35-th Jubilee Annual Assembly of Intl.Med.Assoc.Bulgaria (IMAB)
and
15-th South-East European Conference (SEEC)

9-12 October 2025
Trakia University, Stara Zagora, Bulgaria

Proceedings of publications of papers presented in the Scientific Programme of the

35-th Jubilee Annual Assembly of Intl.Med.Assoc.Bulgaria (IMAB)
and

15-th South-East European Conference Infections and Cancer
Trakia University, Stara Zagora, Bulgaria
9- 12 October, 2025

Sections: Medicine, Dental Medicine, Health Management, Varia

Publisher Journal of IMAB:
Gospodin Peichinski

Contact details:
seec.imab_2025@trakia-uni.bg
kr.metod@gmail.com
lidiahristoff@gmail.com
nedelina.kostadinova@trakia-uni.bg
liliya.pekova@trakia-uni.bg
publisher_imab@abv.bg

SECTION HEALTH MANAGEMENT

ASPECTS IN THE DYNAMICS OF BEHAVIORAL RESPONSES IN DISASTER SITUATIONS

Ekaterina Birnikova[1], Magdalena Platikanova[2], Stamen Pishev[1], Petya Hristova[2], Vanya Slavova[1]

[1]*Department of Social Medicine, Health Management and Disaster Medicine, Medical Faculty, Trakia University, Stara Zagora, Bulgaria*
[2]*Department of Hygiene, Epidemiology, Microbiology, Parasitology and Infectious Diseases, Medical Faculty, Trakia University, Stara Zagora, Bulgaria*

ABSTRACT
Disasters are tragic and unexpected events that affect all aspects of individual and community life. **Purpose:** To study and analyze the individual responses during the different phases of a disaster by analyzing the biological, psycho-emotional, social, and cultural aspects of adaptation and their impact on mental health. **Material and methods:** The present review was prepared through an analysis of scientific literature, including empirical studies and theoretical models of psychosocial responses to disasters. **Results:** A review of the literature shows that disasters should be viewed as processes with a distinct phased structure. Each phase of a disaster is associated with specific emotional, behavioral, and social manifestations. Individual and group reactions range from organized and adaptive to disorganized and risky, and in the different phases one may observe both expressions of altruism and cohesion, as well as disappointment and social tension**. Conclusion:** Psychological trauma in disaster situations is a multifactorial process that develops dynamically over time. This necessitates an integrated approach involving medicine, psychology, and the social sciences in disaster management.
Keywords: disaster phases, behavioral responses to disasters, adaptation, maladaptation, post-traumatic growth

INTRODUCTION Disasters are tragic and unexpected events that affect all aspects of individual and community life [1, 2]. They trigger biological, psycho-emotional, interpersonal, and socio-cultural responses, the dynamics of which vary depending on the phase of the disaster [3]. Understanding these processes is crucial for developing effective strategies for psychosocial support and interventions [4, 5].

THE AIM of the study was to examine individual responses during the different phases of a disaster by analyzing the biological, psycho-emotional, social, and cultural aspects of adaptation and their impact on mental health. To achieve the aim we set ourselves the following tasks:

1. To present the main phases of individual response to a disaster.
2. To describe the characteristic biological, psycho-emotional, interpersonal, and socio-cultural aspects of behavioral responses in each phase.
3. To analyze adaptive mechanisms.
4. To outline the possible long-term consequences for mental health.

MATERIAL AND METHODS The present review was prepared through an analysis of scientific literature, including empirical studies and theoretical models of psychosocial responses to disasters. The main sources encompass publications in peer-reviewed medical and psychological journals, as well as monographs published in the period 1981–2024.

RESULTS Exposure to traumatic stressogenic factors during disaster situations leads to a deterioration of the individual's physical and mental well-being and causes serious harm to their social and professional life [6, 7]. The behavioral responses of individuals develop dynamically over time and cover an extremely broad and complex range [8]. Disasters should be regarded as

processes with a distinct phase-specific character, requiring different types of interventions at each stage [9, 10]. Each phase is associated with specific emotional, behavioral, and social manifestations that reflect the process of adaptation to the disaster situation. The presented table systematizes the main phases of the experience – from the preparatory period before the incident, through the immediate responses during the disaster, to the subsequent stages of recovery. It illustrates how individual and group reactions range from organized and adaptive to disorganized and risky, with manifestations of altruism and cohesion as well as disappointment and social tension observable in different phases (Table 1) [6].

Table 1. Psychological responses during the phases of a disaster

Phases before the incident (if any)	Preparatory phase	Most people try to prepare for the upcoming disaster. Others remain indifferent and deny the coming danger. Some are anxious and somewhat disorganized, while others remain calm.
	Warning phase	Most people become activated and hyper-reactive, while only a few remain calm.
Phase during the disaster		People are frightened, trying to save themselves, running around, saving others, fussing.
Phases after the incident	Heroic phase	Efforts to experience and cope with adversity. Manifestations of altruism, superhuman workload, great exhaustion.
	"Honeymoon" phase	People tend to share their experiences, have optimistic expectations, and maintain hope. A sense of euphoria prevails.
	Disillusionment phase	Disappointment arises because it is impossible for everyone to receive equal assistance. Some people feel unhappy or neglected.
	Reconstruction phase	People must realize that recovery depends partly on their own strength and abilities. Many refuse to accept this, which can lead to conflict and hostility.

Due to the inability of disaster-affected individuals to resolve numerous social and bureaucratic problems, the sense of crisis intensifies [11]. The deepening awareness of the consequences of the disaster leads to loss of vitality, depression, passivity, decreased self-esteem, and helplessness [12, 13]. In a state of emotional stress, the approach to problem-solving determines the outcome: an increased tendency toward emotional disorders, or an improvement in the ability to cope with psychological problems [14]. The psychological trauma provoked by disasters may vary in duration and severity depending on individual genetic and personality factors, social support, and cultural characteristics. An individual's response to a disaster can be represented as a sequence of several phases (Table 2).

Table 2. Dynamics of behavioral responses in disaster situations

Phase	**Non-clinical reactions**	**Possible clinical diagnoses/syndromes**

Threat phase	Anxiety, denial Information seeking/avoidance "Storm parties", Hypervigilance	Adjustment reactions Situational anxiety
Immediate impact	Cognitive confusion, Numbness Passive submission or antagonism Somatovegetative symptoms	Acute stress reaction Risk behavior
Response phase	Grief, Irritability Sense of loss of control Conflicts with services	Adjustment disorder, Depressive episodes, Anxiety disorders Somatoform symptoms
Short-term consequences (weeks–months)	Decreasing social support Disappointment, Isolation	PTSD, GAD Depression, Substance abuse
Long-term consequences (months–years)	Trigger reactions (sounds/news) "Survivor's guilt", Anniversaries	PTSD, Prolonged grief, Chronic depression, Chronic anxiety Psychosomatic conditions

DISCUSSION Psychological trauma in disaster situations is provoked by the sense of acute, overwhelming threat to life. In such cases, the nervous system becomes incapable of controlling the consequences of the experience, leading to a state of imbalance, and the person remains in a traumatic condition for as long as it takes for brain structures to return to normal, coordinated functioning. The genetic, physiological, and personality characteristics of the individual, their intellectual state at the time of the disaster, level of psychological development, available support systems, and the nature, intensity, and duration of the stressor – all of these influence the severity of the traumatic impact of the disaster [15, 16]. A review of the literature shows that individual behavioral responses are highly dynamic and strongly context-dependent [17]. Particular attention should be given to the phenomenon of "survivor guilt," which may develop into depressive or post-traumatic disorders and requires early identification and targeted psychotherapeutic intervention. Another important issue is the role of post-traumatic growth, in which victims develop new personal resources and coping strategies. This positive perspective opens opportunities for preventing chronic psychological consequences by stimulating adaptive mechanisms [18].

CONCLUSION Psychological trauma in disaster situations is a multifactorial process that develops over time and encompasses biological, psycho-emotional, and socio-cultural dimensions. Understanding the phases of these responses is crucial for the early diagnosis of mental health consequences as well as for planning adequate interventions and long-term support. More systematic studies are needed on individual and group adaptation, especially in the context of children, the elderly, and vulnerable groups. The review emphasizes the need for an integrated approach between medicine, psychology, and the social sciences in disaster management.

REFERENCES:

1. Neria Y, Nandi A, Galea S. Post-traumatic stress disorder following disasters: a systematic review. *Psychol Med.* 2008 Apr;38(4):467-480. [PubMed - https://pubmed.ncbi.nlm.nih.gov/17803838/]
2. Bromet EJ, Atwoli L, Kawakami N, Navarro-Mateu F, Piotrowski P, King AJ, et al. Post-traumatic stress disorder associated with natural and human-made disasters in the World Mental Health Surveys. *Psychol Med.* 2017 Jan;47(2):227-241. [CrossRef - https://doi.org/10.1017/S0033291716002026]

3. Beaglehole B, Mulder RT, Frampton CM, Boden JM, Newton-Howes G, Bell CJ. Psychological distress and psychiatric disorder after natural disasters: systematic review and meta-analysis. *Br J Psychiatry.* 2018;213(6):716-722. [CrossRef - https://doi.org/10.1192/bjp.2018.210]
4. Bonanno GA, Galea S, Bucciarelli A, Vlahov D. Psychological resilience after disaster: New York City in the aftermath of the September 11th terrorist attack. *Psychol Sci.* 2006 Mar;17(3):181-6. [PubMed - https://pubmed.ncbi.nlm.nih.gov/16507055/]
5. Bonanno GA, Chen S, Bagrodia R, Galatzer-Levy IR. Resilience and disaster: flexible adaptation in the face of uncertain threat. *Annu Rev Psychol.* 2024;75:573-599. [CrossRef - https://doi.org/10.1146/annurev-psych-011123-024224]
6. Cénat JM, McIntee SE, Blais-Rochette C. Symptoms of posttraumatic stress disorder, depression, anxiety and other mental health problems following the 2010 earthquake in Haiti: A systematic review and meta-analysis. *J Affect Disord.* 2020 Aug 1;273:55-85. [CrossRef - https://doi.org/10.1016/j.jad.2020.04.046]
7. Etova R. Disasters and stress. *Scientific works of the Union of Scientists in Bulgaria-Plovdiv*. 2021; XXVI(G):190-193. [in Bulgarian] [Internet - https://usb-plovdiv.org/wp-content/uploads/2021/06/2021_medicina_farmacia_dentalna_tom_XXVI.pdf]
8. Makwana N. Disaster and its impact on mental health: a narrative review. *J Family Med Prim Care.* 2019;8(10):3090-3095. [PubMed - https://pubmed.ncbi.nlm.nih.gov/31742125/]
9. Rowe O, Nadkarni A. Barriers and facilitators to the implementation of mental health and psychosocial support programmes following natural disasters in developing countries: A systematic review. *Cambridge Prisms: Global Mental Health.* 2024;11:e5. [PubMed - https://pubmed.ncbi.nlm.nih.gov/38283878/]
10. Li G, Shi W, Gao X, Shi X, Feng X, Liang D, et al. Mental health and psychosocial interventions to limit the adverse psychological effects of disasters and emergencies in China: a scoping review. *Lancet Reg Health West Pac.* 2024;45:100580. [CrossRef - https://doi.org/10.1016/j.lanwpc.2022.100580]
11. Tracy M, Norris FH, Galea S. Differences in the determinants of posttraumatic stress disorder and depression after a mass traumatic event. *Depress Anxiety.* 2011 Aug;28(8):666-75. [CrossRef - https://doi.org/10.1002/da.20838]
12. Bufford RK, Skoubo J, Logan K, Paxton A. Natural disasters, psychosocial distress, psychological flexibility, and satisfaction with life. *Behav Sci.* 2025;15(7):848. [CrossRef - https://doi.org/10.3390/bs15070848]
13. Witt A, Sachser C, Fegert JM. Scoping review on trauma and recovery in youth after natural disasters: what Europe can learn from natural disasters around the world. *Eur Child Adolesc Psychiatry.* 2024;33:651-665. [CrossRef - https://doi.org/10.1007/s00787-022-01983-y]
14. Dai W, Chen L, Tan H, Wang J, Lai Z, Kaminga AC, et al. Association between social support and recovery from post-traumatic stress disorder after flood: a 13-14 year follow-up study in Hunan, China. *BMC Public Health.* 2016 Feb 29;16:194. [PubMed - https://pubmed.ncbi.nlm.nih.gov/26924178/]
15. Murray H, Pethania Y, Medin E. Survivor guilt: a cognitive approach. *Cogn Behav Ther.* 2021;14:e28. [CrossRef - https://doi.org/10.1017/S1754470X21000246]
16. Bistas K, Grewal R. The intricacies of survivor's guilt: exploring its phenomenon across contexts. *Cureus.* 2023;15(9):e45703. [CrossRef - https://doi.org/10.7759/cureus.45703]
17. Miller VE, Fitch KV, Swilley-Martinez ME, Agha E, Alam IZ, Kavee AL, et al. Impact of Hurricanes and Floodings on Mental Health Outcomes Within the United States: A Systematic Review and Meta-Analysis. *Disaster Med Public Health Prep.* 2024;18:e335. [CrossRef - https://doi.org/10.1017/dmp.2024.327]
18. Guilaran J, de Terte I, Kaniasty K, Stephens C. Psychological Outcomes in Disaster Responders: A Systematic Review and Meta-Analysis on the Effect of Social Support. *Int J Disaster Risk Sci.* 2018;9(3):344-358. [CrossRef - https://doi.org/10.1007/s13753-018-0184-7]

Address for correspondence:
Vanya Slavova, MD, PhD
Department of Social Medicine, Health Management and Disaster Medicine, Medical Faculty, Trakia University
11, Armejska Str., 6000 Stara Zagora, Bulgaria E-mail: vanya.slavova@trakia-uni.bg

MATHEMATICAL MODELING IN DISASTER MEDICINE

Veselin Ivanov[1], Nadya Bozakova[2], Stefka Fidanova[3]

[1]*Department of Social Medicine, Health Management and Disaster Medicine, Faculty of Medicine, Trakia University, 6000, Stara Zagora, 11 Armeyska street, Bulgaria*
[2]*Department of Animal Husbandry, Faculty of Veterinary Medicine, Trakia University, 6000 Stara Zagora, Bulgaria*
[3] *Centre of Excellence in Informatics and Information and Communication Technologies, Sofia, Bulgaria and Institute of Information and Communication Technology, Bulgarian Academy of Sciences, Sofia, Bulgaria*

ABSTRACT
Purpose: Throughout history, *natural and human-made disasters*- such as wars, volcanic eruptions, and floods—have caused significant loss of life, injury, and material damage. To reduce the impact of such events, society must engage in proactive, science-based disaster preparedness. **Materials and methods**: We use mathematical methods generalized net. **Results**: We created mathematical models about number of casualties, number of victims, types of injury and distribution of patients in hospitals, evacuation strategies. **Conclusions**: These investigations help planning, evacuation resource allocation, and hospital distribution, thereby enhancing disaster management. This integrated approach helps organize medical response more effectively, reduces panic and chaos, and ultimately decreases mortality rates.
Key words: disaster, earthquake, mathematical modeling, evacuation

INTRODUCTION
Society must be adequately prepared for disasters such as wars, volcanic eruptions, and floods [1]. Inadequate or absent preparation often leads to devastating consequences. Effective disaster management requires advance planning [2], including: trained personnel: doctors, nurses, midwives, and rehabilitation specialists; essential supplies: medicines, disinfectants, and evacuation transport; robust infrastructure: hospitals and evacuation routes; financial support: adequate funding for rapid response. These preparations must be based on scientifically grounded forecasts of potential general and medical impacts. Such planning is vital to minimize harm and ensure a coordinated, effective response.
Since 2021, scientists from Thracian University have collaborated with a mathematics team from IICT-BAS to develop data-driven models for disaster response. This interdisciplinary effort has produced predictive tools capable of estimating mortality rates, injury severity (mild to critical), and types of medical conditions (trauma, burns, intoxications, etc.) to support proactive planning and optimize disaster management strategies. A major achievement of this collaboration is the 2024 grant awarded by the Bulgarian National Science Fund—180,000 BGN—for the project "Modeling and Decision-Making in Disaster Medicine", led by Prof. Stefka Fidanova (IICT-BAS). This article presents the outcomes and impact of this joint research and focuses on the dissemination of knowledge from the project. Given the wide range of natural and anthropogenic disasters, the current phase of the project is focused specifically on earthquakes— devastating natural phenomena with severe consequences.
Earthquakes are difficult to predict accurately. Some methods exist, but reliable forecasting remains out of reach. The primary medical consequence is trauma—fractures, head, chest, and abdominal injuries, and vascular damage.

Secondary effects include: 1) Fires causing thermal injuries; 2) Chemical leaks from damaged industrial sites; 3) Tsunamis [3], especially in the Black Sea region (M≥7, depth ~100 m); 4) Floods from dam failures; 5) Landslides; 6) Epidemics, e.g. cholera in Haiti (2010) [4]; 7) Radiation exposure, e.g. Fukushima (2011) [5].
These factors lead to mass casualties with varied injuries—traumatic, thermal, toxic, infectious, and radiation-related—making it difficult to predict the scale and type of medical needs.

MATERIALS AND METHODS

We applied a method based on generalized net, developed by Acad. Kiril Atanasov in 1981 [6]. This approach allows for a structured, data-driven analysis of key influencing factors. The method is described in figures 1-3.

Fig. 1 The information (input data) follows through INPUT into TRANSITION. There, mathematical transformations are performed and processed information is output at OUTPUT – a number or mathematical equation.

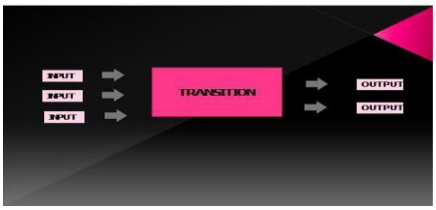


Fig. 2 Sometimes a TRANSITION can have more than one INPUT and/or one OTPUT.

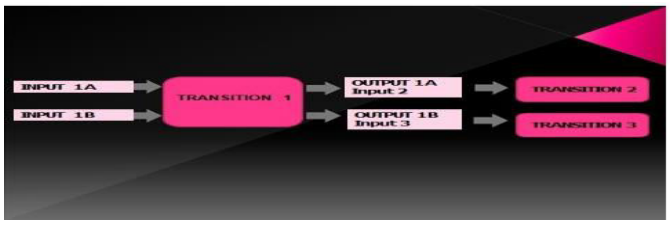


Fig. 3 The output data that is received at one OUTPUT can be fed as input data via INPUT into another TRANSITON for further processing.

RESULTS

As a result of the team's work in this direction, the following scientific conference reports have been published [7-11]:
The first of these examines the mathematical principles through which the analyses were carried out. The second model estimates the number of fatalities, minor and severe traumatic injuries, as well as minor and severe thermal injuries among victims. The third model addresses the optimal allocation of casualties to hospitals. In major earthquakes, hospitals often face overcrowding and shortages of critical resources such as beds, medications, medical staff, and disinfectants. This model incorporates key factors including the number of victims, injury severity and type, hospital capacity and specialization (e.g., burn units), operational flexibility, and the distance from the disaster site to medical facilities. In our fourth study, we developed an evacuation model for diabetic patients using the generalized net method. This model accounts for their specific characteristics, including the presence of comorbidities, complications of diabetes, earthquake-related injuries (traumatic and thermal), details about their residences, and

information about the hospitals to which they are assigned. In the fifth study, we created a model for evacuating individuals with reduced mobility—namely, disabled and elderly persons—who are particularly vulnerable during disasters. These individuals often require assistance to evacuate. The model incorporates whether they reside in social care facilities, distinguishing between homes for the elderly and those for people with disabilities. Our evacuation models consider building structure, floor level, technical rescue needs, comorbidities, and possible traumatic or thermal injuries.

DISCUSSION

Example: While population density is widely acknowledged in the literature as a major determinant of casualty numbers in earthquakes [12], most sources stop at this general observation. Our method seeks to go further—introducing specific, quantitative modeling to better understand and predict its actual impact.

From General Observations to Quantitative Assessment

The mathematical model provides a structured way to quantify the impact of factors like population density. While this indicator is often cited as influencing the number of deaths and injuries (traumatic, thermal, etc.), it cannot alone predict outcomes without considering additional variables. In our approach, population density is treated as a functional component— factor that contributes to, but does not solely determine, outcomes such as mortality rates and injury types. Through mathematical processing and algorithmic modeling, we move beyond qualitative statements to obtain specific, data- driven results. This represents a qualitative advancement in disaster assessment—transforming general observations into actionable insights for planning and decision-making.

Advantages of the Multivariate Prediction Model

The model improves prediction accuracy by incorporating multiple factors beyond population density, such as earthquake magnitude and building characteristics. While textbooks often note that casualty numbers vary between magnitude 5 and higher magnitude earthquakes (6, 7, or 8), these explanations are usually descriptive and lack precise quantification.

For instance, at the same population density, different earthquake magnitudes yield significantly different outcomes in terms of deaths, severe and minor injuries, and specific injury types such as thermal burns. Similarly, the nature of buildings—height, construction quality, and materials—is recognized as influencing casualty rates, yet detailed quantitative analyses are often missing in the literature.

Our model addresses these gaps by providing specific, data-driven predictions that reflect the combined effects of these critical factors.

Flexibility and Expansion of the Model

A major advantage of this model is its ability to incorporate additional factors, enabling the simulation of more complex scenarios. For example, the model can predict differences in casualty numbers if an earthquake occurs during the day versus at night (typically more victims at night) or in summer versus winter, when thermal injuries increase due to heating appliances.

The model also allows modification of other input variables to assess diverse situations, such as dam failures leading to floods, industrial fires, or the loss of critical infrastructure like hospitals. By introducing new transitions, inputs, and outputs into the existing matrix, the model can update forecasts through rigorous mathematical processing.

Thus, the model inherently supports future research and scenario expansion, providing a scientifically robust tool for disaster planning and management.

CONCLUSIONS

This research represents a significant advancement in disaster medicine by enabling more accurate, scientifically grounded assessments of casualty numbers and injury types. Such precision improves forecasting, medical care planning, evacuation strategies, resource allocation, and hospital distribution, thereby enhancing disaster management. This integrated approach helps organize medical response more effectively, reduces panic and chaos, and ultimately decreases mortality rates.

This project is a wonderful example of successful collaboration between doctors, veterinarians, and mathematicians to mitigate the impacts of disasters.

Acknowledgment

The work was partially supported by the Centre of Excellence in Informatics and ICT under the Grant No BG16RFPR002-1.014-0018-C01, financed by the Research, Innovation and Digitalization for Smart Transformation Program 2021-2027 and co-financed by the European Union.

References

1. Shang J, Chastain AM, Perera UGE, Quigley DD, Fu CJ, Dick AW, Pogorzelska-Maziarz M at al. COVID-19 Preparedness in US Home Health Care Agencies. J Am Med Dir Assoc. 2020 Jul;21(7):924-927. doi: 10.1016/j.jamda.2020.06.002. Epub 2020 Jun 4. PMID: 32674820; PMCID: PMC7269929.

