels of reliability, with all other sections scoring above 0.9.

Table 3. **Relative contribution of predictors to overall satisfaction with healthcare services**

Overall Satisfaction			
R^2	S.E.	F	*p*
0.999	0.69487	9910.42	<0.0001
Predictors	β	p	**Relative Contribution (%)**
Emotional Needs	0.164	<0.0001	29.8
Information	0.229	<0.0001	27.3
Communication	0.206	<0.0001	16.8
Inclusion of Family	0.156	<0.0001	13.3
Technical Skills	0.131	<0.0001	8.6
General Satisfaction	0.116	<0.0001	4.2

Table 2. **Satisfaction with healthcare services and internal consistency of the questionnaire**

	The number of items	Mean	SD	Cronbach's alpha
Overall Satisfaction	24	59.46	24.34	0.971
Information	5	59.80	27.72	0.941
Inclusion of family	4	60.46	27.89	0.904
Communication	5	58.10	26.09	0.877
Technical Skills	3	69.83	26.61	0.910
Emotional Needs	4	40.82	34.21	0.946
General Satisfaction	3	72.67	25.09	0.875

Table 3 shows the predictors of individual satisfaction segments with overall satisfaction, along with their relative contribution in rating overall satisfaction with healthcare services. The total percentage of variance explained by the predictors is 99.9%, which is expected given that the overall satisfaction score is derived directly from the predictors included in the questionnaire. Since these predictors were carefully selected and validated (15), their combined effect on overall satisfaction is well captured in the model, supporting the argument that the tool was well-constructed to capture the key factors contributing to overall satisfaction. All satisfaction segments (emotional needs, information, communication, inclusion of family, technical skills, and general satisfaction) is a significant predictor of overall satisfaction as indicated by their p-values ($p<0.0001$). Emotional Needs ($\beta=0.164$) has the largest relative contribution (29.8%) in explaining overall satisfaction. This means that emotional needs have the strongest impact on users' satisfaction with healthcare services. Information ($\beta=0.229$) has a slightly higher coefficient, indicating that information also plays a significant role, contributing 27.3%. Communication ($\beta = 0.206$) and Inclusion on Family ($\beta=0.156$) have a moderate impact, with relative contributions of 16.8% and 13.3%, respectively. Technical Skills ($\beta=0.131$) and General Satisfaction ($\beta=0.116$) contribute less (8.6% and 4.2%), but they are still significant predictors in explaining overall satisfaction.

The analysis of satisfaction with healthcare services based on the duration of the child's illness showed no statistically significant differences in satisfaction levels related to the length of the illness.

Discussion

The main goal of this study was to evaluate the satisfaction of primary caregivers of children and adolescents with type 1 diabetes mellitus (T1DM) concerning healthcare services.

In the Sarajevo Canton, children and adolescents with type 1 diabetes face inadequate support from the healthcare system, primarily due to a shortage of healthcare professionals involved in their treatment and care (16).

The evaluation of primary caregiver satisfaction, utilizing the PedsQL TM Healthcare Satisfaction Generic Module, revealed slightly lower average scores on a 100-point scale. The most influential predictor was the fulfillment of emotional needs. Primary caregivers rated satisfaction with emotional needs the lowest, and these ratings contributed to a decrease in the overall satisfaction with healthcare services. However, the wide range of responses underscores the necessity for a personalized and tailored approach in healthcare delivery. Older respondents reported lower satisfaction in key areas such as communication, technical skills and general satisfaction. This trend indicates that age might shape expectations or perceptions of healthcare quality, highlighting the need for tailored approaches to address the specific concerns of older caregivers within the healthcare system.

Table 4. **Satisfaction with healthcare services based on the duration of the child/adolescent's treatment**

Duration of treatment Number of Participants (N)	6 months-2 years N 9		3-5 years N 13		>5 years N 28		F	p
	Mean	SD	Mean	SD	Mean	SD		
Overall Satisfaction	54.40	± 17.11	58.11	± 14.87	61.72	± 10.86	0.33	0.72
Information	48.33	± 19.38	66.54	± 15.97	60.36	± 9.74	1.17	0.32
Inclusion on family	57.64	± 22.50	65.22	± 14.81	59.15	± 9.73	0.26	0.77
Communication	56.11	± 21.24	49.23	± 16.05	62.86	± 10.77	1.26	0.29
Technical Skills	68.52	± 17.54	64.74	± 15.27	72.62	± 7.85	0.39	0.68
Emotional Needs	29.86	± 27.30	35.94	± 22.82	46.43	± 13.93	0.96	0.39
General Satisfaction	75.93	± 18.07	68.59	± 15.81	73.51	± 8.72	0.26	0.78

Satisfaction of primary caregivers of children and adolescents with type 1 diabetes mellitus regarding healthcare services

Satisfaction with healthcare services in this study was evaluated with an overall score of 59.46. A significant factor influencing this rating was the subscale assessing technical skills, which reflects the healthcare professionals' ability to provide effective treatment for the child. This aspect was strongly linked to the overall satisfaction, as it directly impacts the caregivers' perception of the quality of care their child receives. This highlights that parents of children place significant importance on healthcare professionals who demonstrate competence in providing high-quality care. Parental satisfaction was also a key factor in the general satisfaction rating, which indicated friendly and approachable staff who were willing to help, with an average score of 72.67. Additionally, according to Yoo SY and Cho H (17), the quality of healthcare is influenced by factors such as the experience and professional self-efficacy of nurses. According to Gavurova et al. (4), the satisfaction of healthcare professionals significantly influences overall patient satisfaction with hospital care. Additionally, Kruszecka-Krówka et al. (10) emphasize that parental satisfaction with healthcare services can be intricately linked to their expectations. Recognizing the pivotal role of active patient participation, studies such as Dunsch et al. (6) underscore the importance of establishing partnerships and fostering shared decision-making. Actively involving patients in their healthcare journey is crucial for motivating them to enhance self-care behaviors, serving as the bedrock for improving the health status of individuals with diabetes.

The collaborative approach advocated by Letta S et al. (18), actively involving patients in their healthcare decisions, empowers them to take ownership of their health. This, in turn, enables informed decision-making and effective self-management practices. Such a patient-centered strategy not only promotes better health outcomes but also enhances the overall care experience for individuals with diabetes. In the context of children and adolescents with T1DM in the Sarajevo Canton, adopting a patient-centered approach is imperative to address the observed gaps in healthcare services and improve the overall satisfaction of primary caregivers.

The most significant predictors of overall satisfaction with healthcare services

A substantial variation in responses was evident among participants across all facets of satisfaction with healthcare services. This underscores the imperative for healthcare services customized to meet the specific needs of families with children and adolescents affected by T1DM. The aspect garnering the lowest rating pertains to satisfaction with emotional needs, significantly influencing the overall satisfaction score with healthcare services. In this study, the fulfillment of emotional needs, coupled with satisfaction regarding the information provided, emerges as the most pivotal predictor of overall satisfaction.

Drawing insights from Dunsch et al. (6), it is noted that certain patients value their involvement in the decision-making process concerning medical interventions. The current study reveals a rating of 59.80 for satisfaction with the information received and 60.46 for satisfaction with the level of involvement in treatment. Although all factors exhibited significant associations with satisfaction in healthcare services and were substantial predictors of overall satisfaction among primary caregivers, it becomes evident that primary caregivers prioritize healthcare professionals who demonstrate empathy, support, understanding, and provide comprehensive information about their child's illness. Healthcare professionals with advanced qualifications and expertise are more likely to meet or exceed parental expectations, resulting in higher levels of satisfaction. This includes professionals who demonstrate excellent clinical skills, effective communication, empathy, and a patient-centered approach.

Conversely, when healthcare services fail to meet parental expectations, this can result in dissatisfaction and a negative perception of the quality of care. This underscores the critical need to ensure that healthcare professionals undergo appropriate training, possess up-to-date knowledge and skills, and can deliver comprehensive and compassionate care.

The correlation of the duration of the child's treatment on the satisfaction of primary caregivers regarding healthcare services

Gavurova et al. (4) advocate for a focus on increasing patient satisfaction to foster trust between patients

and healthcare professionals, culminating in the development of loyal relationships and contributing to higher job satisfaction among healthcare professionals. The lack of statistically significant differences in satisfaction levels based on the duration of the child's illness suggests that familiarity with the healthcare process over time does not necessarily improve caregiver satisfaction. This may indicate that factors such as the quality of communication, emotional support, and the responsiveness of healthcare professionals have a greater impact on satisfaction than the length of treatment.

According to Jespersen et al. (19), families place importance on healthcare professionals being kind and clear in their communication - a consideration professionals should bear in mind when delivering healthcare services. Yoo et al. (20) highlight that the concept of family-centered care involves collaborative decision-making about healthcare between the patient's family and healthcare professionals, emphasizing the importance of respecting the patient's dignity, cultural background, values, and beliefs. Suggesting that Person-Centered Care, centered on partnership with healthcare professionals, is the contemporary gold standard of healthcare, Thunberg et al. (21) stress the necessity of identifying the patient's individual needs within a holistic approach. Various communication methodologies may be essential to cultivate a partnership between patients and healthcare professionals. Lohiya et al. (22) propose that a holistic family-centered approach is essential in delivering healthcare services to children and adolescents with T1DM. This approach includes routine assessment of emotional problems, treatment adherence issues, and social support concerns, aiming to assist families in navigating stressful situations.

A partnership approach among healthcare professionals, children/adolescents, and their parents enhances the quality of healthcare, improves treatment adherence, promotes self-care, and contributes to better health outcomes (13). The study's findings indicate the necessity for enhancing the partnership with parents of children and adolescents with type 1 diabetes mellitus in the Sarajevo Canton to improve parental satisfaction with healthcare services. Healthcare professionals should prioritize evidence-based healthcare, aligning with the recognized importance of forming partnerships with patients and their families.

However, this study also opens up several potential directions for future research. For instance, exploring differences in satisfaction levels across various healthcare settings (e.g., public vs. private healthcare providers) could provide valuable insights into how healthcare delivery models impact caregiver satisfaction. Further, expanding the sample size to include a larger and more diverse cohort of caregivers could help in obtaining more generalized findings. Additionally, future studies could investigate the effectiveness of specific interventions aimed at improving emotional support and communication between healthcare professionals and parents, examining how these factors influence long-term satisfaction and health outcomes.

Limitations

The study has limitations. Although the healthcare system support in the Sarajevo Canton is insufficient, we have not investigated whether the shortage of healthcare professionals is a potential cause of reduced satisfaction with healthcare services. It solely detected satisfaction based on questionnaires. The study included 50 participants, with an average of 101 cases reported annually. Future research should include all parents in the Sarajevo Canton and, in addition to questionnaires, incorporate qualitative research methods in healthcare to delve deeper into the reasons for reduced satisfaction with healthcare services. Moreover, it is important to include both parents in the research to gain a more comprehensive understanding of their experiences and satisfaction.

Conclusion

Caregivers particularly emphasized the importance of emotional support and detailed information about their child's condition. The study identified that emotional needs, information provided, and the level of involvement in treatment were the most significant predictors of overall satisfaction. Meeting these expectations is essential for enhancing caregiver satisfaction. Empathy, communication, and competence in healthcare professionals are pivotal in shaping caregivers' perceptions of care quality. Healthcare professionals should undergo continuous training to improve their technical skills, communication, and

empathy to better meet the needs of children with type 1 diabetes and their families. A family-centered approach should be adopted, emphasizing active collaboration with parents in decision-making, providing comprehensive information, and addressing both emotional and practical needs.

These findings underscore the importance of focusing on both the technical and emotional aspects of healthcare provision, aiming to enhance satisfaction and improve the overall healthcare experience for children, adolescents, and their families.

Author contributions

Conceptualization (EM, JM); Data Curation (EM, JM); Formal Analysis (EM, JM); Investigation (EM); Methodology (EM, JM, SB, HK, VĐ); Project Administration (EM, JM, SB, HK, VĐ); Supervision (EM, JM, SB, HK, VĐ); Validation (EM, JM, SB, HK, VĐ); Visualization (EM, JM, SB, HK, VĐ); Writing – Original Draft (EM); Writing – Review & Editing (EM, JM, SB, HK, VĐ).

Conflict of interest

The authors declare no conflicts of interest.

Acknowledgments

The article is a part of the PhD thesis "Quality of life of children and adolescents with type 1 Diabetes mellitus" at the Faculty of Health Science, University of Sarajevo. The doctoral dissertation was successfully defended on February 14, 2023. We would like to express our gratitude to all primary caregivers, children and adolescents for their voluntary participation in the research.

Funding

This research received no external funding.

References

1. Quach A, Tosif S, Nababan H et al. Assessing the quality of care for children attending health facilities: a systematic review of assessment tools. BMJ Glob Health. 2021;6(10):e006804. https://doi.org/10.1136/bmjgh-2021-006804
2. World Health Organization. Standards for improving the quality of care for children and young adolescents in health facilities. Geneva: World Health Organization; 2018.
3. Ferreira DC, Vieira I, Pedro MI, Caldas, P, Varela, M. Patient Satisfaction with Healthcare Services and the Techniques Used for its Assessment: A Systematic Literature Review and a Bibliometric Analysis. Healthcare. 2023;11(5):639. https://doi.org/10.3390/healthcare11050639
4. Gavurova B, Dvorsky J, Popesko B. Patient Satisfaction Determinants of Inpatient Healthcare. Int J Environ Res Public Health. 2021;18(21):11337. https://doi.org/10.3390/ijerph182111337
5. Gualandi R, Masella C, Piredda M, Ercoli M, Tartaglini D. What does the patient have to say? Valuing the patient experience to improve the patient journey. BMC Health Serv Res. 2021;21(1):347. https://doi.org/10.1186/s12913-021-06341-3
6. Dunsch F, Evans DK, Macis M, Wang Q. Bias in patient satisfaction surveys: a threat to measuring healthcare quality. BMJ Glob Health. 2018;3(2):e000694. https://doi.org/10.1136/bmjgh-2017-000694
7. Pantea I, Roman N, Repanovici A, Drugus D. Diabetes patients' acceptance of injectable treatment, a scientometric analysis. Life. 2022;12(12):2055. https://doi.org/ 10.3390/life12122055
8. Henríquez-Tejo R, Cartes-Velásquez R. [Psychosocial impact of type 1 diabetes mellitus in children, adolescents and their families. Literature review]. Rev Chil Pediatr. 2018;89(3):391-8. Spanish. https://doi.org/10.4067/S0370-41062018005000507
9. Rossiter RC, Cooper JL, Marjei SI, Brownie S. Case-Based Insights: Arab Muslim Mothers' Experiences of Managing a Child Newly Diagnosed with Type 1 Diabetes Mellitus. SAGE Open Nurs. 2019;5:2377960819870979. https://doi.org/10.1177/2377960819870979
10. Kruszecka-Krówka A, Cepuch G, Gniadek A, Smoleń, E, Piskorz-Ogórek K, Micek A. Selected predictors of parental satisfaction with child nursing care in paediatric wards in Poland-Cross-sectional study. PLoS One. 2021;16(11):e0260504. https://doi.org/ 10.1371/journal.pone.0260504
11. Hilliard ME, Levy W, Anderson BJ, et al. Benefits and Barriers of Continuous Glucose Monitoring in Young Children with Type 1 Diabetes. Diabetes Technol

Ther. 2019;21(9):493-8. https://doi.org/10.1089/dia.2019.0142

12. von Borries D, Astudillo P, Pérez V, García F H, Rumie K, García B H. Association between depressive symptoms in mothers and metabolic control in adolescents with type 1 diabetes. Rev Chil Pediatr. 2020;91(2):190-8. https://doi.org/10.32641/rchped.v91i2.1151
13. Thompson D, Leach M, Smith C, Fereday J, May E. How nurses and other health professionals use learning principles in parent education practice: A scoping review of the literature. Heliyon. 2020;6(3):e03564. https://doi.org/10.1016/j.heliyon.2020.e03564
14. Varni JW, Burwinkle, TM, Dickinson P, Sherman SA, Dixon P, Ervice JA, et al. Evaluation of the built environment at a children's convalescent hospital: development of the Pediatric Quality of Life Inventory parent and staff satisfaction measures for pediatric health care facilities. J Dev Behav Pediatr. 2004;25(1):10-20. https://doi.org/10.1097/00004703-200402000-00002
15. Li J, Yuan L, Wu Y, Luan Y, Hao Y. The Chinese version of the Pediatric Quality of Life Inventory™ (PedsQL™) healthcare satisfaction generic module (version 3.0): psychometric evaluation. Health Qual Life Outcomes. 2013;11:113. https://doi.org/10.1186/1477-7525-11-113
16. Mrkulić E, Mahmutović J, Branković S, Konjo H, Jogunčić A. Impact of primary caregiver's knowledge on glycemic control pediatric patients with type 1 diabetes mellitus in Canton Sarajevo, Bosnia and Herzegovina. KNOWLEDGE - International Journal. 2022;53(4):599-606.
17. Yoo SY, Cho H. Exploring the Influences of Nurses' Partnership with Parents, Attitude to Families' Importance in Nursing Care, and Professional Self-Efficacy on Quality of Pediatric Nursing Care: A Path Model. Int J Environ Res Public Health. 2020;17(15):5452. https://doi.org/10.3390/ijerph17155452
18. Letta S, Aga F, Yadeta TA, Geda B, Dessie Y. Barriers to Diabetes Patients' Self-Care Practices in Eastern Ethiopia: A Qualitative Study from the Health Care Providers Perspective. Diabetes Metab Syndr Obes. 2021;14:4335-49. https://doi.org/10.2147/DMSO.S335731
19. Jespersen LN, Svensson J, Pilgaard KA, Grabowski D. Communication and Social Relations: A Qualitative Study of Families' Experience with Their Outpatient Pediatric Diabetes Visits. Children (Basel). 2022;9(2):245. https://doi.org/10.3390/children9020245
20. Yoo SY, Cho H, Kim YY, Park JH. Levels of partnership between nurses and parents of hospitalized children and the quality of pediatric nursing care as perceived by nurses. Child Health Nurs Res. 2020;26(1):64-71. https://doi.org/10.4094/chnr.2020.26.1.64
21. Thunberg G, Johnson E, Bornman J, Öhlén J, Nilsson S. Being heard – Supporting person-centred communication in paediatric care using augmentative and alternative communication as universal design: A position paper. Nursing Inquiry. 2022;29(2):e12426. https://doi.org/10.1111/nin.12426
22. Lohiya NN, Kajale NA, Lohiya NN, Khadilkar VV, Gondhalekar K, Khadilkar A. Diabetes distress in Indian children with type 1 diabetes mellitus and their mothers. J Pediatr Endocrinol Metab. 2021;34(2):209-16. https://doi.org/10.1515/jpem-2020-0339

Croat Nurs J. 2025; 9(1): 29-44

Original scientific paper

Erasmus Project BeEmTel – "Advancing Telemedicine for Non-Communicable Diseases: Simulation-Based Approaches and e-Learning Platform Evaluation"

[1] Manuela Bocchino
[2] Giuseppe Di Lorenzo
[1] Cecilia Damiano
[3] Michela Barisone
[1] Marco Silano
[2] Valentina De Nicolò
[3] Gianluca Aimaretti
[4] Antonio Scalogna
[3] Emiliano Loria

[1] Department of Cardiovascular, Endocrine-metabolic Diseases and Aging, Italian National Institute of Health, ISS, Rome, Italy
[2] La Sapienza University of Rome, School of Specialization in Hygiene and Public Health, Rome, Italy
[3] University of Eastern Piedmont, Amedeo Avogadro, Department of Translational Medicine, Novara, Italy
[4] University of Eastern Piedmont, SIMNOVA Centre, Novara, Italy

Article received: 31.10.2024.

Article accepted: 17.02.2025.

https://doi.org/10.24141/2/9/1/3

Author for correspondence:
Manuela Bocchino
ISS, Rome, Italy
E-mail: manuela.bocchino@iss.it

Keywords: e-health, medical pedagogy, medical simulation, telesimulation, e-learning platform

Abstract

Introduction. The key topics of e-health are education and training. The European Erasmus project BeEmTel aimed to create an innovative European curriculum dedicated to Telecare for chronic diseases and emergencies through educational tools based on an e-learning platform and on remote simulation techniques.

Aim. To describe the experience regarding the introduction of an online telemedicine and telesimulation course applied to chronic diseases on some degree and academic career courses.

Methods. The online course has lasted from May 15, 2023 to January 15, 2024, on the e-learning Moodle platform managed by Simnova. The students' population came from the nursing and medical faculties or departments of the four Partner Universities. The e-course has been structured into three sections: Non-Communicable Disease & Emergency, Health Simulation & Telecare, and New Forms of Proximity, with video lessons and resources, and a quiz area. Two immersive weeks have been reserved for a selected group of students. For the evaluation of the e-learning platform and the simulation method, we have referred to the first two levels of Donald Kirkpatrick's model: user feedback, linked to the student's reaction and level of satisfaction with the educational activity, and learning content, concerning learning and knowledge assessment.

Results. Among 394 participants, 38% have consistently attended the course, following a total of

57 theoretical lessons and 14 lectures using a telesimulation/telemedicine approach, and 31% have responded to the survey. Most of them have found the topics interesting (93.4%) and the lessons clear (81%), the platform interface has been considered user-friendly, although with certain practical problems; 91% of learners have been satisfied with the course overall. In terms of the two immersive weeks, all participating learners have been satisfied with the general organization. When analyzing the measures of association considering both degree course and nationality, only one association was statistically significant ("Do you think telemedicine courses should be integrated into your degree program?", Chi-squared test *p*-value=0.013).

Conclusions. The BeEmTel Erasmus+ Project has emerged as an innovative educational experience, effectively introducing the concept of telemedicine to healthcare students across different countries and academic disciplines, irrespective of their previous background or attitudes. Students have demonstrated strong receptiveness to this approach. The student audience has found the type of instruction useful in preparing for careers in the healthcare field. Notably, both in-person medical simulation and "telesimulation" have been proved to be effective pedagogical practices.

Introduction

The Covid-19 pandemic revealed the weaknesses of healthcare systems, especially in relation to vulnerable patients' care, and vocational training system, which remains unable to tackle the significant challenge of reforming the treatment and monitoring methods for chronic patients (1, 2). Various non-communicable diseases (NCD) are associated with a progressive reduction in functional capacity, leading to a persistent need for long-term care. At the European level, these diseases account for about 80% of mortality causes in people over 65 years old (3). Efforts to contain the Covid-19 pandemic have highlighted the need to improve the quality of care for NCD patients and mitigate the negative impact they have not only on patients but also on their families and society. To ensure consistent and high-quality support for NCD patients, their families and caregivers, it is necessary to decentralize medical care at the territorial level (4). In this ever-approaching future scenario, the new profile of a healthcare and social care professional must include additional advanced skills. Doctors, nurses, psychologists and psychiatrists will increasingly require multidisciplinary training that includes digital skills and more specific, practical and clinical competencies.

There are many definitions of competence. The most widely used formulation is the one proposed by G.O. Klempt in 1980 (5), taken up by Boyatzis (6) and then by Spencer&Spencer (7). Competence is "an intrinsic individual characteristic that is causally related to effective and/or superior performance in a task or situation and that is measured against an established criterion". Being the result of knowing how to act, the production of a competent action derives from a shared responsibility between the individual himself/herself, the management, the work context and the training programs. The main skills to be acquired for telehealth include: patient safety and appropriate use, access and equity, communication, data collection and assessment, technology, ethical practices and legal requirements (8).

In recent years, literature has reported certain telemedicine teaching experiences among university students, which indicate that telemedicine is a valuable experience and that an elective course in the medical school curriculum may be a useful way of providing future physicians with an understanding of telemedicine itself (9, 10, 11). Waseh and Dicker emphasized how undergraduate medical education preclinical years can be central to telemedicine training and exposure (12); while many studies focused on the importance of telemedicine as a support to medical professionalism (13), there are still few experiences of its application in curricular teaching programs.

The majority of integration projects apply telemedicine during the clinical years, into the doctoring stream or during lecture time (14), or insert telemedicine into objective structured clinical assessments (15) through existing telemedicine hospital systems, rather than recreating new technology platforms (16). Two widely utilized teaching techniques in telemedicine are lectures, that provide the fundamental ideas, and patient interactions (17, 18), using video-based communication (19, 20), workshops (21), reflection

and reflective writing (20, 22). The instruments most frequently used to gauge customer satisfaction in this field are questionnaires and interviews (23), and pre- and post-test assessment scores (24).

Indeed, by incorporating telemedicine into students' curricula, medical schools can augment their education and teach them competencies for patient care, giving them access to this form of training, which can significantly reduce healthcare costs and increase patient access to care (16).

Aim

The aim of this article is to describe the experience regarding the introduction of an online telemedicine and telesimulation course applied to chronic diseases on some degree and academic career courses. The BeEmTel project is an ongoing Erasmus K2 Action project, which took the opportunity to anticipate practical teaching to future assistance scenarios in chronic disease management.

Methods

The European project for the Erasmus+ Key Action 220 "*Strategic Partnership Program BeEmTel - Beyond the Emergency. Telecare for Non-Communicable Diseases through Simulation Techniques*" comes from a partnership of five European Countries (Italy, Germany, Greece, Romania, and Croatia). The two specific objectives are the creation of:

1. the e-course;
2. the Digital Toolkit, available for free download from the BeEmTel website at the end of the project.

The e-course was initially designed for 250 participants and was completely free, but due to high demand, we extended enrollment by the end of registration on April 25, 2023. The students' population comes from the nursing and medical faculties or departments of the four Partner Universities; to enroll, students had to register on the Moodle platform by the deadline through the BeEmTel website (www.beemtel.eu). The Università del Piemonte Orientale (UPO) focused on the recognition of credits, Croatian, Greek, and Romanian students were easily engaged, as they came from active departments accustomed to Erasmus educational opportunities; however, Ludwig-Maximilians-University (LMU) is a large university offering many structured projects and courses, so the accommodation for a non-recognized pilot course such as BeEmTel through official and compensatory means was not satisfactory.

The BeEmTel e-course engaged forty-six teachers from the partner countries and institutions: eight Croatians, five Greeks, twenty-five Italians, four Romanians, and four Germans. The development revolved around the three main areas: NCD & Emergencies (Area 1), Health Simulation & Telecare (Area 2), and New Forms of Proximity (Area 3). Fifty-seven theoretical lessons were delivered, with a total recording time of 35:02:26 hours. Additionally, fourteen lectures were prepared using a telesimulation/telemedicine approach (Table 1), simulating clinical cases in virtual scenarios set in real-world environments (patient's home, outpatient clinic in a hospital, or general practitioner's office).

Table 1. **Teachers and duration of lessons, divided by thematic areas**

Thematic area	Number of teachers	Average lesson time	Total lesson time
Non-Communicable Diseases & Emergency	12	00:50:00	9:59:54
Health simulation and Telecare	19	00:58:32	17:33:38
New Forms of Proximity	10	00:49:53	7:28:54

There were three hundred ninety-four participants (Table 2): the majority were female (84.3%), while 31.8% were from Italy, followed by Romania (29.7%), Greece (22.1%), Croatia (14.6%) and Germany (1.8%); the majority (44.8%) was represented by students in

nursing, 44.0% in medicine, 2.7% in physiotherapy and 8.5% in other faculties (Computer Science, Pharmacies, Biomedical Laboratory Techniques, School of Engineering and Design - Human Factor Engineering), while 20.6% were first year university students.

The online course designed for the project started on May 15, 2023 on the e-learning Moodle platform managed by Simnova, and ended on January 15, 2024. Simnova is the Interdepartmental Centre for Innovative Didactics and Simulation in Medicine and Health Professions of UPO. It relies on the external company Media Touch to manage the Moodle technology, a widely used open source Learning Management System, ensuring usability, technical control, and the platform's maximum security and reliability.

The e-course is structured into three sections: NCD & Emergency, Health Simulation & Telecare, and New Forms of Proximity; each section contains video lessons and resources, including abstracts and supplementary materials, as well as a quiz section. Teachers prepared traditional video lessons and innovative telesimulation videos, since *showcasing* is a teaching method that gained prominence during the Covid-19 pandemic at leading universities worldwide (3, 25, 26, 27). The quiz area includes three self-assessment tests on each section, and a final quiz; passing the final quiz was required to finish the course.

The course held during two immersive weeks reserved for a selected group of approximately 50 students at two telesimulation centers in Novara and Munich took place between February and March 2024. Telesimulation refers to a new teaching methodology that combines telecommunication and healthcare simulation to provide effective educational support.

For the evaluation of the e-learning platform and the simulation method, we relied on Donald Kirkpatrick's model (28), which analyzes and evaluates the results of training and educational programs. This framework identifies four levels of observation to assess the effectiveness of training:

- user feedback, linked to the student/resident's reaction and the student's level of satisfaction with the educational activity;
- learning content, concerning learning and knowledge assessment;
- workplace behavior, that looks into this topic and considers whether education has influenced behavior;
- impact on the organization, to assesses the effect on outcomes by improving the quality of care and applying best practices.

We considered the first two levels of this model, since the last two are not fully applicable to our project data, using the following indicators:

1. User feedback: students received a survey, developed through a review of relevant literature (29, 30, 31, 32, 33, 34) and a discussion process among the authors. The survey comprised 20 items, with an estimated time of five minutes to complete, six items were dichotomous questions and 14 were multiple-choice questions with answers designed on a 5-point Likert scale.

The survey is available in Appendix A, and it includes the following sections:

(i.) integration of telemedicine in degree programs;
(ii.) previous experience with telemedicine courses;
(iii.) perception of telemedicine's future applicability;
(iv.) continued study of telemedicine;
(v.) experience with e-learning course issues;
(vi.) practical telesimulation experience;
(vii.) relevance and interest of the course content;
(viii.) course notifications and online platform;
(ix.) clarity of the professors' lessons;
(x.) consistency in course attendance;
(xi.) consistency in course attendance;
(xii.) factors affecting participation;
(xiii.) overall satisfaction;
(xiv.) preference for learning mode.

The questionnaire was available from January 4 to January 17, 2024; filling in the survey was mandatory to complete the course.

2. Learning content: asynchronous distance learning has a great advantage for traceability, which allowed us to do an evaluation of this area based on the following indicators:

- user-platform interaction (at least one access to the platform);
- user-content interaction (at least once access to each lesson);

- the percentage of completion of objectives (three modules);
- the number of tests completed;
- the average and total score for each test;
- the percentage of those who would have passed the test by having 60% of the correct answers.

Ethics

The authors state that this it is not a study requiring approval by the ethics committee, according to the national regulations of the Italian Ministry of Health, Decree of 26 January 2023. At the time of registration for the course, the participating students have given their informed consent for the processing of personal data, according to information pursuant to General Data Protection Regulation (EU) 2016/679, although the data from our study were anonymised.

Statistics

Considering the descriptive analysis, categorical variables are reported as frequencies and percentages; for continuous variables, results are reported as median and interquartile range (IQR). We performed several measures of association, including the chi-square test and Cramer's test (35, 36). Such tests analyzed the associations between the answers given by students in the e-learning survey and both their course study or their nationality. In all the analyses, a p value of <0.05 was considered as statistically significant. The software used for data management was Stata version 18.0 (Stata Corporation, College Station, TX, USA).

Results

Considering participation and proficiency, the majority (86.5%) declared willingness to participate to the courses, however, only a third of them completed the quizzes for the thematic areas (33.3% the test for NCD and Emergency and 32.3% for the other 2 areas). Median scores were 79 (IQR 67-89), 77 (IQR 67-84) and 77 (7-88), respectively. The final test was completed by 32.3% of the students and the median score was 87 (IQR 79-93). As a proxy, the association between achieving a passing grade on the final test and the aforementioned variables (degree course, nationality and willingness to participate) was studied. It was found that passing the test was associated with the student's nationality (Table 3).

User feedback

One hundred and twenty-one students filled in the survey (30.7%). Figure 1 reports the user's general opinion on telemedicine and their experience with the course. Only 16% of the students already attended a telemedicine course (Figure 1c). Most of them consider telemedicine an important topic, noting that it should be integrated in their degree program (91%) and that they would continue independent study of the topic to strengthen their knowledge (88%) (Figure 1a, Figure 1b). Students encountered problems in using the platform in 32% of cases (Figure 1d).

Table 2. **Characteristic of the respondents and their level of participation in the courses**

	All (N=394)	Croatia (N=57)	Germany (N=7)	Greece (N=86)	Italy (N=124)	Romania (N=116)
Sex	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**
Male	62 (15.7)	4 (7.0)	2 (28.6)	8 (9.3)	24 (19.4)	20 (17.2)
Female	332 (84.3)	53 (93.0)	5 (71.4)	78 (90.7)	99 (79.8)	96 (82.8)
First language						
Greek	68 (17.4)	0 (0.0)	0 (0.0)	68 (79.1)	0 (0.0)	0 (0.0)
Italian	124 (31.8)	0 (0.0)	0 (0.0)	3 (3.5)	120 (96.8)	1 (0.9)
English	46 (11.8)	2 (3.5)	1 (14.3)	15 (17.4)	4 (3.2)	24 (20.7)
Romanian	91 (23.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	91 (78.4)
German	6 (1.6)	0 (0.0)	6 (85.7)	0 (0.0)	0 (0.0)	0 (0.0)
Croatian	55 (14.1)	55 (96.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Faculty						
Medicine	165 (44.0)	0 (0.0)	1 (33.3)	0 (0.0)	73 (59.9)	91 (80.5)
Nursing	168 (44.8)	55 (100)	1 (33.3)	49 (59.8)	47 (38.5)	16 (14.2)
Physiotherapy	10 (2.7)	0 (0.0)	0 (0.0)	10 (12.2)	0 (0.0)	0 (0.0)
Other faculty	32 (8.5)	0 (0.0)	1 (33.3)	23 (28.0)	2 (1.6)	6 (5.3)
Year of enrolment						
First-year	76 (20.6)	20 (46.5)	0 (0.0)	25 (29.4)	28 (23.0)	3 (2.6)
Second year onwards	245 (66.4)	19 (44.2)	1 (33.3)	39 (45.9)	77 (63.1)	109 (94.0)
Other (working student, etc.)	48 (13.0)	4 (9.3)	2 (66.7)	21 (24.7)	417 (13.9)	3 (3.4)
Participation and proficiency						
Willingness to LTTA activities	319 (86.5)	41 (95.4)	2 (66.7)	82 (96.5)	88 (72.1)	106 (91.4)
Test CDE completed	131 (33.3)	27 (47.4)	2 (28.6)	17 (19.8)	71 (57.3)	14 (12.1)
Test HT completed	127 (32.3)	26 (45.6)	2 (28.6)	16 (18.6)	68 (54.8)	15 (12.9)
Test NFP completed	126 (32.1)	26 (45.6)	2 (28.6)	16 (18.6)	68 (54.8)	14 (12.1)
Final test completed	127 (32.3)	26 (45.6)	2 (28.6)	15 (17.4)	69 (55.7)	15 (12.9)
	Median (IQR)	**Median (IQR)**	**Median (IQR)**	**Median (IQR)**	**Median (IQR)**	**Median (IQR)**
Test CDE score %	79 (67-89)	89 (78-93)	80 (7-89)	68 (61-74)	78 (7-87)	71 (59-85)
Test NFP score %	77 (7-88)	90 (83-94)	80 (71-88)	70 (63-79)	77 (71-86)	70 (66-83)
Test HT score %	77 (67-84)	88 (5-18)	75 (75-75)	71 (57-79)	76 (67-84)	69 (53-80)
Final test score %	87 (79-93)	92 (87-97)	81 (79-82)	83 (69-94)	87 (80-92)	81 (46-95)

Abbreviations: LTTA = Learning, Training and Teaching Activities; CDE = Chronic Diseases (Non-Communicable Diseases) and Emergency; HT = Health simulation and Telecare; NFP = New Forms of Proximity. Missing data (reported for the total sample only): Country: 4; First Language: 4; Faculty: 19; Year of Enrolment: 25; Participation: 25; Quiz CDE: 1; Quiz HT: 1; Quiz NFP: 1; Final quiz: 1.

Table 3. **Measures of association between final test and students' nationality, country and willingness to participate in frontal activities**

	Final test not passed	Final test passed	Chi-squared test	Cramer V
Faculty	**%**	**%**	***p***	
Medicine	9.0	91.0	0.804	0.09
Nursing	4.8	95.2		
Other faculty	0	100.0		
		Country		
Croatia	3.8	96.2	**0.015**	0.31
Germany	0	100.0		
Greece	6.7	93.3		
Italy	2.9	97.1		
Romania	26.7	73.3		
Willingness to participate in LTTA activities				
No	5.0	95.0	0.743	0.00
Yes	7.0	93.0		

Abbreviations: LTTA = Learning, Training and Teaching Activities.

Table 4. **Measures of association considering degree course**

	Medicine	Nursing	Other faculty	Chi-squared test	Cramer V
	%	%	%	*p*	
Do you think telemedicine courses should be integrated into your degree program?					
No	17.0	2.0	0.0	**0.013**	0.27
Yes	83.0	98.0	100.0		
The subjects covered in the course were useful for my future professional life					
Agree	57.6	42.4	66.7	0.310	0.20
Disagree	0	1.7	0		
Neither agree nor disagree	13.7	5.1	0		
Strongly agree	28.8	49.1	33.3		
Strongly disagree	0	1.7	0		
Do you prefer face-to-face or e-learning mode?					
e-Learning	59.3	49.1	100.0	0.156	0.18
Face-to-face	40.7	50.9	0		
Are you satisfied with the course overall?					
Very unsatisfied	0	6.8	0	0.455	0.15
Neither unsatisfied nor satisfied	6.8	5.1	0		
Satisfied	69.5	57.6	66.7		
Very satisfied	23.7	30.5	33.3		
Which of the following factors positively influenced your participation in the course?					
Topics	47.5	56.0	100.0	0.235	0.21
Teachers	15.2	25.4	0		
Platform interface	20.3	5.0	0		
Lesson Breakdown	8.5	6.8	0		
Other	8.5	6.8	0		

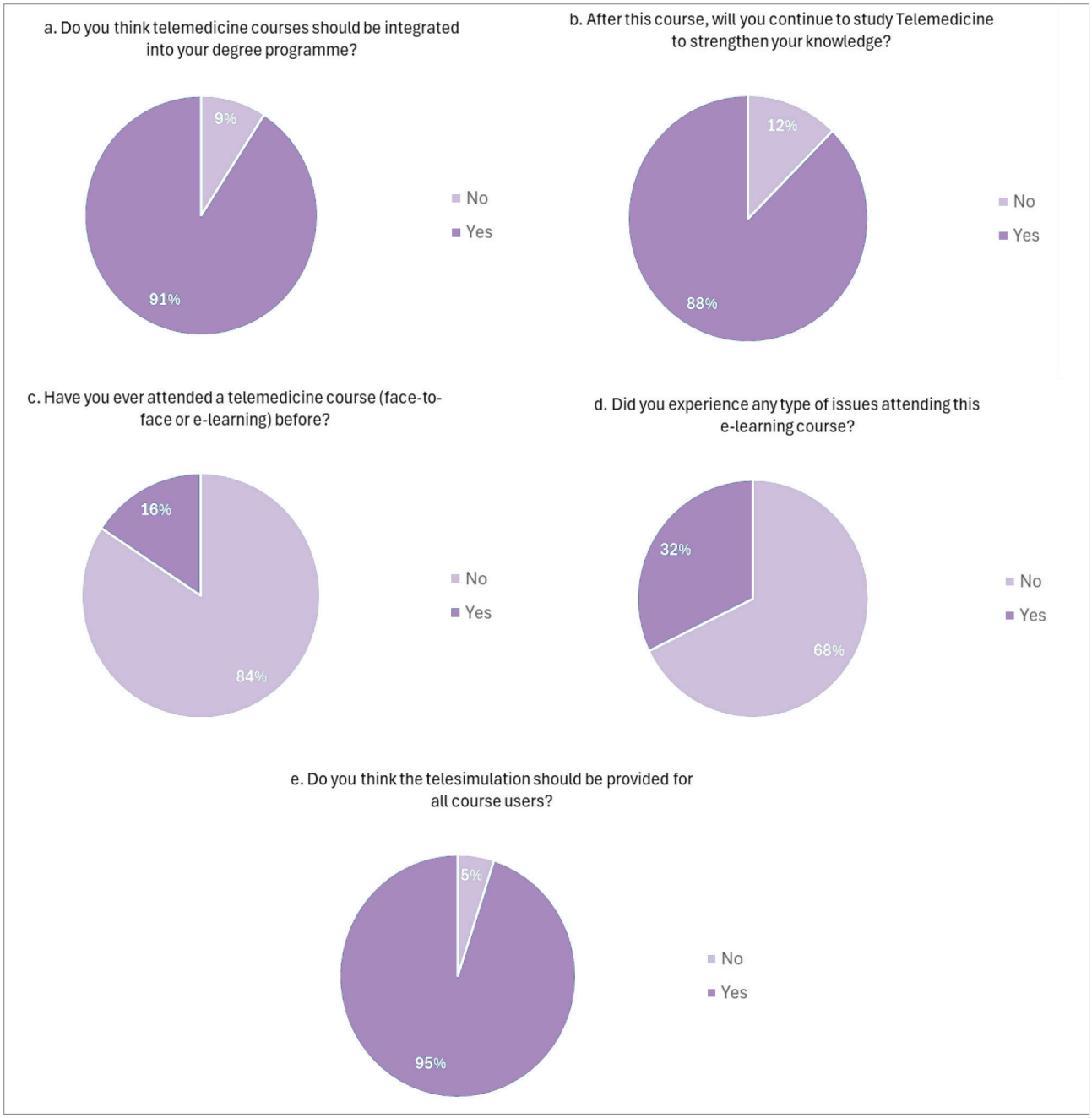

Figure 1. **User's general opinion on telemedicine and their experience (N=121)**

Considering learners' general opinion on the e-course (Figure 2), most of them found the topics covered interesting (93.4%) and in line with their knowledge (79.4%) (Figure 2c, Figure 2a). Students considered topics useful for their future professional life in 89% of cases (Figure 2d).

As for the user's experience on the course' organization (Figure 3), lessons were clear and easy to understand (81%) (Figure 3c), the platform interface was useful and user-friendly for 88% of them, although 17% of the students encountered practical problems with it (Figure 3e).

During the entire year, thirty-eight percent of the learners consistently attended the e-course (Figure 4d). Among the aspects that positively influenced the e-course, the topics covered were indicated by

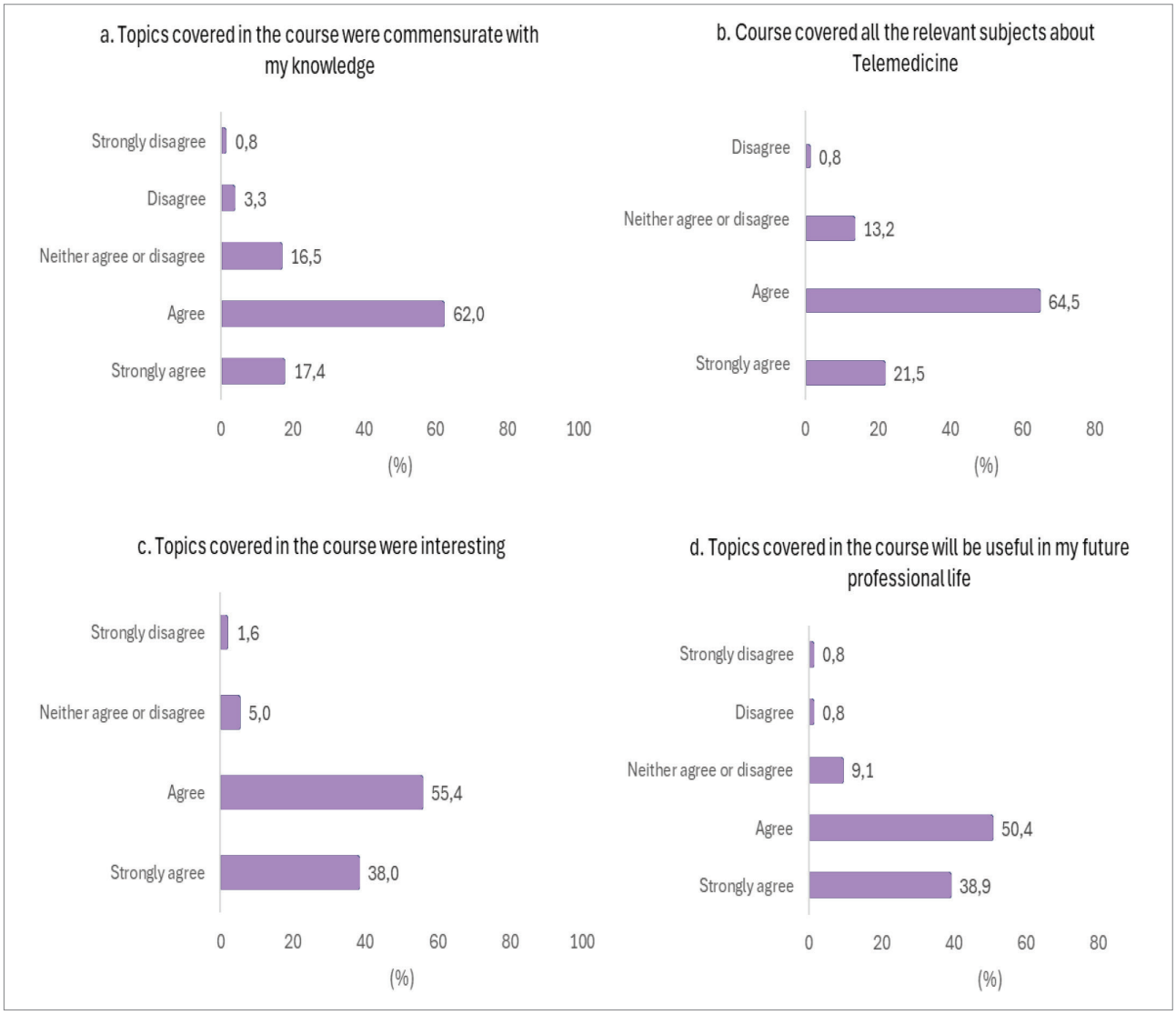

Figure 2. **User's general opinion on the BeEmTel course (N=121)**

52.9%, 19.8% preferred the teachers and 12.4% the platform interface (Figure 4b). Conversely, among the aspects that negatively influenced the course, lack of time to devote to the course was indicated by 67.8% (Figure 4a). Finally, 91% of students were satisfied or very satisfied with the course overall (Figure 4c). When asked if they prefer face-to-face or e-learning lessons, more than half of the students (55.4%) opted for the latter (Figure 4e).

When analyzing the measures of association considering both degree course and nationality (Tables 4 and 5), only one association was statistically significant ("Do you think telemedicine courses should be integrated into your degree program?"). A univariate analysis was performed to verify the effect that area of study, nationality and willingness to participate in activities may have had on the final test score. The analysis did not provide significant findings (results not shown).

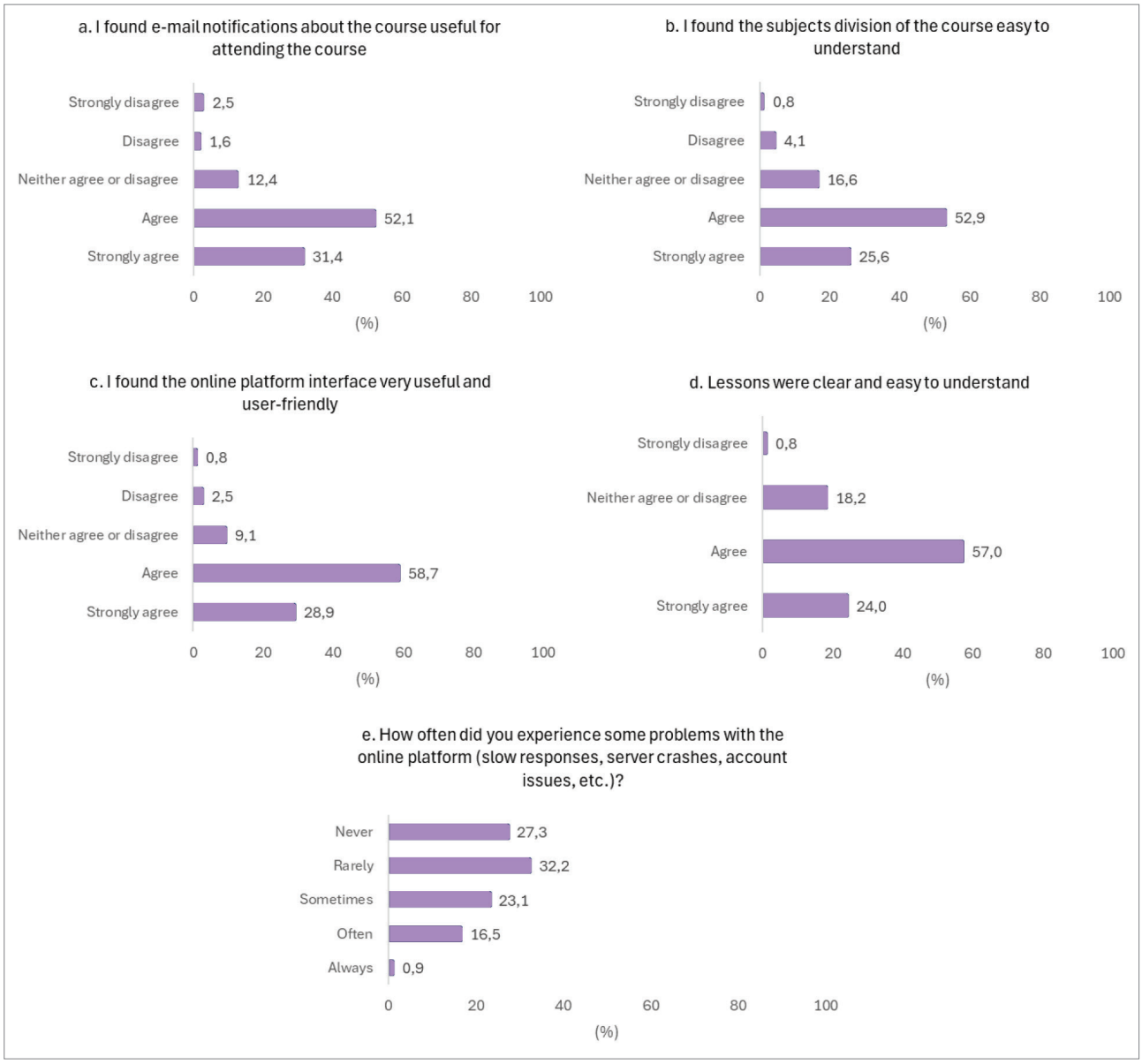

Figure 3. **User's experience on the course' organization (N=121)**

Discussion

Recent major advances in technology have made it easier and more cost-effective to connect patients and their family members/caregivers with remote health care providers. Many experiences tested the use of educational programs aimed at knowledge implementation, such as telesimulation and telemedicine, in the field of chronic diseases (8, 13), and the recent Covid-19 pandemic period Covid-19 was a major driver. However, traditional university teaching across Europe has lagged significantly behind in incorporating even rudimentary elements of telemedicine and telenursing into medical and nursing curricula (37). To address this gap in university education, the Erasmus BemTel project proposed a pilot online course with an immersive experience lasting one week. The BeEmTel project aimed to highlight the potential of digital health education in fostering skills such as digital literacy, patient safety, and communication in telehealth settings. This study,

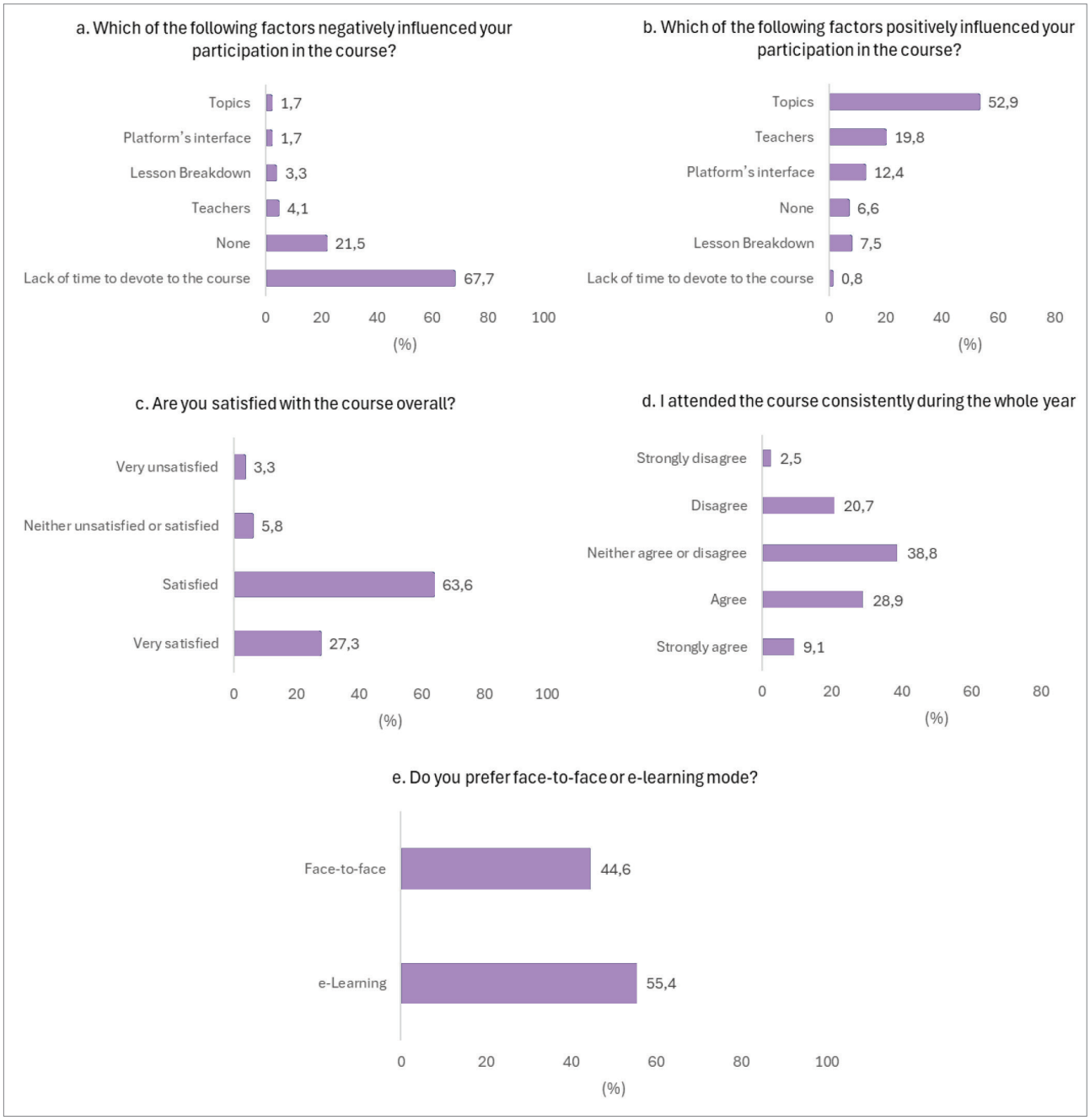

Figure 4. **User's overall opinion (N=121)**

conducted as a final evaluation of the BeEmTel project's outcomes, sought to determine whether integrating telemedicine and telesimulation courses into academic curricula could help prepare healthcare professionals for evolving care models, particularly in managing chronic diseases. This approach is crucial for gaining a deeper understanding of how early exposure to telemedicine training may support students in addressing future healthcare challenges and promoting more accessible, patient-centered care models. The success of this 10-month teaching and learning experience was measured by the satisfaction and approval of the primary targets, as well as by the breadth and diversity of the content focused on NCD, emergencies, telemedicine, and simulation. Additionally, thanks to the new and creative teaching methods of telesimulation, it was possible to deliver practical content even in a distance-learning format.