2. Dariagan JD, Atando RB, Asis JLB. Disaster preparedness of local governments in Panay Island, Philippines. Nat Hazards (Dordr). 2021;105(2):1923-1944. doi: 10.1007/s11069-020-04383-0. Epub 2020 Oct 26. PMID: 33132533; PMCID: PMC7587520.

3. Shuto N. Tsunami hazard mitigation. Proc Jpn Acad Ser B Phys Biol Sci. 2019;95(4):151-164. doi: 10.2183/pjab.95.012. PMID: 30971618; PMCID: PMC6541722

4. Charles M, Delva GG, Boutin J, Severe K, Peck M, Mabou MM et al. Importance of cholera and other etiologies of acute diarrhea in post-earthquake Port-au-Prince, Haiti. Am J Trop Med Hyg. 2014 Mar;90(3):511-7. doi: 10.4269/ajtmh.13-0514. Epub 2014 Jan 20. PMID: 24445205; PMCID: PMC3945697..

5. Konoplev A. Fukushima and Chernobyl: Similarities and Differences of Radiocesium Behavior in the Soil-Water Environment. Toxics. 2022 Sep 30;10(10):578. doi: 10.3390/toxics10100578. PMID: 36287858; PMCID: PMC9608664.

6. Atanassov, K.: On Generalized Nets Theory. „Prof. M. Drinov'' Academic Publishing House. So a. (2007).

7. Fidanova St., Atanassov Kr., Kirilov L., Slavova V., Ivanov V. Generalized Net Model of the Consequences of Earthquake. Recent Contributions to Bioinformatics and Biomedical Sciences and Engineering. Lecture Notes in Networks and Systems 658. 2023, Pp 282- 292

8. Fidanova, S., Kirilov, L., Paprzycki, M., & Ivanov, V. Injured and Died in an Earthquake. In The International Conference on Environmental Protection and Disaster Risks. (2024, June). (pp. 27-37). Cham: Springer Nature Switzerland.

9. Fidanova St., Kirilov L., Ivanov V.Ganzha M. Hospital patients distribution after earthquake. Proceedings of the 19th Conference on Computer Science and Intelligence Systems (FedCSIS). 2025. pp. 597– 601DOI: 10.15439/2024F5777ISSN 2300-5963 ACSIS, Vol. 39

[accessed Oct 30 2024]. (Web of Science)

10 Fidanova St., Atanassov K., Kirilov L., Ivanov V. Generalized Net for Diabetics Services After Earthquake

Accept in Springer serie "Studies in Computational Intelligence", book title "Recent Advances in Computational Optimization" in press

11. Ivanov V., Atanassov K., Kirilov L., Fidanova S. Generalized Net for Disabled Persons Services After Earthquake

Accept in Springer serie "Studies in Computational Intelligence", book title "Recent Advances in Computational Optimization" in press

12. Wang S, Zhang M, Huang X, Hu T, Sun QC, Corcoran J, Liu Y. Urban-rural disparity of social vulnerability to natural hazards in Australia. Sci Rep. 2022 Aug 11;12(1):13665. doi: 10.1038/s41598-022-17878-6. PMID: 35953590; PMCID: PMC9372054.

Address for correspondence: veselin.ivanov@trakia-uni.bg

CULTURALLY COMPETENT BEHAVIOR AMONG NURSES

Kameliya Evtimova[1,2], Gergana Petrova[1], Rositsa Doynovska[2,3]

1. Department of Nursing Care, Faculty of Public Health, Medical University – Plovdiv, Bulgaria.
2. Department of Health Care, Faculty of Public Health, Health Care and Sports, South-West University "Neofit Rilski", Bulgaria.
3. Department of Health Care and Social Work, New Bulgarian University, Bulgaria.

ABSTRACT

Introduction: Cultural competence is a key characteristic of the modern nursing profession, directly related to the quality of health care provided. Nurses encounter patients from diverse cultural, ethnic, and religious backgrounds on a daily basis, which requires adaptation of care and behavioral sensitivity.

Aim: The aim of the study is to identify culturally competent behavior among nursing students and practicing nurses, to compare its levels between the two groups, and to determine the factors influencing its development and application in practice.

Materials and methods: An online survey was conducted among 69 practicing nurses and 56 third- and fourth-year students from the Nursing program at South-West University "Neofit Rilski," Blagoevgrad. For the purposes of the study, questions were adapted from the Cultural Competence Assessment (CCA) tool developed by Schim and Miller (2003). Statistical data analysis was performed using SPSS 26.

Results: Practicing nurses demonstrated higher levels of culturally competent behavior compared to students, who showed moderate self-assessment and a positive attitude.

Conclusion: The need for targeted practical training is essential for improving cultural competence and adapting nursing care to diverse cultural groups.

Keywords: cultural competence, culturally competent behavior, nurses, students, practical training

INTRODUCTION

Cultural competence is increasingly recognized as a key characteristic of the modern nursing profession and is directly related to the quality and effectiveness of the health care provided [1, 2]. In a globalized world, nurses encounter patients from diverse ethnic, religious, and cultural communities whose values, traditions, and health practices significantly influence their perception of illness and treatment processes [3]. To ensure that care is adequate, it must be tailored to these specificities, moving beyond general knowledge toward concrete actions that demonstrate cultural sensitivity.

In this context, culturally competent behavior is viewed as the practical dimension of cultural competence. It encompasses the nurse's ability to adapt communication strategies, use resources to overcome language barriers, avoid stereotypes and prejudices, and build trust-based relationships with patients [4, 5]. The development of such behavior is a continuous process that begins during nursing education and is further strengthened through clinical experience [6].

Scientific studies show that there are differences between nursing students and practicing nurses regarding the manifestation of culturally competent behavior [7, 8, 9]. While students often demonstrate a strong willingness and positive attitudes toward implementing culturally sensitive practices, practicing nurses typically exhibit established action patterns based on professional experience. This creates opportunities for comparative analysis that can highlight the strengths of both groups and provide guidance for improving nursing education and professional practice.

AIM

The aim of the study is to identify culturally competent behavior among nursing students and practicing nurses, to compare its levels between the two groups, and to determine the factors that influence its development and application in practice.

MATERIALS AND METHODS

The data presented in this scientific report are part of a dissertation study aimed at examining and assessing cultural competence among practicing nurses and students from the Nursing program.

The study groups include practicing nurses from hospital healthcare institutions in the Blagoevgrad region and third- and fourth-year nursing students at South-West University "Neofit Rilski." Information was collected through an online questionnaire distributed via the Google Forms platform, based on adapted items from the Cultural Competence Assessment (CCA) tool developed by Schim and Miller (2003) [10]. The questionnaire consists of two subscales — cultural awareness and culturally competent behavior — with the present report focusing on the latter.

Data were quantitatively analyzed using the statistical software package SPSS 26. The Mann-Whitney U test ($p<0.05$) was applied to compare the two groups, while the Pearson correlation coefficient was used to assess the relationship between participation in cultural competence training and self-assessment.

RESULTS

The study included 69 practicing nurses and 56 Nursing students from South-West University "Neofit Rilski", Blagoevgrad. The average age of the nurses was 43,67 ± 9,62 years, while the students, in their third and fourth years of study, represented a diverse age range.

The distribution of work experience among the nurses showed that 24 (34,78%) had over 20 years of experience, 16 (23,19%) had between 11 and 20 years, 5 (7,25%) had between 6 and 10 years, 18 (26,09%) had between 1 and 5 years, and 6 (8,69%) had less than 1 year.

In terms of self-assessed cultural competence, 30 nurses (43,48%) rated themselves as "good," 23 (33,33%) as "moderate," 9 (13,04%) as "excellent," and 7 (10,15%) as "rather low," with none rating themselves as "poor." Among the students, 32 (57,14%) described their cultural competence as moderate, while 9 (16,07%) rated it as good.

The vast majority of nurses — 65 (94,20%) had not participated in any training related to cultural competence, while only 4 (5,80%) had such an opportunity. The correlation between participation in cultural competence training and self-assessment among nurses was extremely weak and statistically insignificant ($r = -0,009$; $p = 0,940$), indicating that training participation had no measurable impact on self-assessment levels.

Specific manifestations of culturally competent behavior among nurses and students are summarized in Table 1, which presents the frequency of responses for each item and the comparison between the two groups.

Table 1. Comparison of Culturally Competent Behavior Between Nurses and Students

Question	**Never**	**Rarely**	**Sometimes**	**Often**	**Always**
I seek information about cultural characteristics and needs when meeting new people in the hospital. (Mann-Whitney U = 1768,000, N = 125, p = 0,388)					

Nurses					
Students	15(21,74%) 20(35,71%)	31(44,93%) 16(28,57%)	21(30,43%) 20(37,72%)	0(0%) 0(0%)	2(2,90%) 0(0%)
I have textbooks and materials that help me learn more about different cultures. *(Mann-Whitney U = 1042,500, N = 125,* ***p = 0,000****)*					
Nurses	60(86,96%)	9(13,04%)	0(0%)	0(0%)	0(0%)
Students	25(44,64%)	15(26,79%)	10(17,86%)	6(10,71%)	0(0%)
I consciously refrain from making generalizing assumptions or judgments about people based on their ethnic, racial, cultural, or religious background. *(Mann-Whitney U = 1620,000, N = 125, p = 0,085)*					
Nurses	0(0%)	0(0%)	7(10,14%)	47(68,12%)	15(21,74%)
Students	0(0%)	0(0%)	10(17,86%)	20(35,71%)	26(46,43%)
I find ways to adapt my nursing care to the cultural preferences of individual patients. *(Mann-Whitney U = 1870,000, N = 125, p = 0,744)*					
Nurses	0(0%)	2(2,90%)	26(37,68%)	13(18,84%)	28(40,58)
Students	0(0%)	0(0%)	20(35,71)	20(35,71%)	16(28,57%)
I use the help of people or resources for translation to facilitate communication with patients who do not speak Bulgarian. *(Mann-Whitney U = 1452,000, N = 125, p =* ***0,012****)*					
Nurses	37(53,62%)	2(2,90%)	30(43,48%)	0(0%)	0(0%)
Students	8(14,29%)	28(50,0%)	12(21,43%)	5(8,93%)	3(5,35%)
I make efforts to build trust with patients from diverse cultural backgrounds. *(Mann-Whitney U = 1587,000, N = 125, p = 0,048)*					
Nurses	0(0%)	15(21,74%)	53(76,81%)	1(1,45%)	0(0%)
Students	0(0%)	15(26,78%)	24(42,86%)	9(16,07%)	8(14,29%)
I adapt my communication style according to the cultural characteristics and preferences of the patient. *(Mann-Whitney U = 1324,000, N = 125, p =* ***0,001****)*					
Nurses	0(0%)	0(0%)	29(42,03%)	33(47,83%)	7(10,14%)
Students	0(0%)	16(28,57%)	16(28,57%)	24(42,86%)	0(0%)
I provide information about nursing care in a language and format that is understandable and accessible to patients. *(Mann-Whitney U = 1134,000, N = 125, p =* ***0,000****)*					
Nurses	7(10,14%)	21(30,43%)	17(24,64%)	18(26,09%)	6(8,70%)
Students	2(3,57%)	4(7,14%)	13(23,21%)	22(39,29%)	15(26,79%)

DISCUSSION

The results of the present study indicate that nurses demonstrate a higher level of culturally competent behavior compared to students, which is likely due to their accumulated professional experience and direct contact with patients from diverse cultural backgrounds. Similar findings have been confirmed in international studies, where practicing healthcare professionals with greater clinical experience show higher engagement and effectiveness in culturally adapted care [11].

The statistically significant differences in the use of interpreters, adaptation of communication, trust-building, and providing information in a language accessible to the patient highlight that practical experience is a key factor in the development of cultural competence. These results are consistent with international research indicating that interaction with patients from different cultures and participation in real clinical situations enhance nurses' cultural adaptation skills and behavioral competence [5, 12].

Students, despite their limited clinical practice, demonstrated moderate self-assessment and a positive attitude toward culturally competent behavior. This is also in line with the reviewed literature, which shows that students often display knowledge and motivation regarding cultural competence but require practical training and support to develop their skills in real-life settings [13, 14].

The lack of a significant relationship between participation in training and self-assessment among nurses suggests that current educational programs do not provide sufficient practical application of knowledge. This finding aligns with other studies indicating that short or purely theoretical courses on cultural competence rarely lead to sustainable behavioral improvement unless combined with clinical experience [8].

CONCLUSION

The study confirms that cultural competence develops through a combination of professional experience and practical skills. Nurses demonstrate higher levels of culturally competent behavior, while students show a positive attitude and potential for growth. The need for targeted and practice-oriented training is crucial for enhancing the ability to adapt nursing care to diverse cultural groups.

REFERENCES:

1. Osmancevic S, Steiner LM, Großschädl F, Lohrmann C, Schoberer D. The effectiveness of cultural competence interventions in nursing: A systematic review and meta-analysis. Int J Nurs Stud. 2025 Jul;167:105079. PubMed
2. Tang C, Tian B, Zhang X, Zhang K, Xiao X, Simoni JM, Wang H. The influence of cultural competence of nurses on patient satisfaction and the mediating effect of patient trust. J Adv Nurs. 2019 Apr;75(4):749-759. PubMed
3. Swihart DL, Yarrarapu SNS, Martin RL. Cultural Religious Competence in Clinical Practice. 2023 Jul 24. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025. PubMed
4. Afriyie D. Effective communication between nurses and patients: an evolutionary concept analysis. Br J Community Nurs. 2020 Sep 2;25(9):438-445. PubMed
5. Henderson S, Barker M, Mak A. Strategies used by nurses, academics and students to overcome intercultural communication challenges. Nurse Educ Pract. 2016 Jan;16(1):71-8. PubMed
6. Putra KR, Hany A, Vatmasari RA, Rahmawati IN, Hidayah R, Agse KBD, Rosyid MD, Zuhri SNN. Clinical learning environment: Improving cultural competence in nursing students. J Educ Health Promot. 2025 Jan 31;14:21. PubMed
7. Lin HL, Guo JL, Chen HJ, Liao LL, Chang LC. Cultural competence among pre-graduate nursing students, new graduate nurses, nurse mentors, and registered nurses: A comparative descriptive study. Nurse Educ Today. 2021 Feb;97:104701. PubMed
8. Červený M, Tóthová V. Self-reported cultural competence among Czech and Slovakian nurses: A comparative correlation study. Int Nurs Rev. 2024 Dec;71(4):1072-1079. PubMed
9. Antón-Solanas I, Tambo-Lizalde E, Hamam-Alcober N, Vanceulebroeck V, Dehaes S, Kalkan I, Kömürcü N, Coelho M, Coelho T, Casa Nova A, Cordeiro R, Sagarra-Romero L, Subirón-Valera AB, Huércanos-Esparza I. Nursing students' experience of learning cultural competence. PLoS One. 2021 Dec 17;16(12):e0259802. PubMed
10. Schim SM, Doorenbos AZ, Miller J, Benkert R. Development of a Cultural Competence Assessment instrument. J Nurs Meas. 2003 Spring-Summer;11(1):29-40. PubMed
11. Liu TT, Chen MY, Chang YM, Lin MH. A Preliminary Study on the Cultural Competence of Nurse Practitioners and Its Affecting Factors. Healthcare (Basel). 2022 Apr 3;10(4):678. PubMed
12. Baugh AD, Vanderbilt AA, Baugh RF. Communication training is inadequate: the role of deception, non-verbal communication, and cultural proficiency. Med Educ Online. 2020 Dec;25(1):1820228. PubMed
13. Cruz JP, Aguinaldo AN, Estacio JC, Alotaibi A, Arguvanli S, Cayaban ARR, John Cecily HS, Machuca Contreras FA, Hussein A, Idemudia ES, Mohamed SAM, Sebaeng J. A Multicountry Perspective on Cultural Competence Among Baccalaureate Nursing Students. J Nurs Scholarsh. 2018 Jan;50(1):92-101. PubMed
14. Majda A, Zalewska-Puchała J, Bodys-Cupak I, Kurowska A, Barzykowski K. Evaluating the Effectiveness of Cultural Education Training: Cultural Competence and Cultural Intelligence Development among Nursing Students. Int J Environ Res Public Health. 2021 Apr 11;18(8):4002. PubMed

Address for correspondence:
Prof. Gergana Petriova, PhD, Department of Nursing care, Faculty of Public Health, Medical University of Plovdiv
gergana.petrova@mu-plovdiv.bg

ORGANIZATION OF HEALTHCARE FOR BURNS

Dimitrina Blagoeva, Petya Trendafilova, Tanya Popova

Department of Health Care, Faculty of Public Health „Prof. Dr. Tsekomir Vodenicharov, MD", Medical University – Sofia

ABSTRACT

Burns are one of the most common and life-threatening injuries affecting various socio-economic groups of the population. The impact of various energy sources - thermal, electrical, chemical, radiation - can cause damage to the body to varying degrees.

The purpose of this study is to examine and analyze the level of input and output knowledge and practical skills of nursing students regarding nursing care for burn patients and methods for local wound treatment.

Material and methods. The study was conducted among 107 students of the "Nursing" specialty in the third year of study at the Faculty of Public Health "Prof. Dr. Tsekomir Vodenicharov, MD" of MU-Sofia. The study used a documentary method, a sociological method, a statistical method.

Results: The results show a significant positive difference of 56.07% between the input (17.76%) and output (73.83%) level of knowledge regarding the presence of soot in the nostrils as a primary sign of inhaled smoke gases.

Conclusion: Burn wounds are in most cases difficult to heal, which requires students to develop skills in dressing methods and means for treating the affected areas of the body.

Key words: burnout, training, competence, students

INTRODUCTION

The World Health Organization (WHO) defines burn injuries as a serious cause of death and morbidity worldwide. [1]

Burns are one of the most common and life-threatening injuries affecting various socio-economic groups of the population. The impact of various energy sources – thermal, electrical, chemical, radiation – can cause damage to the body to varying degrees. Regardless of the etiological factors, the severity of the trauma depends on the affected area, depth, localization and premorbid condition of the victims. Burn wounds are a serious challenge for medical professionals, regardless of the scientifically proven treatment methods applied in practice. [2]; [3]; [4].

The organization and management of nursing care for burn patients requires basic knowledge of the etiology and pathophysiology of trauma, as well as specific knowledge of the healing process in the individual phases of the process. The nursing assessment, care plan, and subsequent interventions focus on key priorities tailored to the individual needs of each patient.

The formation of professional competence in the field of nursing care begins with the basic training of students in higher medical schools, with subsequent upgrading in practice and participation in continuing education - courses, seminars, conferences, etc.

A study conducted in Bulgaria (A. Dimitrova, 2018) among 469 students majoring in "Nursing" from Medical Universities in the country shows that 42.60% of the students feel unprepared to provide emergency care for burns, 23.20% of them cannot assess, 24.90% have some training and only 9.10% have knowledge of medical care at the scene of the accident. [5].

AIM

The purpose of this study is to examine and analyze the level of input and output knowledge and practical skills of nursing students regarding nursing care for burn patients and methods for local wound treatment.

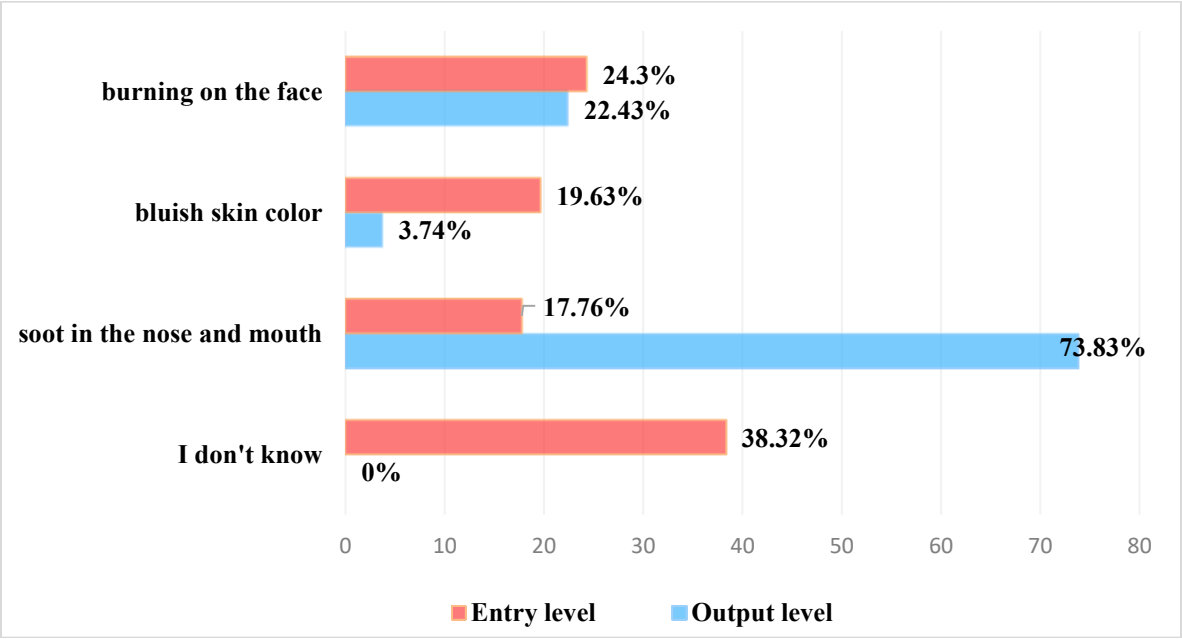
MATERIAL AND METHODS

The study used a documentary method, a sociological method, a statistical method and a graphical method to visually illustrate the results obtained. The study was conducted among 107 students of the "Nursing" specialty in the third year of study at the Faculty of Public Health "Prof. Dr. Tsekomir Vodenicharov, MD" of MU-Sofia during the academic year 2024-2025. In this study, we examined the level of knowledge before and after training on the topic. To assess the students' knowledge, a questionnaire was used with the option of choosing from formulated answers determining their awareness of the severity of the trauma, the classification of burn wounds, and the methods for treating the affected areas.

RESULTS AND DISCUSSION

The assessment of the patient's condition is essential for objective information from the collected and analyzed data on the depth and area of the affected areas of the body, localization, presence of inhalation of gunfire gases and/or direct burns of the respiratory tract [2]. The patient's respiratory and water status remain the highest priority of nursing diagnosis. The results show a significant positive difference of 56.07% between the input (17.76%) and output (73.83%) level of knowledge regarding the presence of soot in the nostrils as a primary sign of inhaled smoke gases. The respondents' stated answer "I don't know" decreased from 38.32% to 0. (Fig. 1).

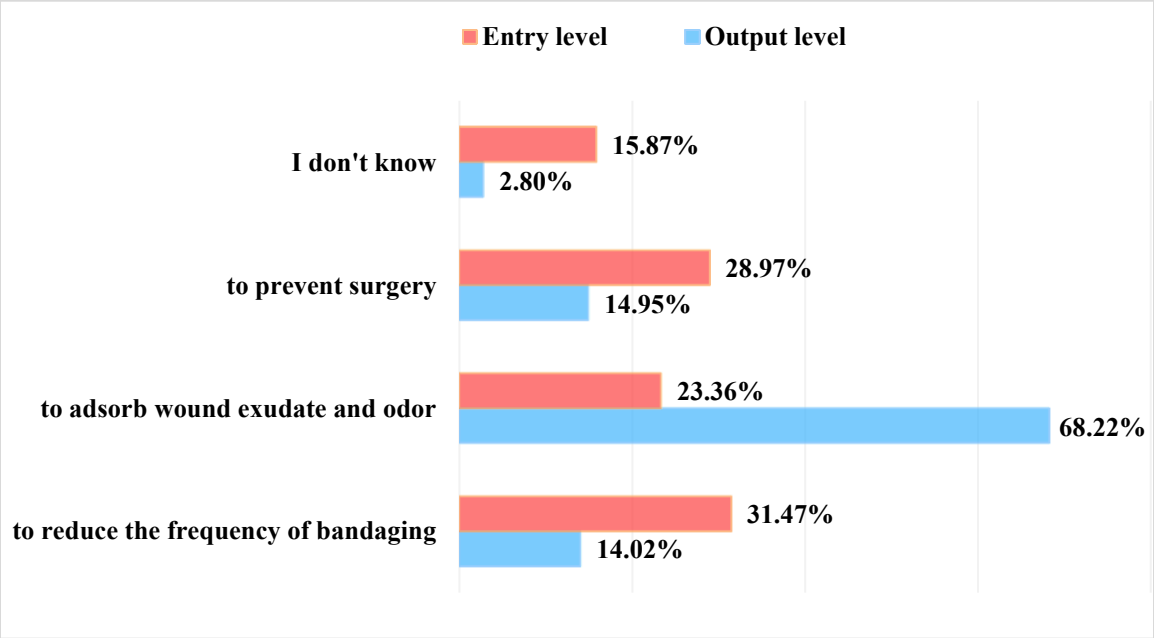
Fig. 1. Signs of inhaled gunshot fumes



Nursing care in local wound management must be precise and effective, which requires knowledge of the wound healing process, types of bandaging, and medications to administer. Bandaging have

the important task of providing the optimal environment by adsorbing excess exudate and odor from wounds. They should have a broad antibacterial spectrum that reduces wound colonization and facilitates the development of granulation tissue.
The results show that the relative share of students knowing the meaning and purpose of burn bandaging increases by 44.86% (from 23.36% to 68.22%), while the share of those who do not know decreases by 13.07% (from 15.87% to 2.80%). Nearly one-third (28.97%) of those surveyed in the first stage believed that it could prevent the surgical approach to wound treatment, with this share decreasing to 14.95% after the training (Fig. 2).

Fig. 2. Purpose of burn dressings



CONCLUSIONS

The study shows limited knowledge at the entry level of nursing students in assessing the extent of burn injuries, with correct answers after the training increasing by a significant share of 40.19% (from 32.71% to 72.9%), and the relative share of students with the answer "I don't know" decreasing from 5.61% to 0.
The study shows a significant difference of 56.07% between the incoming (17.76%) and outgoing (73.83%) level of knowledge regarding the presence of soot in the nostrils as a sign of inhaled smoke gases. Respiratory and water status remain the highest priority of nursing diagnostics.
The results show a significant positive difference in students' knowledge before and after the training regarding the importance of bandages (from 23.36% to 68.22%), the applied antiseptic solutions (from 14.95% to 68.22%) and the drugs for the treatment of wound infection (from 10.28% to 73.83%). Burn wounds are defined as difficult to heal and require additional knowledge in treatment.
Our study confirms the claim of many authors [6]; [7]; [8] that nursing students who have undergone training on the topic demonstrate a significantly higher level of knowledge in the field of burn care.

REFERENCES:

1. World Health Organization. Burns fact sheet worldwide. 2017; 2:9.
2. Hadzhiyski, O., [Burns and frostbite. Atlas Surgery Guide] , ISBN 978-954-322-241-4, т. XVII, acad. izd. "prof. Marin Drinov"", 2008, C., 239-261.
3. Chrapusta A., Pabiańczyk R., Nessler M., Nessler K., Cieślik K. Aquacel Ag w leczeniu oparzeń IIb i IIb/III stopnia ręki u dorosłych–doświadczenia własne. Forum Zakażeń 2012;3: 71–76. [Google Scholar]
4. Oryan A., Alezadeh E., Moshiri A. Burn wound healing: Present concepts, treatment strategies, and future directions. J. Wound Care. 2017; 26:5–19. doi: 10.12968/ jowc. 2017.26. 1.5. [PubMed] [CrossRef] [Google Scholar]
5. Dimitrova, A., [Burn Care Management], . ISBN 978-619-7491-10-4 CMB, MU-Sofia, 2019., 59-60.
6. Hawraa Razzaq Kadhim, Rajha Abdul Hassan Hamza. Effectiveness of an Educational Program on Nurses' Knowledge toward Burn Management. Medico-legal Update, October-December 2020, Vol. 20, No. 4, pp1943 - 1948
7. Meschial WC, Oliveira MLF. (2014). Initial care to burn victims: nursing students' knowledge: a cross-sectional study. Online Brazilian Journal of Nursing. 13(4) Available at: https:// www.objnursing.uff.br/ index.php/ nursing/article/view/4744. [Google Scholar]
8. Siddiqui AF, Al-Qahtani SQ, Al-Qahtani AM, Barkout SA, AlAamri AKA. Knowledge, attitudes and practice of burns prevention and first aid among medical students of King Khalid University, Saudi Arabia. Bangladesh Journal of Medical Science Vol. 17 No. 04 October'18; 17:537–544. [Google Scholar]

Address for correspondence:
Chief Ass. prof. Dimitrina Blagoeva, PhD
Department of Health Care, Faculty of Public Health „Prof. Dr. Tsekomir Vodenicharov, MD", Medical University of Sofia 8, White Sea Str., 1527 Sofia, Bulgaria.
e-mail: d.jordanova@foz.mu-sofia.bg

PSYCHOLOGICAL INTERVENTIONS FOR IMPROVING HEALTH AND HEALTHCARE IN PATIENTS WITH CHRONIC AND ACUTE CONDITIONS

Petar Neshev

Medical College, Trakia University-Stara Zagora, Bulgaria

ABSTRACT

Purpose:

The aim of this article is to examine and highlight the key role of psychological interventions in improving health outcomes and quality of life in patients with chronic and acute diseases.

Methods:

A comparative and content analysis of significant empirical studies was conducted to evaluate the effectiveness of various psychological interventions. The approaches discussed include self-management training, stress management, expressive writing, and the enhancement of social support, applied in the context of cardiovascular diseases, diabetes, asthma, rheumatoid arthritis, and cancer.

Results:

The analysis demonstrates that psychological interventions significantly improve mental well-being, reduce symptoms of depression and anxiety, enhance self-esteem, and facilitate social adaptation. Objective health benefits were also observed, including better disease control, increased physical activity, reduced hospitalization rates, and long-term positive effects on immune functioning and survival.

Conclusion:

Integrating psychological interventions into standard medical care represents an effective and sustainable approach to improving patients' overall health and quality of life. These interventions not only reduce the need for pharmacological treatment but also support a more holistic, patient-centered model of healthcare.

Keywords:

mental well-being, self-management training, stress management, social support, expressive writing, self-regulation, social integration, quality of life.

INTRODUCTION

Today, a variety of psychological interventions are employed by psychologists to help individuals cope with the suffering caused by different illnesses. These interventions generally aim to reduce the distress associated with chronic disease, improve disease management, and minimize the impact of illness on the individual's daily life. Successful implementation of various psychological interventions can prevent disease progression and reduce the risk of additional health complications. Chronic illness has numerous consequences for the affected individual as well as for their family, close relatives, and friends. Following the onset of symptoms, the patient often experiences anxiety related to the diagnostic process, the possibility of hospitalization, and the disruption of normal daily routines. Each type of psychological intervention has its specific effectiveness and brings multiple benefits.

Psychological interventions typically include the following components:

- providing the patient with necessary information about their condition;
- developing stress management skills;

- utilizing social support;
- fostering self-management abilities;
- promoting engagement in social activities;
- expressive writing of emotions.

1. Psychological Interventions for Reducing Distress

Individuals suffering from serious illnesses experience high levels of distress. They worry about their prognosis and treatment, as well as about the impact of the disease on their quality of life and social status. Distress levels are highest during the initial stages of the illness and in times of crisis. Psychological interventions help reduce distress by providing information about the nature of the disease and its treatment stages, as well as guidance on coping strategies, behavioral changes, and ways to lower the risk of disease progression. These interventions are based on the principle that uncertainty increases distress, whereas access to information reduces it. For example, providing cancer patients with information about chemotherapy, offering a tour of the clinic where treatment will take place, and allowing them to ask questions to a consultant specialist significantly decreases distress levels. Patients often prefer to receive this information in advance by mail before hospital admission. Individuals with high levels of trait anxiety benefit the most from such interventions [1].

One particularly effective intervention is stress management training, which teaches patients coping strategies such as problem-solving, cognitive restructuring, and relaxation. Evidence shows positive impacts on psychological well-being. For instance, studies at the University of Miami demonstrated that group-based stress management improved cognitive functioning and reduced distress among women living with HIV/AIDS. Benefits for cancer patients include reduced depressive symptoms, increased appreciation for life, improved decision-making, and enhanced interpersonal relationships [2].

2. Psychological Interventions for Disease Management

Psychological interventions for disease management help individuals develop skills and motivation to control their symptoms effectively. Self-management training is among the most established interventions. It provides patients with knowledge and skills for effective coping, enhancing symptom control and quality of life. Based on social learning theory, patients acquire skills through practice and observation [3].

Key components of self-management training for arthritis patients include:

- physical exercise;
- pain management;
- healthy nutrition;
- fatigue prevention;
- joint protection;
- medication adherence;
- coping with stress and depression;
- effective communication with healthcare professionals;
- critical evaluation of alternative therapies.

3. Psychological Interventions for Preventing Disease Progression

Psychological interventions can play a significant role not only in symptom management but also in slowing the progression of chronic diseases. Historically, studies on Type A behavior by Friedman and Rosenman highlighted the connection between personality traits—such as competitiveness, hostility, and stress-prone behavior—and cardiovascular risk. These early findings laid the groundwork for structured stress management programs in cardiovascular rehabilitation.

Today, stress management training is widely applied in the rehabilitation of patients with cardiovascular diseases [4]. Recent randomized controlled trials and systematic reviews demonstrate that interventions including relaxation training, cognitive-behavioral techniques, and structured coping skills improve both psychological well-being and physiological outcomes. Participants in such programs show reduced distress, improved adherence to treatment plans, enhanced lifestyle behaviors (e.g., physical activity and diet), and lower risk factors associated with disease progression. Evidence from contemporary studies highlights that structured stress management programs in cardiovascular patients can lead to meaningful improvements in both short- and long-term health outcomes [5].

RESULTS

The comparative analysis of empirical studies indicates that psychological interventions yield both psychological and physiological benefits.

- Mental health improvements: reduced depression and anxiety, enhanced self-esteem, and greater social adaptation.
- Disease management: improved symptom control, increased physical activity, and better adherence to treatment plans.
- Healthcare outcomes: lower hospitalization rates, fewer complications, and in some cases improved survival.
- Long-term effects: benefits in immune function, stress resilience, and overall quality of life were observed up to 12 months post-intervention.

Overall, interventions such as stress management, self-management training, social support enhancement, and expressive writing consistently demonstrate positive outcomes across diverse patient populations, including those with cardiovascular disease, cancer, diabetes, asthma, and rheumatoid arthritis

DISCUSSION

The findings highlight that psychological interventions should be integrated into standard healthcare as a complementary approach to medical treatment. Key discussion points include:

Holistic care Addressing: both psychological and physical aspects of disease contributes to comprehensive patient care.

Individualized interventions: Tailoring interventions to patients' psychological profiles, disease stage, and social context increases effectiveness.

Cost-effectiveness: By reducing hospitalizations and reliance on medications, psychological interventions can decrease healthcare costs.

Sustainability: Interventions such as self-management and stress reduction empower patients to maintain health-promoting behaviors long-term.

CONCLUSION

Psychological interventions play a key role in improving the health and quality of life of individuals suffering from various diseases. Comparative analyses and meta-analyses indicate that distress reduction, stress management training, provision of social support, development of self-management skills, and expressive writing lead to significant improvements in patients' mental well-being, self-esteem, and social adaptation. These interventions are particularly effective for patients with chronic illnesses such as coronary heart disease, diabetes, asthma, and cancer. They not only reduce symptoms of depression and anxiety but also enhance physical activity, disease self-management skills, and contribute to a reduction in hospitalization rates. Evidence shows that psychological interventions can improve the quality of life in patients with long-term conditions, with effects maintained up to 12 months after the intervention. Although the effects of psychological interventions vary depending on individual characteristics and context, existing evidence supports their role as an adjunct to traditional medical care. Psychological interventions can reduce the need for medication, increase patients' self-confidence, and enhance treatment effectiveness. Implementing psychological interventions in healthcare practice is not only effective but also essential for providing comprehensive and sustainably improved care for patients with chronic and acute conditions.

REFERENCES

1. Antoni MH, Moreno PI, Penedo FJ. Stress management interventions to facilitate psychological and physiological adaptation and optimal health outcomes in cancer patients and survivors. *Annu Rev Psychol*. 2023;74:621–647. doi:10.1146/annurev-psych-030122-124119.

2. Paley CA, Boland JW, Santarelli M, Murtagh FEM, Ziegler L, Chapman EJ. Non-pharmacological interventions to manage psychological distress in patients living with cancer: a systematic review. *BMC Palliat Care*. 2023;22:88. doi:10.1186/s12904-023-01202-8.

3. Marques A, Santos E, Nikiphorou E, Bosworth A, Carmona L. Effectiveness of self-management interventions in inflammatory arthritis: a systematic review informing the 2021 EULAR recommendations for the implementation of self-management strategies in patients with inflammatory arthritis. *RMD Open*. 2021;7:e001647. doi:10.1136/rmdopen-2021-001647.

4. El-Malahi O, Mohajeri D, Bäuerle A, Mincu RI, Rammos C, Jansen C, Teufel M, Rassaf T, Lortz J. The influence of eHealth stress management interventions on psychological health parameters in patients with cardiovascular disease: systematic review and meta-analysis. *J Med Internet Res*. 2025;27:e67118. doi:10.2196/67118.

5. Bethge M, Thome-Soós F, Rašo LM, Weier L, Benninghoven D. Cognitive-behavioural rehabilitation in patients with cardiovascular diseases: a randomized controlled trial (CBR-CARDIO, DRKS00029295). *BMC Cardiovasc Disord*. 2023;23:252. doi:10.1186/s12872-023-03272-1.

Address for correspondence: petar.neshev@trakia-uni.bg

HEALTH RISK MANAGEMENT FOR NURSES WORKING IN INTERVENTIONAL CARDIOLOGY

Tanya Popova, Kamelia Bogdanova, Dimitrina Blagoeva

Department of Health Care, Faculty of Public Health „Prof. Dr. Tzekomir Vodenicharov, MD, DSc", Medical University – Sofia, Bulgaria

ABSTRACT.

Introduction: Managing health risks in interventional cardiology is an important aspect of the clinical practice and work of nurses. Managing this risk is a priority for healthcare and every senior manager and includes various measures and strategies for their prevention, in order to ensure quality and safe healthcare.

Purpose, material end methods: The present study aims to investigate and analyze the self-assessment of health risks among nurses working in the field of interventional cardiology. The research is part of a study of professional fulfillment, motivating and demotivating factors for work, and assessment and self-assessment of health risks among nurses working in invasive cardiology. To achieve this goal, documentary, sociological, statistical and graphical methods were used.

R**esults** and **conclusions:** The most significant long-term risks for working in interventional cardiology are assessed by nurses as working in an environment with ionizing radiation, wearing heavy radiation-protective clothing, physical exertion, stress, and emotional stress. An underestimated means of protection is wearing radiation-protective glasses, reducing exposure time, and taking breaks to reduce stress and physical exertion.

Key words: management, health risks, nurses, interventional cardiology

INTRODUCTION

Health risk management in interventional cardiology is an important aspect of clinical practice and work of nurses. The main health risk is related to the possibilities of making mistakes and causing harm to patients. Managing this risk is a priority for healthcare and every senior manager and includes various measures and strategies for their prevention, in order to ensure quality and safe healthcare. [1] In addition to patients, risks also exist for the health of medical specialists working in catheterization laboratories. They are most often associated with the risk of injury from sharp and cutting objects, wearing heavy radiation protective clothing, working in an environment with ionizing radiation, heavy physical exertion when serving and moving patients. Fatigue is also not to be underestimated, considering the severe demographic crisis and the shortage of medical specialists in conditions of an ever-increasing number of invasive procedures. [2, 3]

AIM

The present study aims to investigate and analyze the self-assessment of health risks among nurses working in the field of interventional cardiology.

MATERIALS AND METHODS

The research is part of a study of professional fulfillment, motivating and demotivating factors for work, and assessment and self-assessment of health risks among nurses working in invasive cardiology.

To collect primary information, the following were used:

- **Documentary method –** literary sources on the researched issue are studied;

- **Sociological method** – a survey was conducted through a direct, individual, anonymous questionnaire among 88 nurses working in interventional cardiology using a specially developed questionnaire for the purpose;
- A study was conducted in the period 10.01.2024 – 05.03.2025 in 8 medical institutions across Bulgaria.
- **Statistical method.**
- **Graphical data analysis method.**

Fig. 1 presents data regarding the self-assessment of working nurses regarding the health risks inherent in working in the field of interventional cardiology.

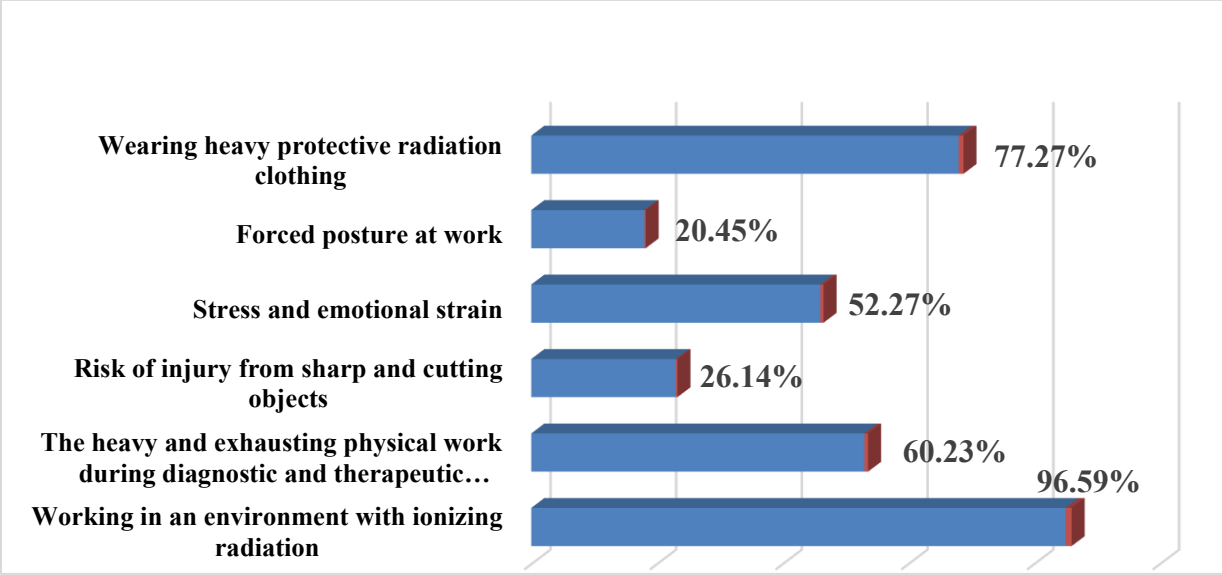


Fig. 1 Self-assesstment of health risk
*Respondents indicated more than one answer

The highest relative share (96.59%) identified working in an environment with ionizing radiation as the main risk factor. Wearing heavy protective radiation clothing was identified as a risk by more than three-quarters of respondents (77.27%), and in third place (60.23%) they indicated heavy and exhausting work during diagnostic and therapeutic procedures. Over half of the study participants (52.27%) identified stress and emotional stress as a health risk, and a quarter (26.14%) identified the risk of injury with sharp and cutting objects. The lowest share of study participants indicated forced posture during work (20.45%).
We also studied the means that workers in invasive cardiology use in order to reduce the likelihood of the negative impact of risk factors.

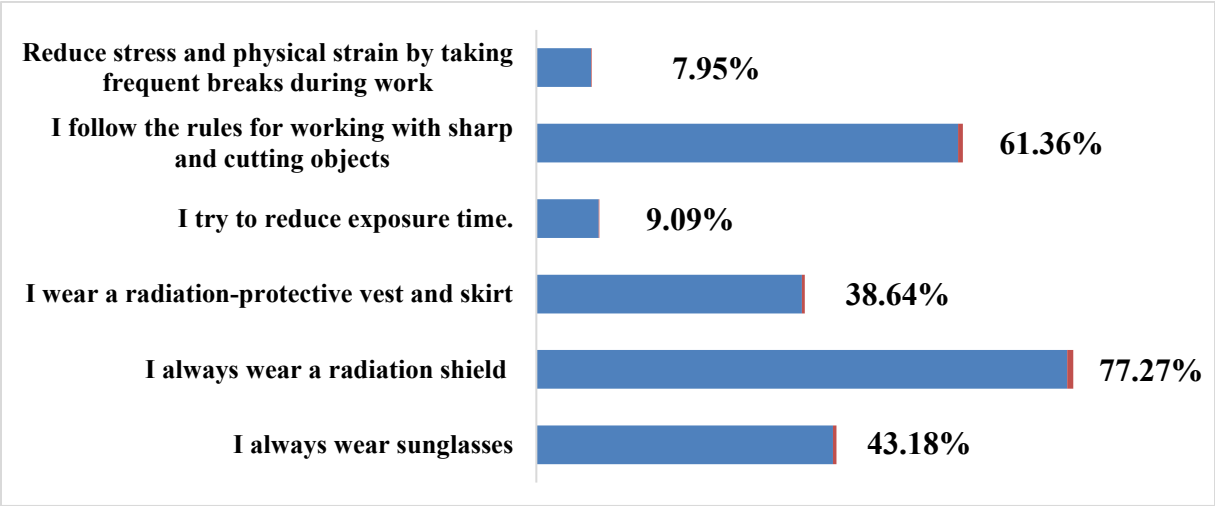


Fig. 2. Means for reducing health risks
*Respondents indicated more than one answer

The highest relative share (77.27%) responded that they always wear a radiation-protective apron while working in an environment with ionizing radiation. Another 61.36% follow the rules for working with sharp and cutting objects, and 43.18% wear radiation-protective glasses. Wearing radiation-protective vests and skirts is reported by 38.64% of respondents. The lowest relative shares of the study participants are those who reduce health risk by trying to reduce exposure time (9.09%) and reduce stress and physical strain by taking frequent breaks during work (7.95%). The data are presented graphically in Fig. 2.