Table 5. **Measures of association considering respondent's nationality**

	Croatia	Germany	Greece	Italy	Romania	Chi-squared test	Cramer V
	%	%	%	%	%	*p*	
Do you think telemedicine courses should be integrated into your degree program?							
No	0	0	6.7	15.4	0	0.120	0.25
Yes	100.0	100.0	93.3	84.6	100.0		
The subjects covered in the course were useful for my future professional life							
Agree	39.1	33.3	53.3	53.9	53.3	0.124	0.22
Disagree	4.4	0	0	0	0		
Neither agree nor disagree	0	0	0	16.9	0		
Strongly agree	52.1	66.7	46.7	29.2	46.7		
Strongly disagree	4.4	0	0	0	0		
Do you prefer face-to-face or e-learning mode?							
e-Learning	56.5	0	46.7	57.0	66.7	0.284	0.20
Face-to-face	43.5	100.0	53.3	43.0	33.3		
Are you satisfied with the course overall?							
Very unsatisfied	8.7	0	0	3.1	0	0.891	0.13
Neither unsatisfied nor satisfied	8.7	0	0	6.2	6.7		
Satisfied	60.9	66.7	66.7	66.2	53.3		
Very satisfied	21.7	33.3	33.3	24.6	40.0		
Which of the following factors positively influenced your participation in the course?							
Topics	60.9	100	46.6	52.3	40.0	0.216	0.20
Teachers	21.7	0	40.0	12.3	33.3		
Platform interface	0	0	6.7	20.0	6.7		
Lesson Breakdown	4.4	0	6.7	9.2	6.7		
Other	13.0	0	0	6.2	13.3		

The positive overall impact of the BeEmTel project demonstrates that it is both possible and desirable to export and implement simulation-based teaching (both in-person and remotely) for telemedicine and, more broadly, for telecare.

BeemTel e-course has been analyzed from two different perspectives: user's feedback and learning of contents. Regarding the user's feedback, only learners who attended the e-course for its entire duration received the satisfaction survey and their responses appeared to be positive because, after the e-course was completed, most of them answered that telemedicine should be integrated into their degree programs and that they would continue to study this subject (Figure 1a, Figure 1b). This kind of interest appears to be an important result, since the majority of the responding students did not experience a telemedicine course before (Figure 1c). Other positive feedback was given regarding the topics covered in the lectures (Figure 2, Figure 3 b, Figure 4b) and the e-course organization (Figure 3). The overall experience has been rated as positive by majority of the students who participated in the entire course (Figure 4c), despite some of them experienced some sort of problem (Figure 1d). Although the attending learners come from different faculties and countries, user's feedback does not appear to be influenced by degree course or nationality (Table 2, Table 3).

Nevertheless, it has to be noticed that only 32.30% of enrolled students completed the e-course and passed the final test, meaning that over 2/3 of them dropped out of the course before it was over (January 2024). However, as shown in Table 2, the number of learners remained constant for the entire duration. This could suggest that the students who abandoned the e-course did that at its beginning, while

those who started attending the lessons decided to do it until the end of the e-course.

Furthermore, it is worth noting that almost all enrolled learners declared their willingness to attend the LTTA (Learning, Training and Teaching Activities) before abandoning the e-course. Perhaps the perspective of a course based almost entirely on an e-learning platform, also suggested from the answers registered from the survey (Figure 1e, Figure 4e), could explain the observed dropout rate. The observed learning indicators confirm the positive feedback about the e-course, too. Lectures appear to have provided learners with well-established knowledge about all the subjects, as shown by the results of self-assessment tests and the final test (Table 2), although a small difference was observed among learners from different countries (Table 3).

However, despite the generally positive feedback from students, their willingness of integrating telemedicine topics into their study program had some heterogeneity and showed a statistically significant association with both the type of degree program and the respondents' country of origin (Table 5). This finding suggests that, despite the overall favourable opinions, students' willingness to add new subjects to their study path varies significantly depending on their specific program and the country where it is pursued. These differences may be attributed to the varying structure of academic programs across disciplines and countries, leading to differing perceptions of workload among students.

No statistically significant differences were found regarding the preference between online or in-person courses, suggesting that the uncertainty expressed on this topic does not appear to be influenced by the field of study or nationality. The same conclusion applies to questions addressing the overall course satisfaction, the perceived usefulness of the topics covered, or the factors influencing participation. None of these items show any association with the respondents' academic or geographical background.

Limitations

This study has some limitations. The first limitation is that the course was voluntary and represented an extra step in comparison to the already demanding university work of the students. This has certainly limited the active and full participation of students.

The other limitation is linked to the methodology of analysis chosen, the four levels proposed by Kirkpatrick: the structure of the project and the course has allowed us to evaluate only the first two levels, user feedback and learning content, leaving aside workplace behaviour, to consider whether education has influenced practice, and impact on the organization, to assess the effect on outcomes by improving the quality of care and applying best practices. Considering only the first two levels of this model, since the last two are not fully applicable to our project data, our work surely needs to be completed.

Conclusion

The BeEmTel Erasmus+ Project has emerged as an innovative educational experience, effectively introducing the concept of telemedicine to healthcare students across different countries and academic disciplines, irrespective of their previous background or attitudes. Considering the growing importance of these fields, both now and in the future, it is crucial to impart this knowledge early in undergraduate education. Students have demonstrated strong receptiveness to this approach. Multicultural initiatives such as the BeEmTel project offer significant opportunities to solidify these emerging disciplines at the European level, promoting community growth and standardization. The experience of the BeEmTel Project lays a strong foundation for future efforts to assess the impact of these lessons and to explore how telemedicine and telesimulation modules can be integrated into university curricula, ensuring that future healthcare professionals are well prepared for the real-world challenges that await them. The results of this project could be used as a basis for a subsequent one, structured to assess its effectiveness by evaluating all four levels proposed by Kirkpatrick.

Author contributions

Conceptualization and methodology (MBo, EL, MBa); Data curation and formal analysis (GDL, CD); Data extraction (AS); Original draft (MBo, MBa, EL, GDL); Review and editing (MBo, GDL, CD, MBa, MS, VDN, GA, AS, EL); Supervison of the project (GA, MS).

Conflict of interest

The authors declare no conflicts of interest.

Acknowledgments

We would like to thank all the creators and implementers of the BeEmTel project, as well as all those who performed the online lessons and the telesimulation sessions and all participant students for the great experience.

Funding

This research received no external funding.

References

1. Sahu PK, Dalçik H. Editorial: Impact of COVID-19 on healthcare professions education. Front Med (Lausanne). 2023;10:1265811 https://doi.org/10.3389/fmed.2023.1265811
2. Davis B, Bankhead-Kendall BK, Dumas RP. A review of COVID-19's impact on modern medical systems from a health organization management perspective. Health Technol (Berl). 2022;12(4):815-24. https://doi.org/10.1007/s12553-022-00660-z
3. Council Of The European Union. Reflection process: Innovative approaches for chronic diseases in public health and healthcare systems. Brussels; 2013. Available at: https://health.ec.europa.eu/document/download/cdf1adad-a748-4146-b63a-380ca79a4752_en
4. World Health Organization. Non communicable disease facility-based monitoring guidance: framework, indicators and application. Geneva; 2022.
5. Klempt GO. The assessment of occupational competence, report to the National Institute of Education. 1980.
6. Boyatzis RE. The competent manager: a model for effective performance. New York: Wiley & Sons, Inc; 1982.
7. Spencer LM Jr., Spencer SM. Competence at work: models for superior performance. Canada: John Wiley & Sons, Inc; 1993.
8. Cruz-Panesso I, Tanoubi I, Drolet P. Telehealth Competencies: Training Physicians for a New Reality? Healthcare. 2024;12(1):93. https://doi.org/10.3390/healthcare12010093
9. Bulik, RJ, Shokar GS. Integrating telemedicine instruction into the curriculum: expanding student perspectives of the scope of clinical practice. J Telemed Telecare. 2010;16(7):355-8. https://doi.org/10.1258/jtt.2010.090910
10. Kuhn S, Jungmann F. [Medicine in the digital age: Telemedicine in medical school education]. Radiologe. 2018;58(3): 236-40. German. https://doi.org/10.1007/s00117-017-0351-7
11. Brockes C, Grischott T, Dutkiewicz M, Schmidt-Weitmann S. Evaluation of the Education "Clinical Telemedicine/e-Health" in the Curriculum of Medical Students at the University of Zurich. Telemed J E Health. 2017;23(11):899-904. https://doi.org/10.1089/tmj.2017.0011
12. Waseh S, Dicker AP. Telemedicine training in undergraduate medical education: mixed-methods review. JMIR Med Educ. 2019;5(1):e12515. https://doi.org/10.2196/12515
13. Shawwa L. The Use of Telemedicine in Medical Education and Patient Care. Cureus. 2023;15(4):e37766. https://doi.org/10.7759/cureus.37766
14. Palmer RT, Biagioli FE, Mujcic J, Schneider BN, Spires L, Dodson LG. The feasibility and acceptability of administering a telemedicine objective structured clinical exam as a solution for providing equivalent education to remote and rural learners. Rural Remote Health. 2015;15(4):3399.
15. Iancu AM, Kemp MT, Alam HB. Unmuting medical students' education: utilizing telemedicine during the COVID-19 pandemic and beyond. J Med Internet Res. 2020;22(7):e19667. https://doi.org/10.2196/19667
16. Gareev I, Gallyametdinov A, Beylerli O, Valitov E, Alyshov A, Pavlov V, et al. The opportunities and challenges of telemedicine during COVID-19 pandemic. Front Biosci (Elite Ed). 2021;13(2):291-8. https://doi.org/10.52586/E885
17. Poland S, Frey JA, Khobrani A, Ondrejka JE, Ruhlin MU, George RL, et al. Telepresent focused assessment with sonography for trauma examination training versus traditional training for medical students: a simulation-based pilot study. J Ultrasound Med. 2018;37(8):1985-92. https://doi.org/10.1002/jum.14551
18. Liu C, Lim RL, McCabe KL, Taylor S, Calvo RA. A web-based telehealth training platform incorporating automated nonverbal behavior feedback for teaching communication skills to medical students: a randomized crossover study. J Med Internet Res. 2016;18(9):e246. https://doi.org/10.2196/jmir.6299
19. Bramstedt KA, Prang M, Dave S, Shin PN, Savy A, Fatica RA. Telemedicine as an ethics teaching tool for medical students within the nephrology curriculum. Prog Transplant. 2014;24(3):294-7. https://doi.org/10.7182/pit2014289
20. Newcomb AB, Duval M, Bachman SL, Mohess D, Dort

J, Kapadia MR. Building rapport and earing the surgical patient's trust in the era of social distancing: teaching patient-centered communication during video conference encounters to medical students. J Surg Educ. 2021;78(1):336-41. https://doi.org/10.1016/j.jsurg.2020.06.018

21. Iancu AM, Kemp MT, Gribbin W, Liesman DR, Nevarez J, Pinsky A, et al. Twelve tips for the integration of medical students into telemedicine visits. Med Teach. 2021;43(10):1127-33. https://doi.org/10.1080/0142159X.2020.1844877
22. AlDossary S, Martin-Khan MG, Bradford NK, Smith AC. A systematic review of the methodologies used to evaluate telemedicine service initiatives in hospital facilities. Int J Med Inform. 2017;97:171-94. https://doi.org/10.1016/j.ijmedinf.2016.10.012
23. Jonas CE, Durning SJ, Zebrowski C, Cimino F. An interdisciplinary, multi-institution telehealth course for third-year medical students. Acad Med. 2019;94(6):833-7. https://doi.org/10.1097/ACM.0000000000002701
24. Sharma D, Bhaskar S. Addressing the Covid-19 Burden on Medical Education and Training: The Role of Telemedicine and Tele-Education During and Beyond the Pandemic. Front Public Health. 2020;8:589669. https://doi.org/10.3389/fpubh.2020.589669
25. Gerstenberger JP, Hayes L, Chow CJ, Raaum S. Medical Student Experiential Learning in Telesimulation. J Med Educ Curric Dev. 2023;10:23821205231216067. https://doi.org/10.1177/23821205231216067
26. Honda R, McCoy CE. Teledebriefing in Medical Simulation. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024. Available from https://www.ncbi.nlm.nih.gov/books/NBK546584/
27. Rosa A. Kirkpatrick's four-level model for evaluating training programs: the weak links in a "chain of evidence". Lifelong, Lifewide Learning. 2018;14(31):17-37. https://doi.org/10.19241/lll.v14i31.113
28. Kirkpatrick DL. Evaluating training programs: The four levels. San Francisco: Berrett-Koehler; 1994.
29. Taveira-Gomes T, Saffarzadeh A, Severo M, Guimarães MJ, Ferreira MA. A novel collaborative e-learning platform for medical students - ALERT STUDENT. BMC Med Educ. 2014;14:143. https://doi.org/10.1186/1472-6920-14-143
30. Falletta SV. Book Review: Evaluating Training Programs: The Four Levels. American Journal of Evaluation. 1998;19(2):259-61. https://doi.org/10.1016/S1098-2140(99)80206-9
31. Zimmerman BB, Clarke MC. Applying survey research methods to gather customer data and to obtain user feedback. In: Albers MJ, Mazur MB, editors. Content and Complexity. New York: Routledge; 2014.
32. Shee DY, Yi-Shun W. Multi-criteria evaluation of the web-based e-learning system: A methodology based on learner satisfaction and its applications. Computers & Education 2008;50(3):894-905. https://doi.org/10.1016/j.compedu.2006.09.005
33. Santoso HB, Schrepp M, Isal RYK, Utomo AY, Priyogi B. Measuring user experience of the student-centered e-learning environment. The Journal of Educators Online 2016;13(1):58-79. https://doi.org/10.9743/JEO.2016.1.5
34. Panagiotis Z, Poylymenakou A. Developing a usability evaluation method for e-learning applications: Beyond functional usability. Intl. Journal of Human–Computer Interaction 2009;25(1);75-98. https://doi.org/10.1080/10447310802546716
35. Cramér H. Mathematical Methods of Statistics. Princeton: Princeton University Press; 1946.
36. Pearson K. On the criterion that a given system of deviations from the probable in the case of a correlated system of variables is such that it can be reasonably supposed to have arisen from random sampling. Philos. Mag. 1900;50(302):157-75. https://doi.org/10.1080/14786440009463897
37. Fradelos EC, Barisone M, Lora E, Valiakos E, Papathanasiou IV. Competencies and skills needed in the management of chronic patients' needs through telecare. Pol Merkur Lek. 2023;51(4):403-16. https://doi.org/10.36740/Merkur202304116

SUPPLEMENTARY MATERIAL

Appendix A.

The appendix contains supplementary information which may be helpful in providing a more comprehensive understanding of the research subjects.

BeEmTel USERS' FEEDBACK SURVEY

Course Topics

- The subjects covered in the course were commensurate with your knowledge (5 points agreement Likert)
- The subjects covered in the course were interesting (5 points agreement Likert)
- The course covered all the relevant subjects about Telemedicine (5 points agreement Likert)
- The subjects covered in the course were useful for my future professional life (5 points agreement Likert)
- In your opinion, Telemedicine will find greater applicability in the future? (Yes/No)
- After this course, you will continue to study Telemedicine to strengthen your knowledge on this topic? (Yes/No)

Structure and Platform

Did you experience any type of issues attending to this e-learning course? (Yes/No)

I found e-mail notifications about the course useful for attending the course (5 points agreement Likert)

How often did you experience some problems with the online platform (slow responses, server crashes, account issues, etc.)? (5 points frequency Likert)

I found the online platform interface very useful and user-friendly (5 points agreement Likert)

I found the subjects division of the course very easy to understand (5 points agreement Likert)

Teachers

- Professor's lessons were clear and easy to understand (5 points agreement Likert)

Participation and appreciation

- I attended the course consistently during the entire year (5 points agreement Likert)
- Which of the following factors negatively affected your participation in the course? (Topics; Platform interface; Lessons breakdown; Teachers; Lack of time to devote to the course; None)
- Which of the following factors positively influenced your participation in the course? (Topics; Platform interface; Lessons breakdown; Teachers; Lack of time to devote to the course; None)
- Are you satisfied with the course overall? (5 points satisfaction Likert)
- Do you prefer face-to-face or e-learning mode? (Face-to-face; e-Learning)
- Do you think that in the future the practical experience of telesimulation should be provided to all course users? (Yes/No)

Croat Nurs J. 2025; 9(1): 45-56

Original scientific paper

Comparison of Nursing Curricula in Croatia and Turkey: Analysis Using the SPICES Model

[1,2]Snježana Čukljek
[3] Rukiye Akarsu Höbek
[1,4]Biserka Sedić
[1,2]Biljana Filipović
[3] Betül Ünsal

[1] University of Applied Health Sciences, Zagreb, Croatia
[2] Faculty of Health Studies, University of Rijeka, Rijeka, Croatia
[3] Yozgat Bozok University, Yozgat Merkez/Yozgat, Turkey
[4] Faculty of Dental Medicine and Health Osijek, University of Osijek, Osijek, Croatia

Article received: 15.01.2025.

Article accepted: 21.02.2025.

https://doi.org/10.24141/2/9/1/4

Author for correspondence:
Biljana Filipović
University of Applied Health Sciences, Zagreb, Croatia
E-mail: biljana.filipovic@zvu.hr

Keywords: nursing curriculum, Croatia, Turkey, SPICES model, comparative analysis, nursing education

Abstract

Introduction. The SPICES model promotes a modern educational framework through Student-centered learning, Problem-based learning, Integrated teaching, Community-based education, Elective studies, and Systematic approaches. This model is pivotal for adapting nursing education to evolving global healthcare demands.

Aim. To perform a comparative analysis of the nursing curricula in the Republic of Croatia and the Republic of Turkey using the SPICES model.

Methods. A cross-national comparative study focusing on the undergraduate nursing programs at designated universities in Croatia and Turkey. Official curriculum documents, course descriptions, and relevant literature from both countries were collected and analyzed according to the six domains of the SPICES model. A comparative table was constructed to elucidate the adherence to and deviations from the model in each curriculum.

Results. Both countries' curricula reflect elements of the SPICES model, but are predominantly influenced by traditional educational practices. The Croatian curriculum shows greater interdisciplinary integration, in line with EU directives, whereas Turkey's curriculum is progressing towards better compliance with international standards through ongoing accreditation efforts. Variations were particularly noted in the extent of elective course offerings and problem-based learning applications.

Conclusions. The study concludes that updating the nursing curricula in Croatia and Turkey to more closely follow the SPICES model could significantly improve the quality of nursing education. Such enhancements are likely to equip nursing professionals with better skills and knowledge, ultimately leading to improved patient care outcomes. The anticipated further accreditation in Turkey could foster the adoption of innovative educational strategies in line with the SPICES model.

Introduction

The quality of nursing care is directly connected to the quality of nursing education. Research shows that robust educational programs are essential for preparing nurses to effectively manage the complexities of modern healthcare (1). It is crucial that nursing curricula remain dynamic, incorporating current knowledge and technologies to develop professionals who are competent and equipped to lead improvements in healthcare practices (2). As such, it is crucial to develop curricula that equip nurses with the necessary skills, knowledge, and attitudes to effectively contribute to healthcare improvement (3). Nursing education curricula must cover essential areas, including foundational medical knowledge, clinical skills, patient care, communication, and ethical principles. A well-designed curriculum is a critical component in ensuring that nurses are not only able to provide high-quality care to their patients, but also continue to grow professionally. Moreover, the quality of a nursing curriculum significantly influences both the professional success of nurses and the overall quality of patient care (4). Research has shown that concept mapping can play a pivotal role in developing critical thinking among nursing students. A systematic review and meta-analysis conducted by Yue et al. indicates that concept mapping has a positive impact on both the affective dispositions and cognitive skills related to critical thinking in nursing education. However, further high-quality research is needed to comprehensively evaluate this method (5).

In light of rapidly changing global dynamics, significant shifts have occurred in societal structures, healthcare services, and nursing education. To keep pace with these developments, nursing education must remain dynamic and continually evolve. The COVID-19 pandemic has highlighted the need for flexibility and rapid adaptation in nursing education globally. As healthcare systems grappled with unprecedented demands, some countries implemented accelerated training programs for nurses to meet urgent workforce needs. To keep pace with these developments, nursing education must remain dynamic and continually evolve (6). Developing nursing curricula is an ongoing, iterative process that involves adapting existing activities and assignments, and at times requires a complete restructuring of the curriculum to ensure that it remains relevant and effective in addressing healthcare needs (7). The ongoing improvement, updating, and strengthening of nursing curricula are necessary to ensure the provision of advanced and high-quality nursing care. Studies that focus on curriculum revisions and updates play a pivotal role in educating qualified nurses who can meet the growing and diverse needs of the healthcare profession (8).

To create comprehensive nursing curricula, educational institutions must regularly assess various aspects of their programs. One effective method of such assessment is comparative studies. These studies examine the curricula of different countries, facilitating scholarly exchanges and enabling the localization of findings to improve existing programs or develop new ones. The insights gained from comparative studies also provide valuable guidance for those designing and implementing nursing curricula, helping to ensure that these programs are aligned with the specific healthcare needs of society (9,10). The selection of Croatia and Turkey for this comparative analysis stems from their active involvement in the Erasmus program, which encompasses not only nursing students but also faculty members. This participation facilitates educational exchanges that provide a rich context for evaluating and understanding the nuances of nursing education across different regulatory and cultural landscapes.

The SPICES model, which stands for Student-centered learning, Problem-based learning, Integrated teaching, Community-based education, Elective studies, and Systematic approaches, offers a modern framework essential for adapting nursing education to global healthcare demands. This model promotes a flexible, engaging, and holistic educational approach crucial in preparing nursing students to face contem-

porary health challenges (11). In Turkey, programs like those at Yozgat Bozok University are designed to balance theoretical knowledge with practical applications. Croatian nursing programs, exemplified by the University of Applied Health Sciences Zagreb, adhere to a standardized core curriculum set by the Ministry of Education, in line with EU directives, to ensure consistent and high-quality education that prepares students for professional practice within and beyond Croatia.

Although several comparative studies in the literature focus on nursing curricula, most involve comparisons between Iran and other countries (9,12). However, a comparison between Croatia, a member of the European Union, and Turkey, a country that serves as a bridge between the Middle East and Europe, offers a unique opportunity to explore the differing approaches to nursing education in these two regions.

Aim

This study aims to conduct a comparative analysis of the nursing curricula in the Republic of Croatia and the Republic of Turkey, with the aim of identifying key differences and similarities that can inform future curriculum development.

Methods

Study design

This study employed a descriptive-comparative design, guided by the SPICES model, to compare the nursing curricula of undergraduate nursing programs in the Republic of Croatia and the Republic of Turkey. In Croatia, the undergraduate nursing program follows a standardized core curriculum set by the Ministry of Education and implemented nationwide. This provides a basis for comparison with the nursing curriculum in Turkey, allowing for an examination of how each system addresses the challenges of modern healthcare education. The SPICES model emphasizes six key domains: Student-centered learning, Problem-based learning, Integrated or inter-professional teaching, Community-based education, Elective studies, and a Systematic or planned approach (11). This model served as the conceptual framework for the comparison between the two educational systems.

Data collection

Data were obtained from official curriculum documents, course descriptions, and relevant academic literature from the University of Applied Health Sciences Zagreb in Croatia and Yozgat Bozok University in Turkey. The data collection process was structured to identify and extract information related to the key components of each institution's nursing curriculum, with a particular focus on the six domains outlined by the SPICES model.

Data analysis

The collected data were systematically analyzed and categorized according to the six domains of the SPICES model. This analysis involved a detailed comparison of similarities and differences between the two curricula within each domain.

The courses included in this analysis were selected based on their alignment with specific elements of the SPICES model. Each course was categorized according to the educational strategies it most effectively exemplified, highlighting the degree to which each course adhered to the principles of student-centered learning, problem-based learning, integrated or inter-professional teaching, community-based education, elective studies, and a systematic approach.

The assessment of course alignment with the SPICES model was conducted by faculty members from both the University of Applied Health Sciences Zagreb in Croatia and Yozgat Bozok University in Turkey. Faculty members evaluated the courses with respect to their learning outcomes, content, teaching methods, and assessment criteria, ensuring that each course was appropriately classified according to the SPICES elements it best represented. The final step in the analysis involved interpreting the data to identify key points of convergence and divergence between the curricula.

Ethics

The study was conducted in accordance with the established ethical standards for educational research. Given that no personal or sensitive data were collected and the study was based solely on publicly available curriculum information, ethical approval was not required. The study did not involve human participants, ensuring compliance with ethical guidelines and the protection of personal data.

Results

The results of the comparative analysis are displayed in two tables. Table 1 summarizes the alignment of Yozgat Bozok University's courses with the SPICES model, categorizing courses under the headings of Student-centered Learning, Problem-based Learning, Integrated Teaching, Community-based Education, Elective Studies, and Systematic Approach. Table 2 presents information for the University of Applied Health Sciences Zagreb, showing how each course fits into the SPICES framework.

Student-based strategy

The student-based strategy, as one of the key components of the SPICES model, shifts the responsibility for learning to the student, fostering active learning. This approach contrasts with the traditional, teacher-centered model and promotes higher-order cognitive skills, including critical thinking. The five stages of the student-based strategy are as follows:

- Stage 1: The student follows a prescribed program with no consideration of individual needs or preferences.
- Stage 2: The course coordinator considers the students' needs and preferences during course planning but maintains the prescribed program.
- Stage 3: The course coordinator tailors courses based on both institutional preferences and student input, while students are responsible for implementing learning activities.
- Stage 4: Students actively participate in both planning and implementation phases of the curriculum.
- Stage 5: Students are involved in all stages, from planning and implementation to assessment (13).

At Yozgat Bozok University in Turkey, the curriculum remains largely educator-centered. Faculty members define learning objectives and course content, conveying theoretical knowledge through lectures and practical sessions. While students play an active role in clinical practice (particularly in case management and patient care planning), the overall learning process is still predominantly guided by instructors. Based on this structure, the Turkish curriculum aligns with Stage 2, where student preferences are considered, but the educational process remains largely predefined.

The University of Applied Health Sciences Zagreb in Croatia operates at Stage 2 of the student-based strategy. In Croatia, the curriculum complies with EU Directives 2005/36 and 2013/55, which mandate specific competencies for nursing graduates. While students have limited input on course content, they are expected to engage actively with learning materials, especially during clinical placements (14, 15).

Problem-based strategy

The problem-based strategy emphasizes solving real-life problems as a central aspect of learning. This approach promotes active learning, enabling students to apply theoretical knowledge in practical settings, thus fostering analytical and problem-solving skills. The five stages of problem-based learning are:

- Stage 1: General rules and concepts are taught without practical examples.
- Stage 2: Administrative rules are introduced, but there is no structured program for their application.
- Stage 3: The applied rules are introduced through examples or problem-solving exercises.
- Stage 4: Problem-solving becomes the focus of learning activities.
- Stage 5: Real-world problems are used to teach inferential rules and concepts (13).

In Turkey, problem-based learning is not systematically applied across the curriculum. However, in key

Table 1. **Classification of activities in Yozgat Bozok University, Turkey, according to SPICES model**

Institution	Student-centred learning	Problem-based learning	Integrated or inter-professional teaching	Community based education	Elective studies	Systematic or planned approach
University of Yozgat Bozok, Yozgat, Turkey	Evaluation of health I, Evaluation of health II, Fundamentals of nursing, Internal medical nursing, Surgical medical nursing, Nursing in obstetrics and gynaecology, Paediatric Health and Disease Nursing, Psychiatric Nursing, Public health nursing, Nursing management, Nursing practice I: internal diseases nursing, Nursing practice II: surgical diseases nursing, Nursing practice III: obstetrics, women's health, and diseases, Nursing practice IV: paediatric health and disease nursing, Nursing practice V: Psychiatric Nursing, Nursing practice VI: public health nursing, Pain Management Nursing, Intensive care nursing, Physical examination, Evidence-based nursing, Protecting and improving health, Turkish language I, Turkish language II, Professional English I, Professional English II, Foreign language I (English), Foreign language II (English)	Research in nursing, First aid and emergency care, Teaching in nursing, Safe Medication Practices, Emergency nursing Pain Management Nursing, Dialysis nursing, Disaster nursing, Intensive care nursing, Nursing management of chronic diseases in disasters, Ostomy and wound care, Nursing rehabilitation, Nursing Occupational, Health nursing, Forensic nursing, Palliative nursing care, Geriatric nursing care, Technology Nursing, Nursing Informatics, Nursing process, Reproductive health nursing	Principles of Atatürk and history of revolution I, Psychology, Basic computer Technologies, Anatomy, Histology, Physiology, Biochemistry, Physical education I, Fundamentals of cyber security, Foreign language I (English), Principles of Atatürk and history of revolution II, Microbiology-Parasitology, Career planning, Pathology, Physical Education II, Nutrition, Foreign Language II (English), Elective course outside the field I, Professional English I, Pharmacology, Professional English II, Biostatistics, Elective course outside the field II, Self-awareness and communication methods, Infectious diseases, Complementary and Alternative Therapies, Symptom management, Physical examination, Protecting and improving health	Individual audit collection methods, Nutrition of public health, Ethics and deontology in nursing, Health sociology, Epidemiology, Transcultural nursing, Nursing and family, Gender and health, Home care nursing, Rehabilitation nursing, Occupational health nursing, Protecting and improving health, Public health nursing, Nursing management, Evaluation of health I, Evaluation of health II, Fundamentals of nursing, Internal diseases nursing, Surgical diseases nursing, Obstetrics and gynaecology Nursing, Paediatric health and disease nursing, Psychiatric Nursing, Public health nursing, Nursing management, Nursing practice I: Internal medical nursing, Nursing practice II: surgical diseases nursing, Nursing practice III: obstetrics, women's health, and diseases, Nursing Practice IV: Paediatric health and diseases nursing, Nursing practice V: Psychiatric nursing, Nursing practice VI: public health nursing	Innovation in nursing, Pain Management Nursing, Complementary and alternative therapies, Disaster nursing, Approach to disabled individual, Intensive care nursing, Ostomy and wound care nursing, Evidence-based nursing, Professionalism in nursing, Reproductive health nursing	Adolescent and problem behaviors, Child and culture, Child values and communication with the child, Pain management nursing, Dialysis nursing, Disaster nursing, Transcultural nursing, Symptom management, Paediatric emergencies, Management of chronic diseases in disasters, Newborn nursing, Home care nursing, Psychiatric nursing in general clinics, Forensic nursing, Evidence-based nursing, Evaluation of health I, Evaluation of health II Fundamentals of nursing, Internal medical nursing, Surgical diseases nursing, Obstetrics and gynaecology nursing, Paediatric health and diseases nursing, Psychiatric health nursing, Public health nursing, Nursing management, Nursing practice I: internal diseases nursing, Nursing practice II: surgical diseases nursing, Nursing practice III: obstetrics, women's health, and diseases, Nursing practice IV: child health and diseases nursing, Nursing practice V: Psychiatric health and diseases nursing, Nursing practice VI: public health nursing, Intensive care Nursing, Physical examination, Evidence-based nursing, Protecting and improving health

Table 2. **Classification of activities in University of Applied Health Sciences Zagreb, Croatia, according to SPICES model**

Institution	Student-centred learning	Problem-based learning	Integrated or inter-professional teaching	Community based education	Elective studies	Systematic or planned approach
University of Applied Health Sciences, Zagreb, Croatia	Fundamentals of nursing care Nursing process Clinical nursing practice 1 Communication skills Interpersonal relationships in nursing Professional development in nursing Basic emergency medical procedures Evidence-based nursing care Clinical nursing practice 2 Child nursing care Maternal and newborn nursing care Nursing care of neurological patients Adult nursing care 1 Citing and referencing in academic writing for health studies students Fundamentals of clinical transfusion medicine Prevention in dental medicine Natural nutrition – breastfeeding Nursing and public media Pain management Mental health protection for children and adolescents Intensive care nursing for children Nursing care of chronically ill children Oncology nursing care Clinical nursing practice 3 Fundamentals of nursing research Palliative nursing care Adult nursing care 2 Nursing care for people with disabilities Psychiatric nursing care Geriatric nursing care Home nursing care Community nursing care Socially beneficial learning Emergency situations in psychiatry Croatian sign language Family nursing care Technology in nursing practice Nursing care in explantation/ transplantation Intensive care unit nursing Nursing care for addicts Diagnostic nursing care	Nursing process Patient safety in healthcare institutions Teamwork in nursing Evidence-based nursing care Basic emergency medical procedures Communication skills Organization, management, and administration in nursing Nursing and public media Social psychology in healthcare Pain management Mental health protection for children and adolescents Sociology of health Health Psychology Fundamentals of nursing research Palliative nursing care Health education with methods of teaching and learning Nursing care for people with disabilities Psychiatric nursing care Nursing care in the community Geriatric nursing care Service learning Emergency situations in psychiatry Nursing care for addicts Nursing care of school-aged children	Anatomy Dietetics Pharmacology Philosophy and ethics in nursing Physiology Informatics in nursing Communication skills Microbiology with parasitology Fundamentals of physics, radiology, and radiation protection Fundamentals of medical chemistry and biochemistry Social and health legislation Lifespan psychology Foreign language Fundamentals of nursing care Nursing process Clinical nursing practice 1 Dermatology Gynaecology and obstetrics Hygiene and epidemiology Infectology Internal medicine Public health Neurology Child nursing care Maternal and newborn nursing care Nursing care of neurological patients Adult nursing care I Clinical nursing practice 2 Organization, management, and administration in nursing Pathophysiology Pathology Paediatrics Health sociology Health psychology Social psychology in healthcare Anaesthesiology, resuscitation, and intensive care Surgery, orthopaedics, and traumatology Ophthalmology Fundamentals of nursing research Otorhinolaryngology Psychiatry and mental health Nursing care for people with disabilities Technology in nursing practice Nursing care in diagnostics Oncology nursing care Clinical nursing practice 3 Adult nursing care II Geriatric nursing care Nursing care for people with disabilities Psychiatric nursing care Home nursing care Community nursing care Emergency situations in psychiatry Family nursing care Nursing care in explantation/ transplantation Intensive care unit nursing Nursing care for addicts Nursing care of school-aged children	Philosophy and ethics in nursing Fundamentals of nursing care Nursing process Professional development in nursing Lifespan psychology Hygiene and epidemiology Infectology Internal medicine Public health Health sociology Child nursing care Maternal and newborn nursing care Nursing care of neurological patients Adult nursing care I Health psychology Prevention in dental medicine Natural nutrition – breastfeeding Oncology nursing care Palliative nursing care Health education with methods of teaching and learning Adult nursing care II Psychiatric nursing care Geriatric nursing care Home nursing care Community nursing care Emergency situations in psychiatry Croatian sign language Family nursing care Nursing care for addicts Nursing care of school-aged children	Patient safety in healthcare institutions Interpersonal relationships in nursing English language German language Professional development in nursing Basic emergency medical procedures Lifespan psychology Teamwork in nursing Evidence-based nursing care Citing and referencing in academic writing for health studies students Basic clinical transfusion medicine Prevention in dental medicine Natural nutrition – breastfeeding Nursing and public media Social psychology in healthcare Pain management Mental health protection for children and adolescents Intensive care nursing for children Nursing care of a chronically ill children Oncology nursing care Service learning Emergency psychiatry Croatian sign language Family nursing care Technology in nursing practice Nursing care in explantation/ transplantation Intensive care unit nursing Nursing care for addicts Nursing care of school-aged children Nursing care in diagnostics Nursing care of the neurosurgical patients	Fundamentals of nursing care Nursing process Clinical nursing practice 1 Patient safety in healthcare institutions Basic emergency medical procedures Teamwork in nursing Evidence-based nursing care Child nursing care Maternal and newborn nursing care Nursing care of neurological patients Adult nursing care I Clinical nursing practice 2 Organization, management, and administration in nursing Health psychology Fundamentals of clinical transfusion medicine Pain management Mental health protection for children and adolescents Intensive care nursing for children Nursing care of chronically ill children Oncology nursing care Clinical nursing practice 3 Thesis Adult nursing care II Geriatric nursing care Nursing care for people with disabilities Psychiatric nursing care Home nursing care Community nursing care Emergency situations in psychiatry Croatian sign language Family nursing care Nursing care in explantation/ transplantation Intensive care unit nursing Nursing care for addicts Nursing care of school-aged children

professional courses, such as obstetrics, psychiatric health, and paediatric nursing, problem-solving methods are occasionally employed in small group settings. The Turkish curriculum aligns with Stage 2, where administrative rules are taught, but no structured problem-solving program exists.

In contrast, the University of Applied Health Sciences Zagreb in Croatia employs problem-based learning at Stage 3. Real-life examples and problems are integrated into the curriculum, particularly in clinical courses, allowing students to apply theoretical knowledge to practical situations. This approach enhances critical thinking and problem-solving abilities, preparing students for real-world nursing challenges.

Integration strategy

The integration strategy in the SPICES model seeks to connect different educational content, promoting coherence and a deeper understanding of the material. This can be achieved through horizontal integration (linking related disciplines) and vertical integration (connecting theoretical knowledge with practical application). The five stages of integration are:

- Stage 1: Courses are independent in terms of objectives, content, instructors, and methods.
- Stage 2: Coordination exists between related courses, with instructors sharing information and consulting with each other.
- Stage 3: Temporary or continuous coordination is achieved, integrating content and assessment across disciplines.
- Stage 4: Boundaries between disciplines begin to blur, with multidisciplinary courses implemented.
- Stage 5: Interdisciplinary and multidisciplinary courses are fully integrated into the curriculum (13).

At Yozgat Bozok University in Turkey, courses are delivered independently, with little horizontal or vertical integration. Students follow a curriculum designed independently by the Nursing Department, with input from internal and external stakeholders. The curriculum is largely organized by semester, and students must complete at least two out-of-field courses. Clinical practice is conducted under the supervision of instructors, and students complete a year-long internship following their three-year coursework. The Turkish curriculum aligns with Stage 1 of the integration strategy, where courses remain distinct in terms of objectives, content, and teaching methods.

At the University of Applied Health Sciences Zagreb in Croatia, the integration strategy aligns with Stage 2. Here, courses are coordinated to ensure students understand how different subjects interrelate. Although there is no full integration of content across disciplines, efforts are made to highlight the connections between related subjects, such as anatomy and physiology, enhancing the overall learning experience.

Community-based education strategy

The community-based education strategy integrates theoretical knowledge with practical experiences in community settings, helping students address real health problems. This strategy encourages students to engage with local populations, fostering creativity and critical thinking about public health issues. The five stages of community-based education are:

- Stage 1: Courses are unrelated to community problems.
- Stage 2: Courses focus on third-level care (hospital-based).
- Stage 3: Courses emphasize sociology and community issues.
- Stage 4: Courses are community-based, with real-world application of knowledge.
- Stage 5: Courses are integrated across disciplines, with community engagement at the core of learning (13).

In Turkey, community-based education is incorporated through courses such as community health nursing, transcultural nursing, and health sociology. Students gain practical experience in primary family health centers and schools, contributing to public health during clinical rotations. Turkey's curriculum aligns with Stage 3, where courses emphasize sociology and community health issues.

In Croatia, community-based education is implemented at Stage 4, with a strong focus on real-world applications. Students participate in clinical rotations in community health centres and engage in public health initiatives, linking theoretical knowledge with practical outcomes. The curriculum ensures students are well-prepared to address the health needs of local populations.

Elective strategy

The elective strategy allows students to tailor their education by selecting courses that align with their personal interests and professional goals. The five stages of the elective strategy are:

- Stage 1: All courses are compulsory.
- Stage 2: Students can select certain aspects, such as consultants or exam schedules.
- Stage 3: Students have additional choices in examination content.
- Stage 4: Certain topics and assessment methods are elective.
- Stage 5: Students choose their learning methods (13).

In Turkey, 33.3% of the courses are elective, with the remaining curriculum consisting of compulsory courses. Students' feedback is incorporated into curriculum updates. Based on this structure, Turkey is aligned with Stage 1, where most courses are compulsory.

At the University of Applied Health Sciences Zagreb in Croatia, the curriculum corresponds to Stage 2. Students have the option to choose from a range of elective courses, such as teamwork in nursing and oncology nursing, which allow them to specialize in areas of interest while completing a largely predetermined program.

Systematic strategy

The systematic strategy involves a structured and planned educational approach, ensuring that course objectives, content, teaching methods, and assessments are clearly defined. The six stages of systematic strategy include:

- Stage 1: Course information (objectives, content, methods, and assessment) is inaccessible to students.
- Stage 2: Course information is provided to students.
- Stage 3: Course content and assessments are directly linked to objectives.
- Stage 4: Objectives are tailored to assessment needs.
- Stage 5: Continuous assessment and feedback are provided (13).

In Turkey, nursing education starts after a competitive university entrance exam. Students are vaccinated and evaluated for health conditions before starting clinical practice. The curriculum is structured, but course information is clearly communicated to students. Turkey's curriculum aligns with Stage 2 of the systematic strategy.

In Croatia, the curriculum is at Stage 3, with clear alignment between course content, learning outcomes, and assessment methods. The national accreditation agency regularly evaluates nursing programs, ensuring compliance with ESG standards and further enhancing the quality of education (16).

Discussion

This study aimed to compare the nursing curricula at the University of Applied Health Sciences Zagreb in Croatia and Yozgat Bozok University in Turkey using the SPICES model as a framework for analysis. The SPICES model, originally developed over 30 years ago, remains highly relevant today, particularly in contexts where curriculum reform is needed or where innovative approaches to teaching and learning are being introduced. The model continues to be regarded as one of the most valid educational strategies for both developing new educational programs and revising existing ones (17 – 20).

Research by Navab et al. (2019) underscores the importance of adapting nursing curricula to meet the evolving needs of communities, drawing on the successful experiences of leading nursing schools that have implemented the SPICES model (21). Such adaptations help ensure that nursing education remains responsive to societal needs, particularly in preparing future nurses to meet the challenges of contemporary healthcare. Globalization has significantly influenced the nursing profession by impacting areas such as nursing development, migration, and specialization. This shift necessitates that nursing curricula address global health challenges and prepare nurses for roles that transcend national boundaries. As highlighted in recent literature, globalization brings both advancements in nursing practice and challenges, including ethical considerations and the need for cultural competence in patient care (22).

A comparative study conducted on the implementation of the SPICES model in the nursing curricula of Tehran (Iran), West (Canada), and Hacettepe (Turkey) universities highlights significant differences in how the model is applied across regions. The findings suggest that the West Nursing Faculty in Canada has more successfully implemented the model compared to the Iranian and Turkish institutions (23). These results highlight the potential for improvement in the application of the SPICES model in countries like Turkey and Iran.

The comparison of the two nursing curricula revealed that while both countries are making efforts to align their nursing education with the SPICES framework, significant differences remain in how these educational strategies are implemented.

An internationally educated and professional nursing workforce is crucial for achieving positive health outcomes. Despite global efforts to improve nursing education, substantial diversity remains in educational standards both within and across countries (24). In response, an international framework of guidelines has been developed to enhance consistency and quality in nursing education worldwide, as highlighted by the World Health Organization's *State of the World's Nursing* 2020 report (25) This framework promotes three core pillars: standardized learning outcomes for nursing graduates, program standards, and institutional standards, while allowing adaptability to local socio-cultural contexts. Global standards in nursing education, such as those promoted by WHO, are crucial for reducing disparities in healthcare quality across different regions. These standards ensure that nursing curricula are not only responsive to local healthcare needs but also aligned with best practices in nursing education worldwide, thereby fostering an internationally competent nursing workforce. The framework's flexibility supports the integration of globally informed best practices into locally relevant curricula, which could be beneficial for countries like Croatia and Turkey as they aim to improve and harmonize their nursing education systems. In Croatia, compliance with EU Directives 2005/36 and 2013/55 plays a critical role in ensuring that nursing education adheres to European standards. This alignment leads to a more structured and standardized curriculum with clear expectations for both educators and students (14, 15). On the other hand, Turkey, despite adopting the SPICES model through its national accreditation process, still faces challenges in fully integrating certain SPICES strategies, particularly in fostering problem-based learning and student-centered education. Study by Hong and Yu demonstrated that the implementation of unfolding case-based learning in lectures significantly improves nursing students' critical thinking abilities (26). These findings suggest that integrating such innovative approaches into current curricula, especially in Turkey, where traditional methods still dominate, could enhance the development of critical thinking and decision-making skills.

One of the key findings is that Turkey remains largely at Stage 2 of both the student-based and problem-based strategies, where student preferences are considered but the curriculum remains predominantly predetermined and guided by faculty members. In contrast, Croatia demonstrates a more integrated approach, especially in clinical settings where students are encouraged to apply theoretical knowledge in real-world environments. However, even in Croatia, opportunities for greater student involvement in curriculum design and decision-making could further enhance the educational experience.

The differences in how these curricula align with the SPICES model have direct implications for nursing practice in both countries. In Croatia, the focus on community-based education and integrated teaching ensures that students are better prepared to address public health challenges and work in interdisciplinary teams. This approach is likely to result in nurses who are more adaptable and capable of applying their skills in diverse healthcare settings. On the other hand, Turkey's emphasis on traditional, instructor-led teaching may limit the development of critical thinking and problem-solving skills in nursing students, which are crucial for handling complex patient care scenarios.

As more nursing programs in Turkey undergo accreditation and move towards higher stages of the SPICES model, it is expected that the quality of nursing education will improve, leading to better-prepared healthcare professionals. A recent comparative study on midwifery students in Ethiopia provides empirical support for the effectiveness of the SPICES model in enhancing clinical reasoning. The study found that students educated under the SPICES framework showed significantly better clinical reasoning skills, as measured by the Script Concordance Test (SCT), compared to those trained in traditional curricula. These findings suggest that implementing a SPICES-

based approach may lead to improvements in critical skills necessary for complex patient care, highlighting the model's potential for broader application in nursing education worldwide (27). The SPICES model's focus on problem-based and student-centered strategies not only aligns with contemporary educational best practices but also promotes lifelong learning, which is essential for adapting to advancements in healthcare. By encouraging active involvement and critical thinking, this model prepares students to tackle complex, real-world challenges they may encounter in diverse healthcare settings. The shift towards active learning and student involvement in the educational process, as promoted by the SPICES model, will likely result in nurses who are more engaged in their learning and more capable of meeting the demands of modern healthcare. Future research could further explore the application of the SPICES model in nursing education across diverse cultural and institutional contexts. Comparative studies involving additional countries would provide a broader understanding of how educational strategies, such as student-centered learning and problem-based education, influence nursing competencies globally.

Limitations

There are several limitations to this study that should be considered when interpreting the results. First, the analysis was limited to two universities - Yozgat Bozok University in Turkey and the University of Applied Health Sciences Zagreb in Croatia – thus restricting the generalizability of the findings. A broader study that includes more universities from both countries would provide a more comprehensive understanding of how the SPICES model is implemented across different institutions. Additionally, the study relied on publicly available curriculum documents and did not involve direct observation or qualitative interviews with faculty members or students. Another limitation is the potential cultural differences between the two countries, which may influence how certain educational strategies are implemented. For example, the emphasis on problem-based learning may differ significantly based on cultural expectations of teaching and learning, as well as the healthcare challenges unique to each country.

Conclusion

This study provides a comparative analysis of the nursing curricula at the University of Applied Health Sciences Zagreb in Croatia and Yozgat Bozok University in Turkey using the SPICES model as a framework. The results highlight both similarities and differences in how the SPICES strategies are implemented in Croatia and Turkey, with Croatia demonstrating a more structured and EU-aligned approach, while Turkey is in the process of improving its curriculum through accreditation and alignment with international standards. Despite both countries making efforts to modernize nursing education, challenges remain, particularly in the areas of problem-based learning and student-centered approaches, which are more prevalent in Croatia. The findings suggest that further efforts are needed, particularly in Turkey, to fully implement the SPICES model to foster active learning and critical thinking, essential for modern nursing practice.