DISCUSSION:

The data analysis shows that almost all respondents are aware of the health risks arising from working in an environment with ionizing radiation. At the same time, medical professionals are protected by their work clothing. This is evidenced by the data that all respondents answered that they wear a radiation-protective apron or radiation-protective skirt and vest during work.

However, the data regarding the wearing of radiation-protective glasses are worrying, as they are indicated as a means of radiation protection by only 43.18%. This underestimation of the risk of radiation-induced cataract has been reported in other studies [3, 4, 5] and requires special attention from healthcare managers in order to prevent the health of medical professionals. [6, 7, 8] The legislation in Bulgaria clearly regulates the provision of radiation protection when working in the catheterization laboratory and the use of a radiation-protective apron, collar, as well as radiation-protective glasses with a lead equivalent of at least 0.75 mm with frontal and 0.5mm side protection. [9]

The extremely low relative share of respondents who try to reduce the time of exposure during work (9.09%) and to reduce stress and physical strain by providing breaks (7.95%) is impressive. The reasons for this can be found in the constantly decreasing number and insufficient number of nurses, both in general and as those working in the field of interventional cardiology. The shortage is also caused by the heavy and exhausting work and the health risks that arise from the work environment. At the same time, there is an epidemic of cardiovascular diseases, the growing need for invasive and interventional procedures and an increase in the number, complexity and duration of their implementation.

CONCLUSIONS:

- Nurses indicate that the most significant long-term risks of working in interventional cardiology are working in an environment with ionizing radiation, wearing heavy radiation protective clothing, physical exertion, stress and emotional strain.
- Higher self-control, as well as control by health managers, is needed regarding the use of personal protective equipment and measures to prevent sharps injuries, as they are a matter of both the personal choice of workers and the motivation to comply with the legal measures and manage health risks.
- An underestimated means of protection is wearing radiation-protective glasses, reducing exposure time, and taking breaks to reduce stress and physical exertion.

Health risk management requires organization, continuous control and updating of knowledge on the prevention of health risks. This is of course a huge challenge, considering the workload of catheterization laboratories and the severe staffing crisis that healthcare managers are facing. Continuous training on prevention measures and methods for their implementation is necessary in order to know and understand the risks to one's own health and minimize them.

This research is supported and funded by the Ministry of Education and Science under the National Program "Young Scientists and Postdoctoral Fellows - 2", Additional Agreement № 237/01.10.2024 with MU-FPH „Prof. Dr. Tzekomir Vodenicharov, MD, DSc"

REFERENCES:

1. Guo J, Lv W. Effect of nursing risk management on perioperative care in cardiovascular interventional catheterization rooms. *Am J Transl Res.* 2024 Oct 15;16(10):5953-5960.
2. Miteva I. Characteristics of occupational risks for the nurse at the workplace. *Nursing*, 54, 2022, № 3: 66-71. [in Bulgarian]
3. Behr-Meenen C, von Boetticher H, Kersten JF, Nienhaus A. Radiation Protection in Interventional Radiology/Cardiology-Is State-of-the-Art Equipment Used? *Int J Environ Res Public Health*. 2021 Dec 13;18(24): 13131. [PubMed]
4. Popova, T. Radiation protection measures for nurses working in interventional cardiology. *General Medicine*, 4, 2025, 21-27. [in Bulgarian]
5. Zagorska A. Dosimetry of the ocular lens of personnel working in interventional radiology and cardiology. Sofia, 2017 [in Bulgarian] [dissertation]
6. Lalova V, Petrova G, Merdzhanova E. Positive as pects of using protocols in Intensive CareUnits in all University hospitals in Plovdiv, Bulgaria. *J of IMAB*, 2019 Oct-Dec;25(4):2838-2842.
7. Lalova V, Petrova G, Merdzhanova E. Better heal ing process by using protocols in ICUs in Plovdiv, Bulgaria. *J of IMAB*, 2020 Apr-Jun;26(2):3098-3101.
8. Penev G, Grigorov E. Analgesic efficacy of preoperative ultrasound transversal abdominal plane block for open hysterectomy. Biotechnology & Biotechnological Equipment, 2022 May 31;36(1):346–52. DOI: 10.1080/13102818.2022.2081515 [PubMed]
9. ORDER No. 13 of 16.12.2016 on ensuring radiation protection when working with X-ray systems for medical purposes. Issued by the Minister of Health, innov., State Np., 103 of 27.12.2016. Source: https://lex.bg/en/laws/ldoc/2136974829 Visited on 13.11.25 [Internet]

ATTITUDES AND NEEDS OF HEALTHCARE PROFESSIONALS IN THE CONTEXT OF FINANCING OUTPATIENT PRACTICES

Tatyana Slavkova, Galya Georgieva

Department of "Health Care", Affiliate "Prof. Dr. Ivan Mitev" – Vratsa, Medical University – Sofia, Bulgaria

ABSTRACT

Outpatient healthcare is a key element of the contemporary healthcare system, as it ensures accessibility, continuity, and timeliness of medical assistance. Its effectiveness depends to a significant extent on a sustainable funding model, which can guarantee adequate resources for healthcare professionals. In the context of growing societal needs, demographic challenges, and the necessity for professional motivation, the issue of stable and predictable financing for outpatient practices is becoming particularly relevant. This article presents an analysis of the attitudes and needs of healthcare professionals with regard to the financial provision of outpatient activities. The aim is to delineate the key priorities of the profession and to formulate recommendations for a sustainable funding model that ensures accessibility, quality, and conditions conducive to professional development. Materials and Methods: A survey study was conducted among healthcare professionals working in medical establishments in the cities of Burgas, Blagoevgrad, Varna, Veliko Tarnovo, Vidin, Vratsa, Gabrovo, and Dobrich. The anonymous nature of the survey ensures the objectivity and reliability of the collected data. Results and Discussion: The obtained data emphasize the need for more clearly defined policies aimed at ensuring stable financing of outpatient practices. The specialists' attitudes show a shortage of resources, a need for guaranteed support, and a need for financial mechanisms that stimulate both the quality of the services provided and professional satisfaction. The discussion of the results highlights the importance of effective dialogue between the professional community and state institutions. The conclusions drawn can provide a basis for the development of policies that respond both to societal needs and to the expectations of healthcare professionals.

Keywords: outpatient healthcare, financing, healthcare professionals

INTRODUCTION

As the share of the elderly population in Europe increases, ensuring quality and accessible long-term care emerges as one of the principal social and healthcare priorities of the European Union member states. As stated in European policies, "all EU member states have committed to providing their citizens with equal access to high-quality long-term care at an affordable price [1]. Nevertheless, with the aging of the population, the financial and organizational challenges facing social and healthcare systems are becoming increasingly serious. This trend is expected to intensify, given that governments are required to function within the constraints of limited resources and the growing needs for care and support [2].

In the Bulgarian context, the National Health Strategy 2012–2030 focuses on several directions, one of which is the creation of a healthcare system oriented towards people's needs, through the establishment of a long-term, sustainable, and predictable financing mechanism based on health outcomes. [3] Healthcare professionals play a key role in the quality of long-term care. Their status, functions, and responsibilities are regulated by Ordinance No. 1 of February 8, 2011, concerning the professional activities that can be performed by healthcare specialists [4].

The Ordinance defines the framework of competencies, responsibilities, and professional boundaries of nurses, midwives, rehabilitation therapists, and other specialists in the healthcare system, while at the same time emphasizing the need for continuous education and professional development. As Borisova notes [5], the effective development of healthcare is closely contingent upon the professional preparation and rational utilization of medical specialists. The need for long-term care in a home environment is especially evident for the elderly, who often require sustained medical and social support.

According to the Documentary analysis of measures and policies for long-term care [6], "professional home health and social care is of a long-term nature and is frequently required, extending until the end of an elderly person's life." This emphasizes that the sustainability and quality of care depend not only on funding but also on the integration between the health and social sectors, as well as on the effective management of human resources [7].

Within this context, the role of healthcare professionals assumes critical importance. Ensuring accessible, high-quality, and long-term care requires adequate legislation, as well as training, motivation, and support for the professionals who provide it. These aspects constitute the basis of modern policies on long-term care in Bulgaria and across Europe.

AIM

The aim is to outline the key priorities of healthcare professionals and to propose recommendations for a sustainable funding model that ensures accessibility of services, high quality of healthcare, and conditions for professional development.

MATERIALS AND METHODS

The study uses a combined approach, including documentary, sociological, and statistical methods. Documentary – an analysis has been conducted of the available normative and legislative documents regulating the organization, financing, and professional development of healthcare professionals in the Republic of Bulgaria. The goal is to outline the institutional framework and the key regulatory factors influencing the system. Sociological – a survey study was conducted among 397 healthcare professionals working in medical establishments in the cities of Burgas, Blagoevgrad, Varna, Veliko Tarnovo, Vidin, Vratsa, Gabrovo, and Dobrich. The survey was provided by the Bulgarian Association of Healthcare Professionals (BAHPN) and was actually carried out among professionals on the ground. The study was conducted anonymously, thereby guaranteeing the objectivity and reliability of the collected information regarding the professional attitudes and priorities of the respondents. Statistical – the primary data obtained were processed and analyzed using SPSS v.19, using descriptive and analytical statistical techniques. Microsoft Excel was used for the graphical visualization of the results.

RESULTS AND DISCUSSION

The respondents represent several professional domains, with nurses accounting for 73%, midwives – 15.4%, rehabilitation therapists – 8.8%, medical laboratory technicians 1.8%, X-ray laboratory assistants – 1%. The results of the study show that the largest share, 34.80%, are aged between 46-55 years. Healthcare professionals clearly express their preference for certain models of financing outpatient practices. According to the data presented, the majority of them (52%) indicate as the most suitable option financing through a direct contract with the NHIF, which underlines the trust in this mechanism and its stability. The majority of respondents are oriented towards centralized and more transparent financing mechanisms and only a small percentage of 14% give priority to highly limited and highly dependent on local government budgets.

	Index	Number	Relative share
1.	Interventions and monitoring of individuals with prescribed treatment at home	344	86,60%
2.	Provision of home-based healthcare for persons with chronic illnesses or conditions	292	73,60%
3.	Training and counseling aimed at ensuring a quality and as independent as possible life, fostering realization and adaptation in accordance with the degree of disability	256	64,50%
4.	Monitoring of women with normally progressing pregnancies carried out within the professional competencies of midwives	206	51,90%
5.	Healthcare for newborn children, carried out within the professional competencies of medical healthcare specialists (midwives, nurses)	251	63,20%
6.	Healthcare for children from 0 to 2 years old, provided at home by midwives	179	45,10%
7.	Healthcare for children aged 2 to 4, delivered at home by midwives	134	33,80%
8.	Rehabilitation after hospital discharge or prescribed to be carried out in outpatient settings	246	62%
9.	Providing palliative care and/or educating of family members	289	72,80%

Table 1. Opinion of healthcare professionals regarding the necessary activities provided in outpatient healthcare practices

The findings indicate that the predominant forms of home care involve the implementation of prescribed treatment and clinical monitoring (86.6%), alongside the provision of care for patients with chronic conditions (73.6%). The share of specialists who provide palliative care (72.8%) and educational support aimed at increasing the autonomy of patients (64.5%) is also high. Activities targeting maternal and child health are performed considerably less often, reported by 33.8% to 63.2% of respondents, with the lowest proportion recorded for care of children aged 2–4 (33.8%). This can be interpreted as an indicator of potentially insufficient coverage of home-based services in early childhood development, as well as the need to strengthen the role of midwives within the community.

	Index	Number	Relative share
1.	More years in better health	228	57,60%
2.	Better recovery after active treatment	336	84,80%
3.	Reduced frequency of exacerbation of chronic conditions	215	54,30%
4.	Reduced frequency of hospitalizations	257	64,90%
5.	Providing palliative care at home	236	59,60%

6.	More affordable and quality healthcare	303	76,50%
7.	None	2	0,50%
8.	I don't know	2	0,5%

Table. 2 Perspectives of respondents regarding the impact of introducing publicly funded outpatient healthcare practices.

CONCLUSIONS:

The results indicate that respondents clearly associate publicly financed outpatient healthcare practices with improved health outcomes and accessibility of services. The predominant positive response (93%) suggests that the allocation of public funding would serve as a significant stimulus for healthcare professionals to commit to outpatient care activities. The result highlights the high potential for expanding outpatient care if appropriate financial conditions are provided. The small percentage of negative responses (7%) may be due to individual or organizational constraints but does not change the overall positive trend. The respondents' perception of their needs confirms that the successful development of publicly financed outpatient practices requires a holistic approach, encompassing material and financial provision, clearly established regulations and standards, institutional support, monitoring mechanisms, as well as opportunities for professional training and development. Ensuring appropriate premises, equipment, and staffing resources, combined with equity and recognition of healthcare professionals, is a key condition for the sustainability and effectiveness of this model.

In conclusion, it can be summarized that the introduction of publicly financed outpatient healthcare practices would have a significant positive effect on both the quality of the services provided and on access to healthcare in the community, with particular benefits for small settlements and among vulnerable groups.

REFERENCES:

1. Spasova Sl, Baeten R, Coster St, Ghailani D, Peña-Casas, R., Vanhercke B. Challenges in long-term care in Europe, A study of national policies, 2018. http:ec.europa.eusocialmain.jsp?catId=1135&langId=en
2. Casanova G, Lillini R., Moreno C, et al. Long-term care needs and the risk of household poverty across Europe: a comparative secondary data study. BMC Geriatr 24, 101 (2024). https://doi.org/10.1186/s12877-024-04687-x
3. National Health Strategy 2030, Ministry of Health (MH) Bulgaria., State Gazette No. 37, of April 26, 2024., https://old.mh.government.bg/media/filer_public/2024/05/10/rns_-_nzs_2030.pdf
4. Ministry of Health (MH), Ordinance No. 1 of 08.02.2011 on the professional activities that nurses, midwives, associated medical specialists and health assistants may perform on an appointment or independently, published in the Official Gazette, issue 15 of 18.02.2011.
5. Borisova S, The role of health care specialists in the development of the health system.: Proceedings from Fourth International Conference Nursing care – a contribution to the quality of life. June 9-10, 2023, Medical University - Varna. p.22-34.
6. Caritas Bulgaria. Documentary analysis of measures and policies for long-term care in Bulgaria. Sofia: Caritas Bulgaria, 2022, p. 6.;
7. Gyoreva S, Documentary analysis of measures and policies for long-term care for the elderly (65+): including data and conclusions from conducted expert interviews. Caritas Bulgaria 2022.

Contact Address:
Chief Assistant Professor, Tatyana Slavkova, PhD
MU–Sofia, "Prof. Dr. Ivan Mitev" Branch – Vratsa,
Department of "Health Care", Bulgaria
e-mail: t.slavkova@filialvratsa.mu-sofia.bg;

REGULATORY CHALLENGES AND INTERNATIONAL LEGAL DIMENSIONS OF TELEMEDICAL MARITIME ADVISORY SERVICES IN BULGARIA

Todor Yotov, Nikolina Radeva

Disaster Medicine and Maritime Medicine Department, Faculty of Public Health, Medical University-Varna, Bulgaria

ABSTRACT: Aim: To analyze Bulgaria's regulatory framework for telemedicine with emphasis on Telemedical maritime assistance services (TMAS) and its alignment with international obligations.
Materials/Methods: Legal-dogmatic and comparative analysis of national acts and international instruments.
Results: Telemedicine in Bulgaria is expressly enabled for licensed medical establishments and detailed through a dedicated telemedicine regulation, supported by the National Health Information System for e-documents and data exchange. TMAS is operationally ensured through Maritime Regional Coordination Center (MRCC-Varna) under the national Search and Rescue (SAR) plan, while patient rights, data protection, e-documents, and financing are addressed by sectoral legislation. Key gaps include cross-border e-prescribing of controlled substances, interoperability, and standardized TMAS protocols with quality audits.
Conclusion: Bulgaria's legal framework largely satisfies core international requirements for TMAS, but targeted operational rules and technical integration are needed to achieve full compliance.
Keywords: *telemedicine; maritime health; TMAS; MRCC*
INTRODUCTION Bulgarian legislation currently lacks a specific definition of "*telemedicine*" [1-5]. In maritime settings, telemedicine acquires a mandatory dimension through international instruments: MLC 2006, Directive 92/29/EEC [6], [7].
The aim of the study is to analyze Bulgaria's regulatory framework for telemedicine with emphasis on TMAS and its alignment with international obligations. The tasks encompass: to examine existing legal instruments and regulations relevant to telemedicine at sea; to refer how maritime telemedicine is implemented in other jurisdictions to put Bulgaria's framework in context; to evaluate the adequacy of current laws and to propose perspectives on what the legal framework should address; to examine of the role of MRCC–Varna, the National SAR Plan, and the institutions in the emergency care system and port health control.

MATERIALS AND METHODS: The study is based on the key Bulgarian national normative acts, strategic documents and international acts and standards, setting requirements for medical care at sea and remote consultations.
To achieve the aim of the study, a comprehensive approach was applied, including: Legal-dogmatic method, Comparative-legal method, Institutional analysis, and Synthetic approach.

RESULTS The analyzed normative acts form a comprehensive framework that ensures the right to health, safety, and citizen's security in both day-to-day conditions and extraordinary conditions [1-5], [8-15]. The role of each law with respect to telemedical consultation services is illustrated in Table 1.

Table 1. Relationship of the regulatory framework with telemedicine

Normative Act / Strategy	Main Focus	Applicability to Telemedicine
Law on the State of Emergency Measures	Emergency measures during pandemic	Legitimized remote consultations, online prescriptions, and sick notes
Law on Medical Establishments	Healthcare establishments' activities	Telemedicine can be provided only by registered healthcare establishments
Health Act	Patient rights; public health	Electronic informed consent; parity of remote services with in-person care
Electronic Document Act	Electronic documents and signatures	Legal validity of e-prescriptions, e-discharges, e-referrals
Electronic Governance Act	Digitalization of public services	Electronic health records and registries; data exchange infrastructure
Law on Protection from Noise	Permissible noise levels	Indirectly: conditions for quality, confidential communication
Law on Medicinal Products	Medicines and their control	Remote prescribing and therapy monitoring
Law on Narcotic Substances	Control of narcotic drugs	Strict control for remote prescribing of controlled substances
Health Insurance Act	Financing via NHIF	Defines reimbursement for online exams and consultations
Law on Transplantation	Organs, tissues, and cells	Facilitates inter-hospital consultations and second opinions for transplants
Law on Medical Devices	Registration and safety of devices	Regulates telemedicine software and equipment
Law on Blood Donation and Transfusion	Blood donation and transfusion	Online screening and follow-up of donors/patients
Law on Safe Working Conditions	Workplace safety	Protects doctors providing telemedicine (remote work conditions)
Personal Data Protection Act	Protection of sensitive data	Encryption and protection of electronic health records
Law on Consumer Protection	Patients' rights as consumers	Right to information, quality service, and redress
Regulation No. 10/2009 (NHIF)	Payment and cost control	Ensures sustainable funding for remote prescribing services
Regulation No. 6/2006 (Noise)	Noise indicators	Ensures quality audio communication during consultations
Regulation No. 16/2014 (Rare Diseases)	Registries and expert centers	Facilitates remote consultations for rare diseases
Regulation No. 3/2017 (Emergency Med.)	Emergency medicine standard	Telemedical triage and remote emergency consultations
Regulation No. N-6/2022 (NHIS)	National health information system	Integrates telemedicine into NHIS (e-prescriptions, records, referrals)
National Health Strategy	Strategic vision	Priority on digitalization and telemedicine development
National Recovery and Resilience Plan	Funding and modernization	Provides resources for telemedicine platforms and e-health services
Law on Medical Establishments (Art. 6b)	Legalization of telemedicine	Legal possibility for hospitals to deliver medical services remotely
Regulation on Remote medical care (2025)	Conditions for remote medical activities	Regulates software, data protection, informed consent, e-documents

From a practical standpoint, the inclusion of TMAS in the national regulatory framework shows that Bulgaria is gradually transitioning from merely "tolerating" remote services to fully integrating them legally. Telemedicine at sea sets Bulgarian institutions in a situation of cross-border obligations – stringent security requirements and the need for 24/7 operational readiness [1-5], [6],

[7], [10], [13-15]. Table 2 presents a matrix of "requirement – national compliance" (mapping conventions/directives against specific national measures/documents), which could be used as a checklist in implementing TMAS in Bulgaria.

Table 2. Compliance matrix: Bulgaria's Telemedicine at sea

International Instrument	Main Requirements	National Measures / Compliance (Bulgaria)
MLC 2006, Title 4 (Medical care)	Ensure medical care on board and access to radio medical advice	- Law on Medical Establishments (Art. 6b) – telemedicine - Regulation on Remote medical care (2025) – still under consideration - National SAR Plan: TMAS via MRCC–Varna
STCW Code A-VI/4	Medical training of crew (Medical First Aid, Medical Care)	- National training plan for seafarers (Naval Academy and Technical University–Varna) - STCW requirements integrated in curricula - Practical TMAS protocols in training
SAR Convention & IAMSAR Manual	National coordination center; TMAS service; medical evacuation	- MRCC–Varna designated as Joint Contact Point - National Maritime SAR Plan - 24/7 TMAS center integrated with MRCC–Varna
Directive 92/29/EEC	Minimum requirements for onboard medical treatment	- State provision of TMAS via designated medical establishments (Ministry of Transport/Health) - Regulation No. 10/2009 for medical supply in port
IHR (2005)	Maintain qualified medical support at ports; remote health control	- Regional Health Inspections at Varna and Burgas ports - Integration with NHIS and early warning system - Telemedicine Regulation: provisions on informed consent and data handling
WHO IMGS (Intl. Medical Guide for Ships)	Ship's medical chest contents and telemedical consultation	- National requirements for ship medical kits (aligned with STCW standards) - Medicinal Products Act & Narcotic Substances Act – rules on access to medicines and controlled substances
IMO MSC/Circ.960	TMAS recommendations: 24/7 availability; staff competence	- Regulation on Medical Care from a Distance (2025) – requirements for security, identification, record-keeping and archiving of consultations - MRCC–TMAS communication protocols
GDPR / Directive 95/46/EC	Protection of personal data; cross-border transfer	- Personal Data Protection Act – DPIA (Data Protection Impact Assessment) and encryption for TMAS platforms - Integration with NHIS (Regulation N-6/2022)

DISCUSSION With the amendments to the Medical Establishments Act and the adoption of the Telemedicine Regulation, Bulgaria now has direct normative regulation of telemedicine services [1]. The biggest challenge remains integrating these strategies, laws, and regulations into a unified telemedicine framework, as currently the regulation is fragmented. Although Bulgaria has ratified the Maritime Labor Convention 2006 and is a party to the relevant IMO conventions, there is no explicit national legislative act defining TMAS as a distinct service, assigning institutional responsibility for its provision [6], [16]. Current TMAS functions are carried out informally or partially by maritime medical units or through ad-hoc coordination with emergency medical services, but without a formalized framework these arrangements are not transparent, consistent, or systematically supervised. Despite Bulgaria's obligations under IMO and ILO conventions, there is an insufficient targeted national policy or legislative framework explicitly integrating TMAS into country's regulated telemedicine system [6], [16]. This creates a policy gap and exposes the country to the risk of not fully meeting its treaty obligations regarding the quality, availability, and accessibility of services. Operational inconsistencies arise and the opportunities for digital integration are being missed. From a legal standpoint, the national health system is now equipped

with the normative basis to integrate TMAS via the Medical Establishments Act (Art. 6b) [1], which for the first time created a legal opportunity for healthcare establishments in Bulgaria to provide medical services remotely, including to vessels. The Regulation on Remote Medical Care (2025), which sets specific requirements for security, identification, data protection, and integration with the National Health Information System, is still under considerations.
Bulgaria has largely fulfilled its international obligations: with a national TMAS capacity (MRCC–Varna); a normative possibility for remote medical service; mechanisms for electronic documents and data [11]; and crew training under Standards for Training Certification and Watchkeeping (STCW) through maritime educational institutions [16]. However, certain legal and practical challenges remain. According to the Medicinal Products Act [12] and the Narcotic Substances Act [13], there are requirements that are difficult to fulfill in an international context, especially when delivering medications upon docking in a foreign port. Integration of TMAS with the National Health Information System (NHIS) [3] is still in its early stages, complicating cross-border exchange of medical documents. International telemedical consultations require strict mechanisms for protection and transfer of sensitive personal data under the Personal Data Protection Act (GDPR) [11], including conducting Data Protection Impact Assessment. There is a lack of operational specifics (e.g. a common MRCC–TMAS–NHIS protocol; bilingual procedures; standardized forms) and regular quality audits and drills for TMAS procedures.

CONCLUSION Telemedicine in Bulgaria has undergone dynamic development. A decisive step in the area of TMAS was the amendment of the Law on Medical Establishments (Art. 6b), by which telemedicine was officially recognized as a medical activity. The subsequent Regulation on Medical Care from a Distance established specific rules for its provision. Bulgaria has a comprehensive regulatory framework for telemedicine that ensures patient accessibility and equity, quality and safety of medical services, security in the handling of sensitive data, and sustainable financing through the National Health Insurance Fund and European mechanisms.

REFERENCES:

1. Republic OF Bulgaria. Law on Medical Establishments. State Gazette No. 85 of 8 Oct 2024, Sofia; 2024.
2. Republic of Bulgaria. Regulation on Remote Medical Care (under consideration).
3. Republic of Bulgaria. Health Insurance Act. State Gazette No. 84 of 06 Oct 2023, Sofia; 2023.
4. Republic of Bulgaria. Electronic Governance Act. State Gazette No. 67 of 15 Aug 2025, Sofia; 2025.
5. Republic of Bulgaria. Health Act. State Gazette No.52 of 27 Jun 2025, Sofia; 2025.
6. International Labour Organization (ILO). Maritime Labour Convention, 2006 (MLC 2006). Geneva: ILO; 2006.
7. Council of the European Communities. Council Directive 92/29/EEC of 31 Mar 1992 on minimum safety and health requirements for improved medical treatment on board vessels.; 1992; L113:19–36.
8. Republic of Bulgaria. Regulation on Exercising the Right of Access to Medical Care. State Gazette, Sofia; 2020.
9. Republic of Bulgaria. Regulation No. 16 of 30 Jul 2014 on rare diseases and expert centers. State Gazette, Sofia; 2014.
10. Republic of Bulgaria. Regulation No. 3 of 06 Oct 2017 Standards “Emergency Medicine.” State Gazette, Sofia; 2017.
11. Republic of Bulgaria. Personal Data Protection Act. State Gazette No. 70 of 20 Aug 2024, Sofia; 2024.
12. Republic of Bulgaria. Law on Medical Products in Human Medicine. State Gazette No. 41 of 10 May 2024, Sofia; 2024.
13. Republic of Bulgaria. Law on the Control of Narcotic Substances and Precursors. State Gazette No. 41 of 10 May 2024.
14. Republic of Bulgaria. Regulation No. 10 National Health Insurance Fund (NHIF). State Gazette No. 55 of 8 Jul 2025.
15. Republic of Bulgaria. Law on the Measures during the State of Emergency. State Gazette No. 28 of 24 Mar 2020.
16. International Maritime Organization (IMO). International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), 1978 (as amended). London: IMO; 1978.

OPPORTUNITIES AND PROSPECTS FOR THE DEVELOPMENT OF AN EDUCATIONAL MODEL FOR MEDICAL TOURISM

Siyka Katsarova[1], Todorka Kostadinova[2]

[1]Bulgarian Union of Balneology and Spa Tourism, [1]European Spas Association
[2]Department of Healthcare Economics and Management, Faculty of Public Health, Medical University - Varna

ABSTRACT
Health tourism is a sub-sector of general tourism that includes medical, spa, and wellness tourism. Medical tourism refers to people traveling abroad to receive medical treatment, often due to lower costs, shorter waiting times, or unavailable procedures in their home countries. It has two main forms: patients who travel independently for treatment and those subsidized by their home countries. The quality and competence of human resources in medical tourism are crucial, requiring specialized education that combines healthcare and tourism skills. Europe has strong advantages such as modern infrastructure, advanced technologies, and skilled specialists, but also faces challenges like language barriers and uneven healthcare standards. Bulgaria has significant potential in medical tourism due to its qualified professionals, accessible healthcare, and growing hospital network. However, it needs better coordination between the health and tourism sectors, as well as training programs to prepare competent professionals. The Deggendorf Institute of Technology in Germany serves as an example with its innovative programs in health and medical tourism management. Ultimately, cooperation among governments, academia, and businesses is essential for sustainable development and competitiveness in medical tourism.
Key words: medical tourism, health tourism, education and training, competencies, quality of healthcare services, cooperation and sustainable development

INTRODUCTION.

Health tourism is a sub-sector of general tourism encompassing medical, spa, and wellness tourism [10].
Medical tourism is a specialized form of tourism referring to people who travel to another country to receive medical treatment. Motivation may include medical services unavailable or illegal in their home country, or excessively long waiting lists.
Medical tourism has two main types [11]:
a) First type: free movement of patients traveling independently with various motivations:

- Price-based - seeking a better price for specific medical treatment;
- Time-based - seeking faster access to specialized medical procedures (in many European countries waiting lists are long for elective surgeries such as prostate laser surgery, pelvic floor repair, etc.);
- Quality-based - seeking higher quality treatment;
- Legal/religious constraints – lack of treatment options in their home country due to legal or religious restrictions (e.g., reproductive treatment, abortion).

b) Second type: patients traveling abroad with costs subsidized by their government when the necessary medical service cannot be provided domestically [10].

The quality of human resources engaged in medical tourism is crucial for the health tourism industry. There is a need to develop educational models with core competencies bridging both the tourism and healthcare industries.

Key factors determining the opportunities and prospects for the development of an educational model for medical tourism. Historically, medical tourism has involved movement from countries with lower income or living standards toward those with higher standards, better medical infrastructure, more qualified specialists, and shorter waiting times.

SWOT Analysis. Medical Tourism in Europe

STRENGTHS: • Competitive pricing; • Well-developed hospital infrastructure; • Availability of state-of-the-art medical technology; • Highly qualified medical professionals; • Standards ensuring excellent patient care and successful outcomes; • Shorter waiting times for procedures compared to other regions; • Easy travel thanks to Europe's developed transport infrastructure; • Schengen visa allowing combined travel purposes; • Possibility to combine medical trips with business, cultural, or historical travel; • Relatively high level of security.	**OPPORTUNITIES**: • Year-round operation of destinations with developed infrastructure for medical tourism; • Telemedicine; • Integration of artificial intelligence to assist doctors and patients; • Development of a unified European competency model in education; • Use of web-based platforms to connect consumers with destinations and healthcare providers.
WEAKNESSES: • Language barriers; • Differing quality standards and healthcare regulations across Europe; • Shortage of well-trained personnel for providing health services (rehabilitators, kinesiotherapists, doctors, nurses); • Lack of multilingual staff.	**THREATS:** • Negative media influence from countries that do not regulate their medical tourism providers; • Concerns in some countries that citizens will leave national healthcare systems, leading to overcapacity, uncovered costs, or extra expenses; • Accelerated disease transmission through global medical travel; • Lack of knowledge among tour operators and travel agencies about assessing the medical condition of travelers or understanding travel restrictions.

Globally, there is an increasing trend toward seeking high-quality medical care abroad, driven by limited domestic healthcare, lower foreign treatment costs, or shorter waiting times. Many insurance companies offer partial or full coverage for medical services received abroad, while others provide special travel insurance for medical trips. Patients may organize travel independently or with the help of a medical tourism facilitator [2].

Bulgaria has favorable conditions for developing medical tourism. According to National Statistical Institute (NSI) data, there are over 340 hospitals in Bulgaria, including university, general, and specialized institutions. Ownership types include state, municipal, private, and mixed. In recent years, competition among hospitals has driven modernization in healthcare, with the desire to attract more patients-and thus funding- serving as a major motivator, including for attracting foreign patients [4]. The hospital network is complemented by over 2,000 outpatient facilities (medical, dental, and diagnostic centers), providing fast access to specialized services without hospitalization.

By the end of 2023, Bulgaria had 29,911 doctors and 44,523 healthcare specialists (NSI data). This workforce ensures quick and easy access for international patients and flexible treatment planning, particularly for complex or multidisciplinary therapies [4].

When consumers of medical services seek a provider, they tend to focus primarily on the physician's credentials and often overlook other important factors.

Key factors in choosing medical treatment

a) The countries and regional medical associations establish, through their regulatory standards of care, the following {7}:

- *The required levels of staff qualification (including language proficiency);*
- *The necessary hospital equipment (such as emergency backup generators, emergency equipment in patient rooms, etc.);*
- *The required hygiene procedures (which may differ significantly between countries);*
- *The necessary education and experience of medical professionals.*

b) Countries also have cultural characteristics that influence the choice:

- *The work ethic of the medical staff;*
- *The level of personal hygiene among staff according to national norms;*
- *The level of care and attention provided by staff;*
- *The traditions in medicine and the communication culture between medical staff and patients.*

c) The geographical location of the country is another factor:

- *Most countries with tropical climates face challenges with tropical diseases;*
- *If the country is very small, tourists must ensure that emergency medical assistance is available and functioning properly.*

Education Education in the field of medical tourism is a key investment for achieving business success in this area. The Deggendorf Institute of Technology in Germany has placed the focus of its European Campus Rottal-Inn (ECRI) on the sectors of tourism and healthcare. The Bachelor's program in International Tourism Management / Health & Medical Tourism and the Master's program in International Tourism Development are modern and practice-oriented courses, with the bachelor's curriculum including a mandatory practical internship [6].

In 2019, ECRI was awarded the European Spa Association (ESPA) prize for its innovative educational program in the field of health tourism, for the Bachelor's degree in International Tourism Management / Health & Medical Tourism [8].

The main modules in the university's Bachelor's program related to medical tourism are as follows [6]:

- **T106 Introduction to Tourism Management, with a Focus on Health and Medical Tourism**

The module includes valuable knowledge and interdisciplinary approaches.

Students learn the importance of sustainability and social responsibility in tourism, particularly in health and medical tourism.They are encouraged to reflect on their own behavior, norms, and values, and to define them independently.

- **T405 ICT Application Systems in Health and Medical Tourism**

The goal of this module is for students to acquire professional competence by becoming familiar with and understanding the requirements of the networked health industry. They learn to evaluate the role of telematics and medical technologies in describing and applying various sensor systems used in healthcare and medical tourism.

- **T606 Management of Tour Operators and Facilitators in Medical Tourism**

The purpose of this module is to familiarize students with the functions of tour operators, intermediaries, and other market participants in the field of medical and spa tourism, and to help them understand the operational processes within the (medical) tourism service chain.
a) Professional competence: students acquire solid knowledge of the market and its developments, especially those related to new internet-based business models, which are presented and discussed during the module.
CONCLUSION Cooperation between all stakeholders in the health tourism value chain - destinations, authorities, local communities, accommodation and transport providers, and intermediaries - is essential. It is the task of the professionals and the academic community to demonstrate to policymakers and the public that health tourism, as a sustainable form of tourism, requires well-educated managers and employees equipped with skills that extend across both the healthcare and tourism sectors [9].
In the new era of medical travel, only those who understand the needs and expectations of their patients and have the strategies to meet them will build sustainable businesses.
Targeted training and competency development in the field of medical tourism enable stakeholders to apply a holistic approach to medical travel and provide high-quality services throughout the patient journey.

REFERENCES:

1. Закон за туризма. В сила от 26.03.2013 г. изм. и доп. ДВ. бр.17 от 25 Февруари 2020 https://lex.bg/laws/ldoc/2135845281 (accessed on 17.09.2025)
2. Кацарова, С. (2022). *Реферат: Възможности за позициониране на България на международния пазар като целогодишна дестинация за здравен, медицински, спа и уелнес туризъм*. Медицински университет Варна. https://repository.mu-varna.bg/handle/nls/3086 (accessed on 17.09.2025)
3. Национална стратегия за устойчиво развитие на туризма в България за периода 2014-2030. Министерство на туризма. https://www.tourism.government.bg/sites/tourism.government.bg/files/documents/2018-01/nsurtb_2014-2030.pdf (accessed on 17.09.2025)
4. Национален статистически институт. (2025). *Статистически данни*. https://www.nsi.bg/bg/content/766/статистически-данни nsi.bg (достъпен на 02.10.2025)
5. Пазарът на медицински туризъм доклад https://www.reportlinker.com/mycart/subscriptionForm?source=c&idreport=279611 (accessed on 17.09.2025)
6. Deggendorf Institute of Technology, Module Guide International Tourism Management / Health and Medical Tourism Faculty European Campus Rottal-Inn Examination regulations 06.05.2020 Date: Tue 19.09.2023 https://www.th-deg.de/Studierende/Antraege-und-Organisatorisches/Modulhandbuecher/modulhandbuch_itm_bachelor_ws2020.pdf (accessed on 22.09.2025)
7. https://www.europeanmedicaltourist.com/ (accessed on 22.09.2025)
8. https://europeanspas.eu/ (accessed on 22.09.2025)
9. Kostadinova T, Katsarova S. THE IMPORTANCE OF THE EUROPEAN HEALTH TOURISM FOR THE DEVELOPMENT OF ECONOMY OF WELLBEING. In: International Thematic Monograph: Modern Management Tools and Economy of Tourism Sector in Present Era [Internet]. Association of Economists and Managers of the Balkans; Faculty of Tourism and Hospitality; 2019 p. 527–39. http://www.udekom.org.rs/tmt2019527 (accessed on 22.09.2025)
10. Policy Department for Structural and Cohesion Policies Directorate-General for Internal Policies. Research for TRAN Committee: Health tourism in the EU: a general investigation extension https://www.europarl.europa.eu/RegData/etudes/STUD/2017/601985/IPOL_STU(2017)601985_EN.pdf (accessed on 17.09.2025)
11. World Tourism Organization (UNWTO) and European Travel Commission (ETC). „Exploring Health Tourism". Executive summary, 2019 https://www.scribd.com/document/451473563/EXPLORING-HEALTH-TOURISM (accessed on 17.09.2025)

BULGARIA, A EUROPEAN DESTINATION FOR MEDICAL TOURISM. THE EXPERTISE OF GERMANY IN THE MANAGEMENT OF THE MEDICAL TREATMENT CHAIN FOR INTERNATIONAL PATIENTS

Siyka Katsarova
Bulgarian Union of Balneology and spa tourism, European Spas Association

Abstract
The global medical tourism market is expanding rapidly, driven by high-quality healthcare, lower costs, and shorter waiting times. Europe is one of the leading regions in this field, with strong healthcare systems and skilled professionals attracting international patients. Bulgaria has considerable potential for medical tourism due to its qualified doctors, affordable services, and natural healing resources. However, the country lacks a clear strategy, effective marketing, and coordination between the health and tourism sectors. A SWOT analysis highlights strengths such as infrastructure and competitiveness, but also weaknesses like limited recognition and workforce challenges. Germany serves as a model, offering world-class healthcare, strict quality standards, and a strong reputation for innovation and patient care. Bulgaria is beginning to take steps toward structured development through a national working group formed in 2024. The new action plan (2025–2027) aims to strengthen Bulgaria's position as a medical tourism destination. With proper strategy, partnerships, and marketing, medical tourism could boost Bulgaria's economy, reputation, and year-round tourism sustainability.
Key words: medical tourism, health tourism, healthcare quality, sustainable development, year-round tourism potential

INTRODUCTION

Over the past decade health tourism has seen an increasingly sustainable development. Established and emerging destinations are tapping into the potential of this tourism segment, seeking to diversify to increase revenue and cope with seasonality [2].
According to sources such as "Patients Beyond Borders", worldwide, there is a steady annual growth of medical tourism between 15% and 20%. [8]. The European Medical Tourism Market is experiencing a significant uptick driven by numerous factors. The sector's anticipated compound annual growth rate (CAGR) of 12.7% over the four-year period signals a robust expansion pace. [8]. This growth can be attributed to several key drivers, including the quest for high quality healthcare services, cost-effective treatment options, and shorter waiting times. The development of medical tourism allows the destination to retain medical professionals working on its territory without changing the industry. This specific tourism product helps the destination to present the quality of medicine, clinical and hospital infrastructure and the medical competence of doctors and medical specialists offered to patients.

Medical tourism in Bulgaria

Medical tourism- definition
The Committee on Transport and Tourism (TRAN), part of the European Parliament, defines in 2017 in a research paper on health tourism the tree main components - medical, wellness and spa tourism. Medical tourism involves people traveling specifically to access medical treatment. People travel for the purpose of wellness tourism to maintain or improve their personal health and well-being. Spa tourism focuses on the treatment, relaxation, or beautification of the body, which is of a preventive and/or curative-healing nature[15].

More and more patients are traveling to other countries, attracted by more affordable prices, shorter waiting times, higher quality of services and the possibility of innovative therapies that are lacking in their national healthcare systems. [10].

Medical tourism refers to a wide range of services - from routine dental procedures to complex surgical interventions, in vitro fertilization and orthopedic surgeries, rehabilitation and preventive examinations. In most cases, medical tourists are not typical holidaymakers choosing medical treatment simply because it is affordable, but patients with health problems for whom the cost of their healthcare is of primary importance and the holiday aspect is secondary. [5].

Bulgaria has a number of key advantages that can establish it as a preferred destination for medical tourism in Central and Eastern Europe. Bulgaria is also rich in natural resources, which allow for easy combination of treatment with rehabilitation. An additional plus is the rich cultural heritage, the diverse and authentic cuisine, the relaxed pace of life and the good transport connections with the rest of Europe.

SWOT Analysis Medical Tourism in Bulgaria

STRENGTHS : • Bulgaria has all the prerequisites to develop successfully as a destination offering a high-quality medical product; • Good medical infrastructure; • Relatively good geographical location / proximity to leading generating markets; • High price competitiveness; • Relatively high security level; • Increasing number of hospitals offering modern therapeutic methods and equipment;eEasy access to clinics; • Human resources – professionally trained specialists with high European-class training; • Rich network of units and institutions engaged in vocational training • Education processes structured in favour of practical training; •	WEAKNESSES: • Absence of a clear vision, including Expert council for the development of Bulgaria as a destination providing medical tourism • Lack of an analysis of the target markets where Bulgaria could be promoted as a destination for year-round health tourism with the line of medical tourism; • Absence of government policies in the field; • is not recognisable as a destination for the medical tourism, part of health tourism. • Outflow of skilled professionals abroad due to degraded working conditions in the country;
OPPORTUNITIES: • Year-round work at destinations with established infrastructure that develop health tourism through conceptual changes (emphasis: preventive medicine, lifestyle changes, rehabilitation, active aging; • Growing trend for organizing financing by insurance companies of paid packages by health insurance companies for rehabilitation; • Search for alternatives on the free market by citizens who do not have quick access to specialist doctors in their countries, cannot receive treatment in their country due to restrictions in the legislation /prohibitions/, prices are high for some patients, waiting lists are long;	THREATS: • Training of personnel seeking professional development abroad due to better career prospects, working conditions, better pay levels and due to seasonality in employment; • In certain regions, there is a shortage of personnel with good professional training to provide health services (rehabilitators, physiotherapists, doctors, nurses); • Lack of emploees , speaking foreign langages; • Lack of specialized departments/units at clinics to serve patients from abroad;

Factors determining medical tourism

Medical tourism is largely driven by overstretched healthcare and public health insurance systems. Some legal directives are also perceived as having an impact, especially those in the field of

medical tourism, such as the European Union (EU) Directive on Cross-Border Mobility. Directive 2011/24/EU on patients' rights in cross-border healthcare clarifies that "patients have the right to seek healthcare abroad, including for planned treatment, and to have the costs reimbursed in principle, without the need to seek prior authorisation."[15].

In recent years, Bulgaria has been making efforts to change its image as a predominantly seasonal summer and winter holiday destination by intensively promoting health tourism, starting with prevention and prophylaxis of medical spas, spas and wellness. A number of medical spa hotels in Bulgaria, located in popular international tourist destinations, are starting to cooperate with dental clinics or medical clinics, offering joint medical tourism packages that include organizing treatment, therapy, flights, transfer and accommodation.

Germany's expertise in medical tourism

Germany is set to become the leading medical tourism destination in Europe by 2023, with a significant market share of 18.4% [3]. This represents a lucrative opportunity for the country to further expand its medical tourism industry. Germany's developed healthcare infrastructure, renowned medical professionals, and high-quality healthcare services position it as an attractive destination for international patients seeking treatment.

Healthcare system – a brief overview

According to the Federal Statistical Office, as of September 27, 2024, the number of hospitals was 1,874. These statistics show that approximately 428,500 doctors worked in Germany in 2023, an increase compared to the previous year of 421,300. The latest statistics from the German Medical Association (Bundesärztekammer) show an increasing number of non-German doctors practicing in the country. The majority of these foreign-born doctors come from other EU countries or countries in the Middle East. Among them, the largest contingent comes from Syria (6,120), followed by Romania (4,668), Austria (2,993), Greece, Russia and Turkey[2]. Germany is among the top destinations for medical tourism in Europe. According to IMTJ data, 255,000 international patients from 177 countries choose Germany for treatment annually. Medical tourists are mainly from the Middle East, UAE, Saudi Arabia, Eastern European countries, the United Kingdom, the Netherlands, the United States[8].

The key factors Germany to be a preferable destination from the patients are: the innovative technologies, the latest developments in diagnostics and the investment in modern medicine, high level scientific research for new treatment options against severe diseases like cancer [14].

Furthermore, the cost of treatment in Germany is controlled by the state organs, so medical tourists won't pay more than the local citizens [9]. Additional important factors include the strict hygiene measures in the German hospitals; the transparency of treatment results and overall follow-up care; medical staff, who speak foreign languages, excellent transport network - airports, railways, highways etc.