The study emphasizes the importance of continuously updating nursing curricula in response to evolving healthcare needs. By aligning more closely with the SPICES model, both countries can enhance the quality of nursing education, better preparing graduates to meet the demands of contemporary healthcare environments.

Author contributions

Conceptualization (SČ, RAH, BS, BF, BÜ); Data Curation (SČ, RAH, BS, BF, BÜ); Formal Analysis (SČ, RAH, BS, BF, BÜ); Investigation (SČ, RAH, BS, BF, BÜ); Methodology (SČ, RAH, BS, BF, BÜ); Project Administration (SČ, RAH, BS, BF, BÜ); Resources (SČ, RAH, BS, BF, BÜ); Supervision (SČ, RAH, BS, BF, BÜ); Validation (SČ, RAH, BS, BF, BÜ); Visualization (SČ, RAH, BS, BF, BÜ); Writing – Original Draft (SČ, RAH, BS, BF, BÜ); Writing – Review & Editing (SČ, RAH, BS, BF, BÜ).

Conflict of interest

The authors declare no conflicts of interest.

Acknowledgments

Not applicable.

Funding

This research received no external funding.

References

1. Yue M, Zhang M, Zhang C, Jin C. The effectiveness of concept mapping on development of critical thinking in nursing education: A systematic review and meta-analysis. Nurse Educ Today. 2017;52:87-94. https://doi.org/10.1016/j.nedt.2017.02.018
2. MacDonnell C, George P, Nimmagadda J, Brown S, Gremel K. A team-based practicum bringing together students across educational institutions and health professions. Am J Pharm Educ. 2016;80(3):49. https://doi.org/10.5688/ajpe80349.
3. MacDonnell C, George P, Nimmagadda J, Brown S, Gremel KA. Team-based practicum bringing together students across educational institutions and health professions. Am J Pharm Educ. 2016;80:49. https://doi.org/10.5688/ajpe80349
4. Wakefield M, Williams DR, Le Menestrel S. The future of nursing 2020-2030: Charting a path to achieve health equity. Washington, DC: National Academies Press; 2021. https://doi.org/10.17226/25982
5. Yue M, Zhang M, Zhang C, Jin C. The effectiveness of concept mapping on development of critical thinking in nursing education: A systematic review and meta-analysis. Nurse Educ Today. 2017;52:87-94. https://doi.org/10.1016/j.nedt.2017.02.018
6. Dewart G, Corcoran L, Thirsk L, Petrovic K. Nursing education in a pandemic: Academic challenges in response to COVID-19. Nurse Educ Today. 2020;92:104471. https://doi.org/10.1016/j.nedt.2020.104471
7. Williams PA. Fundamental Concepts and Skills for Nursing. 6th ed. St. Louis, Missouri: Elsevier Health Sciences; 2021.
8. Yüceyurt NK, Şenyuva EA, Kaya H. Uluslararası ve Ulusal Çalışmaların Hemşirelik Eğitimine Yansımaları. Yükseköğretim ve Bilim Dergisi. 2023;13(1):1-9. https://doi.org/10.5961/higheredusci.1163644 Turkish.
9. Khorashadizadeh F, Karimi Moonaghi H. Systematic strategy in nursing curriculum in American, Canadian, Australian nursing and proposed way for applying it in Iranian nursing curriculum: A comparative study. J Med Educ Dev. 2017;12(1&2):2-12.
10. Karimi Moonaghi H, Khorashadizadeh F. Nursing curriculum in some developed countries and proposed way of applying it in the Iranian nursing curriculum: A comparative study. J Nurs Educ. 2015;4:38-47.
11. Harden RM, Sowden S, Dunn WR. Educational strategies in curriculum development: the SPICES model. Med Educ. 1984;18(4):284-97. https://doi.org/10.1111/j.1365-2923.1984.tb01024.x
12. Asgari P, Navab E, Bahramnezhad F. Comparative study of nursing curriculum in nursing faculties of Canada, Turkey, and Iran according to SPICES model. J Educ Health Promot. 2019;8:120. https://doi.org/10.4103/jehp.jehp_392_18
13. Changiz TA. Course evaluation tool based on SPICES model, and its application to evaluation of medical pharmacology course. J Med Educ. 2006;8(2):111-20.
14. European Parliament & Council. Directive 2013/55/EU amending Directive 2005/36/EC on the recognition of professional qualifications. Available at: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A32013L0055.
15. European Parliament & Council. Directive 2013/55/EU amending Directive 2005/36/EC on the recognition of professional qualifications. Available at: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A32013L0055.
16. European Association for Quality Assurance in Higher Education. Standards and guidelines for quality assurance in the European Higher Education Area (ESG). Brussels, Belgium; 2015. Available at: https://www.enqa.eu/wp-content/uploads/2015/11/ESG_2015.pdf.
17. Dent JA. Using the SPICES model to develop innovative teaching opportunities in ambulatory care venues. Korean J Med Educ. 2014;26(1):3. https://doi.org/10.3946/kjme.2014.26.1.3
18. Karimian Z. Impact of innovative educational technologies on the SPICES model in medical education. Interdiscip J Virtual Learn Med Sci. 2023;14(1):75-9. https://doi.org/10.30476/ijvlms.2023.98690.1223
19. Misganaw E, Yigzaw T, Tezera R, Gelitew A, Gedamu S. The promise of the new educational strategy for curriculum development (SPICES) model on the development of students' clinical reasoning ability. A comparative cross-sectional study. Adv Med Educ Pract. 2022;13:71-9. https://doi.org/10.2147/AMEP.S344933
20. Al-Jarshawi MHA, Al-Imam A. A thousand words about modern medical education: a mini-review concerning the theory of education. J Med Sci. 2022;91(2):124-8. https://doi.org/10.20883/medical.e636
21. Navab E, Bahramnezhad F, Gholami M, Asgari P. Development of the proposed solutions to implement SPICES model strategies in Iranian undergraduate nursing curriculum. J Med Educ. 2019;18(3):e105687. https://doi.org/10.22037/jme.v18i3.25236
22. Dorri S, Abedi A, Mohammadi N. Nursing education in the path of globalization: Promotion or challenge? Journal of education and health promotion. 2020;9(1):269. https://doi.org/10.4103/jehp.jehp_775_19
23. Asgari P, Navab E, Bahramnezhad F. Comparative study of nursing curriculum in nursing faculties of Canada, Turkey, and Iran according to SPICES model. J Educ Health Promot. 2019;8(1):120. https://doi.org/10.4103/jehp.jehp_392_18
24. Baker C, Cary AH, da Conceicao Bento M. Global standards for professional nursing education: The time is now. J Prof Nurs. 2021;37(1):86-92. https://doi.org/10.1016/j.profnurs.2020.10.001

25. World Health Organization. State of the world's nursing 2020: Investing in education, jobs and leadership [Internet]. Available at: https://iris.who.int/bitstream/handle/10665/331677/9789240004863-ara.pdf
26. Hong S, Yu P. Comparison of the effectiveness of two styles of case-based learning implemented in lectures for developing nursing students' critical thinking ability: A randomized controlled trial. Int J Nurs Stud. 2017;68:16-24. https://doi.org/10.1016/j.ijnurstu.2016.12.008
27. Misganaw E, Yigzaw T, Tezera R, Gelitew A, Gedamu S. The promise of the new educational strategy for curriculum development (SPICES) model on the development of students' clinical reasoning ability. A comparative cross-sectional study. Adv medical educ pract. 2022:71-9. https://doi.org/10.2147/AMEP.S344933

Croat Nurs J. 2025; 9(1): 57-65

Original scientific paper

The Relationship Between Self-Esteem and Emotional Competence in a Sample of Nurses in Croatia

[1] Valentina Pomper Vragović
[2,3,4] Marin Mamić
[5] Marijana Neuberg

[1] Sestre Milosrdnice University Hospital Center, Zagreb, Croatia
[2] General County Hospital Požega, Požega, Croatia
[3] Faculty of Medicine, Josip Juraj Strossmayer University in Osijek, Osijek, Croatia
[4] Faculty of Dental Medicine and Health Osijek, Josip Juraj Strossmayer University in Osijek, Osijek, Croatia
[5] University North, Koprivnica, Croatia

Article received: 17.12.2024.

Article accepted: 26.02.2025.

https://doi.org/10.24141/2/9/1/5

Author for correspondence:
Marin Mamić
Tome Matica 20
34000 Požega, Croatia
E-mail: mmamic@fdmz.hr

Keywords: emotional competence, nursing, self-esteem

Abstract

Aim. The goals of this research were to investigate the levels of self-esteem in nurses and to evaluate the relationship between sociodemographic factors, job related variables, and emotional competence influence and self-esteem.

Methods. A total of 306 nurses participated in the research, the majority of whom were female (285, 93.1%). Most respondents were aged between 35 and 44 (98, 32%), held higher education degrees (150, 49%), and had 26 or more years of work experience (81, 26.5%). Additionally, a significant portion were not in management positions (249, 81.4%), and nearly half worked in shifts (140, 45.8%). This research utilized the sociodemographic questionnaire created for these purposes, The Rosenberg Self-Esteem Scale (RSS) and The Emotional Competence Questionnaire (UEK-15).

Results. The results showed that significantly more respondents have high self-esteem, 254 of them (83%) ($p<0,001$). In order to determine the predictors of self-esteem, a linear regression analysis was performed. The results showed that the mentioned variables significantly explain 36,9% of the variance in self-esteem (Adjusted R2=0,369, $p<0.001$). The variables which included emotional competence ($p<0.001$), professional qualifications ($p=0.017$) and length of service ($p=0.019$) were found to be significant. Looking at the β coefficient, it is clear that all of the above variables contribute positively to self-esteem in nurses.

Conclusion. It has been shown that a significantly higher number of nurses exhibit high self-esteem. Furthermore, it was shown that emotional competence is a predictor of self-esteem in nurses, while among the examined sociodemographic variables, the level of education and duration of employment are important indicators as well.

Introduction

Self-esteem involves an emotional evaluation of oneself (1). It represents the assessment of a person's beliefs and feelings regarding their abilities and self-worth (2). It can also be understood as a personal judgment of one's value as an individual (3).

The formation of self-esteem starts in childhood and adolescence, however various individual, environmental, and social factors significantly influence its development (4). It is the product of interactions with significant others such as parents, siblings, friends and the environment in general, and is therefore determined by the quality of interactions and experiences (4). Parental and peer support, self-rated competence in important areas, and the person's attachment play a major role in the development of self-esteem in a person (5). Conversely, low self-esteem may arise from inadequate maternal acceptance, as well as from being exposed to negative social environments. Factors such as a history of child abuse, critical feedback from important individuals regarding one's abilities, and family conflicts and dysfunction can play a role in the formation of low self-esteem (6). Alternative causes of low self-esteem include discrepancies between various aspects of oneself, such as the gap between one's ideal self and actual self. Children exhibit lower self-esteem if they perceive themselves as not competent in a subject during their education and place less value on it (7).

The importance of self-esteem in nursing can be seen through the improvement of the process of psychological resilience (8). Research to date has demonstrated that during the COVID 19 pandemic, resilience was influenced by various personal characteristics, including self-esteem (9). On the other hand, impaired self-esteem can lead to adverse psychological consequences, such as poor social interactions and a reduced ability to cope with challenges (10). Additionally, strong self-esteem in nurses reflects authenticity and signifies their capability to employ empathy, foster collaboration, and build positive relationships with both patients and peers (11). Self-esteem plays a pivotal role in linking work responsibilities to job satisfaction and overall performance (12).

Emotional competence

Emotional competence serves as a crucial asset for promoting human growth (13) and can be defined as 'the ability to successfully attain adaptive goals in situations that evoke strong emotions' (14). Emotional competence refers to the ability to successfully apply the principles of emotional intelligence in everyday situations to effectively manage teams, build interpersonal relationships, and interact positively with individuals and groups (15). Therefore, emotional competence is an important prerequisite for healthy and mutually beneficial social relationships (14). The very emergence and development of emotional competence begins in childhood, where children are most favored through supportive and nurturing interactions and environments from parents, and later from teachers (16).

Emotional competence may be important for nursing, where nurses operate daily in emotionally demanding situations that include caring for patients, their families, and working in multidisciplinary teams (17). According to research, emotional competence allows nurses to better understand and manage their own emotions (17,18). Through the effective control of emotions and the development of positive relationships, emotional competence enables nurses to provide better quality and more humane health care, but also to build better interpersonal relationships with colleagues (17).

The relationship between self-esteem and emotional competence

As the role of emotional competence in building self-esteem has not been researched sufficiently, research has mainly been based on emotional intelligence, which is not the same construct as emotional competence. The relationship between these two constructs is known, but not in the direction of emotional competence - self-esteem, but vice versa, where it has been shown that low self-esteem can

be a cause of psychological distress and can reduce the emotional competence of the subject. Enhancing self-esteem would boost the chances of developing emotional competence, indicating that the individual would function effectively within their environment (19). As seen earlier, both constructs are important in interpersonal relationships that are the core of any helping profession, including nursing. Therefore, it is important to explore the relationships between the above constructs in order to gain a more detailed insight into their interaction among nurses.

Aim

1. To examining self-esteem in nurses
2. To examine the contribution of sociodemographic and job-related variables and emotional competence to self-esteem in nurses.

Methods

A cross-sectional study was conducted. The study involved a total of 306 nurses who took part in the research. The study was conducted from July to August 2021 via Google Forms. In order to recruit respondents, the questionnaire was shared via social network groups (Viber, WP, Facebook, Instagram). The objective of the research was clarified to the participants in the opening section, where they were guaranteed complete anonymity. This was achieved by ensuring that no personal data from the respondents was collected. All respondents also had to consent to the study in the first question. To ensure that respondents did not respond to the questionnaire multiple times, they were required to register using their email; however, no email addresses were stored. Additionally, to confirm that participants resided in the Republic of Croatia and were employed as nurses, two verification questions were included after obtaining consent: 'Do you live in the territory of the Republic of Croatia?' and 'Are you an employed nurse?'.

Instruments

A questionnaire consisting of three parts was used in the study.

The first part related to sociodemographic questions: gender, age, marital status, education, and managerial position at work.

The Rosenberg Self-Esteem Scale (RSS) comprises ten statements that assess overall self-esteem. Participants respond to these statements using a five-point Likert scale (1 = I totally disagree to 5 = I totally agree), and the overall score is determined by adding together the responses for all ten statements. Five of the items are in the positive direction and five in the negative direction, the negative ones had to be recoded, i.e. they are scored in reverse. The total is the sum of all responses and the possible range is from 10 to 50, with a higher number indicating higher self-esteem. Self-esteem scores can also be categorized in a way where a score of less than 23 indicates low self-esteem, 23 - 34 indicates average self-esteem, and a score greater than 34 indicates high self-esteem (20). The reliability coefficient for RSS on the sample of this study is 0,86.

The Emotional Competence Questionnaire (UEK-15) is made up of 15 items that form a single component. Respondents evaluate their answers using a five-point Likert-type scale (1 = not at all, 5 = completely YES), and the total score is calculated by adding the scores of all items. Scores can range from 15 to 75, with a higher score reflecting a greater level of emotional competence (21). The reliability coefficient for the UEK-15 in this study's sample is 0.88.

Statistics

Descriptive statistical methods were used to describe the frequency distribution of the examined variables. Numerical data were described by arithmetic mean, range and standard deviation. Normality of distribution of numerical variables was tested by Kolmogorov-Smirnov test ($p>0.05$). Linear regression analysis (enter method), was performed to determine the predictors of self-esteem (VIF = 1,027 - 4,623; Durbin -Watson 1,536). The Chi-square test (χ^2 test) was utilized to assess if there was a significant variation in the distribution of categorical variables. To avoid Type I error, the Bonferonni correction (0.05/3 = 0.0166) was used for the Chi-square test, and a significant statistical difference was considered to be a value

less than $p<0.016$. In order to determine the connection between Self-esteem and sociodemographic variables and emotional competence, Pearson (emotional competence), Spearman (professional qualification, length of employment in the profession, age) and Point Biserial correlations (gender, management position) were used. A significance level for regression analysis of $p<0.05$ was adopted. The G*Power software indicated that at least 85 participants, with 4 predictors, were necessary to achieve a test power of 0.8 for linear regression analysis. As 306 respondents participated in the study, this criterion was also met. The statistical package JASP, version 0.19.3 was used for data processing.

Results

In the studied sample, the majority of respondents were female (285, 93.1%), aged 35 to 44 (98, 32%), with higher education (150, 49%), with 26 or more years of work experience (81, 26.5%), not in management positions (249, 81.4%) (Table 1).

Arithmetic mean of Self-Esteem (RSS) was M=40.810, while that of emotional competence was M=61.281. The results of both self-esteem and emotional competence in this sample are high (Table 2).

The results showed that the highest number of respondents was in the high self-esteem group (254, 83%). It was also shown that there were significantly more respondents with high self-esteem compared to respondents with average ($p<0.001$) and low self-esteem ($p<0.001$), and significantly more respondents with average compared to low self-esteem ($p<0.001$) (Table 3).

The results showed that self-esteem is low positively related to the age of the examinee ($p=0.002$), professional education ($p=0.005$) and length of service in the profession ($p=0.001$), while it is moderately positively related to emotional competence ($p<0.001$) (Table 4).

Table 1. **Demographic characteristics of the participants**

		N (%)
Gender	male	21 (6.9)
	female	285 (93.1)
Age	18 - 24	30 (9.8)
	25 - 34	96 (31.4)
	35 - 44	98 (32)
	45 - 54	57 (18.6)
	55 and older	25 (8.2)
Professional qualification	secondary education	96 (31.4)
	higher education	150 (49)
	University, college	60 (19.6)
Length of employment in the profession	< 1	16 (5.2)
	1 - 5	59 (19.3)
	6 - 15	74 (24.2)
	16 - 25	74 (24.2)
	26 and more	81 (26.5)
Management position	yes	57 (18.6)
	no	249 (81.4)

Note: n – Number of respondents, % - Percentage

Table 2. **Descriptive statistics of UEK 15 and RSS scale results**

	M (range)	SD
Self-esteem	40.810 (20 – 50)	6.469
Emotional competence	61.281 (39 – 75)	7.635

Note: M –Mean, SD - Standard Deviation

Table 3. **Distribution of RSS scale scores**

Self-esteem	N (%)	
low	2 (0.7)	
average	50 (16.3)	
highly	254 (83)	
	χ^2	p^*
low - average	44.308	**<0.001**
low - highly	248.063	**<0.001**
average - highly	136.895	**<0.001**

Notes: n – Number of respondents, % - Percentage, * Chi square test

Table 4. **Association of self-esteem with sociodemographic variables and emotional competence**

		Self-Esteem
Gender	r_{pb}	-0.076
	p	0.185
Age	ρ	0.173
	p	**0.002**
Professional qualification	ρ	0.159
	p	**0.005**
Length of employment in the profession	ρ	0.195
	p	**0.001**
Management position	r_{pb}	-0.112
	p	0.051
Emotional competence	r	0.569
	p	**<0.001**

Notes: r - Pearson correlation coefficient; r_{pb} - Point Biserial correlations; ρ - Spearman correlations; *p* – Statistical significance;

Table 5. **Results of regression analysis - Self-esteem as a dependent variable**

Multivariate analysis	β	t	*p*	Adjusted R^2
(Constant)		3.376	0.001	0.361
Emotional competence	0.542	11.705	**<0.001**	
Age	-0.051	-0.520	0.604	
Professional qualification	0.112	2.407	**0.017**	
Length of employment in the profession	0.231	2.355	**0.019**	

Note: *p* - statistical significance; β - regression coefficient; t - the size of the difference relative to the variation in sample data; Adjusted R^2 – Adjusted coefficient of determination

Table 5 shows the results of the regression analysis, where self-esteem was taken as the dependent variable, while the independent variables were those that proved to be significant in correlations with self-esteem (Table 3), age, professional education, length of service in the profession and emotional competence. The variables included significantly explain 36.9% of the variance in self-esteem (Adjusted R^2=0.361, p<0.001). The variables of emotional competence (p<0.001), professional qualifications (p=0.017) and length of service (p=0.019) were found to be significant predictors. Looking at the β coefficient, it is clear that all of the above variables contribute positively to self-esteem in nurses (Table 5).

Discussion

One objective of this research was to assess the self-esteem levels among a group of nurses. The findings revealed that a notably larger number of nurses possess high self-esteem. These results align with earlier studies conducted on nurse populations, which indicated elevated self-esteem levels (22, 23). A potential explanation for these findings could be that, even with their concerns, nurses diligently persist in delivering health care services and engaging in various professional tasks, potentially enhancing their self-esteem.

Due to emotionally demanding workplace of nurses, including dealing with difficult moments in the lives of patients, chronic illnesses and death, self-esteem serves as a crucial protective factor, safeguarding nurses from psychological harm (22). In such conditions, high self-esteem is important because it provides resilience and allows easier handling of work challenges (22). Self-esteem of individuals can lead to their self-confidence, socialization and good relations with other people (24), and can influence a person's professional behavior, better coping with professional challenges. It encourages motivation to achieve professional goals and contributes to a more positive approach to work (24). That is why it is important for health professionals to pay attention to self-esteem, and to continuously monitor and work on its improvement, because not only will they have better and more motivated employees, they will also be healthier due to reduced risk of burnout (24).

One of the goals of this research was to explore how sociodemographic and business factors, along with emotional competence, relate to self-esteem among nurses. It was shown that significant predictors of self-esteem in nurses, in addition to sociodemographic variables, were professional qualifications and length of employment in the profession. The results are consistent with previous research (25 - 28),

which showed that there is a positive relationship between academic success and self-esteem. However, it should be noted that the aforementioned research was not conducted on samples of nurses. The reasons for the aforementioned results could be that higher education provides a sense of achievement and competence in nurses, which can be an important factor in self-esteem (29).

Another significant predictor of self-esteem among sociodemographic variables was the length of work experience. This outcome may be explained through the Conservation of Resources (COR) principle (30), which states that someone with high self-esteem may also act in ways to protect this resource, such as working hard to succeed at work, gaining approval from superiors and coworkers, and avoiding highly stressful situations at work (31).

It is also possible that people with higher self-esteem tend to behave more openly, which helps them build and maintain positive interpersonal relationships, thus increasing their sense of connection with others. On the other hand, people with lower self-esteem often show reservedness to protect themselves from possible emotional rejection (32). The above is important because nurses with more experience can develop skills and professional competences at work, which through professional performance can have an effect on better self-confidence among them (33).

It is important to note that managerial position did not prove to be a significant predictor of self-esteem, although previous research has indicated that there may be a positive relationship between higher job positions and self-esteem (34), as employees with high self-esteem feel competent and self-reliant, and have better productivity, which affects their career advancement (34). However, as the aforementioned research was not conducted on a sample of nurses, it is possible that there are specific factors in the nursing profession that influence the perception of self-esteem regardless of hierarchical position, and it is important to conduct further research that could shed light on the aforementioned uncertainties.

The third significant predictor of nurses' self-esteem was shown to be emotional competence. There is no research on this topic on a sample of nurses, however, the relationship of these constructs was investigated on other samples of respondents and they were shown to be significant (35,36). The close relationship between emotional competence and the affective aspect of self-awareness and psychological well-being – specifically, how individuals emotionally perceive their own worth and identity – may help explain these outcomes. Positive emotions are linked to both general and individual self-esteem, and they can be sparked by comprehending and controlling emotions during the self-evaluation process (35,37).

As mentioned in the introduction, emotional competence is important in interaction with other people, i.e. it enables positive relationships with others. The above contributes to strengthening feelings of support and acceptance, which are directly related to self-esteem (38,39). Emotional competence includes skills such as self-awareness, emotional regulation, social skills, and empathy (38,39) that enable nurses to build trust and quality relationships in the workplace with both colleagues and patients. Good communication and creation of a positive environment can help grow nurses' self-esteem resulting from a better feeling at work (40). Emotional competence is perceived as a key concept pertaining to emotional, social, and behavioral adaptation, which enables nurses to effectively navigate various emotional, social, and behavioral challenges, thereby shielding them from emotional strain over time (41). These factors decrease the likelihood of experiencing emotional stress (42) and might lead to an improved self-view (42), as those with low self-esteem might not possess the coping skills needed to manage stressors from their environment (42). Therefore, the above indicates how important emotional competence can be in nursing work, and how it, along with self-esteem, can be a key factor in maintaining healthy relationships with colleagues and patients. Therefore, it is important to further research these constructs in order to gain better insight into the key aspects of their mutual connection.

Future research could focus on identifying specific mechanisms through which emotional competence influences the development and maintenance of self-esteem in nurses, as well as on the way in which both of these constructs contribute to job satisfaction and stress resistance. It would also be interesting to see how the above constructs can affect patient satisfaction with the quality of healthcare provided. Additionally, future research should explore professional self-esteem, as it is a distinct construct from general and personal self-esteem. Given its stronger connection to the work environment, professional self-esteem could serve as a more precise criterion

for evaluating job-related predictors and their impact on employees' well-being and performance.

One major limitation of the research is its online format, which introduces potential bias as participation requires internet access and familiarity with navigating the questionnaire. Furthermore, completing the questionnaire online does not allow for personal contact with the researcher, reducing opportunities to clarify questions or verify the authenticity of responses, ultimately affecting the overall quality of the study.

Conclusion

Consequently, it can be inferred that a notably larger proportion of nurses demonstrate elevated self-esteem. Additionally, emotional competence has been identified as a key factor in predicting self-esteem among nurses, with the important sociodemographic predictors being education level and duration of employment in the field.

Author contributions

Conceptualization (VPV, MN); Methodology (VPV, MN); Investigation (VPV, MN); Writing—original draft preparation (MM); Writing—review and editing (MM).

Conflict of interest

The authors declare no conflicts of interest.

Acknowledgments

The authors would like to thank all the participants.

Funding

This research received no external funding.

References

1. MacDonald G, Leary MR. Individual differences in self-esteem. In: Leary MR, Tangney JP, editors. Handbook of Self and Identity. 2nd ed. New York: Guilford Press; 2012.
2. Rosenberg, M. Society and the adolescent self-image. Princeton: Princeton University Press; 1965.
3. Muris P, Otgaar H. Self-esteem and self-compassion: a narrative review and meta-analysis on their links to psychological problems and well-being. Psychol Res Behav Manag. 2023;16:2961-75. https://doi.org/10.2147/PRBM.S402455
4. Wilson TD, Dunn EW. Self knowledge: its limits, value and potential for improvement. Annu Rev Psychol. 2004;55(2):493-518. https://doi.org/10.1146/annurev.psych.55.090902.141954
5. Chang C, Yuan R, Chen J. Social support and depression among Chinese adolescents: The mediating roles of self-esteem and self-efficacy. Child. Youth Serv. Rev.2018;88:128-34. https://doi.org/10.1016/j.childyouth.2018.03.001
6. Celik CB, Odaci H. Does child abuse have an impact on self-esteem, depression, anxiety and stress conditions of individuals? Int J Soc Psychiatry. 2019;66(2):171-8. https://doi.org/10.1177%2F0020764019894618
7. Wigfield A, Eccles JS. Children's competence beliefs, achievement values, and general self-esteem: change across elementary and middle school. J. Early Adolesc.1994;14(2):107–38. https://doi.org/10.1177%2F0272431694014002003
8. Barf HA, Post MW, Verhoef M, Jennekens-Schinkel A, Gooskens RH, Prevo AJ. Life satisfaction of young adults with spina bifida. Dev Med Child Neurol. 2007;49(6):458-63. https://doi.org/10.1111/j.1469-8749.2007.00458.x
9. Ou X, Chen Y, Liang Z, Wen S, Li S, Chen Y. Resilience of nurses in isolation wards during the COVID-19 pandemic: A cross-sectional study. Psychol Health Med. 2020;26(1):98-106. https://doi.org/10.1080/13548506.2020.1861312
10. Neff KD. Self-compassion, self-esteem, and well-being. Soc Personal Psychol Compass.2011;5(1):1-12. https://doi.org/10.1111/j.1751-9004.2010.00330.x
11. Randle J. Changes in self-esteem during a 3 year pre-registration diploma in higher education (nursing) programme. Learning in Health and Social Care. 2003;12(1):142-43. https://doi.org/10.1046/j.1365-2702.2003.00679.x
12. Dimitriadou A, Koukourikos K, Pizirtzidou E. The concept of self-esteem in nursing education and its impact on professional behaviour. Int. J. Caring Sci.2014;7(1):6-11.

13. Hohm E, Laucht M, Zohsel K, Schmidt MH, Esser G, Brandeis G, et al. Resilienz und Ressourcen im Verlauf der Entwicklung. Kindheit und Entwicklung. 2017;2(4):230-39. German. https://doi.org/10.25932/publishup-43307
14. Saarni C. The development of emotional competence. New York: Guilford Press; 1999.
15. Kozub E, Brown L, Ecoff L. Strategies for success: cultivating emotional competence in the clinical nurse specialist role. Adv Crit Care. 2016; 27(2):145-51. https://doi.org/10.4037/aacnacc2016771
16. Morkel V, McLaughlin T. Promoting social and emotional competencies in early childhood: strategies for teachers. Kairaranga. 2015;16(1):45-51. https://doi.org/10.54322/kairaranga.v16i1.194
17. Mayer JD, Salovey P. What is emotional intelligence? In: Salovey P, Sluyter DJ, editors. Emotional development and emotional intelligence: Educational implications. New York: Basic Books; 1997.
18. Kinman G, Grant L. Exploring stress resilience in trainee social workers: The role of emotional and social competencies. Br J Soc Work. 2011;41(2):261–75. https://doi.org/10.1093/bjsw/bcq088
19. Zaff JF, Hair EC. The positive development of the self: Self-concept, self-esteem, and identity. In: Well-being: Positive development across the life course. Lawrence Erlbaum Associates Publishers; Psychology Press; 2003.
20. Jelić M. Provjera postavki teorije socijalnog identiteta na etničkim grupama [Master's thesis]. Zagreb: Filozofski fakultet u Zagrebu; 2003. Available at: https://www.bib.irb.hr/145139. Croatian.
21. Takšić V. Validacija konstrukta emocionalne inteligencije [Doktorska disertacija]. Zagreb: Filozofski fakultet u Zagrebu; 1998. Available at: https://www.bib.irb.hr/107316. Croatian.
22. Joy GV, Alomari AMA, Singh K, Hassan N, Mannethodi K, Kunjavara J, et al. Nurses' self-esteem, self-compassion and psychological resilience during COVID-19 pandemic. Nurs Open. 2023;10(7):4404-12. https://doi.org/10.1002/nop2.1682
23. Radhakrishnan RV, Jain M, Mohanty CR, Jacob J, Shetty AP, Stephen S, et al. The perceived social stigma, self-esteem, and its determinants among the health care professionals working in India during COVID 19 pandemic. Med J. Armed Forces India. 2021;77(Suppl 2):450-58. https://doi.org/10.1016/j.mjafi.2021.01.017
24. Liu Y, Yang C, Zou G. Self-esteem, job insecurity, and psychological distress among Chinese nurses. BMC Nurs. 2021;20(1):141. https://doi.org/10.1186/s12912-021-00665-5
25. Arshad M, Zaidi SMIH, Mahmood K. Self-esteem & academic performance among university students. Journal of Education and Practice. 2015;6(1):156-62.
26. Nematollahi A, Pouran T, Marzieh A. The relationship between self-esteem and students ' academic achievement and some parental demographic factors. Sch J App Med Sci. 2017;5(5):1758-64. https://doi.org/10.36347/sjams.2017.v05i05.009
27. Ayyash-Abdo H, Sánchez-Ruiz MJ. Subjective wellbeing and its relationship with academic achievement and multilinguality among Lebanese university students. Int. J. Psychol International. 2012;47(3):192-202. https://doi.org/10.1080/00207594.2011.614616
28. Baumeister RF, Campbell JD, Krueger JI, Vohs KD. Does high self-esteem cause better performance, interpersonal success, happiness, or healthier lifestyles? Psychol Sci Public Interest. 2003;4(1):1-44. https://doi.org/10.1111/1529-1006.01431
29. Deci EL, Ryan RM. Intrinsic motivation and self-determination in human behavior. New York: Springer Science & Business Media; 1985.
30. Hobfoll SE, Halbesleben J, Neveu JP, Westman M. Conservation of resources in the organizational context: The reality of resources and their consequences. Annu. Rev. Organ. Psychol. Organ. Behav. 2018;5:103–28. https://doi.org/10.1146/annurev-orgpsych-032117-104640
31. Krauss S, Orth U. Work experiences and self-esteem development: a meta-analysis of longitudinal studies. European Journal of Personality. 2022;36(6):849-69. https://doi.org/10.1177/08902070211027142
32. Murray SL, Derrick JL, Leder S, Holmes JG. Balancing connectedness and self-protection goals in close relationships: A levels-of-processing perspective on risk regulation. J. Pers. Soc. Psychol. 2008;94(3):429–59. https://doi.org/10.1037/0022-3514.94.3.429
33. Bandura A. Self-efficacy: The exercise of control. New York: W.H. Freeman and Company; 1997.
34. Gómez-Jorge F, Díaz-Garrido E. The relation between Self-Esteem and Productivity: An analysis in higher education institutions. Front Psychol. 2023;13:1112437. https://doi.org/10.3389/fpsyg.2022.1112437
35. Coetzee M, Martins N, Basson J, Helene M. The relationship between personality preferences, self-esteem and emotional competence. SA J. Ind. Psychol. 2006;32(2):64-83. https://doi.org/10.4102/sajip.v32i2.233
36. Schoeps K, Tamarit A, Postigo Zegarra S, Montoya-Castilla I. The long-term effects of emotional competencies and self-esteem on adolescents' internalizing symptoms, Revista de Psicodidáctica (English ed.). 2021;26(2),113-22. https://doi.org/10.1016/j.psicoe.2020.12.001
37. Battle, J. Culture – free self-esteem inventories for children and adults. Austin: Pro-Ed; 1992.
38. Bar-On R. The Bar-On model of emotional-social intelligence (ESI). Psicothema. 2006;18(Suppl):13-25.
39. Goleman D. Working with Emotional Intelligence. New York: Bantam Books; 1998.
40. Howell RD, Bellenger DN, Wilcox JB. Self-esteem, role stress, and job satisfaction among marketing managers. Journal of Business Research. 1987;15(1):71-84. https://doi.org/10.1016/0148-2963(87)90019-1

41. Schoeps K, Tamarit A, Postigo Zegarra S, Montoya-Castilla I. The long-term effects of emotional competencies and self-esteem on adolescents' internalizing symptoms. Revista de Psicodidáctica. 2021;26(2):113-22. https://doi.org/10.1016/j.psicoe.2020.12.001

42. O'Hara RE, Armeli S, Boynton MH, Tennen H. Emotional stress-reactivity and positive affect among college students: the role of depression history. Emotion. 2014;14(1):193-202. https://doi: 10.1037/a0034217

Croat Nurs J. 2025; 9(1): 67-75

Original scientific paper

Self-Perceived Professional Preparedness of Final-Year Nursing Students for Entering the Profession

[1] Katarina Fofić
[2,3] Vesna Konjevoda
[3] Marta Čivljak
[3] Ivica Matić

[1] University Hospital Centre Zagreb, Zagreb, Croatia
[2] University Hospital Sveti Duh, Zagreb, Croatia
[3] Catholic University of Croatia, Zagreb, Croatia

Article received: 13.01.2025.

Article accepted: 27.02.2025.

https://doi.org/10.24141/2/9/1/6

Author for correspondence:
Vesna Konjevoda
University Hospital Sveti Duh, Zagreb, Croatia
E-mail: vesna.konjevoda@unicath.hr

Keywords: nursing students, entering the profession, nursing education

Abstract

Introduction. Nursing students' preparedness for entering their professional careers is crucial for ensuring quality healthcare.

Aim. To evaluate the self-perceived preparedness of final-year nursing students as they transition into the nursing profession focusing on clinical competencies, evidence-based practice, administrative skills, and patient-centered care.

Methods. A cross-sectional observational study was conducted among 200 final-year nursing students from the Catholic University of Croatia and the University of Applied Health Sciences. Data were collected using the Professional Preparedness of Nursing Students (PPNS) questionnaire.

Results. Most respondents rated their readiness as excellent. This perception was more prevalent among graduate students (54.2%) compared to undergraduate students (44.4%). Part-time students reported significantly higher levels of perceived readiness compared to full-time students (77.94 vs. 71.50).

Conclusion. Final-year nursing students feel adequately prepared to enter the nursing profession and commence their professional practice. These findings highlight the importance of recognizing diverse student experiences and needs in designing educational programs to enhance professional competence.

Introduction

Globally, healthcare systems are navigating unprecedented challenges in delivering effective care. Changes in healthcare have created demanding working conditions that strain the continuity and quality of services (1). At the same time, the need to provide high-quality, evidence-based care to protect public health has become more urgent (2). These shifts affect all stakeholders in healthcare, from management and frontline staff to students and auxiliary personnel.

Nursing students, who spend a substantial portion of their training in clinical settings, are highly exposed to these pressures. Educators tasked with preparing future nurses recognize the complexities of clinical environments and their influence on student development (3). Clinical practice provides students with essential exposure to patient care realities. However, ensuring that students are adequately prepared for these experiences is becoming increasingly challenging, undermining the ability to maintain high standards of care and patient safety (4, 5).

Nursing education integrates theoretical knowledge with clinical training, aiming to develop students with critical skills and foster clinical reasoning. Clinical placements are pivotal, offering students opportunities to develop hands-on experience and problem-solving capabilities at the bedside (6). The effective evaluation and ongoing enhancement of clinical education are essential to bridge existing gaps and attain educational objectives, particularly in the training of competent healthcare providers (7). One significant approach to this process is self-assessment, which allows students to critically evaluate their own clinical performance. This method has been recognized as a valuable tool for improving learning outcomes (8). Furthermore, understanding students' perspectives on their training experiences offers critical insights that can inform the refinement of educational programs (9).

Despite the emphasis on clinical education, research indicates that many students fail to acquire sufficient clinical experience. For instance, studies in Shiraz and Tehran reported inadequate clinical environments and a lack of essential skills for safe practice among nursing students (10, 11). Similar findings in Kurdistan and Shahroud revealed gaps in competencies and clinical skills, respectively (12, 13). The transition from student to practicing nurse presents additional challenges.

Newly graduated nurses often face a steep learning curve as they adapt to organizational protocols, policies, and tools unfamiliar from their training (14). Duchscher describes this transition as a process of professional socialization, characterized by learning the skills, knowledge, and values of nursing culture (15). New graduates often report difficulties with prioritization and fulfilling their roles, leading to frustration and a sense of being ill-prepared (16). The transition from nursing education to professional practice is further complicated by organizational challenges and the high expectations placed upon newly graduated nurses by senior colleagues. This dynamic often leads to culture shock and contributes to increased turnover rates within healthcare settings. Despite the critical role that newly graduated nurses play in healthcare systems, their level of preparedness for the demands of the profession remains a significant concern (17, 18). While newly graduated nurses are essential to healthcare systems, their preparedness remains a concern. According to Benner's novice-to-expert framework, these nurses often lack the technical skills and clinical experience required for independent practice (16). Transitional programs have been implemented in many institutions to address these gaps, focusing on skill development and role adaptation during the first year of employment. Such programs, while beneficial, are often stressful for participants, highlighting the need for enhanced preparatory training before employment.

Aim

The primary aim of this study is to assess the self-perceived readiness of final-year nursing students as they prepare to transition into professional practice and compare the perceptions of preparedness between full-time and part-time nursing students. The investigation is grounded in the complexities inherent in nursing education and the dynamics of the transition process. Two primary hypotheses guide

this research. First, we hypothesize that more than half of the final-year nursing students will perceive themselves as adequately prepared for clinical practice. This expectation is based on the structured design of nursing curricula, which effectively integrates theoretical knowledge with practical training experiences (19). Second, we propose that part-time students will report higher levels of preparedness compared to their full-time peers. This hypothesis is informed by the additional practical exposure and clinical experience that part-time students typically acquire through concurrent employment in healthcare settings. Such dual engagement in both work and academic environments may enhance their confidence and overall preparedness to meet the demands of professional nursing practice (20).

Methods

This cross-sectional study was conducted in January 2024 to assess the preparedness of final-year nursing students for entering the profession. The study utilized a questionnaire-based approach. Participants were recruited through a link disseminated via email and WhatsApp groups, ensuring a broad outreach to potential respondents. The study emphasized voluntary participation and maintained the anonymity of all respondents throughout the data collection process. The target population comprised full-time and part-time final-year nursing students from the Catholic University of Croatia and the University of Applied Health Sciences. Inclusion criteria required participants to be enrolled in the current academic year, while exclusion criteria eliminated students not enrolled or those participating in international mobility programs. A total of 200 nursing students participated in the study. Of these, 117 were undergraduate students, including 61 full-time and 56 part-time students. Additionally, 83 graduate students took part, with 37 full-time and 46 part-time students.

The survey instrument utilized in this study consisted of two distinct sections designed to gather comprehensive data on the participants. The first section focused on sociodemographic information. This foundational information was essential for understanding the demographic context of the participants and for analyzing potential correlations with the perceived professional preparedness outcomes. The second section of the survey employed the Perceived Professional Preparedness of Nursing Students (PPPNS) questionnaire, a validated instrument specifically designed to assess nursing students' perceptions of their readiness to enter professional practice (21). Prior to its implementation, permission to use the PPPNS questionnaire was obtained from the original authors. The questionnaire was subsequently translated into Croatian, adhering to standardized translation and adaptation protocols to ensure linguistic and conceptual equivalence. The PPPNS questionnaire comprises 19 items rated on a five-point Likert scale, where participants indicate their level of agreement with each statement, ranging from 1 (strongly disagree) to 5 (strongly agree). The items are categorized into four domains that reflect critical aspects of professional preparedness: **Clinical Competence:** Evaluates preparation for administering therapy, measuring vital signs, diagnosing, and managing a range of conditions encountered in healthcare settings. **Evidence-Based Nursing:** Focuses on graduate-level skills, including personal education, patient education, and mentoring colleagues. **Respect for Patients:** Addresses ethical considerations, patient rights, and interpersonal relationships. **Professional Collaboration:** Evaluates respect for colleagues, teamwork, and holistic care approaches. Students rated each item on a scale from 1 (strongly disagree) to 5 (strongly agree), indicating the extent to which the statements applied to them. The questionnaire's raw scores are transformed to scores in the range of 0–100 by subtracting the lowest possible raw score from the obtained raw score, then dividing this difference by the range of possible scores (i.e., the highest possible raw score minus the lowest possible raw score) and finally multiplying the result by 100. Scores below 25% indicate weak perceived preparedness; scores of 25–50%, 50–75%, and above 75% imply medium, good, and excellent perceived preparedness, respectively. The results can be analyzed at the level of the overall scale or domains.

Prior to performing data analysis, the distribution of the results from the PPPNS questionnaire, along with its four subscales, was evaluated for normality using the Kolmogorov-Smirnov test. Therefore, parametric procedures were used for data analysis. Continuous variables were reported as mean ± standard deviation

(SD). Univariate comparisons were conducted using Student's t-test. A *p*-value of <0.05 was considered statistically significant for all analyses. Statistical analyses were performed using JASP software.

Results

Characteristics of study participants and PPPNS domain scores

Table 1. **Characteristics of the students enrolled in the study**

Characteristics	N	%
Gender		
Male	20	10
Female	180	90
Study program		
Undergraduate	117	59
Graduate	83	41
Student status		
Full-time	98	49
Part-time	102	51
Age (M, SD)	26.38	7.64

The sample was predominantly female. The average age of respondents was 26.38 years (SD=7.64), reflecting a diverse age range. Regarding academic level, 59% (N=117) were enrolled in undergraduate programs, while 41% (N=83) were in graduate programs. Additionally, 49% (N=98) were full-time students, and 51% (N=102) were part-time students (Table 1).

The results indicate a generally high level of self-perceived professional preparedness among final-year nursing students. Among the four domains, Patient-Centered Care stands out as the strongest area. Clinical Competency emerges as the relatively weakest domain, suggesting a potential need for further practical training and experience before transitioning into professional practice (table 2).

Differences in preparedness based on study level

The comparison of self-perceived preparedness between undergraduate and graduate nursing students shows no statistically significant difference (*p*=0.176). Both groups generally assess their preparedness as high, with graduate students reporting slightly higher self-perceived readiness compared to undergraduate students (table 3).

Table 2. **Statistics of the PPPNS Questionnaire Domains for Nursing Students (N=200)**

Domain of professional preparedness*	M	SD	Minimum.	Maximum.
Clinical competency	75.82	10.74	44	100
Evidence-cased practice (EBP)	82.40	12.05	36	100
Framework-oriented performance	77.12	12.81	40	100
Patient-centered care	88.18	9.26	32	100

*Preparedness < 25% = poor, 25–50% = average, 50–75% = good, > 75% = excellent

Table 3. **Preparedness* by study level**

Study Level	N	M	SD	t	df	*p*
Undergraduate	117	74.58	11.99	-1.359	198	0.176
Graduate	83	76.90	11.76			

*Preparedness < 25% = poor, 25–50% = average, 50–75% = good, > 75% = excellent

Preparedness of undergraduate students

The t-test showed a statistically significant difference in self-perceived preparedness between full-time and part-time undergraduate nursing students (p=0.003). Part-time students report a higher level of preparedness, while full-time students perceive their readiness as somewhat lower. According to the predefined classification, part-time students fall within the "excellent" category, while full-time students are closer to the upper range of the "good" category" (table 4).

Preparedness of graduate students

The t-test showed a statistically significant difference in self-perceived preparedness between full-time and part-time graduate nursing students (p=0.012). Similar to the findings among undergraduate students, part-time graduate students report a higher level of preparedness compared to their full-time counterparts (table 5).

Discussion

The study confirmed the hypothesis that more than 50% of nursing students feel prepared to transition into the nursing profession, with findings indicating that all participants expressed readiness to commence their professional practice. The assessment evaluated students' agreement with statements related to clinical competencies, evidence-based practice, administration, and patient-centered care. Furthermore, a comparative analysis between full-time and part-time students revealed that part-time students exhibited a higher level of readiness for the labor market.

This research addresses a critical gap by exploring the practical knowledge and clinical competencies of final-year nursing students, areas often overlooked in favor of psychological preparedness. By providing insights into students' actual abilities and confidence levels, the study contributes to understanding the impact of different educational pathways and highlights the need for targeted support to facilitate their transition into professional practice. Clinical competence is broadly defined as the application of knowledge in decision-making, psychomotor skills, and interpersonal communication aligned with nursing role expectations. The work of Fallatah and Laschinger (22) indicates that supportive professional practice environments are crucial for new graduate nurses, as they enable the application of clinical knowledge and skills in real-world settings.

The results of the study reveal that students exhibit the highest levels of confidence in the Patient-Centered Care domain. This reflects a robust understanding of the significance of individualized care, adherence to ethical principles, and the ability to identify changes in patients' physical and psychological conditions. Such findings suggest that the educational framework effectively fosters the competencies required for delivering patient-oriented nursing care. Conversely, the Clinical Competency domain received the lowest scores, indicating a degree of uncertainty

Table 4. **Preparedness of undergraduate students**

Study Level	N	M	SD	t	df	*p*
Full-time	61	71.50	9.91	-3.002	115	**0.003**
Part-time	56	77.94	13.19			

*Preparedness < 25% = poor, 25–50% = average, 50–75% = good, > 75% = excellent

Table 5. **Preparedness of graduate students**

Study Level	N	M	SD	t	df	*p*
Full-time	37	73.33	10.99	-2.565	81	**0.012**
Part-time	46	79.78	11.68			

*Preparedness < 25% = poor, 25–50% = average, 50–75% = good, > 75% = excellent

among students regarding the practical application of theoretical knowledge, clinical decision-making, and the execution of therapeutic procedures accurately. This underscores the necessity for enhanced practical training and a stronger focus on clinical skills within the nursing curriculum.

In this study, students self-assessed their ability to create nursing care plans tailored to patients' cultural and spiritual needs, apply evidence-based nursing practices, and evaluate their preparedness and knowledge regarding care planning and implementation. While clinical competence is fundamental to nursing practice, concerns persist about the readiness of new graduates, both at the bachelor's and master's levels, to meet these expectations (23). Research suggests that improving nursing education programs to enhance clinical competencies is critical for ensuring high-quality care and patient safety (23, 24). Evidence-Based Practice (EBP) emerged as another key factor in this study's assessment criteria. EBP bridges the gap between available evidence and current nursing practices by combining the best research with clinical expertise and patient preferences (24). Studies indicate that positive attitudes towards EBP among nurses correlate with higher implementation rates in clinical settings (25, 26). However, barriers such as lack of support and opportunities often hinder nurses from applying EBP in daily practice (26).

The results of a study conducted in Iran highlight the issue of isolation measures and behavior under different circumstances, suggesting that isolation precautions are mainly applied in departments dealing with infectious diseases or conditions linked to weakened immune systems. However, due to short stays in such departments and rapid rotations, students lack familiarity with the concept of isolation (27). Safe execution of medical procedures, including knowledge of legal frameworks and administrative tasks, was rated significantly below the top score of four.

Patient-centered care was identified as a crucial element for professional development among new nurses (28). A positive perception of patient-centered care in nursing would aid nurses in implementing such care approaches in clinical settings (29). This aligns with the findings of this study, where the first hypothesis – that more than 50% of students are ready to transition into professional practice – was confirmed. While self-assessment results indicated that students feel prepared, previous studies have reported that many nursing students feel inadequately prepared for the responsibilities and roles of nursing professionals (30).

Analysis of student readiness for the labor market revealed differences based on the level of study (undergraduate vs. graduate). Most participants rated their readiness as good. Part-time students, often with prior clinical experience, displayed greater readiness compared to full-time students. This aligns with Benner's "From Novice to Expert" theory, which suggests that nurses progress through five stages of competence: novice, advanced beginner, competent, proficient, and expert. Upon entering the profession, nurses generally possess limited practical experience but have theoretical knowledge gained during education. Therefore, ongoing support and mentorship programs are crucial to ensuring the effective application of theoretical knowledge in practice. Research also emphasizes the importance of continuous education and professional development for maintaining and enhancing nursing competencies throughout their careers (16). Previous studies have highlighted that nurses often require additional clinical exposure to develop practical skills and gain real-life experiences that can later be integrated into their roles (31). Some studies have also reported dissatisfaction with educational programs, citing inadequate coverage of pharmacology, pathophysiology, electronic skills, leadership, and management competencies necessary for nursing practice (31). These challenges can lead to frustration and even prompt new nurses to leave the profession.

One of the earliest studies conducted in the UK on nursing students' readiness for the workforce found that only 52% of respondents felt prepared for their roles post-graduation, and only 63% believed they possessed sufficient competencies and knowledge (32). Similar findings emerged in a 2002 study, where students self-reported inadequate preparation for the responsibilities of nursing professionals, indicating gaps in the skills and knowledge necessary for the job (33).

The results of this study suggest that students' self-assessments of their skills and knowledge indicate that nursing curricula are effectively meeting their educational goals. However, it is important to acknowledge that during clinical practice, students operate under supervision and are not fully accountable for the duties they will undertake as employed

nurses. Previous research has demonstrated that the responsibilities of student nurses and those of employed graduates differ significantly, often resulting in students overestimating their competencies (34).

Limitations

This study included a sample of only 200 nursing students from two institutions, which may limit the generalizability of the findings. Additionally, the localized sample, as both institutions are based in Zagreb, restricts the broader applicability of the results. Another limitation is the reliance on self-assessment, which may introduce subjective biases, including overestimation or underestimation of personal abilities.