Top specialties for treatment in the Germans hospitals, popular among the international patients are oncology/cancer tretamemt; cardiology and cardiovascular diseases; neurosurgery and neurology; orthopedics; ophtamology; rehabilitation [2].

Major clinics such as the German Heart Center, Chartite - University Hospital Berlin, the Vivantes and Helios hospital groups have added specific services that meet the needs of international patients, including multilingual, culturally trained contact persons; special comfort zones. Berlin is an increasingly popular medical tourism destination. With more than 130 clinics, 70 rehab facilities, and around 140,000 hotel beds, it is an excellent location for medicine and research (Statistisches Bundesamt (Destatis,, 2025). International patients are attractive to the clinics for a number of reasons.

Germany is among the first countries in the world to offer rehabilitation programs for patients "after recovery from COVID-19" (Bad Sulza Clinical Center in Thuringia /Bad Sulza) [1].

CONCLUSION Based on these assumptions, in terms of the development of medical tourism as a destination, Bulgaria is still in the early stages of development. Its structure remains fragmented. A common strategy and effective national coordination between the health and tourism sectors is needed. Regulatory and administrative barriers, difficult access to information in a foreign language, a lack of targeted international marketing, and a weak digital presence prevent the country from unleashing its potential. The main strategic document "National Strategy for Sustainable Development of Tourism in Bulgaria (2014-2030)" sets out the priorities for creating conditions for the development of alternative types of tourism - health tourism (and its three main components : medical tourism - travel for the purpose of medical treatment), spa tourism - travel to spa centers, combining medical and health components, and wellness tourism - aimed at improving "health.

References:

1) Balneotherapy care in spas and health resorts in Europe. (n.d.). European Spas Association. https://www.europeanspas.eu/en
2) Doctors in Germany - number. (n.d.). Statista. https://www.statista.com/statistics/582114/doctors-in-germany-number/
3) Europe Medical Tourism Market Overview. (2025). ReportLinker.com. All rights reserved.
4) European Hospital and Healthcare Federation (HOPE). (2015). Medical Tourism. https://www.hope.be/wp-content/uploads/2015/11/98_2015_HOPE-PUBLICATION_Medical-Tourism.pdf
5) European Medical Tourist. (n.d.). https://www.europeanmedicaltourist.com/
6) Focus on Reproduction. (n.d.). IVF and IUI treatment cycles increase across Europe along with stable pregnancy rates. https://www.focusonreproduction.eu/press-releases/ivf-and-iui-treatment-cycles-increase-across-europe-along-with-stable-pregnancy-rates/
7) Healing Travel. (n.d.). Medical tourism for cardiovascular disease treatment: Benefits and considerations. https://healing.travel/blog/medical-tourism-for-cardiovascular-disease-treatment-benefits-and-considerations
8) IMTJ. (2016). Medical Tourism Climate Survey 2016. https://www.imtj.com/resources/medical-tourism-climate-survey-2016/
9) Instituto Bernabeu. (n.d.). Spain leads in vitro fertilization treatments performed in Europe. https://www.institutobernabeu.com/en/news/spain-leads-in-vitro-fertilization-treatments-performed-in-europe/
10) Medical Tourism Magazine. (n.d.). The growing demand for rehabilitation services in medical tourism. https://www.magazine.medicaltourism.com/article/the-growing-demand-for-rehabilitation-services-in-medical-tourism
11) Post-corona recovery: ESPA forum. (n.d.). HTI Conference. https://www.hticonference.com/have-you-followed-the-espa-forum-on-post-corona-recovery/
12) Rehabilitation in the Czech Republic. (n.d.). iMedicalTourismCenter.com. https://imedicaltourismcenter.com/countries/czech-republic/top-treatments/rehabilitation.html
13) Statistisches Bundesamt (Destatis). (n.d.). Hospitals by Länder. https://www.destatis.de/EN/Themes/Society-Environment/Health/Hospitals/Tables/gd-hospitals-laender.html
14) Think Europe. (n.d.). The number of foreign doctors practicing in Germany has reached an all-time high. https://thinkeurope.de/blog/the-number-of-foreign-doctors-practicing-in-germany-has-reached-an-all-time-high
15) UNWTO & European Travel Commission. (2018). Exploring Health Tourism. https://www.e-unwto.org/doi/book/10.18111/9789284420209

THE INFLUENCE OF SOCIO-ECONOMIC FACTORS ON VACCINE PROPHYLAXIS

Tsvetelina Petrova-Gotova[1], Tihomira Zlatanova[1], Ralitsa Zlatanova-Velikova[1], Rumyana Yaneva[1], Nikolay Popov[1], Rosen Mihaylov[2], Mariya Lazarova[1], Miroslava Djuglarska[1], Stefan Velikov[3]

1) Department of Health management and Health economics, Faculty of Public Health "Prof. Tzecomir Vodenitcharov, MD, Dsc", Medical University – Sofia

2) Medical College „Y. Filaretova", Medical University – Sofia

3) Department of Health technology assessment, Faculty of Public Health "Prof. Tzecomir Vodenitcharov, MD, Dsc", Medical University – Sofia

ABSTRACT

The goal of this article is to analyse some socio-economic factors and determine to what a degree they influence societal attitudes to vaccination against seasonal influenza, as well as to formulate recommendations related to morbidity reduction. **Material and methods:** The research uses the documentary, sociological, statistical methods, and graphical analysis. **Results:** A questionnaire-style survey was conducted among 1 038 people across the country regarding their attitudes to, awareness of, and opinions on seasonal influenza vaccination. 72.3% of respondents reported having had influenza, and 37% of them had used a test to identify the disease. Our data analysis shows that work/education absenteeism caused by influenza is not related to neither educational, nor income level. However, a statistically significant correlation was found in terms of social status, education level and the number of vaccinated respondents. **Conclusion:** Influenza vaccination reduces morbidity, decreases absenteeism from work, and ensures the normal functioning of healthcare facilities. This positively impacts all facets of society.

Keywords: vaccination, seasonal influenza, morbidity, public attitudes.

INTRODUCTION: The significance of health and ensuring its effective protection is an indisputable contributor to our country's economic development, social unity, sustainability, and security. Socio-economic factors have a significant impact on the population health, as they determine people's resource access, quality of life, risk exposure, and their options for making healthy choices.

One of the most notable achievements of the public health sector is undoubtedly the successful use of vaccination in the fight against infectious diseases. Influenza is one of the most challenging issues facing modern public health systems [1, 2] and is the most commonly reported infectious disease for which there is a vaccine.

The goal of this article is to conduct an analysis of some socio-economic factors (that is, income, education and social status) to determine to what a degree they influence societal attitudes to vaccination against seasonal influenza, as well as to formulate recommendations related to morbidity reduction.

To achieve this goal, we have set ourselves the following **tasks**:

- ✓ An analysis of the economic consequences associated with influenza morbidity;
- ✓ An analysis of the number of people vaccinated against influenza based on their location, social status, income level, and educational level;
- ✓ An analysis of work/education absenteeism caused by influenza.

MATERIAL AND METHODS: Documentary methods were used to process the data and analyse the results: we reviewed scientific publications on the subject in Bulgarian and international publications, as well as official data, reports, and documents from the National Statistical Institute,

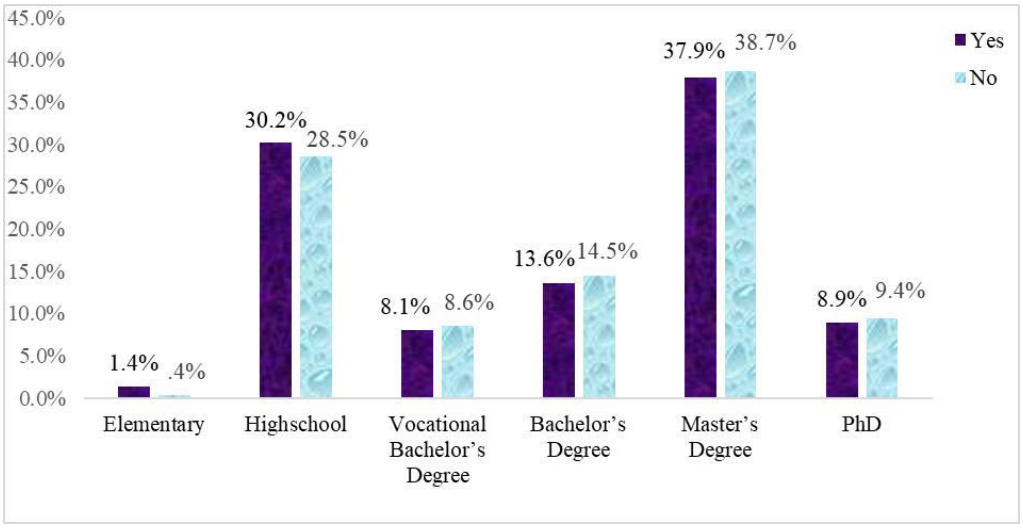
the National Health Insurance Fund, and the Ministry of Health. Sociological methods were also used: we conducted an anonymous questionnaire-style survey via Google Forms. Graphical analysis was also performed. Both descriptive and analytical statistical methods were used. The distribution form was examined using the Kolmogorov-Smirnov test. Pearson's chi-squared test was performed to search for relationships between categorical variables. Quantitative variables were tested via a parametric t-test or a non-parametric Mann-Whitney test. A one-way ANOVA test was used to compare multiple quantitative variables. The level of statistical significance was defined as $p< 0.05$.

RESULTS Between January and April 2025, we conducted a nationwide survey of 1 038 people concerning their attitudes, awareness, and opinions about seasonal influenza vaccination. 79.2% of respondents were women and 20.8% were men. More than half of those polled (66.4%) reported living in Sofia - the capital. In terms of social status, the majority of respondents are in the labour force (70%). It is noteworthy that the majority of respondents were highly educated (69%). The monthly income of nearly half of the respondents (43%) was found to be close to the average salary in the country (between BGN 1077 and BGN 2400). The results of the survey showed that 72.3% of respondents had influenza, and 37% of them had used a test to identify the disease.

Poor health is associated not only with healthcare costs, but also with work absenteeism and reduced labour productivity. For this reason, we asked respondents whether they had been absent from work/education due to influenza, and 65.9% gave an affirmative answer. We performed a chi-squared test to check whether there was a statistically significant correlation between absenteeism, educational attainment, and income.

The result of the test $x^2=2.037$ and the significance level of $p=0.844 >0.05$ does not indicate a significant correlation between these variables. The amount of work absenteeism is identical at all educational levels (Fig. 1).

Fig. 1. Work/education absenteeism caused by influenza, according to respondents' educational level

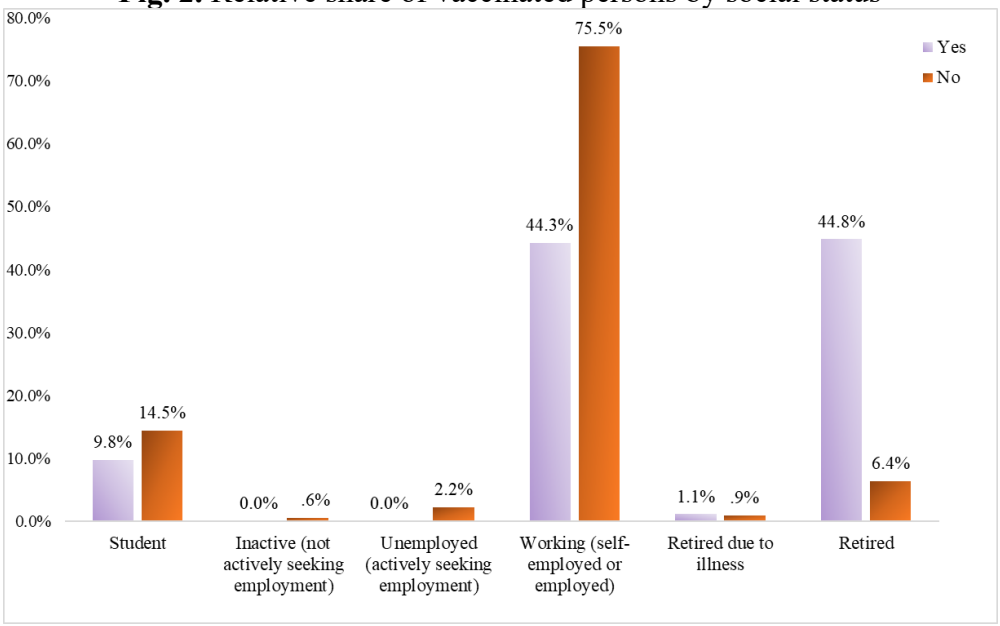


We obtained analogous results when researching the relationship between work absenteeism caused by influenza and respondent income. Pearson's chi-squared test did not reveal a statistically significant relationship between these variables, as the test result was $\chi^2=12.478$ and the significance level was $p=0.052 >0.05$. The conclusion we can draw is that the main factor with the greatest influence on work absenteeism is the severity of the illness.

We also inquired into how many of the respondents had been vaccinated against seasonal flu. The results show an exceptionally low relative proportion of positive responses – 16.76%. In the group of the vaccinated, the vaccination rate in Sofia was shown to be nearly five times higher than in the provincial capitals and more than ten times higher than in other towns or villages. This significant difference suggests that the population in the capital is much better informed about the benefits of vaccination, which can explain the city's more positive attitude towards seasonal influenza vaccination. This is also confirmed by the chi-squared test analysis, which shows a statistically significant relationship between the two variables with a test result of $\chi^2=9.135$ and a significance level of $p=0.028 < 0.05$.

Fisher's Exact Test shows a statistically significant correlation between social status and the number of people vaccinated against seasonal influenza, with a test result of 148.236 and a significance level of $p<0.001$. Fischer's Exact Test shows a statistically significant correlation between the number of respondents vaccinated against seasonal influenza and their social status, with a test result of 148.236 and a significance level of $p<0.001$. In the group of the retired, the share of those vaccinated (44.83%) exceeds the share of unvaccinated individuals (6.37%) by a factor of 7, confirming the beneficial impact of the National Seasonal Influenza Vaccine Prophylaxis Improvement Program and the possibility of free vaccination above a certain age (Fig. 2).

Fig. 2. Relative share of vaccinated persons by social status



A statistically significant correlation was also found between the respondents' education level and the number of them vaccinated against seasonal influenza, with a test result (Fisher's Exact Test) of 21.511 and a significance level of $p=0.001 < 0.05$. This can be explained by the fact that more highly educated people have a higher health literacy, which is often associated with greater awareness of preventive measures and, consequently, a positive attitude towards vaccination.

No statistically significant correlation was found between income level and the number of vaccinated individuals. Regardless of income, the trend in each group remains the same: the percentage of unvaccinated individuals (around 80%) significantly exceeds the percentage of vaccinated individuals.

DISCUSSION Low vaccination rates or refusals to vaccinate have an adverse impact on the country's economy, mainly through higher healthcare and health service costs, medication costs, and social costs (in the form of care costs for sick relatives, social services, and pensions).
The greatest costs to the economy arise when a person becomes disabled or has died. Experts from the Institute for Market Economics have assessed these costs under various epidemic scenarios, and the results indicate that the losses to the Bulgarian economy would range between BGN 1.6 and 17.4 billion (over 64% of these losses are related to the probability of disability, and 34% with death) [3, 4].
As noted above, influenza poses a significant socio-economic burden - on one hand, the large number of mild to moderate cases leads to an increase in the number of sick days taken and causes a loss of productivity among the labour force. On the other hand, it places a burden on the medical system by increasing the number of medical consultations, hospitalizations, clinical complications, and medication use. The containment of viral outbreaks largely depends on the population's willingness and readiness to be vaccinated [1]. Prof. David Fedson, a leading expert on infectious diseases, cites the results of several large-scale studies that demonstrate that annual influenza vaccination reduces mortality in the elderly, as well as the number of hospitalizations, and deaths from influenza and pneumonia [5].

CONCLUSION

Influenza epidemics produce direct and indirect economic losses by causing temporary incapacity to work in the labour force, straining the health and social service systems and causing suffering to the ill. Influenza vaccination reduces morbidity, decreases absenteeism from work, and ensures the normal functioning of healthcare facilities. This positively impacts all facets of society. In this regard, it is necessary to conduct more public and professional information campaigns on seasonal influenza and the benefits of influenza immunisation among people in at-risk groups and their families, among medical professionals, as well as among health managers and politicians [5].

Acknowledgements: This article presents results from Project Grant 2024, Contract No. Д-186/04.06.2025, funded by the Medical University of Sofia, Council of Medical Science.

REFERENCES:

1. Galev, A., A study of the attitudes toward influenza immunization among medical personnel in the Republic of Bulgaria, a thesis for the scientific degree of Doctor of Medical Sciences, Sofia, 2020, 296 p., [In Bulgarian].
2. National Programme for Improving the Vaccination of Seasonal Influenza and Pneumococcal Infections in Persons Aged 65 Years and Older 2023-2026, [In Bulgarian].
3. Georgieva, P., L. Bogdanov, The Value of Health – An Assessment of the Economic Losses to Bulgaria Caused by Low Vaccination Rates, Institute for Market Economics, 2023, [In Bulgarian].
4. Interpersonal Communication for Immunization – A Handbook for Health Workers, Astra Forum Foundation, Sofia, 2022, [In Bulgarian].
5. https://forummedicus.com/archives/all-publications/698https://forummedicus.com/archives/all-publications/698 Vaccine Prophylaxis is a Global Goal, [In Bulgarian].

Address for correspondence:
Tsvetelina Petrova-Gotova
Department of Health management and Health economics
Faculty of Public Health "Prof. Tzecomir Vodenitcharov, MD, Dsc"
Medical University – Sofia
8, Bialo More Str., 1527 Sofia, Bulgaria
E-mail: ts.petrova@foz.mu-sofia.bg

DIGITAL TRANSFORMATION IN OPTOMETRY: OPPORTUNITIES, CHALLENGES AND THE ROLE OF HEALTH TECHNOLOGY ASSESSMENT

Tsvetelina Mihova[1], Desislava Vankova[2], Antoaneta Tsvetkova[1]

[1]*Medical College – Varna,*
[2]*Faculty of Public Health, Department of Social Medicine and Healthcare Organization, Medical University "Prof. Dr. Paraskev Stoyanov" – Varna*

ABSRTACT

Modern optometry is rapidly evolving under the influence of digital innovations such as optical coherence tomography (OCT), artificial intelligence (AI), and telemedicine. This review aims to evaluate their clinical effectiveness, cost-efficiency, and safety within the framework of health technology assessment (HTA). **Material/Methods**: A systematic review of scientific studies published between 2018 and 2024 was conducted using databases such as PubMed, Scopus, and Google Scholar. Logical keyword combinations were applied, and relevant original studies, systematic reviews, and institutional reports were included. **Results:** The findings confirm the strong diagnostic value of OCT, the potential of AI to enhance screening processes, and the economic advantages of telemedicine when implemented with adequate planning and regulatory support. **Conclusions:** In Bulgaria, the integration of such technologies is still emerging, limited by access to equipment, regulatory gaps, and the need for advanced professional training. Applying HTA principles in optometry can support evidence-based decisions, while digitally skilled optometrists can enhance access to quality eye care and reinforce public health.

Key words: optometrist, eye health, digital technologies, health technology assessment (HTA), public health.

INTRODUCTION The increasing demand for eye health services and the integration of digital technologies in optometry highlight the need for a systematic, evidence-based approach to their implementation. Health Technology Assessment (HTA) has become a key framework for evaluating innovations in terms of clinical effectiveness, safety, and societal impact [1]. Given population ageing and the rising prevalence of eye diseases such as glaucoma, cataract, diabetic retinopathy, and macular degeneration [2], the relevance of HTA in ophthalmology and optometry is steadily growing. Digital tools – including OCT, AI, and telemedicine – are transforming diagnostic practice, enabling automation, remote monitoring, and wider screening access. This review synthesizes recent international evidence (2018–2024), emphasizing clinical and economic evaluation within the regulatory framework of Regulation (EU) 2021/2282, which establishes a joint clinical assessment process for health technologies across EU member states.

MATERIALS AND METHODS. A systematic review was conducted across PubMed, Scopus, and Google Scholar (2018–2024) using keywords related to optometry, HTA, and digital technologies. Eligible sources included original studies, reviews, meta-analyses, and institutional reports assessing digital innovations in optometry by HTA criteria. Low-quality, duplicate, and editorial publications were excluded.

RESULTS AND DISCUSSION. OCT is a key non-invasive imaging modality enabling early detection of macular degeneration, glaucoma, and diabetic macular edema. Integrating OCT into standard screening protocols increases diagnostic sensitivity and proves cost-effective despite higher initial costs, with Bulgarian evidence supporting its inclusion in preventive programs [3]. According to NICE guidelines, OCT is recommended for the diagnosis and monitoring of major retinal diseases, contributing to improved accuracy and treatment efficiency [4]. OCT demonstrates

strong clinical effectiveness and economic justification, supporting its broader integration into eye health strategies and public health policy.AI has become an integral component of modern eye health, supporting automated detection of diabetic retinopathy, glaucoma prediction, and visual field analysis [5]. Optometry is among the key areas for AI implementation, with systems such as EyeArt and IDx-DR already approved for autonomous diabetic retinopathy screening, enabling faster and more accurate assessments [6]. Despite notable progress, concerns remain regarding data quality and clinical reliability. A 2025 systematic review found that 28% of AI models were trained on fewer than 500 images and 20% achieved accuracy below 80%, indicating limited generalizability [7]. Other studies emphasize the absence of long-term validation, risks of algorithmic bias, and insufficient transparency in model design [8], alongside ethical and data protection challenges [9]. Real-world data (RWD) and real-world evidence (RWE) are increasingly recognized as essential for validating AI systems beyond controlled trials, ensuring accurate performance evaluation in diverse clinical contexts. Economic analyses confirm that automated AI-based screening can reduce costs and expand coverage, particularly in high-income settings such as the USA and Australia [10], though benefits may be less significant in regions with lower labor costs [11]. Overall, the safe and effective integration of AI in eye care depends on algorithmic transparency, reliability, and continuous validation supported by real-world evidence. Teleophthalmology and teleoptometry became increasingly important during the pandemic period [12]. In optometry, telemedicine includes real-time consultations and asynchronous data transfer [13], with studies showing high patient satisfaction in chronic disease management [14]. Key limitations involve the lack of direct examination and technical constraints [15]. When appropriate equipment is used, diagnostic accuracy is comparable to traditional examinations [16]. Systematic reviews report strong cost-effectiveness, with savings of about USD 74 per patient in tele-screening for diabetic retinopathy and glaucoma [17]. Collaborative models between optometrists and ophthalmologists further improve access in underserved areas [18]. Now established as a sustainable component of eye care [19], telemedicine offers measurable economic and public health benefits, particularly through reduced travel, time loss, and complication rates, while optimizing resource use [20]. The implementation of any digital health technology should follow systematic HTA evaluation to ensure clinical effectiveness, safety, and cost-efficiency before integration into routine practice. In summary, Table 1 presents several key technologies and examples of their evaluation results according to selected HTA criteria.