Future studies should involve larger and more diverse samples from various institutions to allow for broader comparisons. Despite these limitations, the questionnaire used in this study offers practical benefits. It can help students identify potential fears and weaknesses, encouraging them to improve during their education. Furthermore, the questionnaire could be a valuable tool for evaluating nursing curricula and informing employment planning. Achieving favorable outcomes on the questionnaire may enhance professional confidence and help individuals address areas for improvement, ultimately supporting their transition into the workforce.

Conclusion

The findings of this study underscore the essential importance of comprehensive education and preparation in facilitating a smooth transition for nursing students into professional roles, thereby minimizing the risk of transitional shock. By enhancing nursing curricula to prioritize practical skills and clinical competencies, educational institutions can significantly improve students' readiness to meet the demands of the workplace. Additionally, the implementation of supplementary support programs — such as workshops, mentoring schemes, and hands-on experiences — can further facilitate this transition, ensuring that teaching methods are aligned with student needs and enhancing their preparedness for professional practice. For healthcare institutions, the results emphasize the critical importance of structured internship and mentorship programs designed to assist new nurses in adapting to their roles while developing essential skills. Well-prepared nursing graduates are better positioned to deliver high-quality care, which can lead to improved patient outcomes and increased job satisfaction among healthcare professionals. Furthermore, this preparedness can contribute to reducing staff turnover and the associated costs of recruitment and training.

Author contributions

Conceptualization (FK, MI, ČM); Data Curation (VK, FK); Data Analysis (FK, KV, ČM), Writing - Original Draft (FK, MI).

Conflict of interest

The authors declare no conflicts of interest.

Acknowledgments

The authors would like to thank all participants who contributed their time and insights to the study.

Funding

This research received no external funding.

References

1. Figueroa JF, Harrison R, Chauhan A, Meyer L. Priorities and challenges for health leadership and workforce management globally: a rapid review. BMC Health Serv Res. 2019;19(1):408. https://doi.org/10.1186/s12913-019-4080-7
2. Dzando A, Salifu S, Nonoh EA, Donji AB, Akpeke H, Kumah A. Healthcare in Ghana amidst the coronavirus pandemic: a narrative literature review. J Public Health Res. 2022;11(1):2448. https://doi.org/10.4081/jphr.2021.2448
3. Dolu İ, Naharcı M, Logan P, Paal P, Vaismoradi M. Transitional 'hospital to home' care of older patients: healthcare professionals' perspectives. Scand J Caring Sci. 2020;35(3):871-80. https://doi.org/10.1111/scs.12904
4. Boye L, Mogensen C, Mechlenborg T, Waldorff F, Andersen P. Older multimorbid patients' experiences on integration of services: a systematic review. BMC Health Serv Res. 2019;19(1):795. https://doi.org/10.1186/s12913-019-4644-6
5. Gray D, Sidaway-Lee K, White E, Thorne A, Evans P. Continuity of care with doctors—a matter of life and death? A systematic review of continuity of care and mortality. BMJ Open. 2018;8(6):e021161. https://doi.org/10.1136/bmjopen-2017-021161
6. Fraser SW, Greenhalgh T. Complexity science: coping with complexity: educating for capability. BMJ. 2001;323(7316):799-803. https://doi.org/10.1136/bmj.323.7316.799
7. Kaviani F, Aliakbari F, Sheikhbardsiri H, Arbon P. Nursing students' competency to attend disaster situations: a study in western Iran. Disaster Med Public Health Prep. 2021;16(5):2044-48. https://doi.org/10.1017/dmp.2021.263
8. Bayraktar N, Yıldırım M. Senior undergraduate nursing students' perceptions of disaster preparedness: a descriptive study. Disaster Med Public Health Prep. 2016;10(4):557-61. https://doi.org/10.1017/dmp.2016.9
9. Ibrahim F. Nurses knowledge, attitudes, practices and familiarity regarding disaster and emergency preparedness – Saudi Arabia. Am J Nurs Sci. 2014;3(2):18. https://doi.org/10.11648/j.ajns.20140302.12
10. Zahraei RH, Sokhan GA, Salehi S, Ehsanpour S, Hasanzadeh A. Comparing the factors related to the effective clinical teaching from faculty members' and students' points of view. Iran J Med Educ. 2008;7:249-55
11. Rassouli M, Tafreshi MZ, Esmaeil M. Challenges in clinical nursing education in Iran and strategies. J Clin Excell. 2014;2(1):11-22.
12. Kajander-Unkuri S, Meretoja R, Katajisto J, Saarikoski M, Salminen L, Suhonen R, et al. Self-assessed level of competence of graduating nursing students and factors related to it. Nurse Educ Today. 2014;34(5):795-801. https://doi.org/10.1016/j.nedt.2013.08.009
13. Casey K, Fink R, Jaynes C, Campbell L, Cook P, Wilson V, et al. Readiness for practice: The senior practicum experience. J Nurs Educ. 2011;50(11):646-52. https://doi.org/10.3928/01484834-20110817-03
14. Boor K, Scheele F, van der Vleuten CP, Teunissen PW, den Breejen EM, Scherpbier AJ, et al. How undergraduate clinical learning climates differ: A multi-method case study. Med Educ. 2008;42(10):1029-36. https://doi.org/10.1111/j.1365-2923.2008.03149.x
15. Duchscher JEB. Transition shock: The initial stage of role adaptation for newly graduated registered nurses. J Adv Nurs. 2009;65(5):1103-13. https://doi.org/10.1111/j.1365-2648.2008.04898.x
16. Benner P. From novice to expert: excellence and power in clinical nursing practice. Menlo Park, CA: Addison-Wesley; 1984.
17. Omer TY. New Graduate Nurses Experience During the Internship Year: Transitioning from a Student to a Professional Nurse. South Eastern European Journal of Public Health. 2024; 1105-14. https://doi.org/10.70135/seejph.vi.2323
18. Cummings GG, Wong CA. The relationship between nursing leadership and patient outcomes: A systematic review. J Nurs Manag. 2007;15(5):508-21. https://doi.org/10.1111/j.1365-2834.2007.00723.x
19. McKinnon J, McCarthy A. Factors influencing nursing students' preparedness for practice: A systematic review. Int Nurs Rev. 2020;67(2):162-74. doi:10.1111/inr.12539.
20. Hurst K, et al. The impact of part-time work on nursing students' preparedness for practice: A qualitative study. Nurse Educ Today. 2021;97:104703. doi:10.1016/j.nedt.2020.104703.
21. Shahsavari H, Bakhshi F, Khosravi A, Najafi Z, Ghorbani A. Perceived professional preparedness of senior nursing students' questionnaire: Development and psychometric evaluation. Nurse Educ Today. 2020;93:104533. https://doi.org/10.1016/j.nedt.2020.104533
22. Fallatah F, Laschinger H. The influence of authentic leadership and supportive professional practice environments on new graduate nurses' job satisfaction. J Res Nurs. 2016;21(2):125-36. https://doi.org/10.1177/1744987115624135
23. Ehrenberg A, Gustavsson P, Wallin L, Boström AM, Rudman A. New graduate nurses' developmental trajectories for capability beliefs concerning core competencies for healthcare professionals: a national cohort study on patient-centered care, teamwork, and evidence-based practice. Worldviews Evid Based Nurs. 2016;13(6):454-62. https://doi.org/10.1111/wvn.12178
24. Florin J, Ehrenberg A, Wallin L, Gustavsson P. Educational support for research utilization and capability

beliefs regarding evidence-based practice skills: A national survey of senior nursing students. J Adv Nurs. 2012;68(4):888-97. https://doi.org/10.1111/j.1365-2648.2011.05792.x

25. Melnyk BM, Fineout-Overholt E, Giggleman M, Cruz R. Correlates among cognitive beliefs, EBP implementation, organizational culture, cohesion and job satisfaction in evidence-based practice mentors from a community hospital system. Nurs Outlook. 2010;58(6):301-8. https://doi.org/10.1016/j.outlook.2010.06.002
26. Ryan EJ. Undergraduate nursing students' attitudes and use of research and evidence-based practice–an integrative literature review. J Clin Nurs. 2016;25(11-12):1548-56. https://doi.org/10.1111/jocn.13229
27. Khodaveisi M, Aliyari M, Borzoo R, Soltanian A, Molavi-Vardanjani M, Khalili Z. Comparison of achievement of clinical skills in seventh and eighth semester nursing students in Hamadan, West of Iran. Iran J Nurs Midwifery Res. 2019;24(1):66-72. https://doi.org/10.4103/ijnmr.IJNMR_179_17
28. Rudman A, Gustavsson JP. Early-career burnout among new graduate nurses: a prospective observational study of intra-individual change trajectories. Int J Nurs Stud. 2011;48(3):292-306. https://doi.org/10.1016/j.ijnurstu.2010.07.012
29. Fink RM, Krugman M, Casey K, Goode C. The graduate nurse experience: Qualitative residency program outcomes. J Nurs Adm. 2008;38(7-8):341-8. https://doi.org/10.1097/01.NNA.0000323943.82016.48
30. Chappy S, Jambunathan J, Mamocha S. Evidence-based curricular strategies to enhance BSN graduates' transition into practice. Nurse Educ. 2010;35(1):20-4. https://doi.org/10.1097/10.1097/NNE.0b013e3181c42120.
31. Candela L, Bowles C. Recent RN graduate perceptions of educational preparation. Nurs Educ Perspect. 2008;29(5):266-71.
32. McGowan B, et al. Nursing students' perceptions of their preparedness for practice: A UK study. Nurse Educ Today. 2010;30(6):1-6. doi:10.1016/j.nedt.2009.12.012.
33. Ross H. Research as a catalyst for change: the transition from student nurse to registered nurse. J Clin Nurs. 2002;11(4):545-53. https://doi.org/10.1046/j.1365-2702.2002.00610.x
34. McCarthy A, et al. The impact of clinical placements on nursing students' preparedness for practice: A qualitative study. J Nurs Educ Pract. 2021;11(5):1-8. doi:10.5430/jnep.v11n5p1.

Croat Nurs J. 2025; 9(1): 77-90

Original scientific paper

An E-Delphi Study to Identify Core Competencies for Managing Chronic Patients' Needs Through Telecare

[1] Evangelos C. Fradelos
[2] Ioanna Tsatsou
[3] Snježana Čukljek
[4] Michela Barisone
[4] Emiliano Loria
[1] Maria Saridi
[1] Ioanna Papathanasiou

[1] University of Thessaly, Larissa, Greece
[2] Hellenic Airforce General Hospital, Athens, Greece
[3] University of Applied Health Sciences, Zagreb, Croatia
[4] University of Piemonte Orientale, Novara, Italy

Article received: 15.01.2025.

Article accepted: 27.02.2025.

https://doi.org/10.24141/2/9/1/7

Author for correspondence:
Evangelos C. Fradelos
University of Thessaly, Larissa, Greece
E-mail: efradelos@uth.gr

Keywords: chronic diseases, chronic patients, management, telecare, competencies

Abstract

Introduction. Since there is an increase in chronic disease prevalence, there is a global challenge in the field of healthcare professional education in effectively treating chronic patients. Telecare is an effective way of caring for specific populations and situations, but it requires specific competencies and skills from health professionals.

Aim. To recognize core telecare competencies of healthcare professionals for the management of chronic patients, as part of the "BeEmTel: Beyond the Emergency. Telecare for Non-Communicable Diseases through Simulation Techniques" project.

Methods. A three-round e-Delphi study was conducted from May to August 2022. A panel of 26 experts from five European countries was asked to approve, modify, or add items and then prioritize each competence.

Results. This e-Delphi resulted in 37 competencies included in 12 domains: laws/normative/ethics, multidisciplinary team, shared decision-making, patient/caregiver education, relationship, assessment/evaluation, planning, knowledge/ability, communication, risk evaluation, psychological and emotional support and family involvement. From the total of 37 competencies, experts agreed about the score of 22 of them. The agreement in all competencies ranged from 92.4% to 100% (defined as >75% agreement).

Conclusions. The results of this study will provide the basis for European educational institutions to develop educational programs on telecare in chronic diseases as well as to establish national policies on telecare.

Introduction

The increasing global ageing of the population is described by the World Health Organization (WHO) as a critically important issue for the socioeconomic and medical community (1). Unfortunately, the number of older people is rising disproportionately and most people are expected to live to age 60 and beyond (2). Older adults have expectedly higher rates of reported chronic diseases (3).

Chronic diseases are mainly non-communicable diseases generally lasting at least one year, having slow progression and typically require ongoing medical care (4). The four main types of chronic diseases are cardiovascular diseases, cancers, chronic respiratory diseases and diabetes (5). Chronic diseases management includes numerous long-term treatments and an increased demand for healthcare services that lead to excessive costs, inadequate access to care, sometimes poor quality of care (due to lack of education and resources) (6), and poor quality of life of the elderly (3).

Therefore, chronic diseases have become a major problem for the individual, the communities and society as a whole. Undeniably, science is galloping as new methods are found to manage chronic diseases in various hospital and community settings. Therefore, new and promising technologies are being used, such as telecare. Telecare is the use of information, communication, and monitoring technologies which allow healthcare professionals to remotely evaluate health conditions, educate, or deliver healthcare interventions to patients at home or in community settings (7).

Especially during the COVID-19 pandemic, telecare was widely used due to social restrictions. It facilitates health care, particularly in remote or underserved areas. Telecare can improve patient outcomes through the supplementation of the in-person management of chronic diseases, with approaches such as remote monitoring and patient education (8). The most commonly used technologies are those with a monitoring function and systems with reminders, advice, or self-care instructions. An important factor in these systems is their usability, which can help chronic patients to accept and engage in the telecare monitoring systems, making them more independent in their own homes (9).

Telecare is believed to be a revolution of healthcare systems, so it is essential to reflect on the training of healthcare professionals in order to become skilled to engage into telecare and integrate it into their daily clinical practice (10). Indeed, the growing utilization of telecare practices brings considerations about the training and skills of healthcare professionals to use it both effectively and correctly (11). Major barriers to telecare use among healthcare professionals include the lack of knowledge and competence (12). On the other hand, telecare training induces the willingness, readiness, compliance and confidence in using telecare (13).

Based on Miller's pyramid of clinical competence, telecare provision by healthcare professionals requires knowledge on the basis of telecare practices as well as competencies including theoretical knowledge, the basic understanding of telehealth, its tools and its applications, practical skills, and attitudes (14, 15). Also, having knowledge on issues of confidentiality and data protection is of great importance (16).

As shown by two recent reviews, there is no systematic approach regarding the incorporation of telecare in healthcare professionals' training curricula (17, 18). Nevertheless, standards and guidelines for the creation of telecare courses are increasing and they mainly focus on organizational, ethical, clinical, technical and soft skills instead of the specific needs of healthcare professionals (15). Nowadays, there is growing body of literature on teaching and training of telecare competencies, but the methods of their implementation still lack in the academic field. Telecare competencies are being more and more recognized – they are included into the regulations – but still, the application of telecare curricula is complex (19). The most cited competency frameworks are those published by the Accreditation Council for Graduate Medical Education (ACGME) (20) and Association of American Medical Colleges (AAMC) (21).

The European Union has established a number of initiatives and directives since 1999 and throughout the years so as to increase the use of telemedicine in Europe. Additionally, telemedicine presents peculiarities and challenges resulting from its own nature, like the use of complex technologies, thus demanding some specific qualifications from the healthcare professional. Many European countries still do not have a regulation regarding telecare, but even if they did, the regulation includes general considerations instead of specific standards of care or competen-

cies. Lastly, they are mostly developed by a professional and scientific association of each country (22). European Telehealth has created the European Code of Practice for Telehealth Services "TeleSCoPE", which mentions the need for an accreditation and a certification for healthcare professionals engaging in telecare (23). Nevertheless, there is no agreement on common competences in the European Union, and each Member State should have its own competences or requirements for telecare delivery (22). Therefore, there is a lack of a standardized telecare competency framework in Europe, especially for chronic diseases.

As part of the "BeEmTel: Beyond the Emergency. Telecare for Non-Communicable Diseases through Simulation Techniques" project, a literature review was conducted and a list of 35 core competencies for the management of chronic patients' needs through telecare was identified. These 35 competencies were grouped in eight main categories, that is clinical knowledge, critical thinking skills, technological skills, clinical skills, communication skills, implementation skills, professionalism and professional ethics, evidence based practice and others (e.g. cultural and social skills). Therefore, healthcare professionals must have a variety of skills in order to meet their chronic patients' needs through telecare practices (24).

Aim

Driven by the above, an e-Delphi study was conducted to recognize core telecare competencies of healthcare professionals for the management of chronic patients as part of the "BeEmTel: Beyond the Emergency. Telecare for Non-Communicable Diseases through Simulation Techniques" project.

Methods

e-Delphi study

The Delphi technique is a research methodology used to achieve consensus concerning real-world knowledge solicited from experts on topics where no agreement previously existed. The Delphi method is based on the assumption that group opinion is more valid than individual opinion (25), describes it as a method to obtain the most reliable possible consensus from a group of experts through a series of questions with controlled feedback, organized in various rounds. At the end of each round, the results are summarized so that they can be evaluated by the expert panel, thus enabling the 'systematic emergence of a concurrence of judgment/opinion' (26). The number of rounds usually ranges between two and four, depending on the complexity of the topic and the time available.

In order to identify and map the skills needed to meet the profile for future health professionals in chronic disease management through telemedicine, the e-Delphi technique was adopted, because it is quicker to implement and ensures higher response rates. The Delphi technique does not use a random sample, but a selected group of experts, defined as a group of informed individuals (27). The inclusion criteria for the panel of experts were: working in a country of Europe, a scientist working directly or indirectly in the care of chronic patients and be willing to participate.

Taking as a starting point, the results of the literature review in which 35 competencies were identified (24), a three-round e-Delphi study was launched on the 16th of May 2022. At the end of each round, the participants gave their opinion on the identified competencies and a consensus was reached. Once the Delphi study participants provided their opinion on the identified competencies, the responses were summarized and redistributed to the panel in the next round. Only those competencies which reached 75% of the agreement were included in the next round. Through a convergence process that identifies points of agreement and disagreement, a consensus was reached.

For the conduction of the e-Delphi study, it wasn't required to obtain an ethical approval. The panel of experts participated voluntarily and the study did not present any potential harm to individuals or patients.

Results

A multidisciplinary panel was formed. Thirty-five (35) European experts in the fields of chronic diseases and telecare (nursing academics, regulatory board members, nursing service directors and experts on chronic diseases) were invited to participate. For this purpose, a template was specifically designed to collect information about the experts. Out of the 35 invited experts on a voluntary basis, 26 of them agreed to participate in all rounds of the e-Delphi study. The panel of experts was derived from five European countries (Romania, Croatia, Germany, Greece and Italy), but were external to the BeEmTel project consortium partners. In fact, to ensure an objective evaluation, none of the experts knew who the other experts were. The formulation of the panel of experts is depicted in Table 1.

Table 1. **Participants of the e-Delphi study**

Country (N)	Profession (N)	Work field (N)
Romania (8)	MD (14)	Clinical (16)
Italy (7)	RN (10)	Academic (6)
Croatia (7)	Biomedical Informatician-Engineering (1)	Clinical/Academic (4)
Greece (3)	Psychologist (1)	
Germany (1)		
Age: 46.8 ±11.2		
Working experience: 21.9 ± 12.3		

MD: Medicine Doctor, RN: Registered Nurse

In the first round, the panel of experts was asked to rate the 35 competencies (Table 2), according to their importance in a 5-point Likert scale where 1 corresponded to not important to 5 that corresponded to very important. The first round of the e-Delphi study ended on the 10th of June 2022. The participants were asked to rate the competencies according to their importance, to rephrase them if needed and to propose any competency which, in their opinion, is needed but wasn't included. The first round gave the following results. The highest value was observed for the competency #27 "Act according to laws, regulations and ethical standards while practicing" with a mean score 4.93 and the lowest values for the competency #10 "Apply knowledge and practices of data management and analysis" with a mean value 3.82.

Table 2. **Core competencies derived from the literature review**

1.	Perform chronic patient observation by using telecare technology.
2.	Apply specialized knowledge related to chronic diseases.
3.	Conduct a thorough and detailed physical examination of the chronic patient in the telehealth environment.
4.	Make shared clinical decisions remotely.
5.	Demonstrate flexibility and open-mindedness to changes in healthcare conditions.
6.	Prioritize patients' needs, integrate and apply advanced knowledge to analyze a patient's condition and proffer the appropriate care and treatment plan from distance.
7.	In-depth knowledge of technical and telecare systems.
8.	Start and complete a telecare session by using and adjusting technical equipment.
9.	The ability to determine and evaluate individual health requirements and state of health via telecare sessions.
10.	Apply knowledge and practices of data management and analysis.
11.	Educate patients on basic digital and computer competency and the proper use of computer hardware telecare equipment and telecare software programs.
12.	Awareness of benefits and limits of telecare provision.
13.	Use mobile health technologies and e-health (online applications and services) in order to enhance the provided health care.
14.	Identify and assess the health status and health needs of chronic patients by interpreting verbal and non-verbal expressions during video conferencing.
15.	Plan, implement and assess personalized-individualized health care to meet the needs of chronic patients by using telecare technology.
16.	Educate and empower chronic patients for self-management and wellness remotely with the use of technology.
17.	Develop prevention plans remotely in order to avoid potential risks for health and safety of chronic patients.

18. Use and apply communication techniques for therapeutic reasons in order to support patients during a telecare session.
19. Develop a collaborative relationship, fostering bonding and gaining patients' trust and cooperation.
20. Provide psychological and emotional support to patients during telecare sessions.
21. Show empathy in order to guarantee a considerate attention to patients through a telecare session.
22. Communicate with patients using nonverbal communication technics in order to ensure effective communication during telecare session.
23. Be able to initiate, maintain and close a conversation in a telecare session in order to draw and provide information related to health information.
24. Apply written standards of healthcare professional environments to document of one's activity.
25. Integrate scientific findings into practice in an evidence-based manner; introduce research findings into decision-making by formulating a specific clinical inquiry in response to a known information need; look for the most relevant evidence to meet that need; examine the evidence that has been retrieved critically; synthesize the evidence into an action plan and assess the consequences of any acts or actions taken.
26. Act according to laws, regulations and ethical standards while practicing.
27. Apply fundamental ethical principles in the context of remote care.
28. Adopt and maintain a professional image, attitude and communication in a telecare session.
29. The awareness of ethical issues and actions arising in providing care remotely.
30. Respect for human dignity, self-determination, informed consent, and patient confidentiality, which are only a few of the moral norms and processes, ethical questions, and obligations unique to healthcare jobs.
31. Apply procedures and techniques that help determine the reliability of information while reducing the risks of decision-making.
32. Present and follow practices, rules and regulations and other health services in order to remotely apply clinical practices.
33. Locate, retrieve and present medical data for the location, identification and recognition of the patient's medical records.
34. Understand and respect different cultural backgrounds and respond effectively and respectfully to them.
35. Collaborate as a team and manage self-management, self-service and understanding skills.

From the initial 35 competencies, eight had to be removed in order to reach the consensus of 75% required by a Delphi study. Furthermore, the panel of experts proposed a list of 34 additional competencies which, after merging similar proposals, led to the creation of a list of 53 competencies that was distributed for evaluation in the second round (Table 3). Taking into consideration the results of the first round, the second round was prepared and launched on the 27th of June 2022. In the second round, the panel of experts was once more asked to rate the list of derived competencies according to the importance in a Likert scale from 1 to 5. The second round ended on the 8th of July 2022.

The second round of the Delphi study resulted in 37 competencies, as shown in Table 4, divided in twelve areas. Again, in this round, the highest value was observed in a competency in the area of professional ethics and it was in the competency "Respect for human dignity, self-determination, informed consent, and patient confidentiality, which are only a few of the moral norms and processes, ethical questions, and obligations unique to healthcare jobs" with a mean value 4.89. On the other hand, the lowest score was observed in the competency "Provide second opinion for chronic patients" with a mean value 3.86.

Finally, the third round was launched on the 19th July of 2022 and ended on the 13th of August 2022. Then, experts were asked to provide their agreement or disagreement on the score of the 37 competencies that resulted from the second round (Table 5). The agreement in all competencies ranged from 92.4 to 100%. From the total of 37 competencies of the third round, the experts agreed at 100% for the score of 22 of them. For the rest of the competencies, the agreement was noted from 92.4% to 96.2%. These percentages are fulfilling the percentage for the consensus of a Delphi study.

Table 3. **List of proposed competencies for the second round**

Macro Area		Competence
Laws/normative/ ethics	1.	Act according to laws, regulations and ethical standards (such as data protection), and apply ethical principles while practicing in the context of remote care.
	2.	Respect for human dignity, self-determination, informed consent, and patient confidentiality, which are only a few of the moral norms and processes, ethical questions, and obligations unique to healthcare jobs.
	3.	The awareness of ethical issues and actions arising in providing care remotely.
	4.	Understand and respect different cultural backgrounds and respond effectively and respectfully to them.
	5.	Coverage for virtual visits by insurance carrier.
	6.	Understand and respect social inequalities.
Multidisciplinary team	7.	Collaborate as a team and manage self-management, self-service and understanding skills.
	8.	Training of the intervention team (health professionals) in an interdepartmental training program for the acquisition of knowledge and common skills regarding monitoring through telemedicine systems.
	9.	Promote multidisciplinary evaluation for telemedicine evaluations of chronic patients.
	10.	Create a "healthcare network" among all professionals involved in patient's care (general practitioner, nurses, caregivers, etc.).
Shared decision-making	11.	Make shared clinical decisions remotely based on shared knowledge, skills and experience.
Education of patient /caregiver	12.	Educate and empower chronic patients for self-management and wellness remotely with the use of technology.
	13.	Perform chronic patient observation by using telecare technology.
	14.	Educate patients and their families on basic digital and computer competency and for the proper use of computer hardware telecare equipment and telecare software programs.
	15.	Educate and empower caregivers to help the patients using telecare services and technologies.
	16.	Apply specific psychoeducation techniques to foster patients' engagement in treatment.
Relationship	17.	Develop a collaborative relationship with patients and their families, creating connection and earning their trust and cooperation.
Assessment/ evaluation	18.	The ability to determine and evaluate individual health requirements and state of health via telecare sessions.
	19.	Adopt and maintain a professional image, attitude and communication in a telecare session.
	20.	Prioritize patients' needs, integrating and applying sophisticated knowledge, skills, and expertise to diagnose a patient's condition and provide appropriate care and treatment from a distance.
	21.	Assess the level of urgency in case of a medical problem registered through telecare devices or session, provide emergency response and raise appropriate alarms.
	22.	Identify and assess the health status and health needs of chronic patients by interpreting data registered through telecare devices and monitors.
	23.	Provide second opinion for chronic patients.
	24.	Provide prescription of medications using telecare programs.
	25.	Understand the meaning of chronic disease for each patient and target the patient's needs accordingly.
	26.	The evaluation of daily needs from a socioeconomic point of view.
	27.	Perform chronic patient observation by using telecare technology.

Planning	28. Plan, implement and assess personalized-individualized health care to meet the needs of chronic patients by using telecare technology.
	29. Guaranteeing a prompt response to patients' needs through a telecare system (according to the severity of the patients' issues).
Knowledge/ability	30. Apply specialized knowledge related to chronic diseases.
	31. Integrate scientific findings into practice in an evidence-based manner; introduce research findings into decision-making by formulating a specific clinical inquiry in response to a known information need; look for the most relevant evidence to meet that need; examine the evidence that has been retrieved critically; synthesize the evidence into an action plan, and assess the consequences of any acts or actions taken.
	32. Demonstrate flexibility and open-mindedness to changes in healthcare conditions.
	33. Knowledge of technical aspects of telecare devices to be able to support the patient in overcoming difficulties with utilization of the monitoring equipment.
	34. Use mobile health technologies and e-health (online applications and services) in order to enhance the provided health care.
	35. Be able to do some basic troubleshooting due to the use of technical equipment.
	36. Know how to choose whether to apply telemedicine services and which services to use according to the need of the patient.
	37. The ability to evaluate the need to change a telecare service into 'in office' service.
	38. Apply up to date guidelines and medical scores when taking medical decisions.
	39. Adherence to protocols and systematic recording of collected information.
	40. The awareness of telemedicine value, capabilities and limitations. Devotion and responsibility so as not to underestimate the value of telemedical sessions.
	41. The application of the quality control assessment methodology implementation principle with the aim of improving the clinical outcomes of telemedicine treatment for patients with chronic diseases.
	42. Take measures that ensure adequate resources for people with chronic diseases (availability and quality of the Internet, computers, smartphones, etc.).
Communication	43. Use and apply communication techniques, specifically adapted to the telehealth context, for therapeutic reasons in order to support patients during a telecare session.
	44. Identify and assess the health status and health needs of chronic patients by interpreting verbal and non-verbal expressions during video conferencing.
	45. Be able to initiate, maintain and close a conversation in a telecare session in order to draw and provide information related to health information.
Risk evaluation	46. Develop prevention plans remotely to avoid potential risks for health and safety of chronic patients.
Psychological and emotional support	47. During telecare sessions, provide psychological and emotional support to patients and their family members.
	48. Through a telecare session, show empathy to ensure careful attention to patients and family members.
	49. Awareness of benefits and limits of telecare provision.
	50. Consider motivation for treatment and the patient's stage of change in order to offer support as needed.
	51. Offer palliative care, including emotional support using telecare systems.
	52. Be aware of the implications of chronic disease as far as caregivers' burden is concerned, and consider the involvement of patients' caregivers.
Family involvement	53. Involve the family in the care process to facilitate communication.

Table 4. **Competencies resulted from the second round and mean values**

	AREAS	MEAN VALUE
	AREA A: Laws/Normative/Ethics	
1.	Respect for human dignity, self-determination, informed consent, and patient confidentiality, which are only a few of the moral norms and processes, ethical questions, and obligations unique to healthcare jobs.	4.89
2.	Act according to laws, regulations and ethical standards (such as data protection), and apply ethical principles while practicing in the context of remote care.	4.85
3.	The awareness of ethical issues and actions arising in providing care remotely.	4.63
4.	Understand and respect different cultural backgrounds and respond effectively and respectfully to them.	4.63
5.	Understand and respect social inequalities.	4.37
	AREA B: Multidisciplinary team	
6.	Collaborate as a team and manage self-management, self-service and understanding skills.	4.63
7.	Training of the intervention team (health professionals) in an interdepartmental training program for the acquisition of knowledge and common skills regarding monitoring through telemedicine systems.	4.44
8.	Create a "healthcare network" among all professionals involved in patient's care (general practitioner, nurses, caregivers, etc.).	4.41
	AREA C: Shared decision-making	
9.	Make shared clinical decisions remotely based on shared knowledge, skills, and experience.	4.37
	AREA D: Education of patient/caregiver	
10.	Educate and empower chronic patients for self-management and wellness remotely with the use of technology.	4.63
11.	Perform chronic patient observation by using telecare technology.	4.30
12.	Educate patients and their families on basic digital and computer competency and for the proper use of computer hardware telecare equipment and telecare software programs.	4.52
13.	Educate and empower caregivers to help the patients using telecare services and technologies.	4.30
	AREA E: Relationship	
14.	Develop a collaborative relationship with patients and their families, creating connection and earning their trust and cooperation.	4.44
	AREA F: Assessment/evaluation	
15.	Assess the level of urgency in case of a medical problem registered through telecare devices or session, provide emergency response and raise appropriate alarms.	4.89
16.	Identify and assess the health status and health needs of chronic patients by interpreting data registered through telecare devices and monitors.	4.67
17.	Prioritize patients' needs, integrating and applying sophisticated knowledge, skills, and expertise to diagnose a patient's condition and provide appropriate care and treatment remotely.	4.63
18.	The ability to determine and evaluate individual health requirements and state of health via telecare sessions.	4.41
19.	Adopt and maintain a professional image, attitude and communication in a telecare session.	4.33
20.	Understand the meaning of the chronic disease for each patient and target the patient's needs accordingly.	4.30
21.	Perform chronic patient observation by using telecare technology.	4.30
	AREA G: Planning	
22.	Guaranteeing a prompt response to patients' needs through a telecare system (according to the severity of the patients' issues).	4.48
23.	Plan, implement and assess personalized-individualized health care to meet the needs of chronic patients by using telecare technology.	4.41

	AREA H: Knowledge/ability	
24.	Apply specialized knowledge related to chronic diseases.	4.44
25.	The awareness of telemedicine value, capabilities and limitations. Devotion and responsibility so as not to underestimate the value of telemedical sessions.	4.44
26.	Use mobile health technologies and e-health (online applications and services) in order to enhance the provided health care.	4.41
27.	Demonstrate flexibility and open-mindedness to changes in healthcare conditions.	4.37
	AREA I: Communication	
28.	Identify and assess the health status and health needs of chronic patients by interpreting verbal and non-verbal expressions during the video conferencing.	4.63
29.	Be able to initiate, maintain and close the conversation in a telecare session in order to draw and provide information related to health information.	4.48
30.	Use and apply communication techniques, specifically adapted to the telehealth context, for therapeutic reasons in order to support patients during a telecare session.	4.44
	AREA J: Risk evaluation	
31.	Develop prevention plans remotely in order to avoid potential risks for health and safety of chronic patients.	4.67
	AREA K: Psychological and emotional support	
32.	During telecare sessions, provide psychological and emotional support to patients and their family members.	4.48
33.	Through a telecare session, show empathy to ensure careful attention to patients and family members.	4.48
34.	Consider motivation for treatment and the patient's stage of change in order to offer support as needed.	4.33
35.	Be aware of the implications of chronic disease as far as caregivers' burden is concerned and consider the involvement of patients' caregivers.	4.33
36.	Offer palliative care, including emotional support using telecare systems.	4.30
	AREA L: Family involvement	
37.	Involve the family in the care process to facilitate communication.	4.41

Discussion

In this study, a total of 37 healthcare professionals' competencies for telecare in the management of chronic patients are established. These competencies focus more on the part of the management with detail and clinical relevance of chronic diseases with the use of telecare, rather than on the simple use and application of telecare services.

Similarly, in 2016, Van Houwelingen et al. conducted a four-round Delphi study for telehealth competencies in nurses working in the Netherlands. There, 32 competencies were identified. The most significant competencies for nurses that provide telehealth were coaching skills, the ability to combine clinical experience with telehealth, communication skills, clinical knowledge, ethical awareness, and a supportive attitude (28). Also, in 2019, Arends et al. developed 22 telehealth provider competencies based on the relevant existing literature for telehealth practitioners. They used these competencies to educate and train nurse practitioner students in telehealth and were mostly associated with operational issues (29). Rutledge et al. (2021) conducted a modified Delphi study to recognize, develop, and assess telehealth competencies for nurses. The researchers used the four P's of telehealth framework, per se, planning, preparing, providing, and performance evaluation. In detail, planning for the implementation of a telehealth program, the process of readying for telehealth implementation, delivering telehealth services, and evaluating the impact and outcomes of the telehealth program (30). There are indeed studies from different countries that have identified skills and competences for healthcare professionals

Table 5. **Results from the third round of the e-Delphi study**

#	Competence	Score	Agree N (%)
1	Respect for human dignity, self-determination, informed consent, and patient confidentiality, which are only a few of the moral norms and processes, ethical questions, and obligations unique to healthcare jobs.	4.89	26 (100%)
2	Assess the level of urgency in case of a medical problem registered through telecare devices or session, provide emergence response and raise appropriate alarms.	4.89	25 (96.2%)
3	Act according to laws, regulations and ethical standards (such as data protection), and apply ethical principles while practicing in the context of remote care.	4.85	26 (100%)
4	Identify and assess the health status and health needs of chronic patients by interpreting data registered through telecare devices and monitors.	4.67	26 (100%)
5	Develop prevention plans remotely to avoid potential risks for health and safety of chronic patients.	4.67	25 (96.2%)
6	The awareness of ethical issues and actions arising in providing care remotely.	4.63	26 (100%)
7	Understand and respect different cultural backgrounds and respond effectively and respectfully to them.	4.63	26 (100%)
8	Collaborate as a team and manage self-management, self-service and understanding skills.	4.63	26 (100%)
9	Educate and empower chronic patients for self-management and wellness remotely with the use of technology.	4.63	26 (100%)
10	Prioritize patients' needs, integrating and applying sophisticated knowledge, skills, and expertise to diagnose a patient's condition and provide the appropriate care and treatment from a distance.	4.63	26 (100%)
11	Identify and assess the health status and health needs of chronic patients by interpreting verbal and non-verbal expressions during video conferencing.	4.63	26 (100%)
12	Educate patients and their families on basic digital and computer competency and for the proper use of computer hardware telecare equipment and telecare software programs.	4.52	26 (100%)
13	Guaranteeing a prompt response to patients' needs through a telecare system (according to the severity of the patients' issues).	4.48	25 (96.2%)
14	Be able to initiate, maintain and close the conversation in a telecare session, in order to draw and provide information related to health information.	4.48	26 (100%)
15	During telecare sessions, provide psychological and emotional support to patients and their family members.	4.48	25 (96.2%)
16	Through a telecare session, show empathy to ensure careful attention to patients and family members.	4.48	25 (96.2%)
17	Training of the intervention team (health professionals) in an interdepartmental training program for the acquisition of knowledge and common skills regarding monitoring through telemedicine systems.	4.44	25 (96.2%)
18	Develop a collaborative relationship with patients and their families, creating connection and earning their trust and cooperation.	4.44	25 (96.2%)
19	Apply specialized knowledge related to chronic diseases.	4.44	25 (96.2%)
20	Awareness of telemedicine value, capabilities and limitations. Devotion and responsibility so as not to underestimate the value of telemedical sessions.	4.44	26 (100%)
21	Use and apply communication techniques, specifically adapted to the telehealth context, for therapeutic reasons in order to support patients during a telecare session.	4.44	26 (100%)
22	Create an "healthcare network" among all professionals involved in patient's care (general practitioner, nurses, caregivers, etc.).	4.41	26 (100%)

23	The ability to determine and evaluate individual health requirements and health status via telecare sessions.	4.41	26 (100%)
24	Plan, implement and assess personalized-individualized health care to meet the needs of chronic patients by using telecare technology.	4.41	26 (100%)
25	Use mobile health technologies and e-health (online applications and services) in order to enhance the provided health care.	4.41	26 (100%)
26	Involve the family in the care process to facilitate communication.	4.41	26 (100%)
27	Understand and respect social inequalities.	4.37	25 (96.2%)
28	Make shared clinical decisions remotely based on shared knowledge, skills, and experience.	4.37	24 (92.4%)
29	Demonstrate flexibility and open-mindedness to changes in healthcare conditions.	4.37	26 (100%)
30	Adopt and maintain a professional image, attitude and communication in a telecare session.	4.33	26 (100%)
31	Consider motivation for treatment and the patient's stage of change to offer support as needed.	4.33	26 (100%)
32	Be aware of the implications of chronic disease as far as caregivers' burden is concerned, and consider the involvement of patients' caregivers.	4.33	26 (100%)
33	Perform chronic patient observation by using telecare technology.	4.30	25 (96.2%)
34	Educate and empower caregivers to help the patients using telecare services and technologies.	4.30	26 (100%)
35	Understand the meaning of the chronic disease for each patient and target the patient's needs accordingly.	4.30	25 (96.2%)
36	Perform chronic patient observation by using telecare technology.	4.30	25 (96.2%)
37	Offer palliative care, including emotional support using telecare systems.	4.30	24 (92.4%)

for telecare of chronic diseases. A recent systematic review grouped the competences as follows: clinical knowledge, critical thinking skills, technological skills, clinical skills, communication skills, implementation skills, professionalism and professional ethics, and evidence-based practice (29).

The Association of American Medical College (AAMC) Telehealth Competencies includes six domains: patient safety and appropriate use of telehealth, access and equity, communication, data collection, technology, ethical practices and legal requirements for telehealth. The ethical part surrounds issues on understanding the federal, state, and local setting practice requirements to meet minimal standards to deliver telecare, maintain patient privacy, prioritizing the patient's interest, and sustaining the professional-patient relationship (21, 31). The results of the present e-Delphi study revealed that ethics in telecare is put first with the competencies "Act according to laws, regulations and ethical standards while practicing" and "Respect for human dignity, self-determination, informed consent, and patient confidentiality, which are only a few of the moral norms and processes, ethical questions, and obligations unique to healthcare jobs" having the highest values. The Telescope code, the European code of practice for telehealth services has a section on ethical principles. This section underlines that having an understanding of the ethical context of telehealth services is a required skill and knowledge of healthcare professionals and that compliance with the ethical principles is mandatory for all telecare services (23).

Furthermore, the aforementioned competencies from AAMC take account of the data collection in telecare provision, which refers to performing examinations or taking clinical history in digital format and putting this information in the care plan (32). Nevertheless, the collected data management and analysis are not included in these competencies and in the present study, the competency "Apply knowledge and practices of data management and analysis" had the lowest value. Common barriers in the use of telecare services by healthcare professionals are barriers related to hardware and software used for data collec-

tion management and analysis as well as the lack of knowledge in using these technology and technology literacy barriers (33).

Additionally, one of the last scored competencies was "Offer palliative care, including emotional support using telecare systems". Palliative care is an approach that helps patients and their families deal with the challenges of a life-threatening illness. Early detection, accurate diagnosis, and treatment of pain and other issues – whether physical, psychological, or spiritual – prevent and alleviate suffering (34). Since palliative care is considered a specialty that puts a great emphasis ńn communication between patients, caregivers, and the healthcare team dealing with difficult situations and advanced care planning, there is a misperception that it cannot provide the same degree of personal contact and empathy by using telecare. However, there are studies, especially in the United Kingdom and the United States of America, that used and evaluated telecare palliative services with positive results for both patients and caregivers. Therefore, a possible explanation of this finding could be the feeling of potential awkwardness of telehealth medium that healthcare professionals feel, and this should be acknowledged in order to provide proper palliative care and support and have both time and space to discuss questions or concerns (35). Although there is growth of telecare services, there remains insufficient evidence regarding the clinical application of telecare in palliative care (36).

Successful development and implementation of telecare services needs the trust of healthcare professionals, patients and caregivers. The European Commission has made this call for such trust to all Member States (23). However, in European countries, there are varying socioeconomic statuses and major differences across and within countries in the way healthcare professionals currently provide telecare especially in chronic diseases. Eventually, much still needs to be done to ensure equal high-quality standards and training of healthcare professionals in the management of chronic diseases through telecare services.

Limitations

Out of the 35 invited experts on a voluntary basis, 26 of them participated in all of the rounds of the e-Delphi study, being unevenly distributed across Europe. So, the results might have been characterized by a stronger influence of the healthcare systems and cultures of Southern European countries.

Recommendations

Recommendations surface from these results. At first, telecare competencies should be included into undergraduate and postgraduate healthcare professionals' curricula in Europe to educate the future generations. Chronic disease management is difficult and complex, so in order to meet the patients' needs and to effectively and sustainably integrate telecare, it is necessary for telecare to be included into the curricula of future healthcare providers (15).

After that, the existing workforce should be trained with continuing education training programs, possibly organized by the scientific or professional associations of each country. Also, healthcare organizations should have a role in supporting their employees in ongoing professional development, engaging in competency integration and telecare practices.

Conclusion

This study's findings are essential for enhancing telecare delivery in European countries in the midst of a digitalizing world. There is a proposed competence framework of 37 competencies across 12 domains that present a basis for training of telecare practices in Europe. This result can help and guide not only the educational process within the BeEmTel project but, if they can communicate properly, it can assist educational organizations that want to train healthcare professionals in chronic patients' care through telecare.

Author contributions

Conceptualization (ECF, MB, EL); Formal Analysis (ECF, IVP, MS, IT); Investigation (ECF, MB, EL); Methodology (ECF, SC, IVP); Software (ECF); Supervision (IVP); Validation (IT, SC, MS, IVP); Writing – Original Draft (ECF, IT); Writing – Review & Editing (IT, SC, MS ECF, EL, MB, IVP).

Conflict of interest

The authors declare no conflicts of interest.

Acknowledgments

Authors would like to thank all of the experts for their participation in this study.

Funding

This study was funded through the "BeEmTel: Beyond the Emergency Telecare for Non-Communicable Diseases through Simulation Techniques", by the European Commission under the Erasmus+ Program, reference number 2021-1-IT02-KA220-HED-000027572.

References

1. Rudnicka E, Napierała P, Podfigurna A, Męczekalski B, Smolarczyk R, Grymowicz M. The World Health Organization (WHO) approach to healthy ageing. Maturitas. 2020;139:6-11. https://doi.org/10.1016/j.maturitas.2020.05.018
2. Beard JR, Officer A, de Carvalho IA, Sadana R, Pot AM, Michel JP, et al. The World report on ageing and health: a policy framework for healthy ageing. Lancet. 2016;387(10033):2145-54. https://doi.org/10.1016/S0140-6736(15)00516-4
3. Maresova P, Javanmardi E, Barakovic S, Husic JB, Tomsone S, Krejcar O, et al. Consequences of chronic diseases and other limitations associated with old age - a scoping review. BMC Public Health. 2019;19(1):1431. https://doi.org/10.1186/s12889-019-7762-5
4. Bernell S, Howard SW. Use Your Words Carefully: What Is a Chronic Disease?. Front Public Health. 2016;4:159. https://doi.org/10.3389/fpubh.2016.00159
5. Word Health Organization. Noncommunicable Diseases (Internet). Word Health Organization; 2016. Available at: http://www.who.int/topics/noncommunicable_diseases/en/
6. Holman HR. The Relation of the Chronic Disease Epidemic to the Health Care Crisis. ACR Open Rheumatol. 2020;2(3):167-73. https://doi.org/10.1002/acr2.11114
7. Solli H, Bjørk IT, Hvalvik S, Hellesø R. Principle-based analysis of the concept of telecare. J Adv Nurs. 2012;68(12):2802-15. https://doi.org/10.1111/j.1365-2648.2012.06038.x
8. Lewinski AA, Walsh C, Rushton S, Soliman D, Carlson SM, Luedke MW, et al. Telehealth for the longitudinal management of chronic conditions: systematic review. J Med Internet Res. 2022;24(8):e37100. https://doi.org/10.2196/37100
9. Saeed N, Manzoor M, Khosravi P. An exploration of usability issues in telecare monitoring systems and possible solutions: a systematic literature review. Disabil Rehabil Assist Technol. 2020;15(3):271-81. https://doi.org/10.1080/17483107.2019.1578998
10. Thomas EE, Haydon HM, Mehrotra A, Caffery LJ, Snoswell CL, Banbury A, et al. Building on the momentum: Sustaining telehealth beyond COVID-19. J Telemed Telecare. 2022;28(4):301-308. https://doi.org/10.1177/1357633X20960638
11. Adams JE, Ecker DJ. Telehealth: from the abstract to necessity to competency. FASEB Bioadv. 2021;3(7):475-81.
12. Rettinger L, Kuhn S. Barriers to video call-based telehealth in allied health professions and nursing: scoping review and mapping process. J Med Internet Res. 2023;25:e46715. https://doi.org/10.2196/46715
13. Rutledge C, Kott K, Schweickert P, Poston R, Fowler C, Haney T. Telehealth and eHealth in nurse practitioner training: current perspectives. Adv Med Educ Pract. 2017;8:399-409. https://doi.org/10.2147/AMEP.S116071
14. Miller GE. The assessment of clinical skills/competence/performance. Acad Med. 1990;65(9 Suppl):S63-S67. https://doi.org/10.1097/00001888-199009000-00045
15. Rettinger L, Putz P, Aichinger L, Javorszky SM, Widhalm K, Ertelt-Bach V, et al. Telehealth education in allied health care and nursing: web-based cross-sectional survey of students' perceived knowledge, skills, attitudes, and experience. JMIR Med Educ. 2024;10:e51112. https://doi.org/10.2196/51112
16. Arends R, Gibson N, Marckstadt S, Britson V, Nissen MK, Voss J. Enhancing the nurse practitioner curriculum to improve telehealth competency. J Am Assoc Nurse Pract. 2021;33(5):391-7. https://doi.org/10.1097/JXX.0000000000000303
17. Hui KY, Haines C, Bammann S, Hallandal M, Langone N, Williams C, et al. To what extent is telehealth reported to be incorporated into undergraduate and postgraduate allied health curricula: a scoping review. PLoS One. 2021;16(8):e0256425. https://doi.org/10.1371/journal.pone.0256425
18. Chike-Harris KE, Durham C, Logan A, Smith G, DuBose-Morris R. Integration of telehealth education into the

health care provider curriculum: a review. Telemed J E Health. 2021;27(2):137-49. https://doi.org/10.1089/tmj.2019.0261

19. Cruz-Panesso I, Tanoubi I, Drolet P. Telehealth competencies: training physicians for a new reality?. Healthcare (Basel). 2023;12(1):93. https://doi.org/10.3390/healthcare12010093
20. Accreditation Council for Graduate Medical Education (ACGME). Internal Medicine Milestones (Internet). 2021. Available at: https://www.acgme.org/globalassets/pdfs/milestones/internalmedicinemilestones.pdf
21. Association of American Medical Colleges. Telehealth competencies across the learning continuum (Internet). Washington DC: Association of American Medical Colleges; 2021. Available at: https://collections.nlm.nih.gov/catalog/nlm:nlmuid-9918504887606676-pdf?_gl=1*h87kcw*_ga*NTc2NDMwOTE3LjE3NDIyMDQxMDY.*_ga_7147EPK006*MTc0MjU0NjI5MS42LjEuMTc0MjU0NjMxMy4wLjAuMA..*_ga_P1FPTH9PL4*MTc0MjU0NjI5MS42LjEuMTc0MjU0NjMxMy4wLjAuMA.
22. Raposo VL. Telemedicine: The legal framework (or the lack of it) in Europe. GMS Health Technol Assess. 2016;12:Doc03. https://doi.org/10.3205/hta000126
23. European Commission. TeleSCoPE: Telehealth Services Code of Practice for Europe (TeleSCoPE) (Internet). 2013. Available at: https://interoperable-europe.ec.europa.eu/collection/ehealth/document/telescope-telehealth-services-code-practice-europe-telescope
24. Fradelos EC, Barisone M, Lora E, Valiakos E, Papathanasiou IV. Competencies and skills needed in the management of chronic patients' needs through telecare. Pol Merkur Lekarski. 2023;51(4):403-16. https://doi.org/10.36740/Merkur202304116
25. Hsu CC, Sandford BA. The Delphi technique: making sense of consensus practical assessment, research & evaluation. Pract Assess, Res & Eval. 2007;12(1):10 https://doi.org/10.7275/pdz9-th90
26. Dalkey N, Helmer O. An experimental application of the Delphi method to the use of experts. Management Science. 1963;9(3):458-67.
27. Keeney S, Hasson F, McKenna H. The Delphi technique in nursing and health research. Wiley-Blackwell; 2010. https://doi.org/10.1002/9781444392029.fmatter
28. van Houwelingen CT, Moerman AH, Ettema RG, Kort HS, Ten Cate O. Competencies required for nursing telehealth activities: A Delphi-study. Nurse Educ Today. 2016;39:50-62. https://doi.org/10.1016/j.nedt.2015.12.025
29. Arends R, Gibson N, Marckstadt S, Britson V, Nissen MK, Voss J. Enhancing the nurse practitioner curriculum to improve telehealth competency. J Am Assoc Nurse Pract. 2021;33(5):391-7. https://doi.org/10.1097/JXX.0000000000000303
30. Rutledge CM, O'Rourke J, Mason AM, Chike-Harris K, Behnke L, Melhado L, et al. Telehealth Competencies for Nursing Education and Practice: The Four P's of Telehealth. Nurse Educ. 2021;46(5):300-5. https://doi.org/10.1097/NNE.0000000000000988
31. Galpin K, Sikka N, King SL, Horvath KA, Shipman SA; AAMC Telehealth Advisory Committee. Expert Consensus: Telehealth skills for health care professionals. Telemed J E Health. 2021;27(7):820-4. https://doi.org/10.1089/tmj.2020.0420
32. Noronha C, Lo MC, Nikiforova T, Jones D, Nandiwada DR, Leung TI, et al. Telehealth competencies in medical education: new frontiers in faculty development and learner assessments. J Gen Intern Med. 2022;37(12):3168-73. https://doi.org/10.1007/s11606-022-07564-8
33. Jonasdottir SK, Thordardottir I, Jonsdottir T. Health professionals' perspective towards challenges and opportunities of telehealth service provision: A scoping review. Int J Med Inform. 2022;167:104862. https://doi.org/10.1016/j.ijmedinf.2022.104862
34. Sepulveda C, Marlin A, Yoshida T, Ulrich A. Palliative Care: the World Health Organization's global perspective. J Pain Symptom Manage. 2002;24(2):91-6. https://doi.org/10.1016/s0885-3924(02)00440-2
35. Allen Watts K, Malone E, Dionne-Odom JN, McCammon S, Currie E, Hicks J, et al. Can you hear me now?: Improving palliative care access through telehealth. Res Nurs Health. 2021;44(1):226-37. https://doi.org/10.1002/nur.22105
36. Hancock S, Preston N, Jones H, Gadoud A. Telehealth in palliative care is being described but not evaluated: a systematic review. BMC Palliat Care. 2019;18(1):114. https://doi.org/ 10.1186/s12904-019-0495-5

Croat Nurs J. 2025; 9(1): 91-101

Original scientific paper

Assessment of the Quality of Life of Patients Following Cardiac Surgery

[1] Anita Bičvić
[1] Bruno Bolvanac
[1] Karolina Kaser
[2] Ivana Barać
[2,3] Zvjezdana Gvozdanović
[2,4] Maja Carević
[1,2] Nikolina Farčić

[1] University Hospital Centre Osijek, Osijek, Croatia
[2] Faculty of Dental Medicine and Health Osijek, University of Osijek, Osijek, Croatia
[3] General Hospital Našice, Našice, Croatia
[4] Medical High School Osijek, Osijek, Croatia

Article received: 04.12.2024.

Article accepted: 12.03.2025.

https://doi.org/10.24141/2/9/1/8

Author for correspondence:
Nikolina Farčić
University Hospital Centre Osijek, Osijek, Croatia
E-mail: nikfarcic@gmail.com

Keywords: quality of life; cardiac surgery; SF-36

Abstract

Aim. To assess the quality of life of patients following cardiac surgery and to analyze differences in quality of life based on gender, age, diagnosis, and the associated comorbidities.

Methods. A cross-sectional study was conducted at the Clinical Hospital Center Osijek, Clinic for Surgery, Department of Cardiac and Thoracic Surgery, during March, April, and May of 2024. The study included a total of 41 respondents who underwent a cardiac surgery more than six months prior. The SF-36 health questionnaire was used.

Results. The study included 41 respondents, 27 (66%) males and 14 (34%) females. The examination of disease characteristics showed that 59% of respondents took medication for hypertension, while 34% of respondents took medication for diabetes. There were no significant differences in the quality of life of between respondents with hypertension and diabetes. The respondents who underwent combined surgery had significantly poorer physical and social functioning, and experienced more pain compared to those who had mitral valve surgery.

Conclusion. The quality of life of respondents following cardiac surgery is the lowest in the subscale of physical limitations, with no significant difference based on gender. The respondents in the older age group had lower physical functioning, vitality, and energy, and they reported a higher level of pain compared to younger participants.

Introduction

World Health Organization defines health as physical, mental, and social well-being. Quality of life refers to people's ability to function normally in daily life and feel satisfied with their participation in everyday activities (1). After undergoing cardiac surgery, patients often report pain, discomfort, feelings of depression, impatience, and a loss of overall well-being. Such feelings can significantly impair a patient's quality of life. In recent decades, the proportion of older adults in the European Union has increased, leading to a rise in the number of cardiac surgeries performed on elderly patients. With advancements and the introduction of new surgical techniques, lower mortality and morbidity rates have been observed in older patients (2). The results of some studies conducted in Croatia showed that a year after undergoing cardiac surgery, patients' health significantly improved compared to their condition before surgery (3).

Cardiovascular diseases

Cardiovascular diseases are one of the leading causes of illness and death worldwide. According to the World Health Organization, approximately 17.9 million people die from cardiovascular diseases each year globally. Moreover, it is estimated that by the year 2030, this number will have risen to 23 million per year (4). Within the cardiovascular system, a wide range of diseases and health conditions may occur. Cardiovascular disease of the heart refers to four entities: coronary artery disease (ischemic heart disease), cerebrovascular disease, peripheral arterial disease, and aortic atherosclerosis (5). Coronary artery disease is one of the leading causes of reduced quality of life, disability and death worldwide. It is the most common cardiovascular disease, developing as a result of an atherosclerotic plaque in the lumen of a blood vessel, and it represents a condition in which the coronary arteries are narrowed or blocked (6, 7). Coronary artery disease is classified into two main groups: stable ischemic heart disease and acute coronary syndrome. Acute coronary syndrome encompasses conditions such as acute myocardial infarction with ST-elevation (STEMI), acute myocardial infarction without ST-elevation (NSTEMI), and unstable angina pectoris (7).

Risk factors

Risk factors of developing cardiac diseases are diverse and include both modifiable and non-modifiable factors. Non-modifiable factors include gender, age, family history and genetics. Modifiable factors include smoking, obesity, lipid levels, and environmental factor. Unhealthy diet, physical inactivity and smoking are major risk factors for heart disease. Accelerated pace of life, the characteristic of modern world, has led to frequent consumption of fast and unhealthy food, which, combined with a sedentary lifestyle, has contributed to the increased incidence of ischemic heart disease in the population. A higher risk of developing heart disease is associated with male gender, diabetes, hypertension, hypercholesterolemia, and dyslipidemia (8, 9).

Diagnosis and treatment

Diagnosis is based on collecting medical history and conducting a detailed physical examination. Depending on the assessment, further diagnostic tests may be performed. The diagnostic process includes an electrocardiogram (ECG), echocardiography, radiographic imaging, stress testing, cardiac catheterization, and blood laboratory tests (7).

Treatment depends on the characteristics and severity of the disease itself. While treatment varies based on the clinical situation, it is important to emphasize that patients diagnosed with cardiovascular disease should be educated about secondary prevention measures and the importance of modifying risk factors (5). Stable angina pectoris typically presents with substernal chest pain or pressure that worsens with exertion or emotional stress and improves with rest or nitroglycerin, usually persisting for about two months. Pharmacological interventions include cardioprotective and anti-anginal medications. Percutaneous coronary intervention (PCI) is a minimally invasive procedure performed via radial or femoral artery access under X-ray guidance, classified as a mechanical revascularization technique. Coronary artery bypass graft surgery (CABG) is an important surgical procedure for patients with coronary artery disease (10). Acute coronary syndrome presents as a sudden onset of substernal chest pain or pressure, typically radiating to the neck and left arm. It may be accompanied by dyspnea, palpitations, dizziness, syncope, cardiac arrest, or new-onset congestive heart failure. In STEMI, the primary treatment is per-

cutaneous coronary intervention (PCI). Only if PCI is not available within two hours, thrombolytic therapy is indicated (11). According to the 2020 European Society of Cardiology guidelines, in high-risk NSTEMI patients, an early invasive strategy is recommended within 24 hours of hospital admission. However, in patients with very high risk (e.g., hemodynamic instability, cardiogenic shock, refractory or recurrent symptoms despite medication therapy, malignant arrhythmias, mechanical complications of acute myocardial infarction, acute heart failure, or significant ECG changes), an urgent invasive strategy is advised within two hours of admission. According to guidelines, NSTEMI patients are managed similarly to STEMI patients. Before performing invasive therapeutic procedures, it is necessary to assess indications and contraindications. In valvular heart disease, stenotic lesions and regurgitation can be distinguished, with diagnosis and disease severity determined through cardiac catheterization. Severe forms of valvular disease require surgical intervention, and depending on the affected valve, aortic or mitral valve surgery may be performed (replacement or reconstruction) (13, 14). All therapeutic approaches are characterized by specific side effects and complications that significantly impact the quality of life of patients. The negative effects of treating coronary artery disease can be mitigated by the timely recognition of early signs and symptoms, as well as patient education. The aim of cardiac surgical intervention is to improve patients' quality of life, with the level of improvement depending on the patient's preoperative condition and overall treatment outcomes (15 – 18).

Quality of life of cardiac patients

Quality of life as a concept encompasses an individual's well-being in relation to both positive and negative factors within the system of values and cultural context in which they live. It is assessed at a specific moment and can be described as the individual's level of satisfaction with the opportunities available in their own life. Common factors of quality of life include personal health (physical, mental, and spiritual), relationships, educational status, work environment, social status, economic well-being, sense of security, freedom, autonomy in decision-making, social belonging, and physical environment (18). The aim of cardiac surgery for patients with heart disease is to improve their quality of life in all the mentioned aspects. However, the level of post-surgical improvement is not the same in each patient (4, 19). Improvement in quality of life can be achieved by reducing difficulties and symptoms associated with heart disease (20, 21). Assessing patients' quality of life after heart surgery provides valuable information on the benefits and impact of cardiac surgical procedures in enhancing patients' functionality, quality of life, and level of independence.

A review of the available foreign literature identified numerous studies on this topic. However, only a small number of similar studies have been carried out in Croatia so far, which is why we decided to contribute to increasing that number.

Aim

The objective of this study was to examine the quality of life of patients following cardiac surgery and to analyze differences based on gender, age, diagnosis, and associated comorbidities.

Methods

Participants

A cross-sectional study was conducted at the Clinical Hospital Center Osijek, Clinic for Surgery, Department of Cardiac and Thoracic Surgery. The study included a total of 41 respondents who had undergone cardiac surgery, had been discharged to home care and had come for follow-up examination during March, April, or May of 2024.

The time elapsed since the cardiac surgery was more than six months.

The inclusion criteria were: cardiac surgery at least six months prior; signed informed consent from; legal age of majority: understanding and spoken knowledge of Croatian language.

Data protection

Personal data were collected and processed in compliance with General Data Protection Regulation (EU Regulation 2016/679). Adequate physical, technical and security protection measures were also applied. The respondents had the right to request a revision, supplementation, or removal of private information, as well as the right to restrict processing and withdraw consent at any time.

Ethics

The study was conducted in accordance with all applicable guidelines aimed at ensuring proper implementation and the safety of respondents, including the principles of Good Clinical Practice, the Declaration of Helsinki, the Croatian Health Care Act, and the Croatian Patient Rights Protection Act. Ethical approvals for the study were obtained from the Ethics Committee of the Clinical Hospital Center Osijek and the Ethics Committee of the Faculty of Dental Medicine and Health Osijek.

Instrument and study description

Prior to voluntarily signing the informed consent form, the respondents received a detailed explanation of the study. The respondents completed the questionnaire independently. They were also informed that questionnaire materials containing data from medical records would be used in the study. Furthermore, they received information on the general and specific benefits of the study, its duration and type of procedure, the confidentiality of the obtained data, and privacy protection. Additionally, the respondents were informed about their voluntary participation and their right to withdraw from the study at any time, with a note that refusal to participate would not affect the medical care provided.

A two-part questionnaire was used as the instrument to assess the quality of life of patients following cardiac surgery. The first part of the questionnaire consisted of the questions related to socio-demographic characteristics of respondents (age, gender, place of residence, education, marital status) and risk factors related to heart diseases (hypertension, diabetes, cholesterolemia, smoking). The second part of the questionnaire was a license-free SF-36 Health Questionnaire (22), validated Croatian version (23, 24). The questionnaire consisted of 36 items which assess patients' quality of life in the areas of physical functioning, limitations due to physical and emotional difficulties, vitality and energy, social functioning, bodily pain, general health, role emotional, and mental health. The subscales of vitality and energy, social and emotional functioning, and mental health provide an assessment of mental status, while the remaining subscales evaluate the physical health of the respondents. The total score of the SF-36 questionnaire is presented across eight subscales, with a minimum score of 0 and a maximum of 100. In all subscales, a higher score indicates better subjective health.

Statistics

Categorical data were presented as absolute and relative frequencies. Numerical data were described using the arithmetic mean and standard deviation, as well as the median and interquartile range. The normality of the distribution of numerical variables was tested using the Kolmogorov-Smirnov test. Due to deviations from normal distribution, numerical variables between two independent groups were tested using the Mann-Whitney U test. In cases involving three or more independent groups, numerical variables were tested using the Kruskal-Wallis test due to deviations from normal distribution. All *p*-values are two-sided. The significance level was set at α = 0,05. Computer software used for statistical analysis was SPSS (version 22.0, SPSS Inc., Chicago, IL, USA).

Results

The sample included 41 respondents. Most respondents, 28 (68%) of them, had elevated cholesterol levels (Table 1).

After undergoing cardiac surgery, the respondents were least limited by emotional difficulties, making their quality of life in this subscale the highest, while their quality of life was the lowest in the subscale of physical limitations (Table 2).

There was no significant difference in quality of life in respondents following cardiac surgery in relation to gender. It was evident that women were less limited due to physical difficulties than men (Table 3).

Respondents in the 65 – 79 age group had significantly lower physical functioning in relation to the

Table 1. **General information**

		N (%)
Gender	Male	27 (66)
	Female	14 (34)
Age	45 – 54	9 (22)
	55 – 64	11 (27)
	65 – 79	21 (51)
Place of residence	Urban	19 (46)
	Rural	22 (54)
Education	Primary	8 (20)
	Secondary	22 (54)
	Higher	11 (26)
Marital status	Married	26 (63)
	Divorced	3 (7)
	Single	2 (5)
	Cohabiting	4 (10)
	Widowed	6 (15)
Comorbidities	Diabetes	11 (27)
	Hypertension	18 (44)
	Obesity	1 (2)
	Other	11 (27)
Do you have elevated cholesterol level?	Yes	28 (68)
	No	13 (32)
Do you smoke?	Yes, up to 10 cigarettes a day	11 (27)
	Yes, more than 10 cigarettes a day	12 (29)
	I do not smoke	18 (44)
Medical diagnosis for your surgery	Combined surgery	9 (22)
	Aortic valve surgery	9 (22)
	Mitral valve surgery	7 (17)
	Coronary artery bypass surgery	16 (39)
How much time has passed since the surgery?	6 months to a year	26 (53)
	1 – 2 years	13 (32)
	More than 2 years	2 (5)
Total		41 (100)

Table 2. **Quality of life of respondents according to SF-36 subscales**

Subscale	Arithmetic mean	SD	Median	Interquartile range	Min - max
PF	64.87	25.11	65	47.5 - 85	0 - 95
RP	56.09	37.40	50	25 - 100	0 - 100
RE	73.98	36.90	100	33 - 100	0 - 100
VT	59.14	18.19	60	50 - 70	10 - 85
SF	61.89	23.54	62.5	50 - 75	0 - 100
BP	72.98	18.83	77.5	65 - 90	22.5 - 100
GH	54.09	16.34	52	47.5 - 65	10 - 85
MH	65.95	18.50	68	54 - 82	8 - 92

*PF – physical functioning, RP – role physical, RE – role emotional, VT – vitality, SF – social functioning, BP – bodily pain, GH – general health, MH – mental health

Table 3. **Quality of life of respondents according to SF-36 subscales in relation to gender**

Subscale	Median (interquartile range)		*p**
	Male	Female	
PF	65 (55 - 85)	67.5 (41.25 - 86.25)	0.92
RP	50 (25 - 75)	100 (25 - 100)	0.09
RE	100 (33 - 100)	100 (58 - 100)	0.42
VT	65 (55 - 75)	60 (43.75 - 70)	0.44
SF	62.5 (50 - 75)	50 (37.5 - 81.25)	0.56
BP	77.5 (67.5 - 77.5)	67.5 (55 - 93.5)	0.97
GH	55 (50 - 65)	51 (38.75 - 62.75)	0.45
MH	68 (60 - 84)	60 (52 - 77)	0.42

*Mann – Whitney U test; PF – physical functioning, RP – role physical, RE – role emotional, VT – vitality, SF – social functioning, BP – bodily pain, GH – general health, MH – mental health

Table 4. **Quality of life of respondents according to SF-36 subscales in relation to age**

Subscale	Median (interquartile range)			χ2-test	*p**
	45 - 54 (N = 9)	55 - 64 (N = 11)	65 - 79 (N = 21)		
PF	85 (32.5 - 92.5)	85 (80 - 90)	55 (45 - 65)	12.344	0.002[a]
RP	75 (25 - 100)	75 (25 - 100)	50 (25 - 87.5)	1.187	0.55
RE	100 (16.7 - 100)	100 (100 - 100)	100 (33.3 - 100)	2.496	0.29
VT	70 (45 - 77.5)	70 (60 - 80)	60 (50 - 62.5)	6.230	0.04[a]
SF	75 (56.25 - 93.75)	62.5 (50 - 100)	50 (37.5 - 68.75)	4.453	0.11
BP	77.5 (50 - 88.75)	90 (77.5 - 100)	67.5 (55 - 77.5)	7.505	0.02[a]
GH	52 (50 - 70)	55 (50 - 70)	52 (37.5 - 61)	6.665	0.47
MH	72 (60 - 86)	76 (56 - 84)	60 (52 - 76)	2.731	0.25

*Kruskal-Wallis test; [a]at $p<0.05$ significant difference between the 65 – 79 age group and the 55 – 64 age group; PF – physical functioning, RP – role physical, RE – role emotional, VT – vitality, SF – social functioning, BP – bodily pain, GH – general health, MH – mental health

55 – 64 age group (Kruskal-Wallis, post hoc p=0.002). They also had significantly lower vitality and energy (post hoc p=0.04). Respondents in the 65 – 79 age group experienced pain significantly more (post hoc p=0.02) in relation to the 55 – 64 age group (Table 4).

Respondents who had undergone combined surgery had significantly lower physical functioning (post hoc p=0.02), social functioning (post hoc p=0.02). Also, they experienced pain significantly higher (post hoc p=0.04) in relation to respondents who had had mitral valve surgery (Table 5).

There was no significant difference in the quality of life of respondents with hypertension and diabetes (Table 6).

Discussion

This study examined the quality of life of patients following cardiac surgery. Among the 41 respondents, 66 % were males, 63 % were married, and 54 % lived in rural areas, with the same percentage having completed secondary education. The demographic structure of the respondents in this study aligns with previous studies (20, 25), which also involved a higher proportion of male respondents (21, 26), who were married and had completed secondary education (21). The average age of the respondents was 61.1 years (25). The

Table 5. **Quality of life of respondents according to SF-36 subscales in relation to diagnosed disease**

Subscale	Median (interquartile range)				χ2-test	p*
	Combined surgery (N = 9)	Aortic valve surgery (N = 9)	Mitral valve surgery (N = 7)	Coronary artery bypass surgery (N = 16)		
PF	60 (37.5 - 72.5)	55 (35 - 98.5)	90 (80 - 95)	65 (47.5 - 85)	10.092	0.02 [a]
RP	50 (12,5 - 87,5)	50 (12,5 - 100)	100 (50 - 100)	50 (25 - 75)	4,933	0,18
RE	100 (33.3 - 100)	100 (50 - 100)	100 (100 - 100)	100 (33.3 - 100)	2.008	0.57
VT	55 (50 - 62.5)	60 (35 - 72.5)	75 (70 - 80)	62.5 (51.25 - 70)	6.588	0.09
SF	50 (37.5 - 50)	50 (43.75 - 75)	75 (62.5 - 100)	62.5 (50 - 84.73)	9.415	0.02 [a]
BP	67.5 (45 - 83.75)	67.5 (55 - 77.5)	90 (77.5 - 100)	77.5 (67.5 - 85)	8.154	0.04 [a]
GH	50 (30 - 54.5)	52 (50 - 62.5)	65 (50 - 80)	55 (42.5 - 64.25)	7.259	0.13
MH	60 (50 - 68)	68 (60 - 76)	84 (72 - 88)	60 (53 - 83)	6.775	0.08

*Kruskal-Wallis test; [a]at p<0.05 significant difference between combined surgery and mitral valve surgery; PF - physical functioning, RP - role physical, RE – role emotional, VT - vitality, SF - social functioning, BP - bodily pain, GH - general health, MH - mental health

Table 6. **Quality of life of respondents according to SF-36 subscales in relation to comorbidities**

Subscale	Median (interquartile range)		χ2-test	p*
	Diabetes (N = 11)	Hypertension (N = 18)		
PF	65 (45 - 85)	65 (51.25 - 81.25)	0.018	0.89
RP	50 (0 - 100)	50 (25 - 75)	0.118	0.73
RE	100 (33.3 - 100)	100 (33.3 - 100)	1.798	0.18
VT	60 (50 - 70)	60 (43.75 - 66.25)	0.592	0.44
SF	50 (37.5 - 75)	50 (37.5 - 65.62)	0.193	0.66
BP	67.5 (45 - 77.5)	72.5 (66.87 - 80.62)	2.344	0.13
GH	50 (30 - 52)	52 (39.25 - 60.5)	0.341	0.56
MH	60 (52 - 72)	60 (50 - 77)	0.100	0.75

*Kruskal-Wallis test; PF – physical functioning, RP – role physical, RE – role emotional, VT – vitality, SF – social functioning, BP –bodily pain, GH – general health, MH – mental health

results of this study indicated that 68% of respondents had elevated cholesterol levels, 44% were non-smokers, and 29% smoked more than 10 cigarettes per day. Given the average age of 61.9 years in the study, the high prevalence of hypertension can be considered expected. A study by Ostchega et al. also highlighted a high prevalence of hypertension in individuals over 60 years old (26), and studies conducted in Ghana (27) and Germany (28) similarly indicated an association between increasing age and the prevalence of hypertension. The State of Health in the EU: Croatia 2023 report showed that smoking is the second most significant risk factor contributing to increased mortality rates and that tobacco use in Croatia is among the highest in Europe. According to that report, approximately 22% of Croatian citizens reported being smokers, which is 3% higher than the European average (29). In this study, most respondents underwent coronary artery bypass surgery, and the most common time interval between the surgery and participation in the study was between six months and one year. Differences in quality of life after this period indicated that respondents experienced the least limitations due to emotional difficulties, making this subscale the highest-rated in terms of quality of life. Conversely, the lowest quality of life was reported in the subscale of physical limitations. A study by Peric et al. from 2017 suggested that respondents experienced an overall improvement in quality of life across all assessed areas following cardiac surgery. However, a slightly lower quality of life was observed in the subscale of physical limitations during the first six months following surgery (2). A study by Perotti et al. from 2019 showed that ten years after undergoing cardiac surgery, the respondents reported the highest quality of life in the subscale of psychological and physical functioning (21). The differences in levels of the quality of life across the examined subscales may depend on the patient's condition before surgery, their expectations, and the presence of risk factors. When analyzing differences in quality of life based on demographic variables, no significant differences were found between genders; however, women experienced fewer physical limitations than men. In a study conducted in Serbia, men assessed their quality of life higher than women, but both genders showed significant improvement after cardiac surgery (2). Respondents aged 65 and older reported significantly poorer physical functioning, lower vitality and energy levels, and higher levels of pain compared to younger respondents. A study conducted in New York also indicated that older age is a predictor of poorer quality of life after cardiac surgery, as participants over 75 years old reported significantly worse quality of life compared to those aged 74 and younger (30). The lower quality of life among older respondents can be explained by the fact that ageing negatively affects health according to self-assessments, particularly in the subscales of mental and physical health (31). The respondents who had undergone mitral valve surgery reported significantly better physical and social functioning, as well as significantly lower pain levels compared to those who had had a combined surgery. However, the comparison by diagnosis was based on a very small sample size, and despite the significant differences found, these results should be interpreted with caution, requiring further validation. A study by Kulik A. from 2017 indicated that one month after percutaneous coronary intervention, the respondents achieved significantly better quality of life in terms of physical limitations, pain, and overall health compared to those who underwent coronary artery bypass graft surgery (32). The same study showed that six months post-procedure, these differences leveled out, with coronary artery bypass graft patients experiencing fewer physical limitations compared to those who had undergone percutaneous coronary intervention (32). Findings from a study by Cohen et al., conducted on 1800 patients after cardiac surgery, suggested that the quality of life was better in the first six months following percutaneous coronary intervention. However, after six months, the quality-of-life outcomes became similar, and after one year, they were better in patients who underwent coronary artery bypass grafting (33). A study conducted in the Netherlands showed the same results (34). Studies by other authors indicated that patients a year after undergoing coronary artery bypass graft surgery demonstrated better quality of life outcomes compared to those who underwent percutaneous coronary intervention (35, 36). Diabetes and hypertension were among the most common comorbidities in respondents, and no significant differences were found in the quality of life between those with hypertension and diabetes. However, studies conducted in Serbia (2) and France (21) suggested that respondents with diabetes had a lower quality of life following cardiac surgery. In contrast, a study in Colorado found that hypertension and smoking were the most strongly associated with lower quality of life following cardiac surgery (37). A study by Pačarić et al. indicated poor quality of life among patients following cardiac surgery, regardless of risk factors (20). This study, like other studies in the literature (2, 21, 37),

provides valuable insights into the impact of disease risk factors on quality of life following cardiac surgery, highlighting the importance of primary prevention at an early age. Adhering to healthy lifestyle recommendations in youth can significantly influence the development of heart disease, while reducing risk factors in patients with an existing diagnosis can contribute to achieving positive treatment outcomes and improving the quality of life. The quality of life is becoming an increasingly important research topic in medicine, as it reflects both the objective clinical or physiological status and the patient's subjective perception of how their health condition or diagnostic and therapeutic procedures affect their life and well-being. Assessing the quality of life of patients after undergoing cardiac surgery is essential for a comprehensive understanding of their physical, emotional, and social needs. Although cardiac surgeries often save lives, they can have a significant impact on patients' physical functionality, psychological well-being, and social interactions. The quality of life following cardiac surgery varies across different parts of the world. An interesting difference in the domain of pain was observed in a study conducted in Iran (38), where pain was rated the lowest compared to this and other studies (2, 20, 21). This was attributed to non-adherence to prescribed medications and medical advice. Such findings highlight the need for different intervention strategies in different countries to improve the quality of life of patients. Through systematic monitoring and assessment of the quality of life, healthcare professionals can identify specific challenges patients face in the postoperative period and develop personalized interventions to enhance their overall well-being. This approach not only leads to better medical outcomes but also contributes to the improvement of rehabilitation programs, the reduction of psychological distress, and the facilitation of patients' reintegration into everyday life. In conclusion, it can be stated that assessing quality of life following cardiac surgery is not only of medical importance but also of social and emotional significance, as it directly contributes to the overall health and well-being of patients.

The limitations of this study include the fact that it was conducted in a single institution, with a small and convenience-based sample. Additionally, some important variables were assessed in a less sensitive manner, such as the time elapsed since surgery. Since the study was conducted in a single geographic area, the results cannot be generalized. However, they can serve as a basis for designing interventions aimed at improving the quality of life of patients.

Conclusion

The results of this study indicated that, after undergoing cardiac surgery, patients experience the least limitations due to emotional difficulties, making their quality of life in this subscale the highest, while their quality of life is the lowest in the subscale of physical limitations. There was no significant difference in the quality of life of patients following cardiac surgery based on gender. Patients aged 65 and older had significantly lower quality of life in the subscales of physical functioning, vitality and energy, and pain compared to younger patients. Patients who underwent mitral valve surgery had significantly better quality of life in the subscales of physical and social functioning, as well as pain, compared to those who underwent combined surgery. There was no significant difference in the quality of life between patients with hypertension and diabetes.

Author contributions

Conceptualization (AB, NF); Data curation (AB, BB, MC); Formal analysis (IB, KK); Funding acquisition (AB, ZG, NF); Investigation (AB, MC); Methodology (IB, KK, NF); Project administration (BB, KK); Resources (AB, ZG, MC); Software (IB, KK, MC); Supervision (IB, ZG, NF); Validation (IB, ZG, NF); Visualization (BB, IB); Writing – original draft (AB, BB, NF); Writing – review & editing (AB, BB, KK, IB, ZG, MC, NF).

Conflict of interest

The authors declare no conflict of interest.

Acknowledgments

We thank the participants for their participation in the study.

Funding

This research received no external funding.

References

1. Eraballi A, Pradhan B. Quality of life improvement with rehabilitation according to constitution of the World Health Organization for coronary artery bypass graft surgery patients: A descriptive review. Ayu. 2017;38(3-4):102-7. https://doi.org/10.4103/ayu.AYU_152_17
2. Peric V, Stolic R, Jovanovic A, Grbic R, Lazc B, Sovtic S, et al. Predictors of quality of life improvement after 2 years of coronary artery bypass surgery. Ann Thorac Cardiovasc Surg. 2017;23(5):233-8. https://doi.org/10.5761/atcs.oa.16-00293
3. Bishawi M, Hattler B, Almassi H, Spertus JA, Quin JA, Collins JF, et al. Preoperative factors associated with worsening in health-related quality of life following coronary artery bypass grafting in the Randomized On/Off Bypass (ROOBY) trial. Am Heart J. 2018;198:33-8. https://doi.org/10.1016/j.ahj.2017.12.014
4. Cardiovascular diseases [Internet]. World Health Organization. 2024. Available at: https://www.who.int/health-topics/cardiovascular-diseases#tab=tab_1.
5. Lopez EO, Ballard BD, Jan A. Cardiovascular Disease. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025.
6. Schmidt-RioValle J, Ejheisheh MA, Membrive-Jimenez MJ, Suleiman-Martos N, Albendin-Garcia L, Correa-Rodriguez M, et al. Quality of life after coronary artery bypass surgery: a systematic review and meta-analysis. Int J Environ Res Public Health. 2020;17(22):8439. https://doi.org/10.3390/ijerph17228439
7. Shahjehan RD, Bhutta BS. Coronary Artery Disease. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025.
8. Dalen JE, Alpert JS, Goldberg RJ, Weinstein RS. The epidemic of the 20(th) century: coronary heart disease. Am J Med. 2014;127(9):807-12. https://doi.org/10.1016/j.amjmed.2014.04.015
9. Koenig W. High-sensitivity C-reactive protein and atherosclerotic disease: from improved risk prediction to risk-guided therapy. Int J Cardiol. 2013;168(6):5126-34. https://doi.org/10.1016/j.ijcard.2013.07.113
10. Katz D, Gavin MC. Stable Ischemic Heart Disease. Ann Intern Med. 2019;171(3): ITC17-32. https://doi.org/10.7326/AITC201908060
11. Makki N, Brennan TM, Girotra S. Acute coronary syndrome. J Intensive Care Med. 2015;30(4):186-200. https://doi.org/10.1177/0885066613503294
12. Collet JP, Thiele H, Barbato E, Barthélémy O, Bauersachs J, Bhatt DL, et al. ESC Scientific Document Group. 2020 ESC Guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation. Eur Heart J. 2021;42(14):1289-367. https://doi.org/10.1093/eurheartj/ehaa575
13. Maganti K, Rigolin VH, Sarano ME, Bonow RO. Valvular heart disease: diagnosis and management. Mayo Clin Proc. 2010;85(5):483-500. https://doi.org/10.4065/mcp.2009.0706
14. Argulian E, Borer JS, Messerli FH. Misconceptions and Facts About Mitral Regurgitation. Am J Med. 2016;129(9):919-23. https://doi.org/10.1016/j.amjmed.2016.03.010
15. García Rodríguez LA, Martín-Pérez M, Hennekens CH, Rothwell PM, Lanas A. Bleeding risk with long-term low-dose aspirin: a systematic review of observational studies. PLoS One. 2016;11(8):e0160046. https://doi.org/10.1371/journal.pone.0160046
16. Elam MB, Majumdar G, Mozhui K, Gerling IC, Vera SR, Fish-Trotter H, et al. Patients experiencing statin-induced myalgia exhibit a unique program of skeletal muscle gene expression following statin re-challenge. PLoS One. 2017;12(8):e0181308. https://doi.org/10.1371/journal.pone.0181308
17. Teoli D, Bhardwaj A. Quality Of Life. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025.
18. Gjeilo KH, Stenseth R, Wahba A, Lydersen S, Klepstad P. Long-term health-related quality of life and survival after cardiac surgery: A prospective study. J Thor Cardiovasc Surg. 2018;156(6):2183-90. https://doi.org/10.1016/j.jtcvs.2018.05.087
19. Sanders J, Bowden T, Woolfe-Loftus N, Sekhon M, Aitken LM. Predictors of health-related quality of life after cardiac surgery: a systematic review. Health Qual Life Outc. 2022;20(1):79. https://doi.org/10.1186/s12955-022-01980-4
20. Pačarić S, Turk T, Erić I, Orkić Ž, Petek Erić A, Milostić-Srb A, et al. Assessment of the quality of life in patients before and after Coronary Artery Bypass Grafting (CABG): A prospective study. Int J Environ Res Public Health. 2020;17(4):1417. https://doi.org/10.3390/ijerph17041417
21. Perrotti A, Ecarnot F, Monaco F, Dorigo E, Monteleone P, Besch G, et al. Quality of life 10 years after cardiac surgery in adults: a long-term follow-up study. Health Qual. Life Outcomes. 2019;17(1):88. https://doi.org/10.1186/s12955-019-1160-7
22. Rand Corporation. 36-Item short form survey instrument (SF-36) [Internet]. 2019. Available at: https://www.rand.org/health-care/surveys_tools/mos/36-item-short-form/survey-instrument.html.
23. Juresa V, Ivanković D, Vuletić G, Babić-Banaszak A, Srcek I, Mastilica M, et al. The Croatian Health Survey--SF-36: I. General quality of life assessment. Coll Antropol. 2000;24(1):69-78.
24. Maslić Seršić D, Vuletić G. Psychometric evaluation and establishing norms of Croatian sf-36 Health Sur-

vey: framework for subjective health research. Croat. Med. J. 2006; 47: 95–102.

25. Colak Z, Segotić I, Uzun S, Mazar M, Ivancan V, Majtic-Kogler V. Health related quality of life following cardiac surgery--correlation with EuroSCORE. Eur J Cardiothorac SUrg. 2008;33(1):72-6. https://doi.org/10.1016/j.ejcts.2007.09.023
26. Ostchega Y, Fryar CD, Nwankwo T, Nguyen DT. Hypertension Prevalence Among Adults Aged 18 and Over: United States, 2017–2018. NCHS Data Brief. 2020;364:1-8.
27. Dai B, Addai-Danson S, Nutakor JA, Osei-Kwaye J, Larnyo E, Oppong S, et al. The prevalence of hypertension and its associated risk factors among older adults in Ghana. Frontiers in Cardiovascular Medicine. 2022;9:990616. https://doi.org/10.3389/fcvm.2022.990616
28. Muli S, Meisinger C, Heier M, Thorand B, Peters A, Amann U. Prevalence, awareness, treatment, and control of hypertension in older people: results from the population-based KORA-age 1 study. BMC Public Health. 2020;20(1):1049. https://doi.org/10.1186/s12889-020-09165-8
29. State of Health in the EU Hrvatska. Overview of health and healthcare status. 2023. Available at: https://eurohealthobservatory.who.int/publications/m/croatia-country-health-profile-2023
30. Jarvinen O, Saarinen T, Julkunen J, Huhtala H, Tarkka MR. Changes in health-related quality of life and functional capacity following coronary artery bypass graft surgery. Eur J Card Thor Surg. 2003;24(5):750-6. https://doi.org/10.1016/s1010-7940(03)00413-5
31. Lorem GF, Schirmer H, Wang CEA, Emaus N. Ageing and mental health: changes in self-reported health due to physical illness and mental health status with consecutive cross-sectional analyses. BMJ Open. 2017;7(1):e013629. https://doi.org/10.1136/bmjopen-2016-013629
32. Kulik A. Quality of life after coronary artery bypass graft surgery versus percutaneous coronary intervention: what do the trials tell us? Curr Opin Cardiol. 2017;32(6):707-14. https://doi.org/10.1097/HCO.0000000000000458
33. Cohen DJ, Van Hout B, Serruys PW, Mohr FW, Macaya C, den Heijer P, et al. Quality of life after PCI with drug-eluting stents or coronary-artery bypass surgery. The New Engl J Med. 2011;364(11):1016-26. https://doi.org/10.1056/NEJMoa1001508
34. van Domburg RT, Daemen J. Pedersen SS, Bressers M, van Herwerden LA, Firth BG, et al. Short- and long-term health related quality-of-life and anginal status after randomisation to coronary stenting versus bypass surgery for the treatment of multivessel disease: results of the Arterial Revascularisation Therapy Study (ARTS). EuroIntervention. 2008;3(4):506-11. https://doi.org/10.4244/89
35. Spertus JA, Nerella R, Kettlekamp R, House J, Marso S, Borkon AM, et al. Risk of restenosis and health status outcomes for patients undergoing percutaneous coronary intervention versus coronary artery bypass graft surgery. Circulation. 2005;111(6):768-73. https://doi.org/10.1161/01.CIR.0000155242.70417.60
36. Borkon AM, Muehlebach GF, House J, Marso SP, Spertus JA. A comparison of the recovery of health status after percutaneous coronary intervention and coronary artery bypass. Ann Thorac Surg. 2002;74(5):1526-30. https://doi.org/10.1016/s0003-4975(02)04063-8
37. Rumsfeld JS, Ho PM, Magid DJ, McCarthy M, Shroyer ALW, MaWhinney S, et al. Predictors of health-related quality of life after coronary artery bypass surgery. Ann Thorac Surg. 2004;77(5):1508-13. https://doi.org/10.1016/j.athoracsur.2003.10.056
38. Taghipour HR, Naseri MH, Safiarian R, Dadjoo Y, Pishgoo B, Mohebbi HA, et al. Quality of life one year after coronary artery bypass graft surgery. Iran Red Crescent Med J. 2011;13(3):171-7.

Croat Nurs J. 2025; 9(1): 103-114

Original scientific paper

The Relationship Between Cognitive Emotion Regulation and Depression, Anxiety, and Stress in Nurses

[1] Zrinka Pukljak
[1] Lada Perković
[2] Lidija Gavić

[1] University of Applied Health Sciences, Zagreb, Croatia
[2] University Hospital Centre Osijek, Osijek, Croatia

Article received: 08.02.2025.

Article accepted: 14.03.2025.

https://doi.org/10.24141/2/9/1/9

Author for correspondence:
Zrinka Pukljak
University of Applied Health Sciences, Zagreb, Croatia
E-mail: zrinka.pukljak@zvu.hr

Keywords: anxiety, depression, mental health, emotion regulation, nurses

Abstract

Introduction. Numerous studies have shown that there is significant relationship between nurses' emotional states and their work performance. This relationship is particularly significant when symptoms of distress (depression, anxiety, and stress) are elevated. Cognitive emotion regulation strategies that support effective responses to environmental challenges are termed adaptive, while those that impede functioning are known as maladaptive.

Aim. To examine mental health of nurses, as measured by depression, anxiety and stress and to investigate the contribution of cognitive emotion regulation strategies to the prediction of depression, anxiety and stress.

Methods. Data were collected in February 2023 at Osijek University Hospital. A total of 82 nurses participated in the study. Data were collected using sociodemographic questions, the Depression, Anxiety, and Stress Scale (Lovibond & Lovibond, 1995), and the Cognitive Emotion Regulation Questionnaire (Garnefski & Kraaij, 2006).

Results. Although most nurses do not experience depression, anxiety, and stress beyond the normal level, there is a non-negligible proportion who exhibit symptoms ranging from mild to extremely severe levels of these negative emotional states.

The largest proportion of severe and extremely severe results, that might be of clinical significance,

was observed for anxiety (18.53%). The maladaptive strategy of blaming others was found to be a significant predictor of depression, anxiety, stress and positive refocusing was significant predictor of stress.

Conclusion. The results suggest that the use of specific cognitive emotion regulation strategies plays an important role in nurses' mental health, measured as rates of depression, anxiety and stress. This underscores the need for and importance of implementing education and training programmes on cognitive emotion regulation strategies in the professional education of nurses.

Introduction

Nurses' professional functioning can be very stressful and emotionally challenging (1-3). Nurses are often expected to balance the challenging demands of patients, families and colleagues, and the healthcare system. While there is an abundance of literature highlighting the emotional challenges of the nursing profession, there is a lack of research that focuses specifically on how nurses manage their emotions. However, research into the concept of emotion regulation in nursing has evolved over the last decade (4).

Emotion regulation is a process by which 'individuals influence what emotions they have, when they have them, and how they experience and express these emotions' (5). It is a broad concept that encompasses self-regulation and regulation by others, as well as the direct management of emotions or the treatment of their underlying causes (6). These processes encompass biological, social, behavioural, and cognitive domains. On a physiological level, emotions are regulated by physical reactions such as increased heart rate or sweating. On a social level, they are controlled by seeking support from others, while on a behavioural level, reactions such as crying or withdrawal can contribute to coping with stress. Cognitive emotion regulation refers to thought strategies and processes that consciously or unconsciously attempt to alter the extent of the individuals' emotional experience and can be adaptive or non-adaptive (7-10). Garnefski et al. (8) identify four maladaptive cognitive strategies – self-blame, rumination, catastrophizing, and blaming others – and five adaptive strategies – acceptance, positive refocusing, planning refocus, positive reappraisal, and putting events into perspective.

Self-blame involves holding yourself accountable for difficult experiences, while rumination causes you to dwell on negative emotions and thoughts related to negative events. Catastrophizing means exaggerating the severity of situations, and blaming others means attributing your problems to external parties. Acceptance is about coming to terms with what has happened, while positive refocusing is about turning your attention to pleasant and uplifting thoughts, rather than the current challenges. Refocusing on planning emphasizes devising actionable steps to tackle negative situations, and positive reappraisal involves interpreting stressful events as opportunities for growth. Putting events in perspective involves minimizing their perceived severity. There is evidence that the habitual use of certain cognitive emotion regulation strategies is related to emotional outcomes (10-11). The comparison between clinical and non-clinical populations has shown that clinical population uses maladaptive strategies to a significantly greater extent, which are associated with a higher frequency of depressive and anxiety symptoms (7, 8, 12).

Accordingly, it is important to investigate the relationship between cognitive emotion regulation strategies and stress, anxiety and depression specifically in the nursing profession. Nurses' emotions can significantly affect their understanding and retention of information, motivation to achieve healthcare goals, accuracy of problem-solving, and the quality of communication and interpersonal relationships in the workplace (12, 13). Emotions can facilitate nurses' functioning, but they can also lead to declined effectiveness, especially when they arise in inappropriate contexts, are overly intense, or persist for too long (14, 15). The ability to regulate emotions has already been shown to influence nurses' professional efficacy, general psychological well-being (16, 17) and communication skills (16).

Wang et al (18) showed that nurses' cognitive emotion regulation strategies were associated with anxiety and depressive symptoms. A positive correlation was also found between emotional regulation strategies and the level of nurses' perceived stress (19-

20). Some research suggests that emotion regulation characteristics also predict all components of burnout: emotional exhaustion, depersonalization and personal accomplishment (21). However, Bamonti (22) reported that rumination and refocus on planning only predicted depersonalization. Moreover, it seems that maladaptive cognitive emotional strategies of nurses, alleviate PTSD symptoms after experiencing a stressful event (20).

These findings suggest that education about emotional regulation and the implementation of emotional regulation training programs may contribute to better emotional and professional functioning of nurses.

Karatzadeh et al (23) previously reported that the six-week emotional regulation training effectively changed symptoms of depression, anxiety and stress, as well as quality of life in intensive and critical care nurses.

As far as we know, the cognitive emotional strategies of nurses in Croatia have not been studied so far, although Filipec et al (24) have studied cognitive emotion regulation of physiotherapy students as far as health care workers are concerned.

Aim

To examine mental health of nurses, as measured by depression, anxiety and stress and to investigate the contribution of cognitive emotion regulation strategies to the prediction of depression, anxiety and stress.

Methods

Participants and procedure

This cross-secitonal study was conducted in February 2023. The convenience sample consisted of 82 nurses from the Departement of Gynaecology and Obstetrics and the Department of Neurology of the Osijek Universtiy Hospital, Osijek, Croatia. They were predominantly female (95.1%), aged between 21 and 65 years (M=44, SD=1.04). The length of service of the participants ranged from 1 to 46 years (M=22.8, SD=12.1). The additional sociodemographic data of the participants are presented in Table 1.

The questionnaire was completed using a paper-and-pencil method. Participation was voluntary and anonymous. The written instructions on the first page of the questionnaire provided details about the subject, purpose and objectives of the study. They also included information about the data usage, the voluntary nature of participation, measures ensuring anonymity and confidentiality, and participants' right to withdraw at any time without providing a reason.

With the consent of the head nurses from the two wards, printed questionnaires were placed in the nursing rooms, where ward nurses were invited to participate. The completed questionnaires were then deposited in a sealed box provided in the nursing room.

Table 1. **Sociodemographic data of pariticipants (N=82)**

		Frequency	%
Marital status	single	5	6.1
	in a relationship	14	17.1
	married	54	65.9
	divorced	6	7.3
	widowed	1	1.2
Education	secondary education	59	72
	post-secondary education	12	14.1
	tertiary education	10	12.2
Income	below average	0	0
	average	68	82.9
	above average	14	17.1

Instruments

Data were collected using previously validated instruments: the Cognitive Emotion Regulation Questionnaire and the Depression, Anxiety, and Stress Scale (DASS-21), and a series of socio-demographic questions.

The Cognitive Emotion Regulation Questionnaire (CERQ) is a self-report instrument designed to assess the cognitive emotion regulation strategies people use to regulate their emotions after negative experiences or situations.

Unlike other coping questionnaires, which often do not distinguish between person's thoughts and their actions, the CERQ focuses exclusively on cognitive processes (9, 26).

The CERQ consists of 36 items divided into 9 conceptually different subscales, with 4 items per subscale. Respondents rate the frequency with which they use each described cognitive strategy on a 5-point scale (1 – 'never,' 2 – 'very rarely,' 3 – 'sometimes,' 4 – 'often,' 5 – 'always').

The score is calculated by adding the relevant points for each cognitive strategy (from 4 to 20), with a high score indicating more frequent use of a particular strategy.

The meanings of the subscales are as follows:

1. **Self-Blame** – Preoccupation with one's own mistakes and the tendency to blame oneself for negative experiences (e.g., 'I feel like I am the one to blame.').
2. **Acceptance** – Thoughts about the impossibility of changing what has happened and acceptance that life goes on (e.g., 'I think I have to learn to live with it.').
3. **Rumination** – Persistent thoughts about the feelings and thoughts associated with the negative event (e.g., 'I am preoccupied with what I think and feel about what happened.').
4. **Positive Refocusing** – Thinking about other, more pleasant things instead of the actual event (e.g., 'I think about something nice instead of what happened.').
5. **Planning Refocus** – Thinking about the steps needed to deal with the event (e.g., 'I plan what would be the best to do.').
6. **Positive Reappraisal** – Thinking about how you can attribute positive meaning to the event in terms of personal growth (e.g., 'I believe I can become a stronger person after what happened.').
7. **Putting into Perspective** – Downplaying the severity of the situation by comparing it to other events and experiences (e.g., 'I tell myself that there are worse things in life.').

8. **Catastrophizing** – Explicitly emphasising and exaggerating the catastrophic nature of the situation (e.g., 'I often think that this is the worst thing that can happen to a person.').
9. **Blaming Others** – Thoughts of blaming others for what the individual has experienced (e.g., 'I feel that others are to blame for what happened.').

The CERQ can be used to measure cognitive strategies that represent an individual's response to stressful situations, as well as to measure cognitive strategies used in coping with specific stressful events or situations, depending on the nature of the research problems. In this study, we examined the general style of cognitive coping.

The CERQ has satisfactory psychometric properties, both in the original English version and in many adaptations in other countries. The Cronbach alpha values of the nine scales in the English version were between 0.75 and 0.86 (8). Similarly, the reliability in the sample used for the Croatian translation and validation of the questionnaire was satisfactory, as it ranged between 0.73 and 0.89 (25). In our sample, the α- values ranged from 0.63 to 0.87.

The Depression Anxiety Stress Scale (DASS-21; Lovibond & Lovibond, 1995) (26) is a self-report instrument designed to examine the frequency and presence of emotional states such as depression, anxiety, and stress. It consists of 21 items, and participants must rate the presence of symptoms in the past week on a 4-point scale (0 – almost never, 1 – sometimes, 2 – often, 3 – almost always). All items are negative, so a higher total score indicates greater psychological difficulties and more symptoms of depression, anxiety, and/or stress.

To make the results comparable with the norms of the longer version of the DASS scale, which consists of 42 items, the total score for each subscale of the DASS-21 is multiplied by 2. Each subscale has a maximum score of 42, with categories ranging from normal to extremely severe. The subscales are categorised into the following levels: normal, mild, moderate, severe, and extremely severe. There are certain critical values for each subscale: a value of more than 9 for depression, 7 for anxiety, and 14 for stress is considered critical.

The satisfactory psychometric properties of the Croatian version have already been reported (26). In our study, the Cronbach's alpha was 0.90 for depression, and 0.92 for both anxiety and stress.

Ethics

This study was approved by the Ethics Committee of the Osijek University Hospital (Reg. No. r:16643-2/2022.) and all participants gave their informed consent in person before participating in the study.

Statistics

The normality of the distribution for all variables was tested using the Kolmogorov-Smirnov test and the results showed statistically significant differences from the normal distribution. However, additional analyses of skewness and kurtosis showed that all variables in this study had a skewness within a value range of ±3, and kurtosis within a value range of ±10. The highest value of skewness was 1.40, and the highest kurtosis value was -1.11. This means that the criteria for conducting parametric analyses were met (27).

Results

Descriptive statistical methods were used to process the variables under investigation. The mean values are presented as the arithmetic mean, together with minimum and maximum values and the standard deviation.

The most frequently used cognitive emotional strategies are positive reappraisal, planning, and putting into perspective, all of which are adaptive strategies. In contrast, the least frequently used cognitive emotional strategies are self-blame and blaming others, which are maladaptive strategies.

The arithmetic values for depression and anxiety are higher than their critical values.

To examine the percentage of participants scoring high on the DASS subscales, Table 2 shows the distribution across categories from normal to extremely severe scores.

More than half of the participants fall into the 'normal' category, meaning they do not exhibit significant symptoms of depression, anxiety, or stress. A total of 4.25% of participants show some level of

Table 2. **Descriptive statistics for DASS-21 and CERQ questionnaires**

Variables	N	M	SD	TR
DASS-21:				
Depression	80	9.40	9.464	0-42
Stress	78	11.72	9.641	
Anxiety	81	8.07	9.703	
CER strategies:				
Self-blame	80	10.74	3.055	4-20
Blaming others	80	9.05	2.959	
Rumination	80	12.85	2.761	
Catastrophizing	79	10.67	3.331	
Putting into perspective	78	14.58	2.694	
Positive refocusing	77	13.29	3.663	
Positive reappraisal	80	15.06	2.739	
Acceptance	80	13.12	2.308	
Planning refocus	81	14.88	2.803	

Note: N- number of participants; TR- theoretical range; M- Mean; SD- Standard deviation

Table 3. **Distribution of participants according to the categories' of the DASS-21**

Categories	Depression		Anxiety		Stress	
	SR	N (%)	SR	N (%)	SR	N (%)
Normal	0-9	47 (58.75)	0-7	48 (59.26)	0-14	52 (66.67)
Mild	10-13	6 (7.5)	8-9	4 (4.94)	15-18	7 (8.97)
Moderate	14-20	19 (23.75)	10-14	14 (17.28)	19-25	12 (15.38)
Severe	21-27	3 (3.75)	15- 19	2 (2.47)	26-33	3 (3.85)
Extremely severe	28+	5 (6.25)	20+	13 (16.05)	34+	4 (5.13)
Total		80 (100)		81 (100)		78 (100)

Note: SR – range for severity ratings (cut offs); n-number of participants

depression, the same applies to 40.74% of participants in terms of anxiety, and 33% in terms of stress. We can assume that the participants' mental health is at risk in the 'severe' and 'extremely severe' category. That applies to 10% of the participants regarding depression, 18.52% participants regarding anxiety and 8.98% regarding stress. Anxiety is the most prevalent negative emotional state in the extremely severe category (16.05% of participants report symptoms of severe anxiety).