Table 1. Examples of HTA of digital technologies in optometry.
The table summarizes data from various sources, illustrating both the benefits and considerations related to the implementation of digital technologies in eye care.

Technology	Clinical Effectiveness (example results)	Economic Aspect	Safety/Ethical Considerations
Optical Coherence Tomography (OCT)	Increases detection of retinal pathologies – e.g., +26% higher sensitivity for macular edema when OCT is added to screening [21]. Improves glaucoma monitoring through objective measurement of the retinal nerve fiber layer.	Screening strategies including OCT are highly cost-effective – models show dominance when applied at sufficient scale, despite equipment costs [21]. Bulgarian data recommend integration into preventive programs [3].	Safe and non-invasive method. Ethical benefit: early detection prevents blindness. Challenge: limited accessibility due to high equipment cost, especially for small practices.
Artificial Intelligence (AI) in Screening	Achieves expert-level performance in some tasks – AI for diabetic retinopathy shows >90% specificity and sensitivity [22]. Demonstrates potential for earlier disease detection—up to three years before clinical diagnosis. Some glaucoma and	Cost-saving at high patient volumes – e.g., 18.8% cost reduction over 5 years with automated DR screening (USA). In high-labor-cost settings, AI replaces part of human work and is cost-effective; in low-cost regions	Requires strict quality control due to risk of errors or missed cases. Ethical issues: lack of transparency ("black box"), algorithmic bias toward ethnic or demographic groups [24]. Clear accountability must be defined in cases of diagnostic error.

Technology	Clinical Effectiveness (example results)	Economic Aspect	Safety/Ethical Considerations
	AMD models remain below 80% accuracy [23].	(China), the economic benefit is smaller [22].	
Telemedicine (Teleretinal Screening)	Demonstrates diagnostic accuracy comparable to in-person exams when good imaging equipment is used. Expands screening coverage—reaches patients who would otherwise not seek care [25]. High patient satisfaction reported [26].	Cost-effective at scale – e.g., savings of about USD 74 per patient for 200 annual screenings (Norway). Shown to be a cost-effective alternative to standard screening in multiple countries (USA, India, Canada) [25]. Reduces unnecessary specialist referrals.	No direct physical risk; possible risk of missed findings without ophthalmoscopy—requires triage. Ethical considerations: equity (limited internet access) and data confidentiality [26]. Should complement, not replace, in-person eye examinations.
Mobile Applications (e.g., Peek Acuity)	Proven reliable for measuring visual acuity – <0.1 logMAR difference compared to standard charts [27]. Enables self-screening for amblyopia in children or progress monitoring under supervision.	Low cost per test (requires only a smartphone). Cost-effective for mass screening in remote areas by reducing the need for specialist travel. Economic impact difficult to quantify precisely, but improved access leads to indirect benefits (earlier treatment).	Requires device calibration (screen size, lighting). Ethical aspect: apps do not provide a diagnosis but only screening guidance—users must be clearly informed to avoid self-treatment or misinterpretation.

In Bulgaria, HTA is currently applied mainly to pharmaceuticals through the National Council on Pricing and Reimbursement of Medicinal Products, with digital technologies and medical devices yet to be systematically integrated. Regulation (EU) 2021/2282 mandates joint clinical assessments across EU Member States from 2025 [28], creating a framework for evidence-based adoption of innovations such as OCT, AI systems, and teleoptometry platforms under Ordinance No. 7/2021. Access to advanced diagnostic equipment remains uneven, particularly outside major cities, due to the absence of a national eye screening program and unregulated teleophthalmology models. Although AI systems for ocular diagnostics are not yet registered, participation in international projects suggests progress toward future implementation. HTA can support strategic investment in digital optometry under limited resources, following best practices from NICE and HAS that emphasize ethical integration [4,29]. Strengthening legislative frameworks, professional training, and equitable access is key to aligning national development with the IAPB Vision 2030 agenda.

CONCLUSION Digital technologies are proven to be cost-effective, especially in chronic disease management and screening. HTA provides an evidence-based framework confirming their clinical value and sustainability. In Bulgaria, successful implementation requires regulatory support, validation, and specialized optometrist training. Integrating HTA findings into practice will enhance eye health and support the Vision 2030 goal of universal access to quality eye care.

REFERENCES

1. Bennett A, McNeill P, Janicke S. Efficiency of automation and electronic health records in optometric practice. Optom Vis Sci. 2018 Jan;85(1):62–8. PMID: 18156095
2. Kuźma E, Littlejohns TJ, Khawaja AP, Llewellyn DJ, Ukoumunne OC, Thiem U. Visual Impairment, Eye Diseases, and Dementia Risk: A Systematic Review and Meta-Analysis. J Alzheimers Dis. 2021;83(3):1073-1087. doi: 10.3233/JAD-210250. PMID: 34397414.
3. Kirkova R, Tanev I, Dimitrov T, Dimitrova T, Kirkov V. Application of optic coherence tomography as a screening in prevention and control of diabetic retinopathy. Pharmacia. 2024 Jun 20;71:1–9.
4. National Institute for Health and Care Excellence (NICE). Glaucoma: diagnosis and management [Internet]. NICE guideline NG81. London: NICE; 2017. https://www.nice.org.uk/
5. Asaoka R, Murata H. Prediction of visual field progression in glaucoma: existing methods and artificial intelligence. Jpn J Ophthalmol. 2023 Sep;67(5):546-559. doi: 10.1007/s10384-023-01009-3. Epub 2023 Aug 4. PMID: 37540325.
6. Tan TF, Thirunavukarasu AJ, Jin L, Lim J, Poh S, Teo ZL, Ang M, Chan RVP, Ong J, Turner A, Karlström J, Wong TY, Stern J, Ting DS. Artificial intelligence and digital health in global eye health: opportunities and challenges. Lancet Glob Health. 2023 Sep;11(9):e1432-e1443. doi: 10.1016/S2214-109X(23)00323-6. PMID: 37591589.
7. Rather IH, Kumar S, Gandomi AH. Breaking the data barrier: a review of deep learning techniques for democratizing AI with small datasets. Artif Intell Rev. 2024 Aug 2;57(9):226.
8. Homeyer A, Lotz J, Schwen LO, Weiss N, Romberg D, Höfener H, et al. Artificial Intelligence in Pathology: From Prototype to Product. Journal of Pathology Informatics. 2021 Jan 1;12(1):13.

9. Jeyaraman M, Balaji S, Jeyaraman N, Yadav S. Unraveling the Ethical Enigma: Artificial Intelligence in Healthcare. Cureus. 2023 Aug 10;15(8):e43262. doi: 10.7759/cureus.43262. PMID: 37692617; PMCID: PMC10492220.
10. Hu W, Joseph S, Li R, Woods E, Sun J, Shen M, et al. Population impact and cost-effectiveness of artificial intelligence-based diabetic retinopathy screening in people living with diabetes in Australia: a cost effectiveness analysis. eClinicalMedicine. 2024 Jan 1 [cited 2025 Apr 27];67.
11. Ting DSW, Pasquale LR, Peng L, Campbell JP, Lee AY, Raman R, et al. Artificial intelligence and deep learning in ophthalmology. Br J Ophthalmol. 2019 Oct;103(12):167–75. PMID: 31048019
12. Ramamurthy D, Srinivasan S, Chamarty S, Velappan T, Verkicharla PK, Samuel Paulraj AK. Smart Devices in Optometry: Current and Future Perspectives to Clinical Optometry. Clin Optom (Auckl). 2024 Jul 29;16:169-190. doi: 10.2147/OPTO.S447554. PMID: 39100732; PMCID: PMC11296370.
13. Massie J, Block SS, Morjaria P. The Role of Optometry in the Delivery of Eye Care via Telehealth: A Systematic Literature Review. Telemedicine and e-Health. 2022 Dec 1;28(12):1753–63.
14. Herkert C, Kraal JJ, Spee RF, Serier A, Graat-Verboom L, Kemps HMC. Quality Assessment of an Integrated Care Pathway Using Telemonitoring in Patients with Chronic Heart Failure and Chronic Obstructive Pulmonary Disease: Protocol for a Quasi-Experimental Study. JMIR Res Protoc. 2020 Nov 19;9(11):e20571. doi: 10.2196/20571. PMID: 33211017; PMCID: PMC7714643.
15. Parikh D, Armstrong ,Grayson, Liou ,Victor, and Husain D. Advances in Telemedicine in Ophthalmology. Seminars in Ophthalmology. 2020 May 18;35(4):210–5.
16. Lesport Q, Joerger G, Kaminski HJ, Girma H, McNett S, Abu-Rub M, Garbey M. Eye Segmentation Method for Telehealth: Application to the Myasthenia Gravis Physical Examination. Sensors (Basel). 2023 Sep 7;23(18):7744. doi: 10.3390/s23187744. PMID: 37765800; PMCID: PMC10536520.
17. Eze ND, Mateus C, Cravo Oliveira Hashiguchi T. Telemedicine in the OECD: An umbrella review of clinical and cost-effectiveness, patient experience and implementation. PLoS One. 2020 Aug 13;15(8):e0237585. doi: 10.1371/journal.pone.0237585. PMID: 32790752; PMCID: PMC7425977.
18. Maa AY, McCord S, Lu X, Janjua R, Howell AV, Hunt KJ, et al. The Impact of OCT on Diagnostic Accuracy of the Technology-Based Eye Care Services Protocol: Part II of the Technology-Based Eye Care Services Compare Trial. Ophthalmology. 2020 Apr 1;127(4):544–9.
19. Hincapié MA, Gallego JC, Gempeler A, Piñeros JA, Nasner D, Escobar MF. Implementation and Usefulness of Telemedicine During the COVID-19 Pandemic: A Scoping Review. J Prim Care Community Health. 2020 Jan 1;11:2150132720980612.
20. Rajam DAL, Syamsih N, Hasryanty S. The Role of Telemedicine in Improving Access to Healthcare in Remote Areas. Journal of Asian-African Focus in Health. 2024 Nov 10;2(3):111–21.
21. Liu Z, Han X, Gao L, et al. Cost-effectiveness of incorporating self-imaging optical coherence tomography into fundus photography-based diabetic retinopathy screening. NPJ Digit Med. 2024;7:225. doi:10.1038/s41746-024-01222-5.
22. Ramoutar RR. An Economic Analysis for the Use of Artificial Intelligence in Screening for Diabetic Retinopathy in Trinidad and Tobago. Cureus. 2024 Mar 7;16(3):e55745. doi: 10.7759/cureus.55745. PMID: 38586698; PMCID: PMC10999161.
23. Krishnan A, Dutta A, Srivastava A, Konda N, Prakasam RK. Artificial Intelligence in Optometry: Current and Future Perspectives. Clin Optom (Auckl). 2025 Mar 12;17:83-114. doi: 10.2147/OPTO.S494911. PMID: 40094103; PMCID: PMC11910921.
24. Liu TYA, Wu J-H. The ethical and societal considerations for the rise of artificial intelligence and big data in ophthalmology. Front Med (Lausanne). 2022;9:845522. doi:10.3389/fmed.2022.845522.
25. Ullah W, Pathan SK, Panchal A, Anandan S, Saleem K, Sattar Y, Ahmad E, Mukhtar M, Nawaz H. Cost-effectiveness and diagnostic accuracy of telemedicine in macular disease and diabetic retinopathy: A systematic review and meta-analysis. Medicine (Baltimore). 2020 Jun 19;99(25):e20306. doi: 10.1097/MD.0000000000020306. PMID: 32569163; PMCID: PMC7310976.
26. Halajyan CP, Thomas J, Xu B, Gluckstein J, Jiang X. Telemedicine in Eye Care During the COVID-19 Pandemic: A Review of Patient & Physician Perspectives. medRxiv. 2024 Oct 27:2024.10.25.24316160. doi: 10.1101/2024.10.25.24316160. PMID: 39502667; PMCID: PMC11537333.
27. Li JO, Liu H, Ting DSJ, Jeon S, Chan RVP, Kim JE, Sim DA, Thomas PBM, Lin H, Chen Y, Sakomoto T, Loewenstein A, Lam DSC, Pasquale LR, Wong TY, Lam LA, Ting DSW. Digital technology, tele-medicine and artificial intelligence in ophthalmology: A global perspective. Prog Retin Eye Res. 2021 May;82:100900. doi: 10.1016/j.preteyeres.2020.100900. Epub 2020 Sep 6. PMID: 32898686; PMCID: PMC7474840.
28. Regulation (EU) 2021/2282 of the European Parliament and of the Council of 15 December 2021 on health technology assessment and amending Directive 2011/24/EU.
29. Haute Autorité de Santé. About HAS. Haute Autorité de Santé website. 2025. https://www.has-sante.fr/

Address for correspondence:
Tsvetelina Mihova
Medical College -Varna,
Medical University “Prof. Dr. Paraskev Stoyanov” – Varna
84 Knyaz Boris I Blvd.; e-mail: tsvetelina.mihova@mu-varna.bg

WORKPLACE CONFLICT AND THE PERFORMANCE OF MEDICAL STAFF IN A HOSPITAL SETTING

Ekaterina Raykova, Mariya Semerdzhieva, Desislava Bakova, Anna Mihaylova

Department of Healthcare Management, Faculty of Public Health, Medical University, Plovdiv, Bulgaria

ABSTRACT

This study aims to examine the influence of workplace conflicts on the performance of healthcare professionals when performing their professional duties.

Methods: The study is cross-sectional and includes 358 healthcare professionals from two state-owned general hospitals on the territory of the city of Plovdiv, Bulgaria. A set of questions was used to assess the impact that conflicts have on the work performance of medical staff in carrying out their professional activities. Data analysis was performed by using descriptive statistics and non-parametric analysis at a significance level for the null hypothesis of $p < 0.05$.

Results: Conflicts have a detrimental impact on work effectiveness according to 80.0% of medical staff. As a consequence of conflict, 50.7% of respondents report a decrease in work ability when performing their direct responsibilities. According to 42.4% of those holding managerial positions, the conflict behavior of employees in certain cases adversely affects the quality of healthcare and patient safety. A significant share of healthcare workers (56.4%) do not consider that conflicts have a negative influence on the quality of healthcare services.

Conclusions: Workplace conflicts in the hospital environment have a significant negative impact on the productivity of medical staff. Systematic monitoring of the level of conflict, the development of internal prevention mechanisms, and the enhancement of managers' competence in conflict management within hospitals can help mitigate the destructive consequences of workplace confrontations.

Keywords: workplace conflict, healthcare professionals, work performance, hospital

INTRODUCTION Workplace conflicts are among the key factors characterizing the functioning of the hospital as an organization; they also serve as an indicator of its effectiveness [1,2,3,4,5]. They occur as a result of opposing interests, violations of behavioral norms and values, or discrepancies between formal organizational principles and the actual behavior of team members, most often related to work organization and conditions [2,6]. Conflicts may involve medical staff, patients and their relatives, or members of the hospital administration [3,4,7,8], and they have various consequences for the individual, the medical team, or the hospital itself [4,5,9,10,12,13]. The dysfunctional consequences of conflicts include emotional tension, hostility, and various manifestations of destructive and counterproductive work behaviour among medical personnel [4], such as harassment, verbal and physical aggression [3,5]. Workplace conflicts have been identified as a factor that increases stress levels among medical specialists with the potential to cause psychological, social, or physical harm [3,4,13]. They have a direct detrimental impact on job satisfaction, well-being, deteriorated working relationships, and the turnover of qualified personnel, and they significantly impair the performance of medical staff and medical institutions [3,4,7,10,11,13,14]. The presence of work-related conflicts can jeopardize the quality of healthcare, as well as the safety of medical professionals and patients. [3.4,5,13].

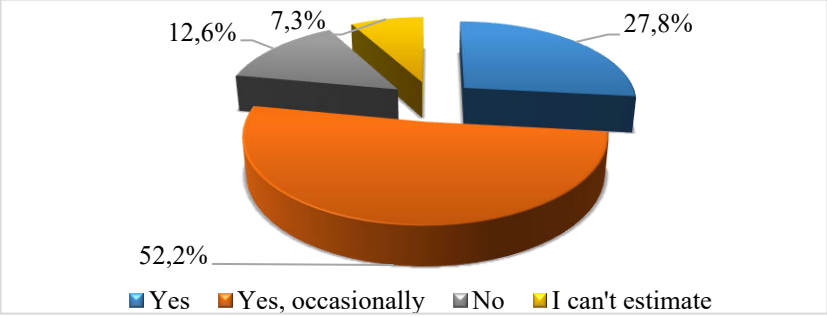
PURPOSE This study aims to examine the influence of workplace conflicts on the performance of healthcare professionals when performing their professional duties.

MATERIAL AND METHODS A cross-sectional study was used to determine the impact of workplace conflicts on the productivity of healthcare professionals in carrying out their professional duties. A direct individual survey using a stratified random sampling method was conducted with 358 medical staff in two state-run general hospitals on the territory of the city of Plovdiv, Bulgaria in the period June - November 2024. A set of questions was used to assess the impact of conflicts on the work performance of healthcare professionals as both direct and indirect participants in conflict interactions. Participation in the study was entirely voluntary and anonymous, and each participant had the right to withdraw at any point during the research process. The statistical processing of the collected primary information was performed by using descriptive statistics. Quantitative variables were presented as mean value and standard error of the mean (mean±SEM), while qualitative variables were presented as absolute numbers (n/%). A non-parametric analysis using Pearson's Chi-squared test (χ^2) was applied for hypothesis testing at a significance level for the null hypothesis of $p < 0.05$. The processing, quantitative analysis of the data, and graphical presentation of the results were performed by using a statistical software package – SPSS for Windows v.23.0 and Excel.

RESULTS The study included 358 healthcare professionals, divided into two main groups: physicians – 87 (24.3±2.3%) and healthcare specialists – 271 (75.7±2.3%). In the surveyed hospitals, respondents holding managerial positions constituted 18.7±2.1%, while those in non-managerial positions comprised 81.3±2.1%. Within the investigated sample, a statistically significant higher relative proportion of women was found – 74.6±2.3%, compared to men – 25.4±2.3% ($\chi^2 = 41.95$, $p = 0.001$). The average age of the included healthcare professionals involved in the study is 44.3±0.62 years. The data analysis showed that, regarding total work experience, the largest relative proportion was among healthcare professionals with professional experience between 11 and 20 years (29.9±2.4%). The mean duration of work experience for the investigated group was 21.7±0.6 years.

The analysis of the study results revealed that workplace conflicts have a destructive impact on the overall effectiveness of healthcare professionals, according to 80.0±2.1% of respondents, with 27.8±2.4% being categorical about the detrimental impact of confrontations on professional activity. (Fig. 1).

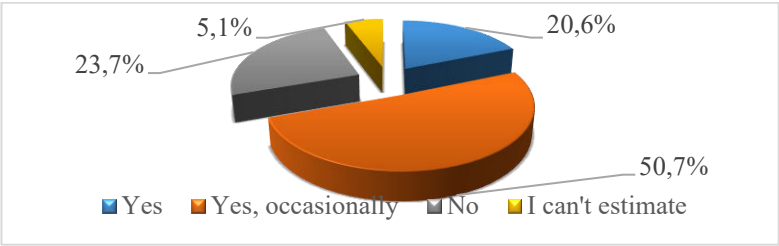
Fig. 1. Healthcare specialists' opinion on the impact of conflicts on work effectiveness (n=356)



The effect of conflicts on the utilization of working time was studied. It was found that a significant portion of healthcare professionals (67.2±2.7%) perceived workplace conflict as a loss of time, and 17.2±2.2% partially shared this negative opinion. The analysis of the results revealed negative

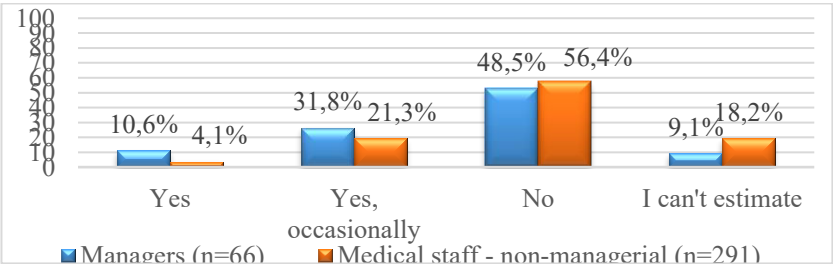
trends regarding the impact of conflicts on the work performance of healthcare professionals when carrying out their direct duties (Fig. 2).

Fig. 2. Impact of conflict on work performance with regard to the direct duties of healthcare professionals (n = 355)



According to 50.7±2.7% of respondents, their work performance was "sometimes" impaired. 20.6±2.1% of the healthcare professionals were categorical in their opinions regarding the negative impact of conflicts on their work. At the same time, 23.7±2.3% did not report a similar negative trend in their professional daily lives. Conflict and unprofessional behaviour adversely affects the quality of healthcare services provided and jeopardizes patient safety, according to the subjective assessment of 28.5±2.4% of healthcare professionals. The positive finding is that, according to 54.9±2.9% of healthcare professionals, patient safety is not affected by workplace conflicts. Nonetheless, 16.5±2.0% of the respondents were unable to evaluate the degree to which a certain conflict affected patient safety and the quality of healthcare services provided. The comparison of data provided by those holding managerial positions and the rest of the medical staff shows a significant statistical difference in their evaluations (χ^2=10.12, p = 0.018) (Fig. 3).

Fig. 3. Comparative analysis of perceptions of managerial and non-managerial medical staff on the impact of conflicts on the quality of medical care



The comparative analysis of the results shows that 42.4±6,8% of those holding managerial positions believed that employees' conflict behavior, in certain cases, negatively impacted the quality of healthcare and patient safety. 10,6±3,8% of them were categorical in this opinion. On the other hand, non-managerial medical staff, 21.3±2.4%, also identified conflict behavior as a factor that affected the quality of healthcare services and patient safety, while 18.2±2.3% were unable to decide. Despite these attitudes, a significant part of medical professionals - 56.4±2.9% - did not support the opinion of their managers and colleagues, which indicates the presence of diverse perceptions regarding the actual impact of conflicts in the hospital environment.