The results show that depression has a weak positive correlation with self-blame (r=0.388, $p<0.001$) and rumination (r=0.291, $p<0.01$) and a moderate positive correlation with blaming others (r=0.503, $p<0.01$) and catastrophizing (r=0.419, $p<0.01$). In addition, stress has a weak positive correlation with rumination (r=0.371, $p<0.01$), a moderate positive correlation with blaming others (r=0.448, $p<0.01$), catastrophizing (r=0.436, $p<0.01$) and self-blame (r=0.456, $p<0.001$) and a weak negative correlation with positive refocusing (r=- 0.249, $p<0.05$). Finally, there is a weak positive correlation between anxiety and self-blame (r=0.234, $p<0.05$) and rumination (r=0.342, $p<0.01$) and a moderate positive correlation with blaming others (r=0.516, $p<0.01$), catastrophizing (r=0.478, $p<0.01$).

Table 4. **Correlation between depression, stress and anxiety and cognitive emotional strategies**

Variables/ r	D	S	A	1	2	3	4	5	6	7	8
Stress	**.860 ****										
Anxiety	**.805 ****	**.850 ****									
Self-blame	**.388 ****	**.456 ****	**.234 ***								
Blaming others	**.503 ****	**.448 ****	**.516 ****	**.373 ****							
Rumination	**.291 ****	**.371 ****	**.342 ****	**.592 ****	**.403 ****						
Catastro-phizing	**.419 ****	**.436 ****	**.478 ****	**.564 ***	**.582 ****	**.610 ****					
Perspective	.003	.005	.088	**.282 ***	.194	**.481 ****	.188				
Positive refocus.	-.182	**-.249 ***	-.071	-.086	.126	.147	-.049	**.482 ****			
Positive reappr.	-.211	-.189	-.124	-.013	.004	.198	-.092	**.649 ****	**.659 ****		
Acceptance	.111	.055	.056	**.380***	.156	.407	**.297 ****	**.533 ****	.141	**.320 ****	
Planning refocus	-.110	-.148	-.107	.089	.062	.319	.001	**.536 ****	**.611 ****	**.772 ****	**.264 ***

Note: D – depression, S – stress, A – anxiety; 1-8 – CER startegies; *p<0.05, **p<0.01

A linear regression analysis was conducted to identify the cognitive emotion regulation strategies that predict the mental health variables. Prior validity assessments were conducted to ensure the appropriateness of the regression analyses. All tolerance values were above 2, variance inflation factors remained below 5 and Durbin-Watson values were in the range of 1.5 to 2.5 indicating that the conditions for conducting the regression analysis were met.

The variables included in the regression significantly explained 27% of the variance in depression (adjusted R^2=0.266; p<0.01). Blaming others proved to be significant positive predictor (p<0.01) of depression. The more participants tend to blame others, the higher their score on the depression scale is.

Table 5. **Results of regression analysis with depression as criterion (dependent variable)**

Predictors (independent variables)	β	t	p
(Constant)		-1.969	.053
Self-blame	.206	1.598	.114
Blaming others	.392	3.228	.002**
Rumination	-.072	-.529	.598
Catastrophizing	.118	.814	.418
Model Summary	Adjusted R^2 =.266		

Note: p-statistical significance significance (**p<0.01); β-regression coefficient; Adjusted R^2 - adjusted coefficient of determination

The variables included in the regression significantly explain 29% of the variance of anxiety (adjusted R^2=0.289; p<0.01). Blaming others proved to be a significant positive predictor of anxiety (p<0.01). A higher score on the blaming others corresponds to higher anxiety.

Table 6. **Results of regression analysis with anxiety as criterion (dependent variable)**

Predictors (independent variables)	β	t	*p*
(Constant)		-2.493	.015
Self-blame	-.128	-1.024	.309
Blaming others	.364	3.065	.003**
Rumination	.102	.783	.436
Catastrophizing	.276	1.941	.056
Model Summary	Adjusted R^2 =.289		

Note: *p*-statistical significance (**p<0.01); β-regression coefficient; Adjusted R^2 - adjusted coefficient of determination

Table 7. **Results of the regression analysis with stress as criterion (dependent variable)**

Predictors (independent variables)	β	t	*p*
(Constant)		-.238	.813
Self-blame	.208	1.539	.128
Blaming others	.322	2.644	.010*
Rumination	.122	.858	.394
Catastrophizing	.032	.222	.825
Positive refocusing	-.291	-2.845	.006**
Model Summary	Adjusted R^2 =.319		

Note: *p*-statistical significance (*p<0.05, **p<0.01); β-regression coefficient; Adjusted R^2 Adjusted coefficient of determination

The variables included in the regression significantly explain 32% of the variance of stress (adjusted R^2=0.319; p<0.01). More frequent blaming of others is associated with greater stress intensity, while positive refocusing is linked to lower stress levels.

Discussion

The aim of this study was to explore the mental health of nurses, as measured by depression, anxiety and stress levels, and to investigate the relationship between these unpleasant emotional states and nurses' cognitive emotion regulation strategies.

Table 2 shows the average stress, anxiety, and depression scores in our sample. The DASS-21 is primarily a screening instrument and not a clinical instrument. It cannot diagnose depression, anxiety or stress but it can indicate whether these problems are significantly affecting a person's life. People in the 'normal' category are likely to be coping well, while those in the 'mild' and 'moderate' categories may benefit from interventions such as stress management techniques. Participants in the 'severe' and 'extremely severe' categories may need professional support. The majority of participants fall into the category with nopronounced symptoms of stress, anxiety, and depression. For a non clinical population positive asymmetry in DASS-21 scores is common. Looking at the possible range of values from 0 to 42, the average values for stress, anxiety, and depression may appear relatively low at first glance. However, the mean values for anxiety and depression are actually above the critical cut-off value.

Among the nurses in our sample exhibiting extremely severe symptoms of negative emotional states, anxiety was the most prevalent (16,05%). We consider this to be the most concerning finding, highlighting the need to provide support to nurses experiencing such high levels of anxiety. This can be done through organized psychoeducation and providing professional support from mental health services. Research shows that additional training for team leaders in management techniques can also be helpful. Team leaders should be able to respond with empathy, understand the causes of nurses' anxiety and take tangible compassionate organizational acrions to support their well-being and clinical practice (28-29).

When comparing the results of our study with other studies that have used the DASS-21 in nurses, it is important to consider the timing of the research, as most recent studies report levels of anxiety, stress, and depression during the COVID-19 pandemic. For this reason, we will compare our results with a study in which the DASS-21 was administred to hospital nurses in Iran shortly before and than after the outbreak of COVID-19 (29). Before the outbreak of COVID-19, the mean scores for anxiety, stress and depression were 8.74 ± 7.77, 13.71 ± 8.89 and 9.90 ± 8.41. These are mean scores that are very similar to each other, i.e., they correspond closely. In the aforementioned study, anxiety, stress, and depression scores increased significantly during the first wave of the COVID-19 pandemic compared to pre-pandemic levels. In contrast, the study by Pačić-Turk et al. (30), which administred the DASS-21 to

135 healthcare workers in Croatia (including both doctors and nurses) during the COVID-19 pandemic, showed slightly lower average scores on the anxiety and depression subscales, while stress was similar to that in our study. This is particularly interesting, as this study involved healthcare workers from the departments most affected by COVID-19, where one might expect more pronounced negative emotional states compared to our study, which was conducted four years after the outbreak of the pandemic.

In terms of cognitive regulation strategies, our results show that nurses most frequently used positive reappraisal, planning, and putting into perspective, all of which are considered adaptive strategies.

The higher prevalence of adaptive strategies is consistent with previous research on cognitive emotional strategies of nurses in general hospital (17). Bamonti et al. (22) also found that planning, positive reappraisal, and acceptance were the most commonly used techniques among geriatric nurses. Similarly, Kharatzadeh et al (23) found that planning, positive reppraisal and putting into persprecitve are the most common among intensive and critical care nurses. To the best of our knowledge, the cognitive emotional regulation strategies of healthcare workers' in Croatia have not yet been studied. However, Filipec et al (24) examined cognitive emotional regulation in physiotherapy students and found that the most frequently used emotional regulation strategies were adapative ones, such as acceptance and positive reppraisal. They also found that female students used less effective cognitive emotion regulation strategies than male students.

Blaming others, as one of the maladaptive cognitve emotion regulation strategies, was found to to be siginificant predictor of all unpleasant emotional states (depression, anxiety, stress). Domardzaka and Fajkowska (31) found that blaming others for what happened was particularly strognly associated with reactive valence depression, composed of negative affect and attentional avoidance. In addition, Wang et al (18) found that all maladaptive strategies, including blaming others, were used much more frequently by nurses with depressive symptoms than those without depressive symptoms. In the same study, all maladaptive strategies, including blaming others, were used significantly more frequently by nurses with anxiety symptoms than those without anxiety symptoms.

Our results suggest that among the different CER strategies, blaming others was the only significant predictor of all three psychological distress outcomes. This suggests that externalizing blame may play a critical role in nurses' emotional well-being.

Previous research demonstrates that externalizing blame is associated with lower resilience and higher vulnerability to emotional exhaustion (32-33), which may explain why this strategy almost exclusively predicts anxiety, depression and stress in nurses. Although other maladaptive strategies (e.g., self-blame, catastrophizing, rumination) are known to correlate with stress, these are internal attributions that may promote some degree of emotional processing. Blaming others, on the other hand, inhibits emotional processing by focusing on external factors rather than adopting oneself. Another explanation can be that adaptive CER strategies buffer the negative effects of internal attributions such as self-blame, but this buffering effect does not apply to external attributions such as blaming others. Thus, this finding might encourage research to investigate the interplay between concepts from attribution theories and emotion regulation theories in future research.

Apart from the fact that blaming others is a maladaptive strategy, positive refocusing was found to be a significant predictor of stress, suggesting that nurses using this strategy have lower stress levels. This finding is consistent with previous research, that has consistently shown that the use of adaptive cognitive-emotional regulation strategies can help prevent the onset and persistence of mental illness and is often associated with better mental health outcomes (18, 23, 34).

It is interesting to note that, although the nurses in this study used more adaptive than maladaptive strategies, among the adaptive strategies, only positive refocusing was found to be significant predictor, and only for stress.

In a recent comprehensive review, positive refocusing was identified as a key component of most stress reduction programs (35). Bono et al. (36) demonstrated that the introduction of regular daily positive refocusing intervention in clinical settings significantly reduced stress levels in healthcare staff involved in direct patient care. Its effectiveness has also been demonstrated in nurses, particularly in coping with ethical dilemmas related to moral stress in the workplace (35) and in coping with workplace bullying (37).

Study limitations

We were not able to measure gender differences. The sample might be biased as it includes only those who responded, and these might have particular characteristics (e.g., motivation, more free time, interest in the topic), so the generalizability of the results might be limited.

Study strengths

Strategies of cognitive emotion regulation have not been studied in Croatia before. The detailed analysis of individual cognitive emotional strategies conducted in this study can serve as a practical guide for planning interventions to miaintain nurses' mental health.

Conclusion

Anxiety is the most pronounced negative emotional state among nurses. Although the majority of nurses do not exhibit pronounced symptoms of the negative emotional states studied, a smaller proportion of nurses with severe or extremely severe symptoms of anxiety, depression and stress should not be overlooked, as these categories indicate a high level of distress that may require professional intervention.

Of all the cognitive emotion regulation strategies studied, the maladaptive strategy of blaming others was found to be the most detrimental to nurses' mental health, as it was a significant predictor of more anxiety, depression, and stress. Among the adaptive strategies, positive refocusing was a predictor of lower stress.

Author contributions

Conceptualization (ZP, LG); Data Curation (ZP, LG); Formal Analysis (ZP, LP, LG); Investigation (LG); Methodology (ZP, LP, LG); Project Administration (ZP); Resources (ZP); Supervision (ZP); Validation (ZP, LP); Visualization (ZP, LP); Writing – Original Draft (ZP, LP, LG); Writing – Review & Editing (ZP, LP).

Conflict of interest

The authors declare no conflicts of interest.

Acknowledgments

The authors thank to head nurses of the Departement of Gynaecology and Obstetrics and the Department of Neurology of the Osijek Universtiy Hospital for their assistance in collecting the questionnaires.

Funding

This research received no external funding.

Declaration of Generative AI in Writing

During preparation, the author(s) used ChatGpt Open AI for language enhancement.

References

1. Woo T, Ho R, Tang A, Tam W. Global prevalence of burnout symptoms among nurses: A systematic review and meta-analysis. J Psychiatr Res. 2020;123:9–20. https://doi.org/10.1016/j.jpsychires.2019.12.015
2. Bai JH, Ravindran V. Job stress among nurses. Indian J Contin Nurs Educ. 2019;20(2):92. http://dx.doi.org/10.4103/IJCN.IJCN_11_20
3. Søvold LE, Naslund JA, Kousoulis AA, Saxena S, Qoronfleh MW, Grobler C, et al. Prioritizing the mental health and well-being of healthcare workers: an urgent global public health priority. Front Public Heal. 2021;9:679397. https://doi.org/10.3389/fpubh.2021.679397
4. Fasbinder A, Shidler K, Caboral-Stevens M. A concept analysis: Emotional regulation of nurses. Nurs Forum [Internet]. 2020;55(2):118–27. https://doi.org/10.1111/nuf.12405
5. Gross JJ. Antecedent- and response-focused emotion regulation: Divergent consequences for experience, expression, and physiology. J Pers Soc Psychol. 1998;74(1):224–37. https://doi.org/10.1037//0022-3514.74.1.224
6. Thompson RA, Calkins SD. The double-edged sword: Emotional regulation for children at risk. Dev Psychopathol. 1996;8(1):163–82. https://doi.org/10.1017/S0954579400007021
7. Garnefski N, Kraaij V. The cognitive emotion regulation questionnaire: Psychometric features and prospective relationships with depression and anxiety in adults.

Eur J Psychol Assess. 2007;23(3):141–9. https://doi.org/10.1027/1015-5759.23.3.141

8. Garnefski N, Kraaij V, Spinhoven P. Negative life events, cognitive emotion regulation and emotional problems. Personal Individ Differ. 2001;30(8):1311–27. https://doi.org/10.1016/S0191-8869(00)00113-6
9. Aldao A. The Future of Emotion Regulation Research: Capturing Context. Perspect Psychol Sci. 2013;8(2):155–72. https://doi.org/10.1177/17456916124595
10. Mocan A, Iancu S, Băban AS. Association of cognitive-emotional regulation strategies to depressive symptoms in type 2 diabetes patients. Rom J Intern Med. 2018;56(1):34–40. https://doi.org/10.1515/rjim-2017-0037
11. Sakakibara R, Kitahara M. The relationship between Cognitive Emotion Regulation Questionnaire (CERQ) and depression, anxiety: Meta-analysis. Japanese J Psychol. 2016;87(2):179–85. https://doi.org/10.4992/jjpsy.87.15302
12. Garnefski N, Teerds J, Kraaij V, Legerstee J, van den Kommer T. Cognitive emotion regulation strategies and depressive symptoms: Differences between males and females. Pers Individ Dif. 2004;36(2):267–76. https://doi.org/10.1016/S0191-8869(03)00083-7
13. Yu CC, Liu ZQ, Zhao M, Liu Y, Zhang Y, Lin A, et al. The Mediating Role of Emotion Management, Self-Efficacy and Emotional Intelligence in Clinical Nurses Related to Negative Psychology and Burnout. Psychol Res Behav Manag. 2023;16:3333–45. https://doi.org/10.2147/prbm.s417729
14. Mehrabi A, Mohammadkhani P, Dolatshahi B, Pourshahbaz A, Mohammadi A. Emotion Regulation in Depression: An Integrative Review. Pract Clin Psychol [Internet]. 2014;2(3):181–94. Available at: http://jpcp.uswr.ac.ir/article-1-184-en.html
15. Parrott WG. Implications of Dysfunctional Emotions for Understanding How Emotions Function. Rev Gen Psychol. 2001;5(3):180–6. https://doi.org/10.1037/1089-2680.5.3.180
16. Lee JH, Sim IO. Analysis of the relationship between the psychological well-being, emotional intelligence, willpower, and job-efficacy of clinical nurses: a structural model application. Int J Environ Res Public Health. 2021;18(11):5582. https://doi.org/10.3390/ijerph18115582
17. Ghaemi F, Soltaninejad M, Khaje F. The prediction of quality of life based on cognitive emotion regulation strategies and communication skills in female nurses. Iran J Psychiatr Nurs [Internet]. 2018;6(5):50–6. Available at: http://ijpn.ir/files/site1/user_files_38e7a3/msoltani-A-10-1067-1-9c559c7.pdf
18. Wang QQ, Fang YY, Huang HL, Lv WJ, Wang XX, Yang TT, et al. Anxiety, depression and cognitive emotion regulation strategies in Chinese nurses during the COVID-19 outbreak. J Nurs Manag. 2021;29(5):1263–74. https://doi.org/10.1111/jonm.13265
19. Vivian E, Oduor H, Arceneaux SR, Flores JA, Vo A, Madson Madden B. A cross-sectional study of perceived stress, mindfulness, emotional self-regulation, and self-care habits in registered nurses at a tertiary care medical center. SAGE Open Nurs. 2019;5:1–15. https://doi.org/10.1177/2377960819827472
20. Xue M, Yuan Y, Chen H, Liu Y, Dai M, Sun H, et al. Perceived stress and symptoms of post-traumatic stress disorder in nurses: A moderated mediation model of maladaptive cognitive emotional regulation and psychological capital. Front Psychiatry. 2022;13:902558. https://doi.org/10.3389/fpsyt.2022.902558
21. Salvarani V, Rampoldi G, Ardenghi S, Bani M, Blasi P, Ausili D, et al. Protecting emergency room nurses from burnout: The role of dispositional mindfulness, emotion regulation and empathy. J Nurs Manag. 2019;27(4):765–74. https://doi.org/10.1111/jonm.12771
22. Bamonti PM, Smith A, Smith HM. Cognitive Emotion Regulation Strategies Predict Burnout in Geriatric Nursing Staff. Clin Gerontol [Internet]. 2022;45(5):1236–44. https://doi.org/10.1080/07317115.2020.1829230
23. Kharatzadeh H, Alavi M, Mohammadi A, Visentin D, Cleary M. Emotional regulation training for intensive and critical care nurses. Nurs Heal Sci. 2020;22(2):445–53. https://doi.org/10.1111/nhs.12679
24. Filipec M, Kuzmić A, Ćurlin M, Vlahek P. Cognitive emotional regulation in physiotherapy students in Croatia. Heal Psychol Behav Med [Internet]. 2024;12(1):1–15. https://doi.org/10.1080/21642850.2024.2419842
25. Soldo L, Vulić Prtorić A. Upitnik kognitivne emocionalne regulacije. In: Zbirka psihologijskih skala i upitnika, svezak 9. Sveučilište u Zadru; 2018. Available at: https://lumen.kzz.hr/wp-content/uploads/2023/03/Zbirka-psihologijskih-skala.pdf
26. Ivaković F. Skale depresije, anksioznosti i stresa DASS-S i DASS-0 Priručnik [Internet]. 2019. Available at: https://www2.psy.unsw.edu.au/groups/dass/Croatian/Selekcija%20DASS/Priru%C4%8Dnik%20DASS%20Ivakovi%C4%87.pdf
27. Kline RB. Principles and practice of structural equation modeling. 4th ed. New York; London; The Guilford Press: 2016.
28. Hofmeyer A, Taylor R. Strategies and resources for nurse leaders to use to lead with empathy and prudence so they understand and address sources of anxiety among nurses practising in the era of COVID-19. J Clin Nurs. 2021;30(1–2):298–305. https://doi.org/10.1111/jocn.15520
29. Simonetti V, Durante A, Ambrosca R, Arcadi P, Graziano G, Pucciarelli G, et al. Anxiety, sleep disorders and self-efficacy among nurses during COVID-19 pandemic: A large cross-sectional study. J Clin Nurs. 2021;30(9–10):1360–71. https://doi.org/10.1111/jocn.15685
30. Pačić-Turk L, Ćepulić DB, Haramina A, Bošnjaković J. The relationship of different psychological factors with the level of stress, anxiety and depression in

health care workers during the COVID-19 pandemic in the Republic of Croatia. Suvremena Psihol. 2020;23(1):35–53.

31. Domaradzka E, Fajkowska M. Cognitive emotion regulation strategies in anxiety and depression understood as types of personality. Front Psychol. 2018;9:856. https://doi.org/10.3389/fpsyg.2018.00856
32. Palmieri PA, Peterson LT. Attribution theory and healthcare culture: Translational management science contributes a framework to identify the etiology of punitive clinical environments. Adv Health Care Manag. 2009;8:81–111. https://doi.org/10.1108/S1474-8231(2009)0000008008
33. Okpala P. Nurses' perspectives on the impact of management approaches on the blame culture in healthcare organizations. Int J Healthc Manag [Internet]. 2020;13(Supp1):199–205. https://doi.org/10.1080/20479700.2018.1492771
34. Potard C, Landais C. Relationships between frustration intolerance beliefs, cognitive emotion regulation strategies and burnout among geriatric nurses and care assistants. Geriatric Nursing. 2021;42(3):700-7. https://doi.org/10.1016/j.gerinurse.2021.02.018
35. Bernuzzi C, Setti I, Maffoni M, Sommovigo V. From moral distress to burnout through work-family conflict: the protective role of resilience and positive refocusing. Ethics Behav. 2022;32(7):578–600. https://www.tandfonline.com/doi/full/10.1080/10508422.2021.1955682
36. Bono JE, Glomb TM, Shen W, Kim E, Koch AJ. Building positive resources : effects of positive events and positive reflection on work stress and health Georgia Institute of Technology. Acad Manag J. 2013;56(6):1601–27. https://doi.org/10.1080/10508422.2021.1955682
37. Berry PA, Gillespie GL, Fisher BS, Gormley D, Haynes JT. Psychological distress and workplace bullying among registered nurses. Online J Issues Nurs. 2016;21(3):8. https://doi.org/10.3912/OJIN.Vol21No03PPT41

Croat Nurs J. 2025; 9(1): 115-126

Professional paper

Analysis of Patient Falls at Clinical Hospital Dubrava

[1] Natalia Cesar
[1] Tea Jelić
[1] Sanja Kunštek

[1] Dubrava University Hospital, Zagreb, Croatia

Article received: 03.10.2024.

Article accepted: 30.12.2024.

https://doi.org/10.24141/2/9/1/10

Author for correspondence:
Tea Jelić
Dubrava University Hospital, Zagreb, Croatia
E-mail: tjelic@kbd.hr

Keywords: fall, patient, assessment, education

Abstract

Aim. The aim of the conducted analysis was to determine the frequency of patient falls at the Clinical Hospital Dubrava and to present, based on the data collected, the most common risk factors for falls, causes and consequences of falls, the location and manner of falls, and the need for additional interventions or actions taken after a fall.

Methods. The analysis examined falls in 22,639 patients hospitalized at the Clinical Hospital Dubrava from July 1, 2022, to June 30, 2023. The analysis included the age and gender of patients, fall risk assessment using the Morse Scale, location and manner of falls, falls with and without consequences, and whether patient falls required additional healthcare interventions. Data were sourced from the Hospital Information System (HIS). The study used graphic and tabular methods of presentation through MS Excel.

Results. A total of 144 patient fall cases were reported, which represents an incidence rate of 6.3 falls per 1,000 hospitalizations, or 0.935 falls per 1,000 patient days. A significant clinical issue is the fact that 75% of patients were over 65 years old. Using the Morse Scale for fall risk assessment, 47% of patients were assessed as being at high risk for falls. In terms of internal and external risk factors, 77% of falls were due to internal factors, with the majority of falls occurring in the patient's room (78%). Additional interventions requiring staff time and presence were necessary for 53% of patients.

Conclusion. The long-term goal is to reduce the incidence of falls, which will lead to a reduction in treatment costs and a shorter hospital stay for patients. It is essential to develop a quality system to provide the best possible and reliable care for patients.

Introduction

Clinical Hospital Dubrava recognizes quality as one of the fundamental values for defining goals and strategies for action in providing healthcare. The Department for Quality Assurance and Improvement of Healthcare at Clinical Hospital Dubrava conducted an analysis of falls among hospitalized patients over a year in order to raise the culture of patient safety. Achieving and improving the quality of healthcare is based on the principles of efficiency, appropriateness and safety for patients, staff and all healthcare procedures. Key elements include systematic monitoring, assessment and planning of activities to improve procedures, with the aim of increasing efficiency, eliminating deficiencies and preventing adverse events. Patient safety, as a key indicator of the quality of the healthcare system, requires effective and coordinated communication between staff members with different levels of education, experience and perspectives on treatments, thus ensuring optimal cooperation and better outcomes for patients. Well-coordinated cooperation is crucial for reducing adverse events and ensuring safe and effective treatment.

Fall

A fall among hospitalized patients is defined as an unexpected and involuntary descent to the ground, floor, or other lower surface, not due to syncope or external force (1). It is also considered a medical error that requires the elimination of such errors from the hospital environment. Falls in hospital wards, especially among patients older than 65 years, can cause permanent disability, prolonged treatment, increased costs, and death (2). They are a common cause of morbidity and mortality, associated with disability, longer hospital stays, and the risk of transferring patients to other facilities. Falls result from a variety of factors, including the patient's health condition, response to treatment, and the infrastructure and safety of the hospital environment. Therefore, falls in a hospital setting are an important indicator of patient safety (3). They cause functional decline, prolonged hospital stay, and increased institutional liability. Geriatric research focuses on strategies and interventions to prevent falls in institutional settings. Falls with injuries, such as fractures, are a serious health problem, causing other adverse outcomes, such as decubitus or hospital infections (4).

Fall risk factors

Risk factors for falls can be external and internal. External risks include medications that affect the central nervous system, rooms with cluttered furniture, bathrooms, slippery floors or floor mats, beds, inappropriate footwear, walking aids (crutches, walkers), and poor lighting. Internal risks include previous falls, poor vision, unsteady gait, general weakness, fatigue, weakness in the legs, diseases of the locomotor system, changes in mental status (restlessness, confusion), dizziness, acute illnesses (orthostatic hypotension, stroke, fever) and chronic illnesses (diabetes, cataracts, glaucoma, arthritis, dementia). By combining these factors, the risk of falling increases. The increased risk of falls in hospital is also associated with older age and poorer general health condition. Several observational studies on falls in residents of nursing homes revealed an increased risk of falls in patients with gait disorders or frailty (5). Hospitalization of an older adult patient can lead to unwanted harmful consequences of procedures that were originally intended as therapeutic. Prolonged bed rest, polypharmacy, medical procedures (e.g., intravenous lines, urinary catheters), telemetry, various restrictions on movement, sensory deprivation, disruption of normal sleep patterns, and lack of proper nutrition contribute to functional, physical, and cognitive decline. Since many older adults live in a balance between independence and functional dependence, even a small decline in function during hospitalization can place them in a position of newly acquired dependence (6). Medication use may be one of the most common and modifiable risk factors for falls, although observational studies have difficulty disentangling the effects of medications from underlying medical conditions. Medications that target the central nervous system, such as neuroleptics, benzodiazepines, antidepressants, and other sedatives (e.g., zolpidem), appear to be associated with an increased risk of falls (7). Other drug groups associated with an increased risk of falls include: vasodilators, diuretics, beta blockers and drugs for diabetes (8). Recent changes in drug dosages or new drugs, especially benzodiazepines, may also be an important factor risk of falling.

Assessment of fall risk factors

Evaluating the risk of falls is a key aspect of quality control in healthcare. Efforts to minimize adverse events, such as patient falls during hospitalization, focus on developing and utilizing tools to assess and identify patients at risk (9). The most commonly used fall risk assessment instruments are the Morse Fall Scale (MFS), the St. Thomas Risk Assessment Tool in Falling Elderly Inpatients (STRATIFY) and Hendrich II Risk Fall model (HFRM II). For assessing the risk of falling in Clinical Hospital Dubrava, the Morse scale is used as an integral part of the nursing documentation defined by The Regulation on Nursing Documentation in Hospital Healthcare Institutions (Figure 1).

The Morse Fall Scale (MFS) assesses six areas of potential fall risk: previous falls, secondary diagnoses, mobility aids/self-care, intravenous therapy, gait/posture/transfer, and mental status. The range of scores is 0 to 125, with higher scores indicating greater risk of falls (10).

Fall as an indicator of quality

Clinical Hospital Dubrava continuously adjusts its quality system in accordance with the provisions of the Regulation on Accreditation Standards for Hospital Healthcare Institutions ("Official Gazette", No. 92/19) and the Regulation on Quality Standards in Healthcare ("Official Gazette", No. 79/11), aiming to improve healthcare quality. Patient safety is one of the fundamental principles of the quality system, achieved by implementing measures to prevent adverse events that could cause death or harm to patients' health. These measures, based on current knowledge in medical procedures, ensure the best possible treatment outcomes and reduce the risk of negative health consequences (11). Clinical Hospital Dubrava strives to provide top-quality health care, however errors and adverse events can occur in any medical procedures. Adverse events are divided into unexpected events, patient safety indicators and events towards staff, and can occur at all levels of the health system. The quality assurance and improvement system within Clinical Hospital Dubrava enables timely reporting and documentation of adverse events through the patient

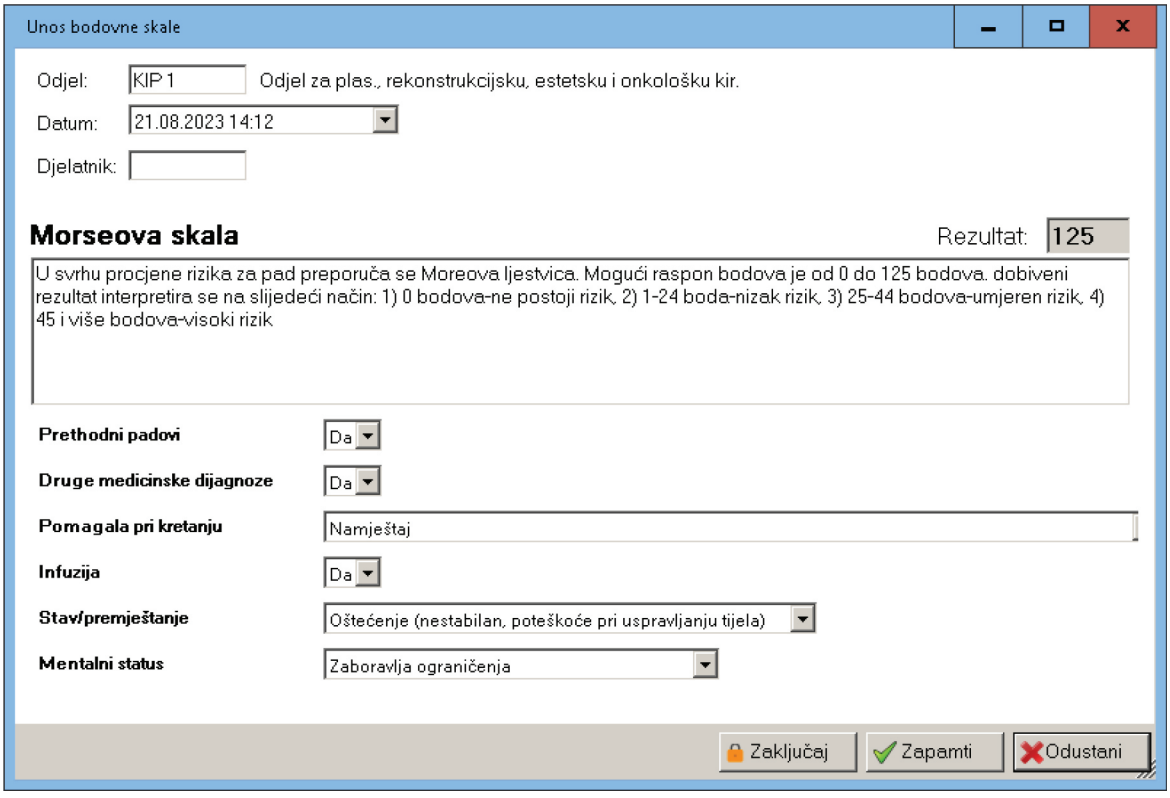

Figure 1. **Morse scale for assessing the risk of falling**
Taken from the Hospital Information System of Clinical Hospital Dubrava. Accessed on 21. 8. 2023

and staff safety system. Reports on patient falls include details of the mechanism of the fall, location, time, injuries, loss of consciousness, relevant environmental information, and strategies for preventing the risk of falls. Clinical Hospital Dubrava has a patient safety management procedure in place, which provides a system for recognizing, reporting, and learning from incidents that affect patient and staff safety, including "near miss" events. The unit where the fall occurred must analyze the causes and submit a report to the quality assistant director within seven days. A multidisciplinary approach is key to continuously improving the quality of healthcare procedures. The Health Care Quality Assurance and Improvement Service has established a system for recognizing, reporting, and learning from adverse events, which includes the cooperation of all employees and patients and the importance of reporting and analyzing all adverse events in order to prevent future problems and improve quality. Nurses/technicians have a duty to report every patient fall by documenting it in e-care system and completing a report in the Hospital Information System (HIS) (Figure 2). Proper documentation must be factual, timely, and in accordance with the requirements of quality standards.

Clinical Hospital Dubrava has established methods for identifying and detecting incidents that affect or threaten the safety of patients and staff, including medical errors and other adverse events, respectively patient safety indicators (PSI).

PSI is integrated into HIS, module "Accreditation". In order to obtain credible information, it is the obligation of every healthcare professional to enter patient treatment data into HIS in a timely and accurate manner. Data is automatically retrieved overnight from the daily input of information for individual patients at the level of organizational units.

The descriptive data lists from the Sector for Hospital Health Care and Quality of Health Care of the Ministry of Health include: number of sick days, number of patient falls among cases defined by inclusion and exclusion criteria, as well as the patient age and gender. Inclusion criteria: patients discharged during the reporting period. Exclusion criteria: falls resulting from the application of force, syncope R55 (ICD-10), and epilepsy G40 (ICD-10). The table records data such as: case identification number (which allows the institution to identify the patient), date of birth, gender, date of admission, diagnosis (ICD-10), patient's fall risk at admission, date of the incident (fall), time of the incident, location of the incident, consequence of the fall, and date of discharge from the institution. The descriptive lists for each indicator, including falls, comply with the Manual on Healthcare Quality Standards and their application.

Fall prevention

Fall prevention requires knowledge of risk factors and implementation of preventive measures to reduce exposure or eliminate the risk completely. Fall

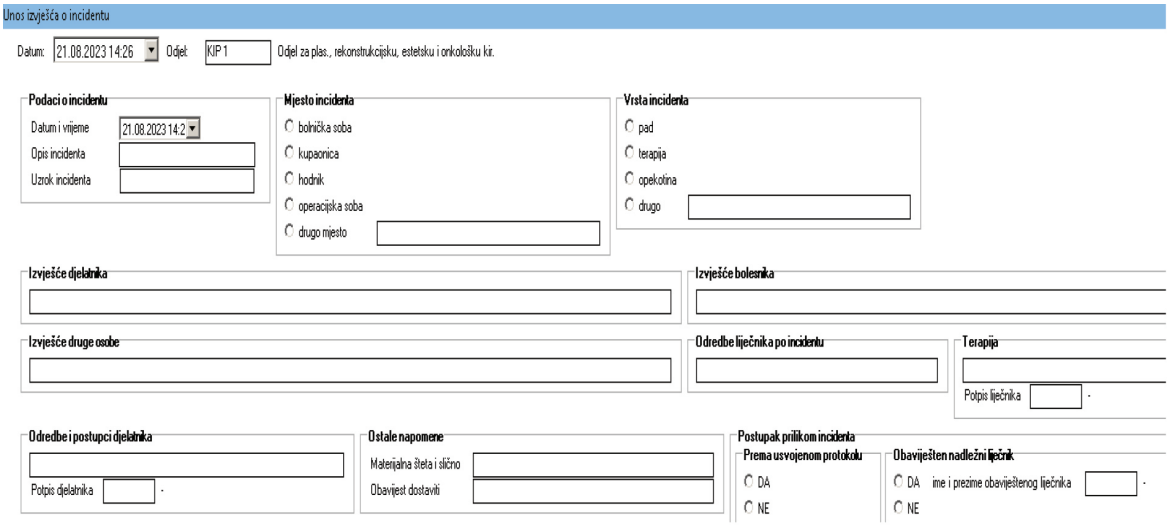

Figure 2. **Incident report.**
Taken from HIS Clinical Hospital Dubrava. Accessed on 21. 8. 2023

prevention in the elderly is a challenge due to demographic trends of aging populations. It is estimated that, if the necessary preventive measures are not taken, the number of injuries due to falls will double by 2030 (12). This makes fall prevention a very important challenge for hospital risk management and maintaining a culture of patient safety.

Nurses and technicians prevent patient falls by assessing risk, providing information, adjusting beds and wheelchairs, using safety rails, providing physical assistance with getting up, and maintaining a clean and safe environment. They also educate patients on the use of assistive devices such as canes, walkers, glasses, or hearing aids, and ensure adequate lighting, safe floors, bathtubs, and doorbells are within reach. Fall prevention includes educational programs, multidisciplinary collaboration, and the availability of equipment, such as adapted beds and alarms that facilitate the identification of patients at risk. The implementation of interventions aimed at reducing the risk of falls is key.

The Croatian Institute of Public Health, in cooperation with the Ministry of Health, has developed educational material for mature and elderly people with the aim of reducing falls and their consequences. The leaflet contains practical guidelines on regular health checks, adopting healthy habits, increasing stability when moving, and adapting the home to create a safer environment. It is available at the following link: https://www.hzjz.hr/wp-content/uploads/2022/10/Sprijecite-pad.pdf (13).

Aim

- examine the frequency of patient falls at Clinical Hospital Dubrava in the period from July 1, 2022 to June 30, 2023,
- present the most common risk factors for falls, causes and consequences of falls, place and manner of fall,
- analyze the need for additional interventions/actions taken after the fall.

Methods

The analysis was conducted at the level of inpatient organizational units of Clinical Hospital Dubrava in the period from July 1, 2022 to June 30, 2023. Data were collected from the HIS reporting system, incident reports, e-care course, medical history and discharge letters. Data collected included age and gender, the patient's risk of falling upon admission to the institution (Morse scale), the location and manner of the fall, time, types of causes and consequences of the fall, and the need for additional interventions, or actions taken after the fall. This paper uses graphical and chart presentation methods using MS Excel.

The rate in relation to the number of hospitalized patients is expressed as follows:

Number of falls/total number of hospitalized patients x 1000.

The rate in relation to the number of sick days is expressed as follows:

Number of patient falls/patient days x 1000.

Ethics

The Ethics Committee of the Clinical Hospital Dubrava approved the conduct of scientific research entitled: "Falls as an indicator of the quality of healthcare; Analysis of falls in the Clinical Hospital Dubrava" at the session held on October 27, 2023. approval number: 2023/2710-05. During and after the research, privacy and confidentiality of data were ensured, in accordance with ethical guidelines and legal regulations on the protection of personal data.

Results

Data from 20 organizational units of Clinical Hospital Dubrava, where patient falls were recorded, were analyzed. A total of 144 cases of patient falls were reported, which represents an incidence rate of 6.3 falls per 1000 hospitalizations, or 0.935 falls per 1000 patient days.

The total number of discharged patients in the period from July 1, 2022 to June 30, 2023 was 22,639, of which 144 were falls, 74 (51%) male subjects and 70 (49%) female subjects. Of the total 144 patients, 110 (76%) were above 65 years of age (Chart 1).

According to the data on the patient's fall risk at admission to the institution, 130 (90%) patients were at risk for falling, 5 (4%) were at no risk for falling, while 9 (6%) patients were not assessed for falling at all. According to the data analysis, according to the Morse risk assessment scale, 57 (42%) patients were assessed as having a high risk for falling, i.e. more than 45 points. Moderate risk for falling was assessed in 44 (33%) patients, i.e. 25 - 44 points, and 29 (21%) of them had low risk of falling, i.e. 1 - 24 points. A total of 5 (4%) patients were assessed as having no risk of falling (Chart 2).

Internal factors were the cause of the fall in 109 (76%) patients, and external factors in 31 (21%) (Chart 3).

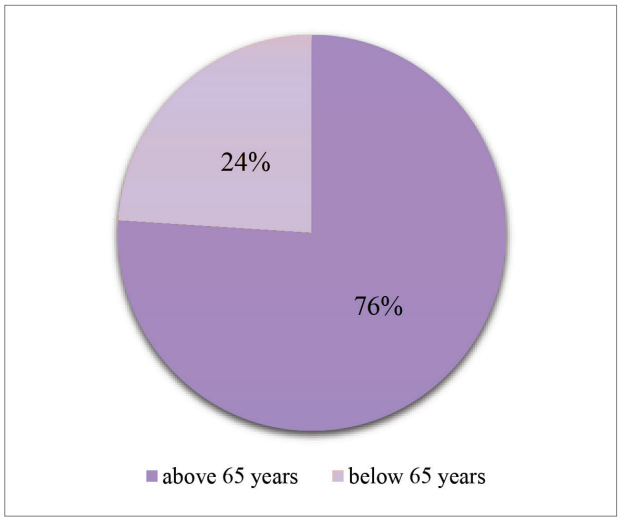

Chart 1. **Overview of patients who fell based on age**

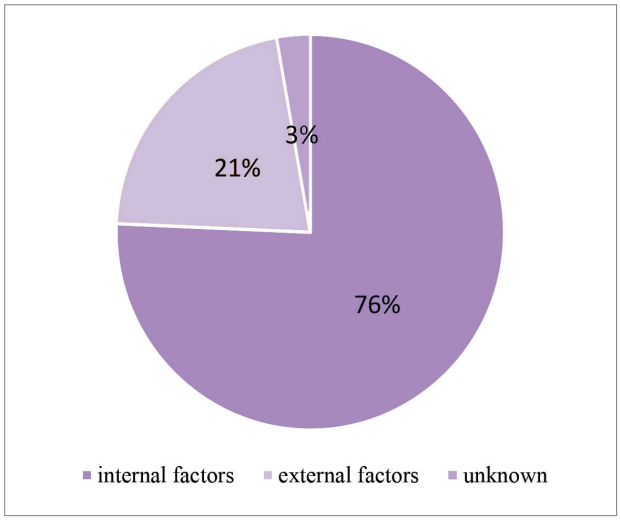

Chart 3. **Presentation of causes of falls by factors**

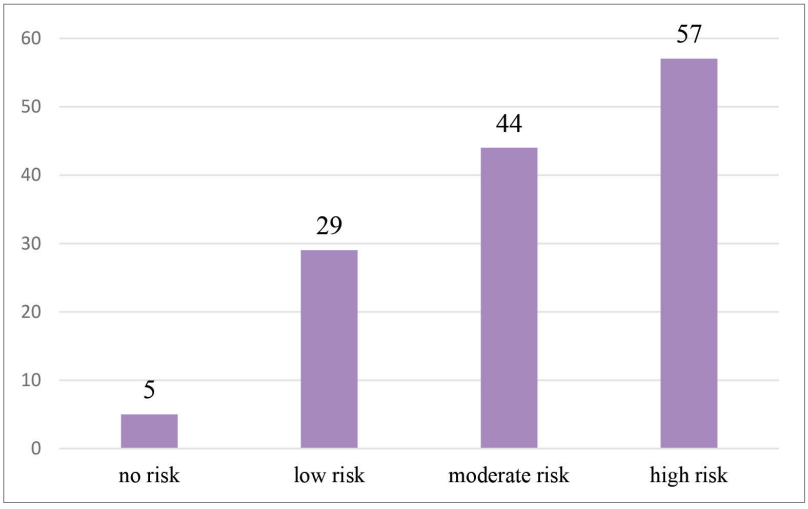

Chart 2. **Presentation of fall risk assessment according to the Morse scale**

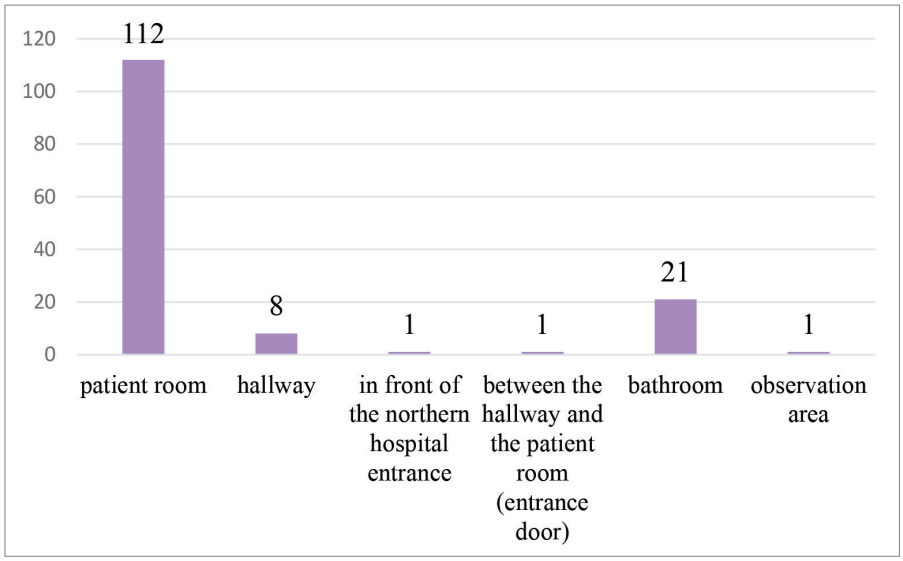

Chart 4. **Presentation of the most common locations of patient falls**

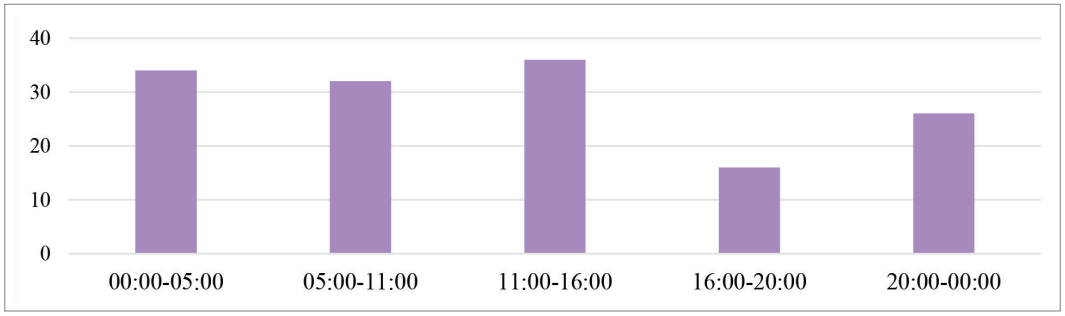

Chart 5. **Number of patient falls by time of day**

Falls most often occurred in the patient's room, 112 (78%), 21 (15%) falls occurred in the bathroom, while 8 (6%) falls were recorded in the hallway (Chart 4).

In the period from midnight to 05:00, 34 falls (24%) were recorded, from 05:00 to 11:00, 32 falls (22%), from 11:00 to 16:00, 36 falls (25%), from 16:00 to 20:00, 16 falls (11%), and from 20:00 to midnight, 26 falls, which is 18% (Chart 5). The results obtained by separating the falls by the hour of the fall indicate that the largest number of falls occurred at 6:00 in the morning (Chart 5.1).

We divided the way patients fell into two categories; 47 (33%) patients fell off the bed, while 97 (67%) fell on the floor by slipping, tripping or stumbling (Chart 6).

Falling off the bed led to hematomas, scratches, abrasions and cuts in 22 (47%) patients, while falling from a height in 70 (72%) patients was without consequences (Chart 7).

There was no need for additional interventions by healthcare professionals, i.e. taking actions after a fall in 68 (47%) patients. The need for radiological examinations was required by 44 (31%) falls, while 25 (17%) and 7 (5%) required observation and surgical interventions (Chart 8).

Discussion

The analysis assessed falls in 22,639 patients hospitalized at Clinical Hospital Dubrava in the period from July 1, 2022 to June 30, 2023. Data from 20 organizational units of Clinical Hospital Dubrava where patient falls were recorded were analyzed. A total of

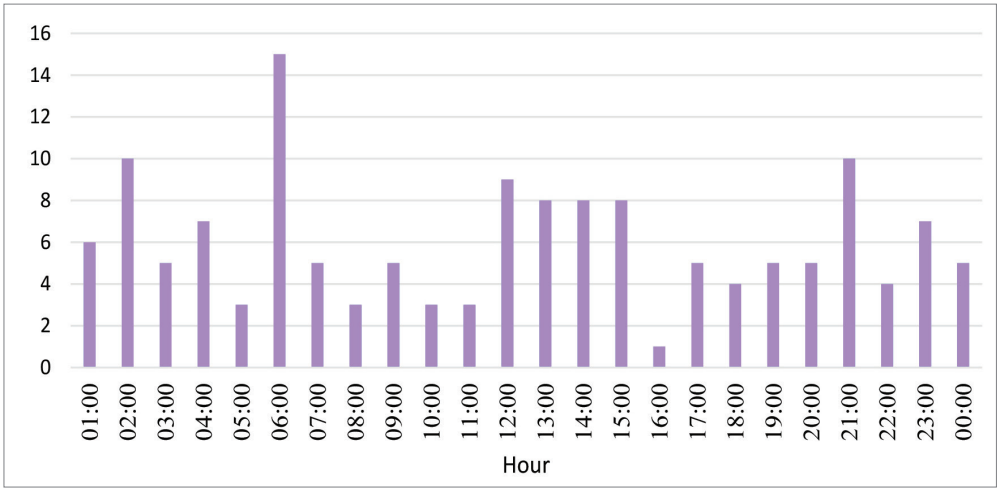

Chart 5.1**. Number of patient falls per hour**

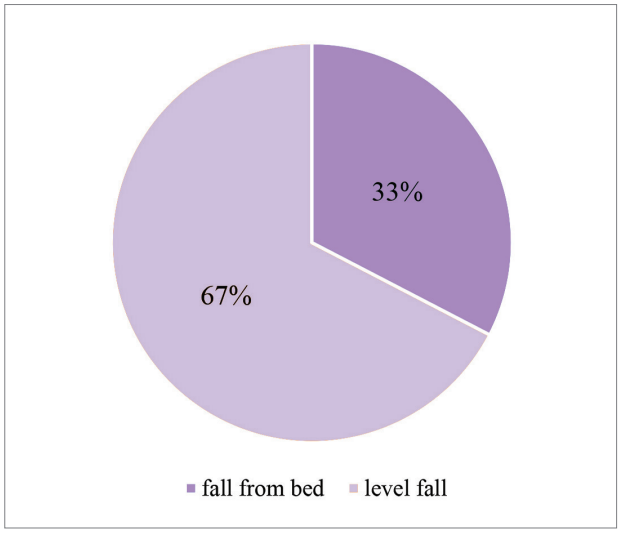

Chart 6. **Fall pattern overview**

144 falls were recorded, with 70 (49%) male and 74 (51%) female patients. Out of a total of 144 patients, 110 (76%) were over 65 years of age, as shown by data from the available literature. Therefore, it is concluded that falls represent a significant clinical problem, especially among patients over 65 years of age. All patients who fall are at risk of injury. Age, gender, and health of the individual can affect the type and severity of injury. Age is one of the key risk factors for falls. Older people have the highest risk of death or serious injury due to falls, and the risk increases with age. For example, in the United States, 20-30% of older people who fall sustain moderate to severe injuries such as bruises, hip fractures, or head injuries (14). According to the Central Bureau of Statistics, as of 2020, the population is continuously aging, with the average age of the total population of the Republic of Croatia being 43.8 years (men 42.0, women 45.5). This places us among the oldest nations in Europe (15). This could represent a major public health problem given the significant impact on falls in people over 65 years of age. Patients over 65 years of age most often have impaired vision and are less mobile, which increases their risk of falling due to their clinical condition, infrastructure, and environment (16). Given that the number of patients at risk of falling increases due to aging, it is necessary to support organizational factors to ensure quality healthcare for patients at risk of falls, which includes an adequate number of nurses/technicians and investment in education and competence enhancement. For the purpose of assessing the risk of falls in Clinical Hospital Dubrava, the Morse scale is used as an integral part of the nursing documentation, and in the conducted study, 57 (42%) patients were assessed as having a high risk of falls, i.e. with more than 45 points. Early identification of patients at high risk of falls at the beginning of their hospital stay is a crucial first step towards implementing proactive prevention strategies within the hospital. Multiple common risk factors for falls have been described among the elderly population in both community and hospital settings, including previous falls, physical impairment, age, altered mental status, and medications (17). It is important and mandatory to categorize all patients, given that in 6% of patients no risk of falls had been assessed at all upon

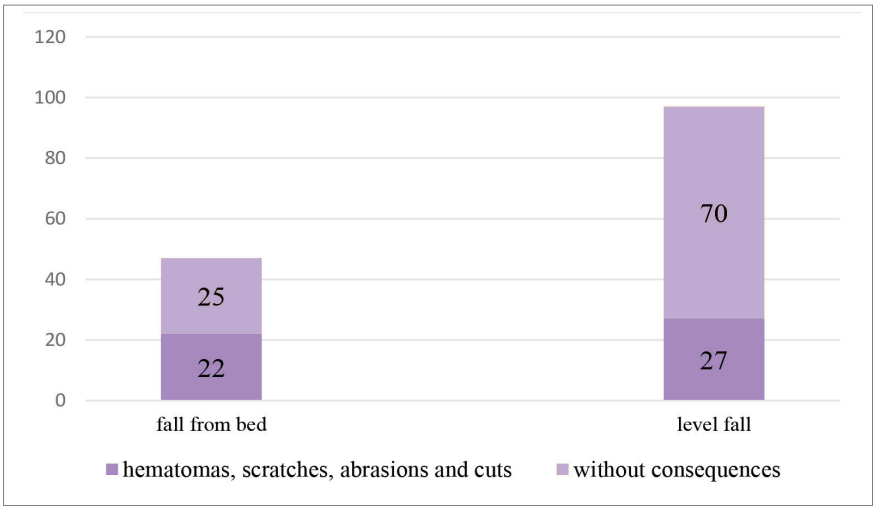

Chart 7. **Type of consequences according to the type of fall**

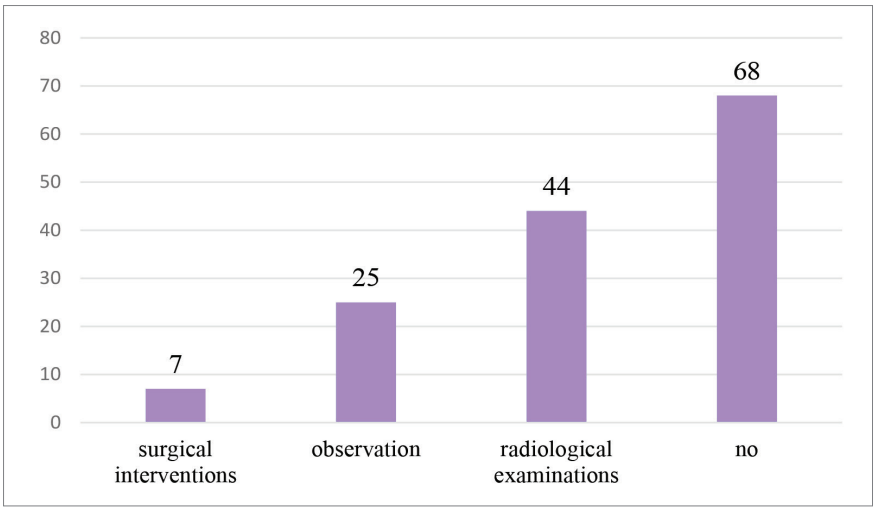

Chart 8. **Presentation of additional interventions**

hospitalization. Education of nurses/technicians is also necessary regarding procedures for patients assessed to be at high risk for falls. A review of the literature reveals the 6 PACK model for implementing fall prevention programs, which includes the following six interventions: a "fall alert" sign placed above the bed, patient monitoring in the bathroom, ensuring walking aids are within easy reach of the patient, a toileting schedule, providing a low bed, and an alarm for the bed/chair (18). The model mentioned is something that could be considered and introduced into our work process. What could be applied in practice, without requiring significant financial expenditure, is the use of a fall alert sign. In high-risk areas, additional visual and audible warnings are placed to draw attention to the danger. Analyzing all steps of the 6 PACK model requires planned management of the hospital's financial costs and human resources, and the model itself allows for a systematic and strategic approach to cost control, optimization of human and material resources, and improvement of operational efficiency.

According to the division of external and internal risk factors for falls, most patients fell due to internal factors such as dizziness, confusion, disorientation, syncope, leg weakness, and chronic diseases like diabetes. Among external factors, the most common

causes of falls were slipping on wet floors, tripping, and stumbling. After conducting the analysis, it was concluded that falls most frequently occur in the patient's room, while smaller percentages of falls were recorded in the bathroom and hallways. Research in the hematology department and in the population with cardiovascular diseases confirms that the patient's room is the most common location for falls. (19, 20). Regarding the frequency of falls by time of day, the results indicate an equal distribution of falls in day and night shifts, with a small increase in the number of falls in the night shift, when patients are often less supervised. Most falls were recorded in the morning hours, which can be associated with the beginning of patients' activities. Patient falls were divided into two categories according to the mode of fall: falls off the bed and falls on level ground. Falls off the bed often caused hematomas, abrasions, and cuts, while falls from a height were mostly without consequences, but some patients sustained hematomas, fractures, and cuts. Each fall required medical intervention, but in many cases, there was no need for additional interventions or actions after the fall. The need for radiological examinations was common, with particular emphasis on CT scans of the head, which were performed in a large number of patients. Falls also required observation and, in a minority of cases, surgical interventions. A study conducted at Tokushima University Hospital also confirms the high incidence of falls in the patient room (21). All additional interventions after a fall require time and staff presence, and research confirms that nurses/technicians are faced with insufficient resources, making it difficult or even impossible for them to meet all the requirements outlined in individual care plans. It is certain that an adequate number of medical staff is crucial for improving patient treatment outcomes and reducing the risk of falls, and therefore, the number of nurses plays a significant role in fall prevention or management in clinical settings. While the absolute number of nurses/technicians is closely linked to patient safety, the competence of nurses/technicians is also a factor associated with patient safety (18). As previously noted, falls in hospitals are common and pose significant complications in the provision of hospital care, particularly among older patients. Epidemiological studies have found that falls occur at a rate of 3-5 per 1000 hospital days, and the US Agency for Healthcare Research and Quality estimates that 700,000 to 1 million hospitalized patients fall each year. Patients in long-term care facilities are also at very high risk of falls. Approximately half of the 1.6 million nursing home residents in the United States fall each year, and a 2014 report by the Office of Inspector General found that nearly 10% of adverse events experienced by residents of Medicare-qualified nursing facilities were falls that resulted in significant injury (22). Fall reports and adverse event reports, as well as the overall nursing documentation, must be maintained in a timely and complete manner as official evidence of work. The purpose of nursing documentation is to ensure effective communication within the team throughout the entire patient care process, support informatization, allow for monitoring costs relative to efficiency, and serve as a source of information for future nursing research. Nursing documentation represents a comprehensive record of all procedures during treatment, is an integral part of medical documentation, and serves as a part of legal protection.

Conclusion

In conclusion, falls represent a serious clinical problem, especially among older patients who, due to their specific health conditions and related factors, are at a higher risk of injury. Data collected at the Clinical Hospital Dubrava confirm the importance of early identification of patients at high risk of falls and the implementation of preventive measures. In addition to physical and environmental factors, organizational aspects such as the adequate number of medical staff, their competencies, and education play a key role in significantly reducing the risk of falls and improving patient safety. Timely nursing documentation ensures effective communication within the team, monitoring of care efficiency, and legal protection. Given the demographic changes and an aging population, it is essential to invest in the development of resources and strategies for effectively managing the risk of falls, in order to ensure quality healthcare and reduce the frequency of adverse events. The Quality Assurance and Improvement Department of the Clinical Hospital Dubrava actively promotes a safety culture and will continue to improve healthcare quality, contributing to better patient protection and improved treatment outcomes.

> "Patient safety is the most reliable measure of the quality of the healthcare system."

Author contributions

All three authors equally contributed to all stages of the manuscript preparation, including the study design, data collection and analysis, as well as writing and editing the manuscript. All authors have read and approved the final version of the manuscript.

Conflict of interest

The authors declare no conflicts of interest.

Acknowledgments

The authors express their sincere gratitude to Clinical Hospital Dubrava for its support and for providing the necessary conditions to conduct this research. Special appreciation is extended to the hospital's then Head Nurse, Ms. Ana Primorac, for her kind cooperation and understanding.

Funding

This research received no external funding.

References

1. Agostini J, Baker DI, Bogardus ST Jr. Prevention of falls in hospitalized and institutionalized older people. In: Shojania KG, Duncan BW, McDonald KM, Wachter RM, Markowitz AJ. Making Health Care Safer: a critical analysis of patient safety practices. 2001;43:281-300. Available at: https://www.ncbi.nlm.nih.gov/books/NBK26985/
2. Ministarstvo zdravstva. Priručnik - opisne liste pokazatelja sigurnosti pacijenta i neočekivanih neželjenih događaja za 2023. [Internet]. Zagreb: Služba za kvalitetu zdravstvene zaštite; 2023. Available at: https://pokazatelji.aaz.hr/upute/opisneliste2023.pdf Accessed: 18.08.2023. Croatian.
3. Ministarstvo zdravstva. Priručnik o standardima kvalitete zdravstvene zaštite i načinu njihove primjene [Internet]. Zagreb: Agencija za kvalitetu i akreditaciju u zdravstvu; 2011. Available at: https://www.kb-merkur.hr/userfiles/pdfs/Djelatnost/Jedinica%20za%20kvalitetu/propisi/011-Prirucnik%20o%20standardima%20kvalitete%20zdravstvene%20zastite%20i%20nacinu%20njihove%20primjene.pdf Accessed: 18.08.2023. Croatian.
4. Alanazi FK, Lapkin S, Molloy L, Sim J. The impact of safety culture, quality of care, missed care and nurse staffing on patient falls: A multisource association study. J Clin Nurs. 2023;32(19-20):7260-72 https://doi.org/10.1111/jocn.16792
5. Krauss MJ, Evanoff B, Hitcho E, Ngugi KE, Dunagan WC, Fisher I, et al. A case-control study of patient, medication, and care-related risk factors for inpatient falls. J Gen Intern Med. 2005;20(2):116-22. https://10.1111/j.1525-1497.2005.40171.x
6. Mattison, M. Hospital management of older adults. UpToDate [Internet]. Available at: https://www.uptodate.com/contents/hospital-management-of-older-adults?search=patient%20fall&source=search_result&selectedTitle=6~150&usage_type=default&display_rank=6 Accessed: 22.08.2023.
7. Kolla BP, Lovely JK, Mansukhani MP, Morgenthaler TI. Zolpidem is independently associated with increased risk of inpatient falls. J Hosp Med. 2013;8(1):1-6. https://doi.org/10.1002/jhm.1985
8. Simonson W, Han LF, Davidson H. Hypertension treatment and outcomes in US nursing homes: results from the US National Nursing Home Survey. J Am Med Dir Assoc. 2011 Jan;12(1):44-9. https://doi.org/10.1016/j.jamda.2010.02.009
9. Vuković-Kostić Ž, Vuković M, Mirković S. The importance of nurses documentation at risk assessment for all of the patient in hospital environment. Inspirium. 2015;14:45-50. https://doi.org/10.5937/insp1514045v
10. Drvoderić M. Pokazatelji kvalitete zdravstvene njege na bolničkom odjelu [Master's thesis]. Zagreb: University of Zagreb, School of Medicine; 2021. Croatian.
11. Zakon o zdravstvenoj zaštiti. 2018; NN 100/18, 125/19, 147/20, 119/22, 156/22, 33/23, 36/24 Available at: https://www.zakon.hr/z/190/Zakon-o-zdravstvenoj-za%C5%A1titi Accessed: 11.04.2022.
12. Ozljede kao javnozdravstveni problem [Internet]. Available at: http://zdravljezasve.hr/html/zdravlje11_brojke-index.html Accessed: 31.08.2023.
13. Hrvatski zavod za javno zdravstvo. Prevencija padova [Internet]. Available at: https://www.hzjz.hr/aktualnosti/prevencija-padova/ Accessed: 31.08.2023. Croatian.
14. World Health Organization. Falls [Internet]. World Health Organization; 2021. Available at: https://www.who.int/news-room/fact-sheets/detail/falls Accessed: 25.08.2023.
15. Državni zavod za statistiku. Procjena stanovništva Republike Hrvatske u 2020. [Internet]. Zagreb: DZS; 2021. Available at: https://podaci.dzs.hr/2021/hr/9931 Accessed: 28.08.2023. Croatian.
16. Kljaić M. Upravljanje kvalitetom u zdravstvenoj njezi [Master's thesis]. Zagreb: University of Zagreb, School of Medicine; 2017. Croatian.
17. Hars M, Audet MC, Herrmann F, De Chassey J, Rizzoli R, Reny JL, Hars M, Audet MC, et al. Functional performances on admission predict in-hospital falls, injurio-

us falls, and fractures in older patients: A prospective study. J Bone Miner Res. 2018;33(5):852-9. https://doi.org/10.1002/jbmr.3382

18. Ayton DR, Barker AL, Morello RT, Brand CA, Talevski J, Landgren FS, et al. Barriers and enablers to the implementation of the 6-PACK falls prevention program: A pre-implementation study in hospitals participating in a cluster randomised controlled trial. PLoS One. 2017;12(2):e0171932. https://doi.org/10.1371/journal.pone.0171932
19. Zubak S. Pad kao neželjeni događaj kod hematoloških bolesnika [Master's thesis]. Zagreb: University of Zagreb, School of Medicine; 2014. Croatian.
20. Grgurević D, Jezl V, Vitale K. Uloga medicinske sestre u procjeni rizika od pada u kardiološkog bolesnika. Sigurnost. 2021;63(1):27-35.
21. Hase N, Osaka A, Sairyo K, Katoh S. Falls among hospitalized patients in an acute care hospital: Analyses of incident reports. J Med Invest. 2018;65(1-2):81-4. https://doi.org/10.2152/jmi.65.81.
22. Agency for Healthcare Research and Quality. Falls [Internet]. 2019. Available at: https://psnet.ahrq.gov/primer/falls Accessed: 25.08.2023.

Croat Nurs J. 2025; 9(1): 127-139

Review

Differences in Expectations and Preferences for Healthcare between Baby Boomers and the Silent Generation: A Literature Review

[1] Danijela Sopić

[1] Alma Mater Europaea University, Maribor, Slovenia

Article received: 24.11.2024.

Article accepted: 10.02.2025.

https://doi.org/10.24141/2/9/1/11

Author for correspondence:
Danijela Sopić
Alma Mater Europaea University, Maribor, Slovenia
E-mail: danijela.sopic@almamater.si

Keywords: healthcare for older adults, patient satisfaction, decision-making, healthcare communication

Abstract

Introduction. Research on differences in expectations and preferences for healthcare between the Baby Boomer and Silent Generation is crucial, as these two generations represent the largest groups of healthcare service users. Their health attitudes have been shaped by specific values and sociocultural conditions, resulting in different healthcare needs. As they enter older age, their healthcare needs become increasingly complex, requiring individualized care. Given the limited number of comparative studies, further research is needed to improve service quality, enhance older adults' quality of life, and optimize resource use in healthcare systems.

Aim. The aim of this paper was to identify empirical studies investigating the healthcare needs of the Baby Boomer and Silent generations.

Methods. In this paper, an analysis of ten empirical studies involving participants aged 65 and older was conducted. The data were primarily collected from the PubMed and Web of Science databases, with a focus on Research related to the healthcare needs of the Baby Boomer and Silent generations.

Results. The analysis of the selected studies reveals significant differences between the generations. Baby Boomers are confident, resourceful, and inclined to address their health issues independently, preferring personalized communication with professionals and technological solutions to improve access to information. In contrast, healthcare for the Silent Generation is shaped by conservative beliefs and tra-

ditional practices, leading to a more passive decision-making approach with less information.

Conclusion. Understanding generational differences allows for the adaptation of healthcare services, improving care quality and patient satisfaction. A personalized approach, incorporating technology for Baby Boomers and social services for the Silent Generation, ensures optimal care for both generations.

Introduction

The decline in birth rates and the increase in life expectancy worldwide mark the current demographic trend of an aging population (1). Europe is facing low fertility rates, with total fertility rates varying from 1.3 to above 2.1 in different countries and regions (2). Additionally, the COVID-19 pandemic has significantly impacted life expectancy in Europe, with losses recorded in 391 areas, some losing more than 2-3 years (3). Outside of Europe, Japan is facing a serious demographic crisis, with the country's population decreasing by 1.5% by 2022, while the aging rate reached 29.9%, the highest among the G7 countries (4). Similarly, South Korea is experiencing rapid aging, with projections showing that by 2029, all 37 regions will achieve "super-aged society" status, with over 20% of the population aged 65 and over (5). The number of people aged 65 and over is expected to reach 1.5 billion by 2050, accounting for 16% of the global population (1, 6, 7).

These demographic trends are changing not only the numerical ratio of populations but also the fundamental social and economic structures, presenting new challenges in planning health and social policies. The age structure of the population is shifting towards an increased share of older individuals, significantly impacting the population structure (8). These changes bring challenges to health and economic systems, as well as intergenerational relations. The increased prevalence of chronic diseases and the need for long-term care strain healthcare systems, requiring adjustments in the organization and financing of health services (9). The economic consequences of aging are visible in the rising costs of treating chronic diseases such as heart failure, coronary artery disease, and diabetes (10). At the same time, reducing the younger workforce coupled with the growing number of retirees increases pressure on social and healthcare systems (11). Changes in the age structure also affect intergenerational solidarity. Although the need for elderly care is increasing, the decline in the younger population may weaken family support, leading to a greater reliance on institutional forms of care (12).

The Baby Boomer generation (born between 1946 and 1964) and the Silent Generation (born before World War II) represent the two largest groups of older individuals (13). Social values are a significant factor distinguishing these two generations. Ullrich (2017) argues that the Silent Generation values conservative ideals and traditional customs, while Baby Boomers are more inclined to liberal attitudes on social issues and are more open to differences in racial, gender, and family contexts (14).

These differences in social values are partly shaped by the historical context in which the generations grew up. The Silent Generation was raised during the Great Depression and World War II, which instilled values of thriftiness, hard work, and sacrifice (13). These experiences shaped their more cautious approach to social and technological changes and, compared to younger generations, they exhibited greater resistance to modernization (13). At the same time, their expectations about health were often shaped by traditional perceptions of aging and the limited medical advancements available during their earlier years. The study by Aguilar-Palacio et al. (2018) showed that age has a significant effect on self-rated health in older generations, suggesting that various factors shape how these generations perceive their health and access to medical care and that the influence of individual and national factors on self-rated health differs across generations (15).

In contrast, the Baby Boomer generation grew up in the post-war period, marked by economic growth, technological innovation, and expanding educational opportunities (16). The culture of the 1960s, with its emphasis on social movements and youth emancipation, further shaped their attitudes and life priorities (17). Thanks to medical advancements and improved healthcare, their health expectations were more optimistic compared to previous generations (18). There are also differences in digitalization. While the Baby Boomer generation grew up with technology, the Silent Generation's entry into the digital world

was determined by factors such as education level and socio-economic status (13).

However, this generation was not immune to health challenges. While, on average, Baby Boomers had better cardiovascular health, with fewer heart attacks and lower blood pressure compared to previous generations, they simultaneously faced higher rates of chronic diseases such as hypertension, diabetes, and mental disorders (18). The increased prevalence of mental health issues in this cohort suggests that social and economic factors, including stressful life transitions and lifestyle changes, may have contributed to these outcomes. Specifically, the cohort born between 1950 and 1954 showed a significantly higher prevalence of mental disorders (4.7%) compared to those born between 1935 and 1939 (2.5%) (18). Despite progress in digitalization, the Baby Boomer generation lags behind the Silent Generation in adopting a healthy lifestyle and in their perception of their health (19). Davis and Roberts (2010) express concern about issues such as obesity, low vegetable consumption, physical inactivity, and the increasing prevalence of chronic diseases within this generation (20). These generational differences illustrate how historical, economic, and social conditions have shaped not only their values and health perceptions but also the actual health outcomes they experience in older age.

Given the above, differences in expectations and preferences for healthcare between Baby Boomers and the Silent Generation have a significant impact on shaping future health policies and strategies. While both generations face aging challenges and increased healthcare needs, their distinct life circumstances, social values, and approaches to health require adjustments in healthcare services. As Baby Boomers continue to enter older age, it will be necessary to continuously explore their changing needs and preferences, particularly in the context of the growing prevalence of chronic diseases, mental disorders, and an increasing reliance on technology (20). This paper lays the groundwork for understanding these specific needs, emphasizing the importance of adjusting healthcare services that consider generational differences. Understanding and integrating these differences into the development of healthcare services is crucial for improving the quality and effectiveness of healthcare to meet the specific demands of both generations.

Literature overview

Healthcare specifics of the Baby Boomer generation

According to population estimates from the U.S. Census Bureau, the number of Baby Boomers in the United States in 2019 was 71.6 million. The first Baby Boomers, born between 1946 and 1964, reached 65 in 2011, placing them in the elderly population category (21). Therefore, it is reasonable to assume that extending their lifespan will result in certain health issues. According to Badley et al. (2015), there is no proof to back up the assumption that Baby Boomers are healthier than previous generations (22). Research by Luo and Gao (2020) and Ramage-Morin and Polsky (2020) demonstrates the exact opposite, finding that older Baby Boomers are more prone to mental and physical health issues and have higher rates of chronic diseases and disabilities than previous generations (23, 24). Chronic diseases such as diabetes, cardiovascular diseases, and obesity require constant health support (25). As a result, Baby Boomers with numerous comorbidities are probably going to use specialized medical care more than primary care (26).

Because of the impact of Baby Boomers on the healthcare system, Canizares et al. (2016) and Fiorillo and Gorwood (2020) state that the health problems of Baby Boomers necessitate adaptation to their specific needs, and healthcare providers must be aware of their comorbidities, unique expectations, and preferences for healthcare services (26, 27). According to Pelok (2023), Baby Boomers are goal-oriented, confident, and resourceful, and they frequently try to solve their health problems on their own (28). They excel at searching for and critically evaluating health information on the Internet but prefer confirmation of relevant and reliable data from healthcare providers (13, 29). Kahana and Kahana (2014) state that they are smart, assertive, health-conscious, and actively involved in their healthcare (30). However, they still want service providers' advice before making final decisions regarding their health (31). This highlights the need for an inclusive approach to the delivery of healthcare services that respects Baby Boomers' autonomy and fosters collaborative decision-making.

Healthcare specifics of the Silent generation

The first members of the Silent Generation were born before World War II, and those over 85 are the fastest-growing age group in many developed countries (32). In the USA, the number of people over 80 is predicted to rise to 19.5 million by 2030 (33). Ullrich (2017) states that this generation is characterized by their advanced age and quiet, adaptive nature, as well as their overall health characteristics (14). In a study on centenarians with fragility hip fractures, Bermejo Boixareu et al. (2023) discovered that 83% of the subjects were female, 33% of the subjects had severe dementia, and 36% were living in nursing homes. This reveals that the Silent generation consists mostly of women, that degenerative changes are common, and that institutionalization occurs frequently (34). However, a study by Araújo and Ribeiro (2011) on adults over 80 years of age found that respondents rated their health positively in comparison to other generations, despite disability and age-related losses, suggesting subjective differences in health assessments (35).

According to Lee et al. (2020), the most common health problems of people over 80 include cognitive impairment, depression, anxiety, and physical health issues such as chronic diseases, musculoskeletal problems, and problems with eyes, hearing, insomnia, and teeth (36). Their diminished day-to-day functioning and increased cognitive impairment require additional medical attention (37). According to Bhattarai (2016), the aforementioned suggests that social and healthcare services must be integrated and that healthcare should be provided to each patient's unique needs and priorities. To achieve compliance, understanding the specifics of Silent generation is imperative (38). When it comes to choosing one's healthcare, there is a preference for fewer options and less autonomy due to the conservative social characteristics and deeply ingrained traditional values of the Silent Generation (39, 40).

According to Banerjee (2015), the Silent generation prefers a more passive role in the decision-making process in healthcare. As a result, they express higher levels of satisfaction with healthcare services than younger generations and report fewer difficulties in accessing healthcare (41). This suggests providing healthcare using simple guidelines while maintaining a balance between expertise and adherence to traditional principles.

Aim

The aim of this paper was to identify empirical studies investigating the healthcare needs of the Baby Boomer and Silent generations.

Methods

The systematic literature review was conducted in early January 2024 in two relevant bibliographic and cataloging databases: Web of Science and PubMed. The search was primarily conducted in these databases and covered the period from 2007 to 2023, with 2007 chosen as the starting year based on an analysis of the Web of Science database, which indicated that the topic began to be more intensively researched from that year. The goal of the search was to identify empirical studies investigating the healthcare needs of the Baby Boomer and Silent generations. The systematic review included only empirical studies to ensure the analysis of actual data and evidence directly exploring the healthcare needs of these generations. The search in the aforementioned databases was conducted by PRISMA guidelines to ensure a systematic and transparent literature analysis. The study selection process followed clearly defined inclusion and exclusion criteria (Table 1).

To ensure the comprehensiveness of the literature review, the search was extended beyond the Web of Science and PubMed databases, and relevant journals and institutional repositories were also reviewed. This resulted in the inclusion of an additional relevant paper by Saele et al. (2019) (31), which is not indexed in these databases but was assessed as significant according to the predefined inclusion criteria and was thus included in the analysis of results.

The article search conducted in the Web of Science database used the following keywords: "Baby Boomer generation" OR "Seniors" AND "Health Decision Making" OR "Patient Preferences", which initially resulted in 8,571 results. After applying the inclusion and exclusion criteria and filtering by specific cate-

Table 1. **Inclusion and exclusion criteria**

	Inclusion Criteria	Exclusion Criteria
Type / category of the article	Empirical articles (qualitative research, quantitative research, mixed methods)	Articles focusing on theoretical considerations without the application of empirical methods (studies using only secondary data sources, reviews and meta-analyses, expert articles, and commentaries)
Participants	Older than 65 years (Baby Boomer or Silent Generation)	Other age groups
Access	Only open access articles	Restricted access articles
Language	Only in English	Articles in other languages
Publication Date	2007 - 2023	Articles published before 2007

gories within Web of Science recognized as relevant to the research topic (Health Care Sciences Services, Gerontology, Geriatrics Gerontology, Medical Informatics, Nursing, Nutrition and Dietetics), the number of results was reduced to 726 articles. Further selection of thematic citations at the meso level: Palliative Care, Nutrition and Dietetics, Nursing, Health Literacy, and Telemedicine, further reduced the results to 385 articles.

The search in the PubMed database was conducted using a combination of keywords: health care preferences AND aging population AND healthcare needs of seniors OR generational differences in health care, which initially resulted in a total of 4,249 articles. After applying the inclusion and exclusion criteria (Table 1), the number of potentially relevant papers was reduced to 414. The distinction in the keywords used in Web of Science and PubMed arises from the specific characteristics of each database and their focus areas; while Web of Science offers a broader approach to multidisciplinary fields, PubMed specializes in biomedical and health literature, so the selected keywords were better aligned with medical and health literature. During the merging of results from PubMed and Web of Science, 27 duplicates were identified and removed. After this process, the total number of articles was reduced to 772, which were then subjected to further analysis (Figure 1).

Results

After reviewing the titles, abstracts, and keywords, 20 articles were selected for further analysis. The selection criteria included a focus on specific populations by generation or age, clarity of insights into generational differences, decision-making in healthcare, relevance to the research topic, and adequacy of the data collection methods used (including both qualitative and quantitative studies). After a detailed review of the full texts of these 20 articles, 10 studies were selected that met specific conditions: they analyzed aspects of decision-making in healthcare (including behaviors, expectations, and interactions of participants with healthcare providers), examined factors influencing decision-making (such as socio-demographic characteristics, education, trust in healthcare providers, health behaviors, and preferences), and investigated how key healthcare needs and challenges for older adults (such as trust, health literacy, and preferences regarding services) affect the delivery and utilization of healthcare services within the older population.

A total of ten articles were included in the overall analysis: nine found in the Web of Science and PubMed databases, and one additional article, Seale et al. (2019), which was not indexed in the mentioned databases but was deemed relevant according to the predefined inclusion criteria (Table 2).

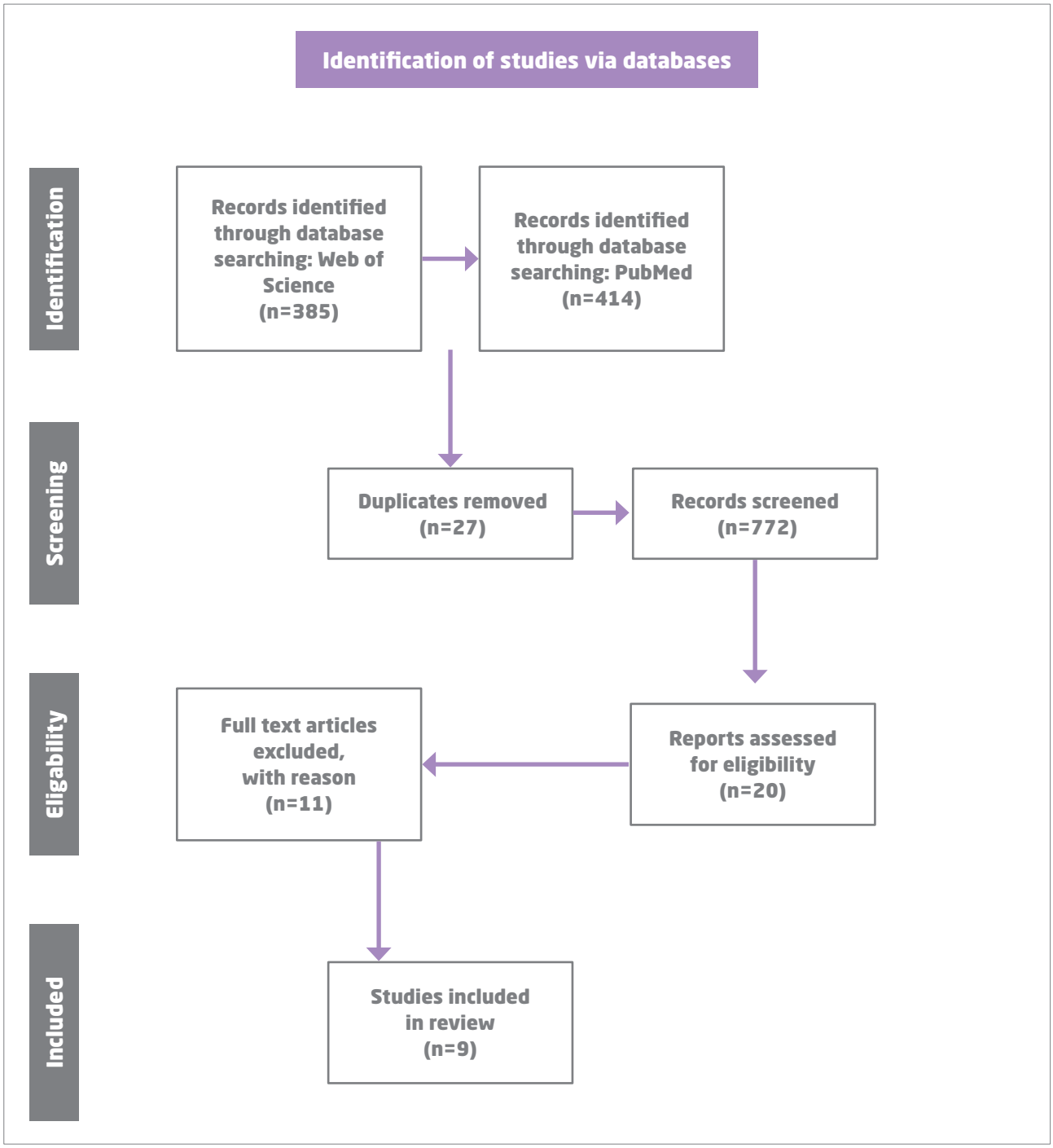

Figure 1. **PRISMA Flowchart for Search in Web of Science and PubMed Databases**

Table 2. **Overview of the studies finally included**

Authors	Population	Parameters	Results	Healthcare Decision-Making	Limitations
Chen H, Cohen P, Kasen S (2007) (42) longitudinal study	314 pre-Boomers 304 Baby Boomers	demographics, personality factors, health behavior	lower self-rated health in Baby Boomers	emphasized the pivotal role of personalized health choices in the conclusive decision-making process for Baby Boomers	limited to the female population
Guberman N, Lavoie JP, Blein L, Olazabal I (2012) (43) qualitative research	39 Baby Boomers in Quebec	identification of Baby Boomers with their social generation and perception of the caregiving role	Baby Boomers anticipate substantial support from healthcare services	investigated the impact of socio-cultural factors on the decision-making processes concerning health among Baby Boomers	findings are geographically specific to Quebec
Canizares M, Gignac MA, Hogg-Johnson S, Glazier RH, Badley EM (2016) (26) longitudinal analysis	10,186 participants	examination of factors associated with birth cohort differences in health service utilization	Baby Boomers exhibit lower usage of primary healthcare services compared to previous cohorts, with a higher preference for specialist services	explored the correlation between health service utilization patterns and decision-making autonomy among Baby Boomers	findings are specific to the Canadian healthcare system
Seale DE, LeRouge CM, Ohs JE, Tao D, Lach HW, Jupka K, et al. (2019) (31) qualitative research	6 focus groups of Baby Boomers	exploration of Baby Boomers' relationships with healthcare providers and their utilization of health information	Baby Boomers prefer to make conclusive healthcare decisions with active participation from healthcare providers	examined the influence of trust in healthcare providers on the involvement of Baby Boomers in the decision-making process regarding their health	focus restricted to a particular subset of Baby Boomers
Gill L, Cameron ID (2022) (29) qualitative study	11 Baby Boomer caregivers	identification of Baby Boomer service expectations and service delivery challenges	identified five key factors of care, with demandingness being one of them	explored the interplay between Baby Boomers service expectations and the challenges faced by healthcare service providers in meeting those expectations	qualitative analysis introduces subjectivity, and the sample size is small

Table 2. **Overview of the studies finally included**

Authors	Population	Parameters	Results	Healthcare Decision-Making	Limitations
Reed AE, Mikels JA, Simon KI (2008) (39) cross-sectional study	102 seniors from senior centers in New York	examination of healthcare decisions and everyday decisions	older individuals prefer fewer options when making decisions compared to younger individuals	investigated how senior's healthcare decisions align with their everyday decision-making preferences	the study did not account for individual differences in the cognitive abilities of the elderly
Lissitsa S, Zychlinski E, Kagan M (2022) (13) cross-sectional study	231 Silent generation 536 Baby Boomers	exploration of socio-demographic and psychological variables in the use of web search engines	socio-demographic status and education are correlated with the use of search engines	examined the role of information-seeking behaviors in shaping healthcare decision-making among Baby Boomers	cultural and geographical context limited to Israel
Paige SR, Miller MD, Krieger JL, Stellefson M, Cheong J (2018) (44) measurement invariance study	Baby Boomers and Silent generation (n=384)	assessment of trust, understanding and action in health e-literacy	the Silent generation exhibits lower awareness of e-health resources	investigated the influence of health e-literacy on the decision-making of Baby Boomers and the Silent Generation regarding their health-related actions	results lack generalizability
Torres S, Cao X (2019) (45) qualitative study	25 interviewed individuals in advanced age	exploration of interactions of elderly people in institutions for the elderly	elderly individuals are inclined towards informal accommodation	examined the role of informal accommodation in healthcare decision-making among elderly individuals in institutions	focus limited for a small sample and urban area (New York)
Bermejo Boixareu C, Ojeda-Thies C, Guijarro Valtueña A, Cedeño Veloz BA, Gonzalo Lázaro M, Navarro Castellanos L, et al. (2023) (34) retrospective cohort study	25,938 patients admitted for fragility hip fractures, centenarians accounted for 253 patients	examination of the clinical characteristics of centenarians with fragility hip fractures, a comparison of management and outcomes between centenarians and other age groups older than 75 years	83% of centenarians were women, 33% had severe dementia and 36% lived in nursing homes	investigated the challenges in healthcare decision-making for centenarians with fragility hip fractures and compared outcomes across age groups	lack of long-term follow-up data

Discussion

Chen et al. (2007) analyzed the differences between cohorts of women born in two distinct periods, pre-boomers (1935–1944) and Baby Boomers (1945–1954), with a focus on their self-assessed health status (42). The findings show that Baby Boomers rate their health lower than members of the Silent Generation, with chronic diseases and depressive symptoms being key predictors of this self-assessment (42). These results suggest that, despite significant improvements in social and healthcare conditions, Baby Boomers report lower levels of health self-assessment. This can be attributed not only to the increased prevalence of chronic diseases and mental health issues such as depression but also to their greater access to medical information, which may make them more aware of their health conditions (18).

The findings by Chen et al. (2007) are further confirmed by a study by Martin et al. (2009), who identify a paradox between the improvement of objective health indicators and the decline in subjective health assessments among Baby Boomers (46). Although mortality rates in this generation have decreased and life expectancy has increased, their self-assessment of health has not necessarily improved (46). This suggests that, even though Baby Boomers live longer, it does not mean they enjoy better health. A key factor in this paradox may be the higher prevalence of diagnosed chronic diseases, but it is important to note that this increase may be due to better diagnostic methods and advanced healthcare technologies, rather than a genuine deterioration of the population's health status (46).

In addition to objective improvements in health indicators, it is essential to consider the psychological and social factors that may shape Baby Boomers' perception of health. This generation has had significant socio-economic and medical advantages throughout their lives, which could have raised their expectations and standards regarding health (46). As a result, despite objective improvements in health, their self-assessment may be lower because they compare themselves to the high health standards they have set for themselves over the years. Furthermore, Baby Boomers are the first generation to have had widespread access to medical information and preventive care, which may make them more critical of their health status. Increased awareness of health risks and the availability of diagnostic tools can lead to a higher perception of illness, even when objective indicators do not suggest significant deterioration in health.

Similarly, the way Baby Boomers perceive healthcare plays a crucial role in their health assessment. A qualitative study conducted in Quebec showed that this generation views healthcare as a partnership between patients and healthcare providers, with expectations for an active role in making decisions about their health (43). This approach reflects Baby Boomers' long exposure to modern medical advancements and the high level of healthcare they have become accustomed to, further reinforcing their high expectations regarding the availability and quality of healthcare services in older age. Therefore, their lower self-assessment of health may not necessarily reflect a genuinely worse health situation but rather a shift in how they define their well-being, influenced by higher standards, more advanced diagnostic methods, and a redefined relationship with the healthcare system.

The historical context in which Baby Boomers grew up has also significantly shaped their relationship with health. This generation witnessed unprecedented technological advances and the expansion of healthcare, creating the expectation that they should be the healthiest generation to date (18). However, their perception of health has not been shaped solely by objective indicators but also by the standards they have developed over their lives. Research by Canizares et al. (2016) shows that even individuals with multiple comorbidities maintain high expectations of healthcare, indicating the growing need for a system tailored to chronic disease management (26). This suggests that this generation, which has witnessed technological progress and the expansion of healthcare, has developed high expectations of the healthcare system, including an active role in decision-making about their health. This further shapes their perception of health, as they still expect high-quality services despite the increased prevalence of chronic diseases.

In addition to technology, technological innovations play an important role in shaping Baby Boomers' health, as they provide significant advantages in managing chronic diseases and promoting healthy lifestyle habits. This generation shows a high de-

gree of acceptance of new technologies, including email, video conferencing, and SMS messages, which improve communication with healthcare professionals and facilitate daily health management (47). For example, the Healthy Lifestyle Management (HLM) model, which uses mobile health technology, allows Baby Boomers to actively participate in their care. This approach enhances collaboration with providers and encourages informed decision-making that supports sustainable healthy habits (48). This model is particularly beneficial as most Baby Boomers have at least one chronic health condition, which increases healthcare costs (20).

In addition, Baby Boomers are showing increasing health literacy, which can also reduce the need for expensive medical interventions. Research by Seale et al. (2019) found that Baby Boomers successfully use the Internet to search for health resources and critically evaluate their relevance (31), indicating their growing engagement in the health decision-making process. While they use online sources, they simultaneously prefer reliable information from healthcare professionals, suggesting a need for close collaboration between this generation and healthcare providers (31). This combination of autonomy and demand for professional guidance creates a balance that enables optimal health management and better quality healthcare.

Additionally, Gill and Cameron (2022) emphasize that Baby Boomers possess a high level of independence and critical judgment, which allows them to selectively choose the information and services they use, which is especially important in the context of the overwhelming availability of information on the internet (29). These characteristics not only show their tendency for active management of their health but also highlight the importance of independence in healthcare decision-making while maintaining high standards for the quality of services and information they receive. This suggests that by using technology, Baby Boomers can optimally manage their health, making it easier to monitor chronic conditions daily while also allowing for the creation of personalized health plans, including their active engagement.

On the other hand, the Silent Generation shows a clear preference for simpler, more straightforward options when making health decisions. According to research by Reed et al. (2008), members of the Silent Generation prefer fewer options when making healthcare decisions (39), reflecting their tendency to simplify the process. This behavioral pattern can be linked to cognitive changes that occur with aging, when the capacity to process larger amounts of information may be reduced. This suggests that for this generation, it is more important to have structured guidelines from healthcare professionals than to rely on online sources or new technologies.

The Silent Generation's tendencies toward more traditional approaches to health are confirmed by the results of research by Zachrison et al. (2021), who found that the Silent Generation is significantly less likely to adopt virtual healthcare compared to younger generations (49). Specifically, doctors from the Silent Generation were significantly less likely (OR 0.39) to be early adopters of virtual healthcare technologies compared to younger colleagues (49). This resistance to new technologies is likely due to their preference for traditional forms of communication, where personal interaction with healthcare providers plays a key role in decision-making. Similar tendencies toward simpler, more personal forms of communication are confirmed by research by Lissitsa et al. (2022), which showed that members of the Silent Generation use search engines less frequently than Baby Boomers (13), which can be linked to lower levels of digital literacy.

Furthermore, research by Paige et al. (2018) also found that the Silent Generation has lower levels of trust in e-health resources and their digital skills (44). These tendencies may be a result of social norms and conditions in which they grew up when personal relationships and direct communication with healthcare professionals were key to making health decisions. As a result, many members of the Silent Generation may not consider it necessary to use the internet to find health information but instead prefer direct communication and trust the expertise of healthcare professionals. Such a preference for personal contact suggests their need for recognition and respect within the healthcare system, which differs from the Baby Boomers' more liberal approach (45).

However, it is interesting to note that research by Papp-Zipernovszky et al. (2021) shows that, despite initial barriers to internet access, older generations (including the Silent and Baby Boomer generations) report a greater sense of empowerment when they succeed in finding useful health information online (50). This paradox indicates that, although the Silent Generation may have lower overall digital skills when they are allowed to access relevant health

information via the Internet, they feel empowered and informed, which may contribute to a better self-assessment of health.

Moreover, research by Bermejo Boixareu et al. (2023) shows high rates of the Silent Generation living in care facilities, but this generation is still more likely to live in informal housing (34). This also confirms their preference for traditional values in healthcare, which are based on interpersonal relationships, where family and community play an important role as support systems. These findings suggest that understanding the Silent Generation's preferences for simpler, more traditional approaches to health is crucial for optimizing healthcare, with an emphasis on interpersonal relationships and involving family and community as key support systems. This will allow the creation of inclusive healthcare services that take into account the specific needs of this generation while supporting the integration of new technologies in a way that is understandable and accepted by them.

Conclusion

The Baby Boomer and Silent generations' expectations and preferences for health care are influenced by differences in their social values, technological preferences, and lifestyles. While their health status is comparable to that of other generations, Baby Boomers are notable for having a greater number of chronic diseases, requiring specialized medical care. They expect a high level of engagement from service providers, combining self-help skills with the need for reliable information. However, the Silent generation wants less autonomy over their own healthcare decisions, and to meet their needs, such as those related to musculoskeletal and cognitive issues, social and individual services must be integrated. Baby Boomers also emphasize the importance of technologically supported communication, while the Silent generation prefers a more traditional approach. To provide services that are tailored to the unique needs of each generation and promote the best possible health and well-being, healthcare providers must be aware of these differences. Creating personalized health plans with a focus on technology support specific to the needs of Baby Boomers is one of the good practice case proposals. Regarding the Silent generation, the focus should be placed on implementing social and individual services, paying particular attention to tailoring communication to their preferences.

Author contributions

The author solely conceived the study, conducted a systematic literature review, analyzed the available sources, and wrote the manuscript.

Conflict of interest

The author declares no conflict of interest.

Acknowledgments

Not applicable.

Funding

This research received no external funding.

References

1. Busetta A, Bono F. Demographic aspects of aging. In: Caruso S, Candore G, editors. Human Aging. Academic Press; 2021. https://doi.org/10.1016/B978-0-12-822569-1.00019-6
2. Sobotka T. Is lowest-low fertility in Europe explained by the postponement of childbearing? Popul Dev Rev. 2004;30(2):195-220. https://doi.org/10.1111/j.1728-4457.2004.010_1.x
3. Bonnet F, Grigoriev P, Sauerberg M, Alliger I, Mühlichen M, Camarda CG, et al. Spatial variation in excess mortality across Europe: a cross-sectional study of 561 regions in 21 countries. J Epidemiol Glob Health. 2024;14(2):470-9. https://doi.org/10.1007/s44197-024-00200-0.
4. Kaneda Y, Yamashita E, Kaneda U, Tanimoto T, Ozaki A. Japan's demographic dilemma: navigating the post-pandemic population decline. JMA J. 2024;7(3):403-5. https://doi.org/10.31662/jmaj.2024-0010
5. Kim KW, Kim OS. Super aging in South Korea unstoppable but mitigatable: a sub-national scale population projection for best policy planning. Spat Demogr. 2020;8(2):155-73. https://doi.org/10.1007/s40980-020-00061-8

6. Fakhro MA. What's really happening among the elderly population? Lancet. 2018;3 (3):1603-58. https://doi.org/10.31031/GGS.2018.03.000563.
7. Gnanasabai G, Kumar M, Boovaragasamy C, Rahman M. Socio-demographic and morbidity pattern of geriatric population in rural area of Puducherry: a community based cross sectional study. Int J Community Med Public Health. 2020;7(9):3393. https://doi.org/10.18203/2394-6040.ijcmph20203941.
8. Wu HW, Kumar P, Yu CW, Cao SJ. A global challenge for smart and healthy care homes for the elderly. Indoor Built Environ. 2022;31(7):1733-7. https://doi.org/10.1177/1420326X221103
9. Lim W, Pang WP, Wong S, Choo P, Leong I. Forging a frailty-ready healthcare system to meet population ageing. Int J Environ Res Public Health. 2017;14(12):1448. https://doi.org/10.3390/ijerph14121448
10. Garrett N, Martini EM. The boomers are coming: a total cost of care model of the impact of population aging on the cost of chronic conditions in the United States. Dis Manag. 2007;10(2):51-60. https://doi.org/10.1089/dis.2006.63
11. Jakovljevic M. Population ageing alongside health care spending growth. Srp Arh Celok Lek. 2017;145(9-10):534-9. https://doi.org/10.2298/sarh160906113j
12. Wolf DA. Population change: friend or foe of the chronic care system? Health Aff (Millwood). 2001;20(6):28-42. https://doi.org/10.1377/hlthaff.20.6.28
13. Lissitsa S, Zychlinski E, Kagan M. The Silent Generation vs Baby Boomers: Socio-demographic and psychological predictors of the "gray" digital inequalities. Comput Human Behav. 2022;128:107098. https://doi.org/10.1016/j.chb.2022.107098
14. Ullrich HE. The Silent Generation: 1964. In: The Women of Totagadde. New York: Palgrave Macmillan; 2017. https://doi.org/10.1057/978-1-137-59969-8_2
15. Aguilar-Palacio I, Rabanaque MJ, Gil-Lacruz AI, Sánchez-Recio R. Self-rated health in Europe and its determinants: does generation matter? Int J Public Health. 2018;63(2):223-32. https://doi.org/10.1007/s00038-018-1079-5
16. Phillipson C, Biggs S, Money A, Leach R. Social and cultural constructions of ageing: the case of the baby boomers. Sociol Res Online. 2008;13(3):1-14. https://doi.org/10.5153/sro.1695
17. Karisto A. Finnish baby boomers and the emergence of the third age. Int J Ageing Later Life. 2007;2(2):91-108. https://doi.org/10.3384/ijal.1652-8670.072291
18. Rice NE, Lang IA, Henley W, Melzer D. Baby boomers nearing retirement: the healthiest generation? Rejuvenation Res. 2010;13(1):105-14. https://doi.org/10.1089/rej.2009.0896
19. Shen A. Religious Attendance, Healthy Lifestyles, and Perceived Health: A Comparison of Baby Boomers with the Silent Generation. J Relig Health. 2019;58(4):1235-45. https://doi.org/10.1007/s10943-018-0736-6
20. Davis GL, Roberts WL. The healthcare burden imposed by liver disease in aging Baby Boomers. Curr Gastroenterol Rep. 2010;12(1):1-6. https://doi.org/10.1007/s11894-009-0087-2.3
21. Fry R. Millennials overtake Baby Boomers as America's largest generation. Pew Research Center; 2020. Available at: https://www.pewresearch.org/short-reads/2020/04/28/millennials-overtake-baby-boomers-as-americas-largest-generation/. Accessed: 10.04.2025.
22. Badley EM, Canizares M, Perruccio AV, Hogg-Johnson S, Gignac MA. Benefits gained, benefits lost: comparing baby boomers to other generations in a longitudinal cohort study of self-rated health. Milbank Q. 2015;93(1):40-72. https://doi.org/10.1111/1468-0009.12105
23. Luo GG, Gao SJ. Global health concerns stirred by emerging viral infections. J Med Virol. 2020;92(4):399-400. https://doi.org/10.1002/jmv.25683
24. Ramage-Morin PL, Polsky JY. Health-related concerns and precautions during the COVID-19 pandemic: a comparison of Canadians with and without underlying health conditions. Health Rep. 2020;31(5):3-8. https://doi.org/10.25318/82-003-x202000500001-eng
25. Xiong TY, Redwood S, Prendergast B, Chen M. Coronaviruses and the cardiovascular system: acute and long-term implications. Eur Heart J. 2020;41(19):1798-800. https://doi.org/10.1093/eurheartj/ehaa231
26. Canizares M, Gignac MA, Hogg-Johnson S, Glazier RH, Badley EM. Do baby boomers use more healthcare services than other generations? Longitudinal trajectories of physician service use across five birth cohorts. BMJ Open. 2016;6(9):e013276. https://doi.org/10.1136/bmjopen-2016-013276
27. Fiorillo A, Gorwood P. The consequences of the COVID-19 pandemic on mental health and implications for clinical practice. Eur Psychiatry. 2020;63(1):e32. https://doi.org/10.1192/j.eurpsy.2020.35
28. Pelok SD. Pharmacotherapeutic challenges for treating the baby boomer cohort. Spec Care Dent. 2023;43(3):328-35. https://doi.org/10.1111/scd.12839
29. Gill L, Cameron ID. Identifying baby boomer service expectations for future aged care community services in Australia. Health & Social Care in the Community. 2022;30(2):726-34. https://doi.org/10.1111/hsc.13187
30. Kahana E, Kahana B. Baby boomers' expectations of health and medicine. Virt Mentor. 2014;16(5):380-4. https://doi.org/10.1001/virtualmentor.2014.16.05.msoc2-1405
31. Seale DE, LeRouge CM, Ohs JE, Tao D, Lach HW, Jupka K, et al. Exploring early adopter baby boomers' approach to managing their health and healthcare. Int J E-Health Med Commun. 2019;10(1):94-117. https://doi.org/10.4018/IJEHMC.2019010106
32. Motl RW, McAuley E. Physical activity, disability, and quality of life in older adults. Phys Med Rehabil Clin. 2010;21(2):299-308. https://doi.org/10.1016/j.pmr.2009.12.006

33. Gjonca E, Calderwood L. Socio-demographic characteristics. In: Marmot M, Banks J, Blundell R, Lessof C, Nazroo J, editors. Health, wealth and lifestyles of the older population in England: The 2002 English longitudinal study of ageing. London: Institute for Fiscal Studies; 2003.
34. Boixareu CB, Ojeda-Thies C, Valtueña AG, Veloz BAC, Lázaro MG, Castellanos LN, et al. Clinical and demographic characteristics of centenarians versus other age groups over 75 years with hip fractures. Clin Interv Aging. 2023;18:441-51. https://doi.org/10.2147/CIA.S386563
35. Araújo L, Ribeiro Ó. Incapacity paradox of very-old people. Acta Med Port. 2011;24(2):189-96. https://doi.org/10.20344/amp.1510
36. Lee HY, Hasenbein W, Gibson PA. Mental Health and Older Adults. In: Encyclopedia of Social Work. 2020. https://doi.org/10.1093/acrefore/9780199975839.013.1355
37. Gosney, M. General care of the older cancer patient. Clin Oncol. 2009;21(2):86-91. https://doi.org/10.1016/j.clon.2008.11.005
38. Bhattarai B. Preparedness of health care of older people. Health Renaissance. 2016;12:147-8. https://doi.org/10.3126/hren.v12i3.15251
39. Reed AE, Mikels JA, Simon KI. Older adults prefer less choice than young adults. Psychol Aging. 2008;23(3):671. https://doi.org/10.1037/a0012772
40. Black AD, Car J, Pagliari C, Anandan C, Cresswell K, Bokun T, et al. The impact of eHealth on the quality and safety of health care: a systematic overview. PLoS Med. 2011;8(1):e1000387. https://doi.org/10.1371/journal.pmed.1000387
41. Banerjee S. Multimorbidity—older adults need health care that can count past one. Lancet. 2015;385(9968):587-89. https://doi.org/10.1016/S0140-6736(14)61596-8
42. Chen H, Cohen P, Kasen S. Cohort differences in self-rated health: evidence from a three-decade, community-based, longitudinal study of women. Am J Epidemiol. 2007;166(4):439-46. https://doi.org/10.1093/aje/kwm100
43. Guberman N, Lavoie JP, Blein L, Olazabal I. Baby boom caregivers: Care in the age of individualization. The Gerontologist. 2012;52(2):210-8. https://doi.org/10.1093/geront/gnr140
44. Paige SR, Miller MD, Krieger JL, Stellefson M, Cheong J. Electronic health literacy across the lifespan: measurement invariance study. J Med Internet Res. 2018;20(7):e10434. https://doi.org/10.2196/10434
45. Torres S, Cao X. Improving care for elders who prefer informal spaces to age-separated institutions and health care settings. Innov Aging. 2019;3(3):igz019. https://doi.org/10.1093/geroni/igz019
46. Martin LG, Schoeni RF, Freedman VA, Andreski PM. Health and functioning among baby boomers approaching 60. J Gerontol B Psychol Sci Soc Sci. 2009;64(3):369-77. https://doi.org/10.1093/geronb/gbn040
47. LeRouge C, Van Slyke C, Seale D, Wright K. Baby boomers' adoption of consumer health technologies: survey on readiness and barriers. J Med Internet Res. 2014;16(9):e200. https://doi.org/10.2196/jmir.3049
48. Faiola A, Papautsky EL, Isola M. Empowering the aging with mobile health: a mHealth framework for supporting sustainable healthy lifestyle behavior. Curr Probl Cardiol. 2019;44(8):232-66. https://doi.org/10.1016/j.cpcardiol.2018.06.003
49. Zachrison KS, Schwamm LH, Zuccotti G, Samuels-Kalow ME, Licurse A, Yan Z. Association of physician characteristics with early adoption of virtual health care. JAMA Netw Open. 2021;4(12):e2141625. https://doi.org/10.1001/jamanetworkopen.2021.41625
50. Papp-Zipernovszky O, Horváth MD, Schulz PJ, Csabai M. Generation gaps in digital health literacy and their impact on health information seeking behavior and health empowerment in Hungary. Front Public Health. 2021;9:635943. https://doi.org/10.3389/fpubh.2021.635943

Croat Nurs J. 2025; 9(1): 141-150

Review

Physiotherapy for Osteoarthritis Following Orthobiological Injections – a Narrative Review of Recent Literature

[1] Ivana Čulo
[1] Dalibor Kiseljak
[1,2,3,6] Miljenko Franić
[1,3,4,5] Alan Ivković

[1] University of Applied Health Sciences, Zagreb, Croatia
[2] University Hospital Dubrava, Zagreb, Croatia
[3] School of Medicine, University of Zagreb, Zagreb, Croatia
[4] University Hospital Sveti Duh, Zagreb, Croatia
[5] Polyclinic Ivković, Zagreb, Croatia
[6] Faculty of Dental Medicine and Health Osijek, University of Osijek, Osijek, Croatia

Article received: 27.12.2024.

Article accepted: 13.03.2025.

https://doi.org/10.24141/2/9/1/12

Author for correspondence:
Alan Ivković
"Sveti Duh" University Hospital, Zagreb, Croatia
E-mail: alan.ivkovic@gmail.com

Keywords: cell therapy, injection, osteoarthritis, physiotherapy, platelet-rich plasma

Abstract

The integration of orthobiologic injection modalities with structured physiotherapy regimens has emerged as a promising avenue for optimizing recovery trajectories in patients affected by osteoarthritis (OA). While these interventions demonstrate therapeutic potential, the existing research exhibits substantial variability in patient demographics, injection methodologies, study duration, and outcome assessment. Furthermore, despite the recognized importance of post-injection rehabilitation, comprehensive documentation of physiotherapy protocols remains scarce, precluding a definitive understanding of their complementary effects with orthobiologic treatments.

This study evaluates and synthesizes the current evidence on the therapeutic efficacy of orthobiologic injections, platelet-rich plasma (PRP) and other cell-based regenerative therapies when implemented alongside physiotherapeutic interventions in patients with knee OA. The absence of standardized post-injection physiotherapy protocols, coupled with inconsistent methodological frameworks, impedes the formulation of evidence-based rehabilitation guidelines. Accordingly, future research must prioritize longitudinal, well-controlled investigations that delineate the optimal integration of physiotherapy with orthobiologic therapies to maximize functional restoration and long-term symptom management in OA.

A structured literature search was conducted via PubMed, utilising a strategic combination of Medical Subject Headings (MeSH) and targeted keywords to

ensure thorough retrieval of relevant studies. A total of sixteen studies met the inclusion criteria, all of which reported favourable outcomes following orthobiologic injections. Interestingly, only one trial incorporated a general physiotherapy program, thus emphasizing the noticeable gap in literature regarding the integration of orthobiologic injections with standard rehabilitative strategies.

Introduction

Osteoarthritis (OA) is a multifactorial degenerative joint disorder characterised by the progressive degradation of articular cartilage, which leads to the involvement of surrounding joint structures such as the subchondral bone, ligaments, and synovium (1, 2). The management of OA requires a multimodal approach encompassing pharmacological, non-pharmacological, and surgical strategies (3). While conservative therapies are often effective in mitigating symptoms, certain cases progress to advanced stages where these interventions become insufficient, necessitating surgical options. It is therefore not surprising that the development of minimally invasive surgical techniques has transformed OA management by offering the potential to regenerate damaged joint structures, alleviate symptoms, and slow disease progression (4).

Among emerging non-surgical approaches, orthobiological products have gained prominence for their ability to enhance tissue repair and reduce pain across various musculoskeletal pathologies, including cartilage, ligament, tendon, and bone injuries. Frequently orthobiologic treatments applied in OA management include hyaluronic acid, platelet-rich plasma (PRP), mesenchymal stem cells (MSCs) delivered as bone marrow aspirate concentrate (BMAC), and stromal vascular fraction (SVF) (5).

The therapeutic effects of orthobiologic injections are closely linked to mechanobiology, as biomechanical processes play a key role in stimulating tissue repair and functional recovery (6). Physiotherapy works within the same framework, aiming to reduce pain, improve mobility, and enhance overall function by using targeted interventions (7). This includes manual therapy, thermotherapy, therapeutic ultrasound, laser therapy, and magnetotherapy, all of which support joint health and promote healing (8). To effectively integrate these treatments into a rehabilitation program, a thorough understanding of the biological/physiological mechanisms that drive musculoskeletal regeneration is essential, allowing interventions to be tailored for optimal recovery (6).

Methods

Review objective and eligibility criteria

The target population for this review includes adults aged 18 years and older diagnosed with osteoarthritis who have undergone orthobiologic injections, followed by recommended physiotherapeutic interventions such as exercise therapy, manual therapy, and physical agents to optimize clinical outcomes. To ensure the inclusion of high-quality, contemporary evidence, only randomized controlled trials published in English from 2014 to 2024 were considered.

Information sources and search strategy

A comprehensive literature search was conducted in PubMed utilising a combination of Medical Subject Headings (MeSH) and specific keywords to ensure thorough coverage. The search terms included: (Osteoarthritis) AND (Injection) AND ((Physiotherapy) OR (Rehabilitation)); (Osteoarthritis) AND (Injection) AND (Postinjection); (Physiotherapy) OR (Physical Therapy) OR (Exercise); (Orthobiologics) OR (Platelet-rich plasma); (Orthobiologics) OR (Stem cell) OR (Stromal vascular fraction); and (Orthobiologics) OR (Bone marrow aspirate) OR (Stem cell). The filters were applied to restrict results to randomized controlled trials published from 2014 to 2024, focusing on studies relevant to the scope of this review.

Study selection process and data synthesis

The initial screening process involved a review of titles and abstracts to identify potentially relevant

studies, which were then retrieved for comprehensive evaluation. Data extraction was conducted using a standardised approach, capturing key details such as study design, population characteristics, orthobiologic and physiotherapy interventions, and outcomes. A narrative synthesis was performed across all included studies, integrating critical characteristics, interventions, and observed outcomes into a cohesive summary.

Limitations

The search strategy lacked a standardized query instead of relying on multiple searches, which may have led to gaps or inconsistencies in the search results. Without a uniform approach, there is no certainty that all the relevant studies were identified, raising the possibility of missing key research or unintentionally introducing selection bias. Any such inconsistency in search methodology could ultimately impact the completeness and reliability of the review's findings.

Results

Sixteen articles met the inclusion criteria, each reporting positive effects of orthobiologic injections. Among them, only Mautner et al. implemented a general physiotherapy program that remained consistent regardless of the injection type. The remaining studies provided limited guidance, offering general recommendations on physiotherapy, physical activity, exercise, or therapeutic modalities following orthobiologic treatment. A comprehensive summary of the selected articles is presented in Table 1.

Discussion

Platelet-rich plasma (PRP)

Platelets, anucleate cell fragments circulating within the blood, play a fundamental role in haemostasis by forming haemostatic plugs and releasing coagulation factors at injury sites, a process orchestrated by a diverse array of proteins, cytokines, and bioactive factors. Simultaneously, they regulate wound healing through the secretion of growth factors such as PDGF, TGF-β, and VEGF, which drive angiogenesis, modulate inflammation, and recruit progenitor cells for tissue repair. Building on these biological properties, PRP has emerged as a therapeutic modality associated with enhanced tissue repair and regeneration. PRP is characterised by a platelet concentration significantly higher than baseline, requiring a minimum of 10^6 platelets per µL (or about 5 times the baseline) (25, 26).

Across multiple studies, PRP has consistently yielded significant improvements in VAS and WOMAC scores, indicating substantial reductions in pain, stiffness, and functional impairment (9 – 18). Notably, sustained benefits have been observed in both PRP and PRGF (Plasma Rich in Growth Factors) groups at 12 months, surpassing conventional treatments such as CST and HA. These outcomes are driven by the biologically active components of PRP, which modulate inflammation and facilitate tissue repair, offering not only immediate symptom relief but also long-term therapeutic effects. The additional evidence of lasting improvements in VAS and Lequesne scores with PRGF, alongside higher patient satisfaction compared to HA, demonstrate the potential of growth factor-rich therapies for managing chronic conditions (14, 15, 17). Beyond symptom relief, PRP improves functional capacity and overall well-being, as suggested by higher IKDC and SF-36 scores (9 – 12, 16, 19).

Importantly, a three-injection PRP protocol has shown superior efficacy over single-injection PRP or CST, further supporting the importance of optimising treatment regimens to maximise results of clinical outcomes (17).

Compared to AAT (Adipose Autologous Tissue), PRP differs in efficacy, with AAT demonstrating greater

Table 1. **Included articles**

Study	Population	OA grade	Study group	Injection time protocol [week]	Number of injections	Duration of study	Post-injection intervention	Outcome measures
Cole et al. 2017 (9)	111 patients	KL 1-3	G1: HA	0, 1, 2	3	52 weeks	Weight bearing restrictions, ice/cold therapy, exercise	VAS, WOMAC, IKDC, ELISA
			G2: PRP	0, 1, 2	3			
Elik et al. 2020 (10)	60 patients	KL 1-3	G1: PRP	0, 4, 24	3	6 months	No NSAID; paracetamol, exercise	VAS, WOMAC, SF-36, Ultrasonography
			G2: PL	0	1			
Kaszy´nski et al. 2022 (11)	60 patients	KL 1-3	G1: AAT	0, 1, 2	3	12 months	Weight bearing restrictions, exercise	VAS, KOOS, WOMAC, IKDC, EQ-5D-5L; TUG test, 5xSTS; 10mWT
			G2: PRP	0	1			
			G3: Control					
Raeissadat et al. 2015 (12)	160 patients	KL 2,3	G1: HA	0, 1, 2	3	12 months	Rest, No NSAID; paracetamol, ice/cold therapy, weight bearing restrictions, exercise	WOMAC, SF - 36
			G2: PRP	0, 4	2			
Raeissadat et al. 2020 (13)	23 patients (46 knees)	KL 1-3	G1: PRP	0, 4	2	8 months	No NSAID; paracetamol, exercise	VAS, WOMAC, MRI
			G2: EX					
Raeissadat et al. 2020 (14)	102 patients	KL 2,3	G1: HA	0, 1, 2	3	12 months	Rest, active knee flexion and extension after a 20-min rest for the injected fluid dispersion, no NSAID; acetaminophen, exercise	VAS, WOMAC, Lequesne index
			G2: PRGF	0, 3	2			
Raeissadat et al. 2021 (15)	238 patients	KL 2,3	G1: HA	0, 1, 2	3	12 months	Rest, active knee flexion and extension after a 20-min rest for the injected fluid dispersion, no NSAID; paracetamol, ice/cold therapy, exercise	VAS, WOMAC, Lequesne index
			G2: PRP	0, 3	2			
			G3: PRGF	0, 3	2			
			G4: OZ	0, 1, 2	3			
Rayegani et al. 2014(16)	62 patients	KL 1-4	G1: PRP, EX	0, 4	2	6 months	Rest, active knee flexion and extension after a 20-min rest for the injected fluid dispersion, no NSAID; acetaminophen, ice/cold therapy, exercise	WOMAC, SF-36, QOL
			G2: EX					

Table 1. **Included articles**

Study	Population	OA grade	Study group	Injection time protocol [week]	Number of injections	Duration of study	Post-injection intervention	Outcome measures
Uslu Güvendi et al. 2018 (17)	50 patients	KL 3	G1: CST	0	1	6 months	Immobilization, rest, ice/cold or heat therapy, paracetamol, exercise	VNS, WOMAC, Lequesne index, HAD
			G2: PRP	0	1			
			G3: PRP	0, 1, 2	3			
Xu et al. 2024 (18)	48 patients	KL 1-3	G1: PRP	0, 1, 2 (months)	3	12 weeks	Low-frequency PEMFs irradiation therapy with a frequency of 30 Hz and intensity of 1.5 mT, once daily, 5 times a week for 12 weeks	VAS, WOMAC, Lequesne Index, ROM
			G2: PEMF					
			G3: PRP, PEMF	0, 1, 2	3			
Anz et al. 2020 (19)	90 patients	KL 1-3	G1: PRP	0	1	12 months	No NSAID, weight bearing restrictions, physiotherapy	WOMAC, IKDC
			G2: BMAC	0				
Freitag et al. 2019 (20)	30 patients	KL 2,3	G1: control			12 months	Weight bearing restrictions, crutches, exercise	NPRS, KOOS, WOMAC, MRI
			G2: ADMS	0 (months)	1			
			G3: ADMS	0, 6 (months)	2			
Garza et al. 2020 (21)	39 patients	KL 2,3	G1: hd SVF	0	1	12 months	Weight bearing restrictions, exercise	WOMAC, MRI
			G2: ld SVF	0	1			
			G3: PL	0	1			
Hong et al. 2018 (22)	16 patients (32 knees)	KL 2,3	G1: SVF, HA	0	1	12 months	Weight bearing restrictions, physical activity, Celebrex	WOMAC, ROM, MRI
			G2: HA, SVF	0	1			
Mautner et al. 2023 (23)	480 patients	KL 2-4	G1: BMAC	0	1	12 months	Weight bearing restrictions, physiotherapy	VAS, KOOS, EQ-5D, PROMIS-29 scores
			G2: SVF	0	1			
			G3: UCT	0	1			
			G4: CST	0	1			
Zhang et al. 2022 (24)	126 patients	KL 2,3	G1: SVF	0, 1, 2 (months)	3	5 years	Weight bearing restrictions, physical activity	VAS, WOMAC, Radiography, MRI
			G2: HA	0, 1, 2 (months)	3			

AAT – Autologus adipose tissue, ADMS – Adipose-derived mesenchymal stem cell, BMAC –Bone marrow aspirate concentrate, CST – Corticosteroids, ELISA – Enzyme-linked Immunosorbent Assay, EQ-5D-5L – Health Questionnaire EQ-5D-5L, HA – Hyaluronic acid, HAD – Hospital Anxiety and Depression Scale, hd, PRP –High dose stromal vascular fraction, IKDC – International Knee Documentation Committee, KL – Kellgren–Lawrence, KOOS – Knee Injury and Osteoarthritis Outcome Score, ld PRP – Low dose stromal vascular fraction, 10mWT –10 m Walk Test, NPRS – Numeric pain rating scale, OZ – Ozone, PEMF – Pulsed electromagnetic fields, PL – Placebo, PRGF-PRP – derived growth factor, PRP – Platelet-rich plasma, QOL – Quality of life score, ROM – Range of motion, SF 36 – Short Form Health Survey, 5*STS – 5 Times Sit to Stand Test, SVF – Stromal vascular fraction, TUG – The Timed Up and Go test, UCT – Allogeneic human umbilical cord tissue-derived mesenchymal stromal cells, VAS – Visual analog scale, VNS – Visual numeric scale, WOMAC – Western Ontario and McMaster Universities Osteoarthritis Index, G1– Group 1, G2 – Group 2; G3 – Group 3; G4 – Group 4.

improvements in functional assessments such as TUG (Timed Up and Go), STS (Sit-to-Stand), and MWT (6-Minute Walk Test). This suggests that AAT may be more appropriate in cases where mobility restoration is the primary concern, either as a standalone treatment or in conjunction with PRP. To that degree, the adaptability of biological therapies in alleviating pain and inflammation while enhancing physical function points to the necessity of more tailored and patient-specific treatment approaches (11).

In contrast to commonly used outcome measures such as VAS and WOMAC, measure like MRI offers a detailed visualisation of joint structures, enabling the detection of early osteoarthritic changes and the assessment of cartilage integrity (27). A trial conducted by Raeissadat et al. (13) demonstrated the positive effects of PRP on MRI findings, including increased patellofemoral cartilage volume and reduced synovitis, whereas Elik et al. (10) found no statistically significant difference in distal femur cartilage thickness via ultrasonography. Additionally, biochemical methods analyse metabolic processes in OA, aiding in the identification of molecular markers associated with disease progression (27). Biochemical analyses showed reduced pro-inflammatory cytokine levels in the PRP-treated group, which may account for the symptomatic improvements in clinical outcomes (9).

Mesenchymal stem cells (MSCs)

Mesenchymal stem cells (MSCs) are multipotent progenitor cells capable of differentiating into a variety of mesenchymal lineages (7, 28). These cells exhibit remarkable self-renewal capacity and plasticity, possessing notable immunosuppressive and anti-inflammatory properties. MSCs can be derived from a range of tissue sources, including bone marrow, adipose tissue, peripheral blood, and synovial membranes (29). Among these sources, bone marrow is a well-established source of MSCs. Its extraction typically involves aspirating marrow, which is then processed to yield BMAC, a concentrated formulation of bone marrow-derived cells (30). Similarly, adipose tissue serves as a significant source of regenerative and immunomodulatory cells, primarily contributing to the SVF (31).

Given the potential of MSCs in regenerative medicine, extensive investigations into the efficacy and safety of intra-articular cellular injections have been conducted. Mauetner et al. evaluated 480 patients with KL grades 2 – 4 OA. Following the injection, all trial groups adhered to a physiotherapy protocol. One year later, VAS and KOOS assessments revealed significant pain reduction across all groups, where none of the orthobiologic injections demonstrated superior efficacy compared to CST, and no serious adverse events related to the procedure were reported (23).

Cellular preparations derived from SVF have shown significantly better outcomes compared to hyaluronic acid injections (22, 24). Moreover, repeated injections have proven more effective than control treatments in enhancing joint function, relieving pain, and slowing OA progression (20, 21).

Despite these clinical improvements, MRI assessments have provided inconsistent findings regarding structural changes in the joint. Muetner et al. observed no significant differences in joint health or cartilage condition among groups treated with BMAC, SVF, UCT, or CST after one year (23). However, other studies reported mixed results; while SVF injections led to functional improvements, MRI evaluations revealed no measurable changes in the modified Outerbridge classification or chondral thickness, a limitation that may stem from the resolution constraints of MRI imaging (21).

SVF treatment improved cartilage repair and reduced bone marrow abnormalities in some cases, but the results were worse in knees with severe cartilage damage, making advanced structural degeneration difficult to treat. Control groups, especially those receiving HA, showed little effect on cartilage repair (22).

While SVF treatment led to functional improvements, its long-term impact on structural changes remains unclear. Zhang et al. found no improvements in bone marrow lesions (BMLs) after SVF injections, suggesting that the therapy may relieve symptoms or aid superficial repair, but it does not address deeper bone-related changes in OA. A five-year follow-up showed no significant differences in BMLs between SVF-treated groups and controls, indicating its limitations in reversing bone damage. Final radiological evaluations showed that total cartilage volume loss was reduced in both the SVF and HA groups. More patients in the SVF group maintained or improved full-thickness cartilage defects, with fewer experiencing progression compared to the HA group (24).

A study comparing injection regimens found that two injections were most effective, with 89% of partici-

pants maintaining or improving cartilage health and no osteophyte progression. Single injections provided moderate benefits, while the control group experienced significant cartilage loss and osteophyte development. Synovitis, meniscus damage, and popliteal cysts remained unchanged across all groups, showing the complexity of OA and the need for more targeted treatments (20).

Physiotherapy and co-interventions

Physiotherapy treatment should be structured according to the phases of the regenerative process: inflammation, proliferation, and maturation. While these phases have general timeframes, their duration varies between individuals. Age, sex, comorbidities, and the extent of structural damage influence the progression of each phase (6). Treatment is personalized, with goals and plans developed in collaboration with the patient to match their functional needs and priorities (8).

Orthobiological injections often cause inflammation and pain, requiring immobilization or support, the application of ice, elevation, and medication for management (17). It is commonly advised to avoid taking NSAIDs before and after treatment in the early stages, as they interfere with platelet function and reduce growth factor release. Other analgesics can be prescribed instead. Cryotherapy may help manage pain, but concerns remain that reduced blood flow could slow healing (9-24).

Swelling can be addressed through lymphatic drainage, which improves circulation, intercellular signalling mechanisms, and the release of growth factors. Additionally, the injection site needs to be protected by reducing the load on the treated segment through rest or immobilization. Although initial immobilization is recommended, small range-of-motion movements can be performed after the first day of treatment (9, 11, 19 – 22, 32).

The resolution of inflammation marks the transition into the second phase of healing, typically occurring between 3 and 14 days following treatment (32). During this phase, it is recommended to focus on increasing the range of motion, enhancing circulation in the treated area, and improving tissue resilience through therapeutic exercises. The intensity and type of physiotherapy interventions during this period should be guided by the patient's tolerance to activity. A practical guideline is to avoid exercises or activities that elicit pain exceeding 3/10 on a numerical rating scale either during or after the activity (10, 33).

As healing progresses, controlled mechanical loading through therapeutic exercises becomes essential for collagen reorganization and tissue recovery. Strengthening and stretching exercises performed in water are particularly beneficial during this phase (32). Water-based exercises minimise mechanical stress on the joints while providing resistance to support muscle strengthening. For intra-articular injections, strengthening programmes may be initiated earlier than for tendons or ligaments, given the differences in healing dynamics (33).

To optimize healing and rehabilitation outcomes, incorporating physical agents into treatment may be beneficial. For instance, pulsed electromagnetic fields (PEMF) have been shown to enhance the bioavailability of PRP growth factors by stimulating cellular uptake and activation, thereby improving tissue repair and functional recovery. Xu et al. investigated the use of PEMF applied five times per week over 12 weeks, reporting significant improvements in pain measured via VAS, function via WOMAC, and mobility compared to standalone PRP or PEMF therapy (18). Additionally, extracorporeal shock wave therapy (ESWT) has shown promising results in treating OA combined with intraarticular injections, as a non-invasive therapy that applies mechanical force to tissue cells by passing through different mediums. When subjected to mechanical force, cells generate biological signals that stimulate anti-inflammatory responses, angiogenesis, immune modulation, cell proliferation, and cartilage protection (34 – 36).

During healing, exercise programs should progress from single-joint to multi-joint movements. Isometric contractions are the safest option at this stage due to restricted joint mobility and provide short-term pain relief. In knee OA, the focus is on strengthening the locomotor chain, including the hip, knee, and ankle joints (32). Raeissadat et al. proposed a protocol with multi-angle isometric strengthening exercises for the quadriceps femoris, hip adductors, and abductors, along with hamstring stretching. Participants performed these exercises three times daily, holding each stretch for 10 seconds and repeating it 10 times (13). As patients progress, simple knee flexion and extension exercises can be advanced to more complex movements such as lunges, squats, and seated holds (33).

Stretching exercises are recommended between 24 hours and one week post-treatment, but the optimal modality, whether dynamic, static, or proprioceptive neuromuscular facilitation (PNF), remains unclear. Stretching improves flexibility and joint range of motion. Exercises should be pain-free and adapted to the patient's needs and tolerance (37).

Eccentric contractions are typically avoided in the early stages of healing due to concerns that they may impair the healing cascade by reducing vascularisation. Consequently, eccentric exercises are more appropriately introduced during the late proliferative or remodelling phases (37). To manage pain alongside exercise, transcutaneous electrical nerve stimulation (TENS) may be employed. By the end of the second phase, low-impact aerobic activities such as cycling, swimming, and walking can be gradually introduced to maintain or improve cardiorespiratory fitness (23, 32).

In the early third phase (weeks 3 to 4), pain typically subsides, and full joint range of motion should be restored. The focus shifts to increasing activity levels, progressively building muscle strength and endurance. If not started earlier, eccentric strengthening exercises begin at this stage, along with proprioceptive and stability training. Water-based exercises should increase in duration and intensity to improve aerobic capacity.

In the later third phase (weeks 5 to 10), exercises become more complex, incorporating multi-plane movements and adjusting loads based on progress. High-intensity resistance training may be introduced when appropriate. Aerobic activities such as cycling, swimming, and running continue to support overall fitness. Monitoring pain, joint mobility, and motor control ensures safe and effective progression (32).

Conclusion

Orthobiologic injections have shown positive results in OA management, with most studies evaluating outcomes using VAS and WOMAC scores, where these measures consistently indicate pain relief and functional improvement. However, MRI findings remain inconsistent, suggesting that structural changes may not always align with symptomatic benefits. Variability in patient populations, OA severity, injection protocols, and administration intervals further complicates comparisons. Multiple injections are administered at intervals ranging from weeks to months, with no clear consensus on the optimal dosing schedule.

Despite the potential benefits of orthobiologic therapies, post-injection rehabilitation protocols are poorly defined. While many studies acknowledge the importance of physiotherapy, this review identifies one study that provides guidelines on exercise selection, progression, or timing relative to injection administration. Most rehabilitation programs are briefly mentioned or entirely undocumented, limiting the ability to assess their role in treatment outcomes, which shows a significant gap in the literature.

The relationship between orthobiologic injections and physiotherapy remains unclear due to the lack of standardized rehabilitation protocols. Future research should focus on developing evidence-based post-injection rehabilitation strategies and establishing standardized outcome measures beyond self-reported pain and function scores. More comprehensive assessments, including objective imaging and long-term follow-up studies, are needed to determine the true impact of orthobiologic therapies following physiotherapy on OA progression and recovery.

Author Contributions

Conceptualization (IČ, AI, MF); Data Curation (DK), Formal Analysis (IČ, DK); Writing – Original Draft (IČ), Writing – Review & Editing (IČ, AI, MF, DK). All authors reviewed and approved the final version of the manuscript.

Conflict of Interest

The authors declare no conflicts of interest.

Acknowledgments

Not applicable.

Funding

This research received no external funding.

References

1. Hawkins T, Bar A. Osteoarthritis: pathophysiology and diagnosis. Clin Pharm, CP. 2015;7(3). https://doi.org/10.1211/PJ.2015.20068288
2. Khon MD, Sasson AA, Navin FD. Classifications in Brief: Kellgren-Lawrence Classification of Osteoarthritis. Clin Orthop Relat Res. 2016;474(8):1886-93. https://doi.org/10.1007/s11999-016-4732-4
3. Grazio S, Ćurković B, Babić-Naglić Đ, Anić B, Morović-Vergles J, Vlak T, et al. Guidelines of the Croatian Society for Rheumatology for the treatment of knee and hip osteoarthritis. Reumatizam. 2010;57(1):36-47.
4. Chen T, Weng W, Liu Y, Aspera-Werz RH, Nüssler AK, Xu J. Update on Novel Non-Operative Treatment for Osteoarthritis: Current Status and Future Trends. Front Pharmacol. 2021;12:755230. https://doi.org/10.3389/fphar.2021.755230
5. Graeff JJ, van den Bekerom MPJ, van Meer BL, Zijl JAC. Orthobiologics and hyaluronic acid usage in the Netherlands: an electronic survey of 265 orthopaedic surgeons and sports physicians. J Exp Orthop. 2021;8(1):66. https://doi.org/10.1186/s40634-021-00380-9
6. Centeno CJ, Pastoriza SM. Past, current and future interventional orthobiologics techniques and how they relate to regenerative rehabilitation: A clinical commentary. Int J Sports Phy Ther. 2020;15(2):301-25.
7. Margiana R, Markov A, Zekiy AO, Hamza MU, Al-Dabbagh KA, Al-Zubaidi SH, et al. Clinical application of mesenchymal stem cell in regenerative medicine: a narrative review. Stem Cell Res Ther. 2022;13(1):366. https://doi.org/10.1186/s13287-022-03054-0
8. HKF. Kliničke smjernice za fizikalnu terapiju kod osteoartritisa kuka i koljena, Hrvatska komora fizioterapeuta. In: Grubišić M, Hofmann G, Jurinić A, editors. Kliničke smjernice u fizikalnoj terapiji. Zagreb: HKF: 2018. Croatian.
9. Cole BJ, Karas V, Hussey K, Pilz K, Fortier LA. Hyaluronic acid versus platelet-rich plasma: a prospective, double-blind randomized controlled trial comparing clinical outcomes and effects on intra-articular biology for the treatment of knee osteoarthritis. Am J Sports Med. 2017;45(2):339-46. https://doi.org/10.1177/0363546516665809
10. Elik H, Dogu B, Yılmaz F, Begoglu FA, Kuran B. The efficiency of platelet-rich plasma treatment in patients with knee osteoarthritis. J Back Musculoskelet Rehabil. 2020;33:127–38. https://doi.org/10.3233/BMR-181374
11. Kaszyński J, Bąkowski P, Kiedrowski B, Stołowski Ł, Wasilewska-Burczyk A, Grzywacz K, et al. Intra-Articular Injections of Autologous Adipose Tissue or Platelet-Rich Plasma Comparably Improve Clinical and Functional Outcomes in Patients with Knee Osteoarthritis. Biomedicines. 2022;10(3):684. https://doi.org/10.3390/biomedicines10030684
12. Raeissadat SA, Rayegani SM, Hassanabadi H, Fathi M, Ghorbani E, Babaee M, et al. Knee osteoarthritis injection choices: Platelet-rich plasma (PRP) versus hyaluronic acid (A one-year randomized clinical trial). Clin Med Insights Arthritis Musculoskelet Disord. 2015;8:1-8. https://doi.org/10.4137/CMAMD.S17894
13. Raeissadat SA, Ghorbani E, Sanei Taheri M, Soleimani R, Rayegani SM, Babaee M, et al. MRI Changes After Platelet Rich Plasma Injection in Knee Osteoarthritis (Randomized Clinical Trial). J Pain Res. 2020;13:65-73. https://doi.org/10.2147/JPR.S204788
14. Raeissadat SA, Gharooee Ahangar A, Rayegani SM, Minator Sajjadi M, Ebrahimpour A, Yavari P. Platelet-Rich Plasma Derived Growth Factor vs Hyaluronic Acid Injection in the Individuals with Knee Osteoarthritis: A One Year Randomized Clinical Trial. J Pain Res. 2020;13:1699-711. https://doi.org/10.2147/JPR.S210715
15. Raeissadat SA, Ghazi Hosseini P, Bahrami MH, Salman Roghani R, Fathi M, Gharooee Ahangar A, et al. The comparison effects of intra-articular injection of Platelet Rich Plasma (PRP), Plasma Rich in Growth Factor (PRGF), Hyaluronic Acid (HA), and ozone in knee osteoarthritis; a one year randomized clinical trial. BMC Musculoskelet Disord. 2021;22(1):134. https://doi.org/10.1186/s12891-021-04017-x
16. Rayegani SM, Raeissadat SA, Taheri MS, Babaee M, Bahrami MH, Eliaspour D, et al. Does intra articular platelet rich plasma injection improve function, pain and quality of life in patients with osteoarthritis of the knee? A randomized clinical trial. Orthop Rev. 2014;6(3):112-7. https://doi.org/10.4081/or.2014.5405
17. Uslu Güvendi E, Aşkin A, Güvendi G, Koçyiğit H. Comparison of efficiency between corticosteroid and platelet rich plasma injection therapies in patients with knee osteoarthritis. Arch Rheumatol. 2017;33(3):273-81. https://doi.org/10.5606/ArchRheumatol.2018.6608
18. Xu RD, Li JH, Zhang H, Liang HR, Duan SY, Sun M, et al. The combined application of pulsed electromagnetic fields and platelet-rich plasma in the treatment of early-stage knee osteoarthritis: A randomized clinical trial. Medicine (Baltimore). 2024;103(35):e39369. https://doi.org/10.1097/MD.0000000000039369
19. Anz AW, Plummer HA, Cohen A, Everts PA, Andrews JR, Hackel JG. Bone marrow aspirate concentrate is equivalent to platelet-rich plasma for the treatment of knee osteoarthritis at 2 years: a prospective randomized trial. Am J Sports Med. 2022;50(3):618-29. https://doi.org/10.1177/03635465211072554
20. Freitag J, Bates D, Wickham J, Shah K, Huguenin L, Tenen A, et al. Adipose-derived mesenchymal stem cell therapy in the treatment of knee osteoarthritis: a randomized controlled trial. Regen Med. 2019;14(3):213-30. https://doi.org/10.2217/rme-2018-0161

21. Garza JR, Campbell RE, Tjoumakaris FP, Freedman KB, Miller LS, Santa Maria D, et al. Clinical efficacy of intra-articular mesenchymal stromal cells for the treatment of knee osteoarthritis: A double-blinded prospective randomized controlled clinical trial. Am J Sports Med. 2020;48(3):588-98. https://doi.org/10.1177/0363546519899923
22. Hong Z, Chen J, Zhang S, Zhao C, Bi M, Chen X, et al. Intra-articular injection of autologous adipose-derived stromal vascular fractions for knee osteoarthritis: a double-blind randomized self-controlled trial. Int Orthop. 2019;43(5):1123-34. https://doi.org/10.1007/s00264-018-4099-0
23. Mautner K, Gottschalk M, Boden SD, Akard A, Bae WC, Black L, et al. Cell-based versus corticosteroid injections for knee pain in osteoarthritis: a randomized phase 3 trial. Nat Med. 2023;29(12):3120–36. https://doi.org/10.1038/s41591-023-02632-w
24. Zhang S, Xu H, He B, Fan M, Xiao M, Zhang J, et al. Mid-term prognosis of the stromal vascular fraction for knee osteoarthritis: a minimum 5-year follow-up study. Stem Cell Res Ther. 2022;13(1):105. https://doi.org/10.1186/s13287-022-02788-1
25. Rahman E, Rao P, Abu-Farsakh HN, Thonse C, Ali I, Upton AE, et al. Systematic review of platelet-rich plasma in medical and surgical specialties: quality, evaluation, evidence, and enforcement. J Clin Med. 2024;13(15):4571. https://doi.org/10.3390/jcm13154571
26. Foster TE, Puskas BL, Mandelbaum BR, Gerhardt MB, Rodeo SA. Platelet-rich plasma: from basic science to clinical applications. Am J Sports Med. 2009;37(11):2259-72. https://doi.org/10.1177/0363546509349921
27. Illingworth KD, El Bitar Y, Siewert K, Scaife SL, El-Amin S, Saleh KJ. Correlation of WOMAC and KOOS scores to tibiofemoral cartilage loss on plain radiography and 3 Tesla MRI: data from the osteoarthritis initiative. Knee Surg Sports Traumatol Arthrosc. 2014;22(7):1649-58. https://doi.org/10.1007/s00167-013-2402-6
28. Copp G, Robb KP, Viswanathan S. Culture-expanded mesenchymal stromal cell therapy: does it work in knee osteoarthritis? A pathway to clinical success. Cell Mol Immunol. 2023;20(6):626-50. https://doi.org/10.1038/s41423-023-01020-1
29. Giuseppe F, Francesco P, Alice R, Maurilio M, Elizaveta K. Stem cells in articular cartilage regeneration. J Orthop Surg Res. 2016;11:42. https://doi.org/10.1186/s13018-016-0378-x
30. Her YF, Kubrova E, Martinez AGA, D'Souza RS. The analgesic efficacy of intradiscal injection of bone marrow aspirate concentrate and culture-expanded bone marrow mesenchymal stromal cells in discogenic pain: A systematic review. J Pain Res. 2022;15:3299-318. https://doi.org/10.2147/JPR.S373345
31. Shanmugasundaram S, Vaish A, Chavada V, Murrell WD, Vaishya R. Assessment of safety and efficacy of intra-articular injection of stromal vascular fraction for the treatment of knee osteoarthritis-a systematic review. Int Orthop. 2021;45(3):615-25. https://doi.org/10.1007/s00264-020-04926-x
32. McKay J, Frantzen K, Vercruyssen N, Hafsi K, Opitz T, Davis A, et al. Rehabilitation following regenerative medicine treatment for knee osteoarthritis-current concept review. J Clin Orthop Trauma. 2019;10(1):59-66. https://doi.org/10.1007/10.1016/j.jcot.2018.10.018
33. Sussman WI, Gruner MP, Bakal DR, Mautner KR. Rehabilitation principles for interventional orthopedics and orthobiologics. In: George TK, Mostoufi SA, Tria JrAJ, editors. Orthopedic Rehabilitation. Cham: Springer; 2023. https://doi.org/10.1007/978-3-031-32026-2_1
34. Kou D, Chen Q, Wang Y, Xu G, Lei M, Tang X, et al. The application of extracorporeal shock wave therapy on stem cells therapy to treat various diseases. Stem Cell Res Ther. 2024;15(1):271. https://doi.org/10.1186/s13287-024-03888-w
35. Li J, Li J, Li D, Jin X, Liu S, Zhang L. The efficacy of extracorporeal shock wave combined with platelet rich plasma in the treatment of knee osteoarthritis with meniscus injury: A retrospective analysis. Pak J Med Sci. 2024;40(3Part-II):382-7. https://doi.org/10.12669/pjms.40.3.8670
36. Mingwang Z, Zhuanli D, Changhao W, Lufang F, Xiaoping W, Haiping L, et al. Efficacy and safety of extracorporeal shock wave therapy combined with sodium hyaluronate in treatment of knee osteoarthritis: a systematic review and Meta-analysis. J Tradit Chin Med. 2024;44(2):243-50. https://doi.org/10.19852/j.cnki.jtcm.20231226.002
37. Lippi L, Ferrillo M, Turco A, Folli A, Moalli S, Refati F, et al. Multidisciplinary rehabilitation after hyaluronic acid injections for elderly with knee, hip, shoulder, and temporomandibular joint osteoarthritis. Medicina (Kaunas). 2023;59(11):2047. https://doi.org/10.3390/medicina59112047

Author Guidelines

AIM AND SCOPE

Croatian Nursing Journal is a peer-reviewed nursing journal that publishes original articles that advance and improve nursing science and practice and that serve the purpose of transfer of original and valuable information to journal readers. Croatian Nursing Journal is published biannualy in the English language. Authors are invited to submit original papers in the form of research findings, systematic and methodological review and literature review related to nursing.

SUBMITTING A MANUSCRIPT

All manuscripts must be written in English and in accordance with the ICMJE Recommendations (Recommendations by the International Committee of Medical Journal Editors, formerly the Uniform Requirements for Manuscripts), available at: **http://www.icmje.org**. The manuscripts must be submitted through an online submission system available at **http://www.cnj.hr**. The submission system guides you stepwise through the process of entering your details and uploading your files. Manuscripts should be uploaded in Step 2 (*Upload Submission*) and cover letter, title page, tables, figures and/or other documents in Step 4 (*Upload Supplementary Files*). The Croatian Nursing Journal uses the Diamond Open Access model. The articles go through the process of peer review and there are NO author charges. All articles are freely available at our website to all users immediately upon publication and are published under CC BY-NC license.

AUTHORSHIP

All persons designated as authors should qualify for authorship, and all those who qualify should be listed. Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content. All others who contributed to the work who are not authors should be named in the Acknowledgments. All authors should take responsibility for the integrity of the whole work, from inception to published article. Each manuscript is checked for plagiarism detection system. By submitting your manuscript to this journal you accept that it will be screened for plagiarism.

COVER LETTER

Manuscripts must be accompanied by a cover letter signed by all authors including a statement that the manuscript has not been published or submitted for publishing elsewhere, a statement that the manuscript has been read and approved by all the authors, and a statement about any financial or other conflict of interest. A statement of copyright transfer to the journal must accompany the manuscript.

PREPARATION OF MANUSCRIPT

The manuscript must be prepared using Microsoft Office Word, in a 12-point font, double spacing, in either Times New Roman, Arial or Calibri.

Double spacing should be used throughout, including the title page, abstract, text, acknowledgments, references, individual tables, and legends. Pages should be numbered consecutively, beginning with the title page. The page number is to be written in the lower right-hand corner of each page. Manuscript must not exceed 7500 words including the abstract, text, references, tables and figures. The text should be accompanied by the title page as a separate page.

The text of the manuscript should be divided into sections: Abstract and Key words, Introduction, Methods, Results, Discussion, Acknowledgment, References.

Title page

The title page should include:

- the title of the article (which should be concise but informative)
- full name of the author(s), with academic degree(s) and institutional affiliation
  - If authors belong to several different institutions, superscript digits should be used to relate authors' names to respective institution. Identical number(s) should follow the authors' name and precede the institution names
- the name and mailing address of the author responsible for correspondence including his/her e-mail address
- acknowledgments – if any acknowledgment are to be included, they should be briefly stated.

Abstract and Key Words

The first page should contain the title and the abstract (summary) both in English and Croatian, of no more than 250 words each.

The abstract should state the purposes of the study or investigation, basic procedures, main findings, and principal conclusions. It should emphasize new and important aspects of the study or observations. Below the abstract, the authors should provide 3 to 8 key words or short phrases that will assist in cross-indexing the article and may be published with the abstract. Terms from the Medical Subject Headings (MeSH) list of Index Medicus should be used for key words.

Introduction/Background

State the purpose of the article and summarize the rationale for the study or investigation. Give a critical review of relevant literature.

Methods

Describe the selection and identify all important characteristics of the observational or experimental participants. Specify carefully what the descriptors mean and explain how the data were collected. Identify the methods, apparatus with the manufacturer's name and address in parentheses, and procedures in sufficient detail to allow other workers to reproduce the results. Provide references to established methods and statistical methods used. Describe new or substantially modified methods, give reasons for using them, and evaluate their limitations. Identify precisely all drugs and chemicals used. Use only generic names of drugs. All measurements should be expressed in SI units.

Ethics

Papers dealing with experiments on human subjects should clearly indicate that the procedures followed were in accordance with the ethical standards of the institutional or regional responsible committee on

human experimentation and with the Helsinki Declaration and Uniform Requirements for Manuscripts submitted to Biomedical journals. This must be stated at an appropriate point in the article.

Statistics

Describe statistical methods with enough detail to enable a knowledgeable reader with access to the original data to verify the reported results. Whenever possible, quantify findings and present them with appropriate indicators of measurement error or uncertainty. Specify the statistical software package(s) and versions used.

Results

Present your results in logical sequence in the text, tables, and illustrations. Do not repeat in the text all the data in the tables or illustrations; emphasize or summarize main findings.

Discussion

Emphasize the new and important aspects of the study and the conclusions that follow from them. Do not repeat in detail data or other material given in the Introduction or the Results section. Include in the Discussion section the implications of the findings and their limitations, including implications for future research, but avoid unqualified statements and conclusions not completely supported by the data. Relate the observations from your study to other relevant studies. State new hypotheses when warranted, but clearly label them as such.

Conclusion

Emphasize the new and important aspects of the study and the conclusions that follow from them. Do not repeat in detail data or other material given in the Introduction or the Results section. Identify recommendations for practice/research/education or management as appropriate, and consistent with the limitations.

Tables

Please ensure to embed all tables and figures directly into the text of your manuscript. Do not submit tables as photographs. Number tables consecutively in the order of their first citation in the text and supply a brief title for each. Give each column a short heading. Each table should be self-explanatory. Legend or key should be placed in footnotes below the table.

Figures

Figures and illustrations should be professionally drawn and photographed. Make sure that letters, numbers, and symbols should be legible even when reduced in size for publication. Figures should be numbered consecutively according to the order in which they have been first cited in the text.

The preferred formats are JPEG and TIFF, although any format in general use that is not application-specific is acceptable. Make sure that minimum resolution should be 300 DPI.

Graphs, charts, titles and legends in accepted manuscript will be edited prior to publication. Preferred format for graphs or charts is xls or xlsx.

Abbreviations

Use only standard abbreviations. The full term for which an abbreviation stands should precede its first use in the text unless it is a standard unit of measurement.

Acknowledgments

List all contributors who do not meet the criteria for authorship, such as a person who provided purely technical help, writing assistance, or a department chair who provided only general support. Financial and material support should also be acknowledged.

References

References should be numbered consecutively in the order in which they are first mentioned in the text. Identify references in the text, tables, and legends by Arabic numerals in brackets. Use of the DOI is highly encouraged.

References style should follow the NLM standards summarized in the International Committee of Medical Journal Editors (ICMJE) Recommendations for the Conduct, Reporting, Editing and Publication of Scholarly Work in Medical Journals: Sample References, available at **http://www.nlm.nih.gov/bsd/uniform_requirements.html**

References to papers accepted but not yet published should be designated as "in press" and in case of e-

publication ahead of print, the author should provide DOI. The author should obtain written permission to cite such papers as well as verification that they have been accepted for publication.

List of references should include only those references that are important to the text. Long list of references is not desirable. We kindly ask that authors limit their references to 50 in total. All citations in the text must be listed in the references, and all references should be cited in the text. References should be the most current available on the topic.

EDITORIAL PROCESS

After submission of the manuscript, the author will receive a letter confirming manuscript receipt. All manuscripts received are anonymously sent to two reviewers. Croatian Nursing Journal is committed to promote peer review quality and fairness. The reviewers are asked to treat the manuscript with confidentiality. Authors are welcome to suggest up to five potential reviewers for their manuscript (excluding co-authors or collaborators for the last three years), or to ask for exclusion of reviewer(s) and the reasons for it. The Editorial Board may or may not accept authors' suggestions regarding reviewers. Usually four to six months after submission, the authors will receive the reviews. Generally, the instructions, objections and requests made by the reviewers should be closely followed. The authors are invited to revise their manuscript in accordance with the reviewers' suggestions, and to explain amendments made in accordance with the reviewers' requests. The articles that receive more than one reviewer's recommendations for "major review" are sent after revision to the same reviewer, who makes final recommendation about the revised article. Based on the reviewers' suggestions and recommendations, the Editorial Board makes final decision about the acceptance of the submitted article.

Authors will receive a letter confirming acceptance of the paper submitted for publication. Corresponding author will receive page-proof version of the article to make final corrections of possible printing errors.

The Croatian Nursing Journal adheres to the **Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals** (2016) of the International Committee of Medical Journal Editors and to the Committee on Publication Ethics (COPE) general guidelines for ethical conduct in publishing.

For questions about the editorial process (including the status of manuscript under review) please contact the editorial office **info@cnj.hr**.

Submission Preparation Checklist

As part of the submission process, authors are required to check off their submission's compliance with all of the following items, and submissions may be returned to authors that do not adhere to these guidelines.

1. The submission has not been previously published, nor is it before another journal for consideration (or an explanation has been provided in Comments to the Editor).
2. The submission file is in OpenOffice, Microsoft Word, RTF, or WordPerfect document file format.
3. Where available, URLs for the references have been provided.
4. The text is double-spaced; uses a 12-point font; employs italics, rather than underlining (except with URL addresses); and all illustrations, figures, and tables are placed within the text at the appropriate points, rather than at the end.
5. The text adheres to the stylistic and bibliographic requirements outlined in the **Author Guidelines**, which is found in About the Journal.

Privacy Statement

The names and email addresses entered in this journal site will be used exclusively for the stated purposes of this journal and will not be made available for any other purpose or to any other party.


ISSN: 2584-6531