DISCUSSION Workplace conflicts have a contradictory impact on the performance of medical professionals. The results of the current study show that workplace conflicts have a direct,

detrimental impact on the utilization of working time, productivity, and effectiveness of medical professionals. Consistent with this, other studies have revealed that contradictions generate workplace tension, distract team members from fulfilling their core responsibilities [3,4,9], and affect medical professionals' ability to work effectively [3,4,7,10,11,14]. Furthermore, other studies have demonstrated that individuals affected by workplace conflicts experience demotivation and dissatisfaction, potentially resulting in displays of apathy, less engagement, and even reckless behavior when performing their professional duties [3,5,10,13,14]. Engagement in daily conflicts by medical professionals leads to a considerable loss of working time, posing a significant threat to the uninterrupted flow of hospital activities [3,4,5,7,13]. In particular circumstances, workplace conflicts as well as their outcomes, may have a beneficial effect on medical professionals' performance. The present findings are, to some extent, consistent with data from previous studies, which indicate that conflict enhances the efficacy of interaction among those involved in it and facilitates the fulfillment of their needs. offers an opportunity to change or resolve existing controversies [15]. Notwithstanding the recognized beneficial impact, some researchers suggest that the consequences of conflicts can only be determined after a precise analysis of the conflict process and the constructive changes affecting organizational effectiveness [6,15]. The results highlight the existence of divergent attitudes towards the potential positive value of professional conflicts, which in turn necessitates an individualized approach to their management within the hospital setting. The findings of this study indicate that workplace conflicts possess the potential to adversely affect the quality of healthcare delivered. Similar results have been reported by other researchers who found that conflicts can adversely affect the work of medical professionals, threaten the quality of healthcare and patient safety, and substantially impact the overall activity and functioning of the hospital [3,4,14]. A positive finding of the current study is that the majority of medical professionals did not perceive conflicts as negatively affecting the quality of healthcare services rendered. The results reveal a significant discrepancy in management and other medical professionals' perceptions of the impact of conflicts on healthcare quality and patient safety. Based on this finding, it can be assumed that managers possess the ability to apply rules of procedure and medical standards to prevent the negative impact of conflicts on the quality of medical services in the hospital work environment. That emerges as a specific conflict management competency characteristic of effective healthcare managers [15,16]. It is nonetheless vital to highlight that even minor conflicts can yield severe adverse outcomes if one of the parties involved is a patient. Such situations not only jeopardize the quality of medical care but can also significantly compromise the hospital's reputation in the eyes of patients and the general public.

CONCLUSIONS The present study emphasizes that workplace conflicts in hospitals significantly affect both the effectiveness of medical staff and the quality and safety of patient care. The findings reveal that although some respondents did not view conflicts as an immediate peril to patient safety, the majority acknowledged a detrimental influence on their professional performance. The findings highlight the necessity for a systemic approach to conflict monitoring, prevention, and management, including the development of internal mechanisms for self-regulation and the enhancement of conflict management competency of managers. Such measures are crucial for mitigating the destructive impacts of conflicts and enhancing the resilience and effectiveness of healthcare facilities.

Acknowledgements

The authors would like to thank the hospital managers and medical professionals who participated in the study.

REFERENCES

1. Chmielewska M, Stokwiszewski J, Markowska J, Hermanowski T. Evaluating Organizational Performance of Public Hospitals using the McKinsey 7-S Framework. *BMC Health Serv Res.* 2022 Jan 2;22(1):7. [Crossref]
2. Krijgsheld M, Tummers LG, Scheepers FE. Job performance in healthcare: a systematic review. *BMC Health Serv Res*. 2022 Feb 4;22(1):149. [Crossref]
3. Graves JM, Moore M, Avery A, Wolff C, St. Vil C, Jackson E, et al. The Burden of Violence to US Hospitals: A comprehensive assessment of financial costs and other impacts of workplace and community violence. Report. *Harborview Injury Prevention and Research Center*, *University of Washington*. 2025 Mar;1-39. [Crossref]
4. Pavithra, A., Sunderland, N., Callen, J. *et al.* Unprofessional behaviours experienced by hospital staff: qualitative analysis of narrative comments in a longitudinal survey across seven hospitals in Australia. *BMC Health Serv Res.* 2022 Mar 28;410(22). [Crossref]
5. Pavlova S. Aggression as a risk factor in health care. *J of IMAB.* 2024 Jul-Sep;30(3):5631-5635. [Crossref]
6. Mihajlova IG. [Conflicts in the organization and their management.] [in Bulgarian] St. *Kliment Ohridski University Press – Sofia*. 2021, 127 p.
7. Konlan KD, Abdulai JA, Saah JA, Doat AR, Amoah RM, Mohammed I, et al. The influence of conflicts among members of the clinical team on patient care; an explorative, descriptive study, Ghana. *J Glob Health Sci*. 2023 Apr-Jun;5(1):e1. [Crossref]
8. Petrova-Dzheretto E, Naseva E, Mirazchiyski B, Cherkezov D. **[**Comparative study of generational differences in University hospital Burgas and Regional hospital "Dr. Atanas Dafovski"-Kardzhali.] [in Bulgarian] *Management and education* 2025;21(6):125-31. [Crossref]
9. Çınar Ş, Uğrak U, Mersinlioğlu Serin G. Healthcare conflict and job satisfaction: A case of tertiary hospital. *Turk Hij Den Biyol Derg*. 2025;82(1):151-164. [Crossref]
10. Helga Eva Virginia, M. Oktaviannur. The Effect of Work Stress and Work Conflict on Employee Performance at the Regional Mental Hospital of Lampung Province. *IJEBIR.* 2025 Jan 16; 4(01): 1099-1112. [Crossref]
11. Kadir B, Harizanova S. Conflicts in the work environment of public health inspectors. *MEDIS – Int J Med Sci Res*. 2025 May 25;*4*(2):37-40. [Crossref]
12. Norful AA, Albloushi M, Zhao J, Gao Y, Castro J, Palaganas E, et al. Modifiable work stress factors and psychological health risk among nurses working within 13 countries. *J Nurs Scholarsh*. 2024 Sep;56(5):742-751. [PMC]
13. Moreno-Leal P, Leal-Costa C, Díaz-Agea JL, Castaño-Molina MLÁ, Conesa-Ferrer MB, De Souza-Oliveira AC. Disruptive Behavior and Factors Associated with Patient Safety Climate: A Cross-Sectional Study of Nurses' and Physicians' Perceptions. *J Nurs Manag*. 2024 Mar 12; 2024:5568390.]Crossref]
14. Monyei FE, Ezinwa PN, Agbaeze EK, Ukpere WI, Ugbam CO, Ndu V. Workplace conflict and the productivity of employees in the healthcare sector: A case study. *Corporate Governance and Organizational Behavior Review*. 2023 Jun;7(3):70-79. [Crossref]
15. Nosrati S, Bigdeli S. Sohrabi Z. Developing an interprofessional conflict management framework for surgical residents: a qualitative study. *BMC Med Educ.* 2025;601(25). [Crossref]
16. Mierzwa A, Syrkiewicz-Świtała M, Kuraszewska B, Świtała R, Grzebieluch J, Detyna B, et al. Competencies of a Healthcare Manager in the Context of Hospital and Ambulateral Diagnostic Imaging Centers. *Logistics.* 2024 Dec 19; 8(4):133. [Crossref]

Address for correspondence:
Ekaterina Raykova
Department of Healthcare Management, Faculty of Public Health, Medical University, Plovdiv, Bulgaria
Blvd. "Vasil Aprilov" 15a, Plovdiv, Bulgaria
E-mail: ekaterina_raikova@abv.bg
Ekaterina Raykova - http://orcid.org/0000-0003-0632-4105
Maria Semerdjieva - http://orcid.org/0000-0001-5339-948X
Desislava Bakova - https://orcid.org/0000-0002-6567-8854
Anna Mihaylova - https://orcid.org/0000-0002-7674-6074

MEDICAL PROFESSIONALS' PERCEPTIONS ON PSYCHOLOGICAL NEEDS DURING DISASTERS

Elena Valkanova[1], Radka Masaldzhieva[2], Mariya Semerdjieva[2], Rostislav Kostadinov[1], Rumyana Etova[1], Mariya Georgieva[1]

1) Department of Epidemiology and Disaster Medicine, Faculty of Public Health, Medical University -Plovdiv, Bulgaria
2) Department of Health Care Management, Faculty of Public Health, MU-Plovdiv

ABSTRACT

INTRODUCTION: Disaster situations place extraordinary psychological demands on medical professionals, who are required to perform under extreme pressure. Building psychological resilience is crucial for maintaining both individual well-being and team functionality.
OBJECTIVE: The aim of this study was to explore the perceptions of medical professionals regarding their psychological needs during disasters, with a focus on the types of knowledge and skills they consider essential, as well as their preferred coping strategies.
METHODS: An anonymous survey was conducted in 1.11-31.12.2021 among 181 medical professionals from hospital and outpatient care settings in Plovdiv, Bulgaria. Data were processed using SPSS Statistics v.21, with statistical significance set at $p < 0.05$.
RESULTS: Respondents emphasized the importance of practical knowledge, particularly in team communication during crises (61.9%) and coping strategies for stress management (56.4%). Adaptive coping methods such as emotional regulation, planning, and cognitive reframing were favored, while more abstract approaches such as meditation (13.8%) and religious coping (5.5%) were less commonly endorsed. Notably, self-awareness and understanding emotional and behavioral responses were also valued, highlighting the importance of psychological self-preparedness.
CONCLUSION: Medical professionals recognize the need for psychological preparedness in order to effectively cope with disaster situations and express a need for focused training programs that develop practical, adaptive coping skills. These findings support the integration of mental health and emotional competence modules into continuing education programs for healthcare workers to enhance individual and team resilience in high-stress environments.
KEYWORDS: Disaster Response, Medical Professionals, Psychological Resilience, Healthcare Education

INTRODUCTION: Disasters are complex events that exert widespread and destructive impacts. The immense force of these occurrences causes extensive damage not only to the environment, material assets, and infrastructure, but most critically—to human lives. In addition to fatalities and physical injuries, disasters result in profound psychological consequences. [1]
Psychological trauma affects not only the population directly impacted by the disaster, but also the professionals actively engaged in emergency response efforts. Among the most vulnerable are medical specialists. The nature of their work exposes them to a range of stress-inducing factors, such as high workload, critical decision-making responsibilities, moral dilemmas, and exposure to traumatic scenes. [2]
Strengthening the psychological resilience of medical professionals requires the implementation of targeted and evidence-based strategies. Research has shown that pre-disaster psychological preparedness can significantly reduce the risk of post-traumatic stress. [3] Nevertheless, structured

training programs aimed at developing psychological resilience have not yet been systematically integrated into medical education in Bulgaria.

OBJECTIVE: The aim of the present study is to examine the perceptions of medical professionals regarding the needed psychological knowledge and skills, as well as their preferred approaches for emotional regulation in disaster situations.

MATERIALS AND METHODS: An anonymous survey was conducted from November 1 to December 31, 2021, among 181 medical professionals working in inpatient and outpatient care settings in the city of Plovdiv. Data were processed using SPSS Statistics v.21, with statistical significance set at $p < 0.05$.

RESULTS AND DISCUSSION

A total of 181 medical professionals participated in the survey. Of these, 80.1% (n = 145) were women and 19.9% (n = 36) were men. Distribution according to occupation and profession is shown in Table 1. The largest proportion of participants reported having more than 20 years of work experience (38.7%, n = 70), followed by those with less than 5 years of experience (28.2%, n = 51). Participants with 10–20 years and 5–10 years of work experience accounted for 19.9% (n = 36) and 13.3% (n = 24) of the sample, respectively.

Table. 1 Distribution of participants according to occupation and profession

	Number	Percent (%)
Doctor in hospital care	40	22,1
Doctor in pre-hospital care	20	11,0
Nurse in hospital care	90	49,7
Nurse in pre-hospital care	31	17,1
Total	181	100,0

The majority of medical professionals identified knowledge related to effective team communication during disasters as particularly important—61.9% (n = 112) (Fig. 1). This trend is consistent with findings from previous studies, which report that healthcare workers demonstrate strong motivation to participate in communication skills training. [4, 5]

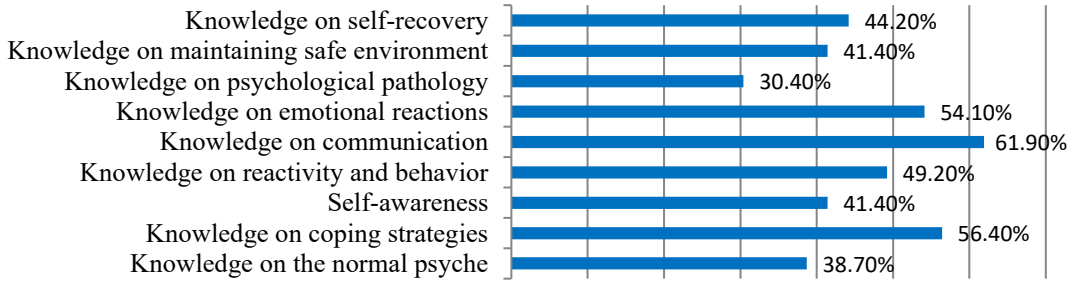


Fig. 1 Perceptions on the importance of the knowledge of the psyche, which is necessary for participation in disaster medical support.

Communication skills are directly linked to patient safety and team effectiveness, as they facilitate faster decision-making, reduce stress and errors, improve coordination and support better situational awareness and more efficient use of resources. [6]

Second in importance is the knowledge of coping strategies, identified as essential by 56.4% (n = 102) of respondents (Fig. 1). The highest proportion was observed among hospital physicians, where 67.5% emphasized this need. Adaptive coping strategies—such as planning, positive thinking, allocating time for rest and self-care, seeking social support and maintaining physical health—have been shown to reduce the risk of psychological harm. In contrast,

maladaptive strategies, including denial, suppression, and self-blame are associated with an increased incidence of post-traumatic stress disorder and depression. [7]
During disasters the majority of the individuals exhibit at least one form of emotional response. Reactions may vary widely and include shock and confusion, fear and anxiety, sadness and grief, anger and irritability, guilt, helplessness, and apathy. Emotional disequilibrium may also manifest in physical symptoms. [8] Distinguishing between normal psychological reactions and pathological responses to extreme and highly stressful situations, as well as guiding affected individuals toward recovery and adaptation, is a critical skill that medical professionals should possess. [9] In support of this, 54.1% (n = 98) of respondents identified knowledge of expected emotional reactions as important. (Fig. 1)
The reactions of medical personnel in extreme situations are equally diverse and often difficult to predict. Elevated levels of anxiety and stress typically lead to deterioration in both cognitive and emotional functioning, which may hinder the performance of individual tasks as well as effective team collaboration. [10] In this context, mutual trust, grounded in the awareness of both one's own and others' reactivity and behavior under stress, emerges as a critical factor for effective crisis management. This view is supported by 49.2% (n = 89) of surveyed medical professionals. (Fig. 1)
The lowest level of interest was reported for general knowledge of normal (38.7%, n = 70) and pathological (30.4%, n = 55) psychology (Fig. 1). This reveals a clear preference for practical content, while the theoretical foundations appear to be undervalued. The most plausible explanation is the heavy workload faced by healthcare professionals across all sectors. This places specific demands on the structure and delivery of training programs—they must be highly efficient, providing concise and practically applicable knowledge and skills.
An essential component of building psychological resilience is the development of emotional regulation skills. They help control acute stress responses and maintain balance, enabling more effective decision-making by reducing the likelihood of impulsive reactions and enhance professional performance. [11]

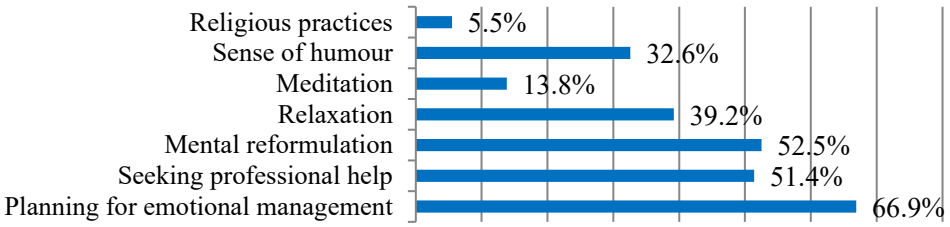


Fig. 2 Perceptions on coping strategies. Percentage of the respondents with affirmative answers on the applicability and effectiveness of different coping techniques

According to the results of our study, the majority of respondents (66.9%, n = 121) consider the development of an emotional management plan to be an important component of coping strategies. (Fig. 2) This approach involves the mental simulation of possible scenarios and corresponding actions, and has been recognized as a frequently used and effective technique. [12] Cognitive reframing—the process of replacing negative thoughts with positive ones—was also valued by 52.5% (n = 95). (Fig. 2) A study conducted in Australia found that 51.5% of respondents reported using this technique. [13]
In our study only a small proportion of participants viewed meditation (13.8%, n=25) or religious practices (5.5%, n=10) as appropriate coping strategies, indicating that neither plays a substantial role in fostering psychological resilience among the surveyed professionals. (Fig. 2)

CONCLUSION: The results of the present study indicate that medical professionals recognize the need for psychological preparedness in order to effectively cope with disaster situations. Particular importance is placed on team communication skills and stress management strategies. A clear preference was observed for practical and applicable techniques. In contrast, more abstract approaches were rated significantly lower. This highlights the need to adapt the structure and content of training programs. Educational interventions should be concise, focused, and aimed at developing skills in order to promote greater personal and professional resilience. The inclusion of such modules in the educational programs would provide an accessible and reliable means for acquiring the essential knowledge and competencies needed to enhance effectiveness in disasters.

REFERENCES:

1. Norris FH, Friedman MJ, Watson PJ, Byrne CM, Diaz E, Kaniasty K. 60 000 disaster victims speak: Part II. Summary and implications of the disaster mental health research. Psychiatry. 2002 Fall;65(3):240–60. doi:10.1521/psyc.65.3.240.20169
2. Hoell A, Kourmpeli E, & Dressing H. (2023). Work-related posttraumatic stress disorder in paramedics in comparison to data from the general population of working age: a systematic review and meta-analysis. Frontiers in Public Health, 11, Article 1151248. https://doi.org/10.3389/fpubh.2023.1151248
3. Kang P, Lv Y, Hao L, Tang B, Liu Z, Liu X, et al. Psychological consequences and quality of life among medical rescuers who responded to the 2010 Yushu earthquake: A neglected problem. Psychiatry Research. 2015;230(2):517–23.
4. Георгиева Д, Захариева К. Промяна в нагласите и моделите на комуникация между медицинска сестра и пациент. Научни трудове на русенския университет – 2011: 50(8.1); 141-145.
5. Zimmer M, Czarniecki DM, Sahm S. Communication of preclinical emergency teams in critical situations: A nationwide study. PLOS ONE. 2021;16(5): e0250932–e0250932.
6. Mesmer-Magnus JR, DeChurch LA. Information sharing and team performance: A meta-analysis. Journal of Applied Psychology. 2009;94(2):535–46.
7. Cofini V, Carbonelli A, Cecilia MR, Binkin N, di Orio F. Post traumatic stress disorder and coping in a sample of adult survivors of the Italian earthquake. Psychiatry Research. 2015;229(1–2):353–8.
8. National Institute for Occupational Safety and Health (NIOSH). (2002). Traumatic Incident Stress: Information for Emergency Response Workers. Cincinnati, OH: CDC, U.S. Department of Health and Human Services. Retrieved from: https://www.cdc.gov/niosh/stress/traumaticincidentstress.html
9. Kılıç N, Şimşek N. The effects of psychological first aid training on disaster preparedness perception and self-efficacy. Nurse Education Today. 2019;83:104203.
10. Naushad VA, Bierens JJLM, Nishan KP, Firjeeth CP, Mohammad OH, Maliyakkal AM, et al. A Systematic Review of the Impact of Disaster on the Mental Health of Medical Responders. Prehospital and Disaster Medicine. 2019;34(6):632–43.
11. Laranjeira, C., Dixe, M. A., Querido, A., & Salgueiro-Oliveira, A. (2021). Coping strategies and post-traumatic growth in healthcare professionals after COVID-19: A cross-sectional study. Frontiers in Psychology, 12, 791568. https://doi.org/10.3389/fpsyg.2021.791568
12. Bou Malhab, S., El Khoury-Malheme, M., & Mons, U. (2025). Adaptive versus maladaptive coping strategies: insight from Lebanese young adults navigating multiple crises. BMC Public Health, 25, Article 22608. https://doi.org/10.1186/s12889-025-22608-4
13. Abraham LJ, Thom O, Greenslade JH, Wallis M, Johnston ANB, Carlström E, et al. Morale, stress and coping strategies of staff working in the emergency department: A comparison of two different-sized departments. Emergency Medicine Australasia. 2018;30(3):375–81.

Address for correspondence:

Elena Valkanova, MD, PhD

Department of Epidemiology and Disaster Medicine
Faculty of Public Health, Medical University of Plovdiv
Mobile: +359 885 23 11 41 e-mail: Elena_Valkanova@mu-plovdiv.bg

EVALUATION OF MANAGEMENT EFFECTIVENESS IN INTENSIVE CARE UNITS: RESULTS OF A STATISTICAL RESEARCH

Dimitrina Milikina, Kamelia Bogdanova

Department of Health Care, Faculty of Public Health "Prof. Dr. Tzekomir Vodenicharov, MD, DSc", Medical University – Sofia

ABSTRACT:
Introduction: The intensive care covers the most critical moments in the course of diseases, when there is an immediate risk of sudden deterioration or death. **Purpose, material and methods:** The aim of the study is to assess the effectiveness of management in intensive care units through statistical analysis of data collected from medical institutions on the territory of the Republic of Bulgaria, as well as to determine the main parameters that influence management results. **Results and conclusions**: Effective management, including resource optimization, improved communication, and adequate allocation of professionals, leads to a significant improvement in the quality of care and a reduction in the time for critical interventions. This study provides practical guidance for improving the management processes in intensive care units and supports the need for systematic monitoring and evaluation of key performance indicators.
Keywords: healthcare management, quality of care, statistical analysis, efficiency.

INTRODUCTION

The intensive care covers the most critical moments in the course of diseases, when there is an immediate risk of rapid deterioration or death. It is carried out in specialized departments and clinics, where patients receive high-tech medical care [1,2]. Anesthesiology, resuscitation and intensive care represent a complex but logically structured field that is key to the modern development of medicine [3]. Effective healthcare management in anesthesiology and intensive care units depends on organization, the optimal allocation of all resources – human, material, technical and financial, and the strict implementation of medical quality standards. Adherence to established algorithms when providing medical care is key to ensuring safety, consistency, and a high level of professional care. [4,5].

AIM

The aim of the study is to assess the effectiveness of management in intensive care units through statistical analysis of data collected from medical institutions on the territory of the Republic of Bulgaria, as well as to determine the main parameters that influence management results.

MATERIALS AND METHODS

The following methods were used to collect and analyze the information:

- Documentary method – literary sources on the researched issue are studied;
- Sociological method – a survey was conducted through a direct, individual, anonymous questionnaire among 230 nurses and 58 health care managers;
- The study was conducted in the period 01.12.2021 - 10.05.2023 in 7 medical institutions in Bulgaria;
- Statistical method - the survey data were processed with the statistical computer program SPSS v.19. with qualitative and quantitative parameters.

RESULTS

The effectiveness of healthcare management in intensive care units is assessed through statistical methods that show the significant influence of age, education, professional experience and qualifications of nurses, as well as the satisfaction and awareness of patients' relatives. These factors are decisive for the organization and quality of care in the intensive care sector.

Fig. 1 presents a statistically significant correlation between the age of healthcare professionals and the availability of qualifications and experience to provide quality healthcare.

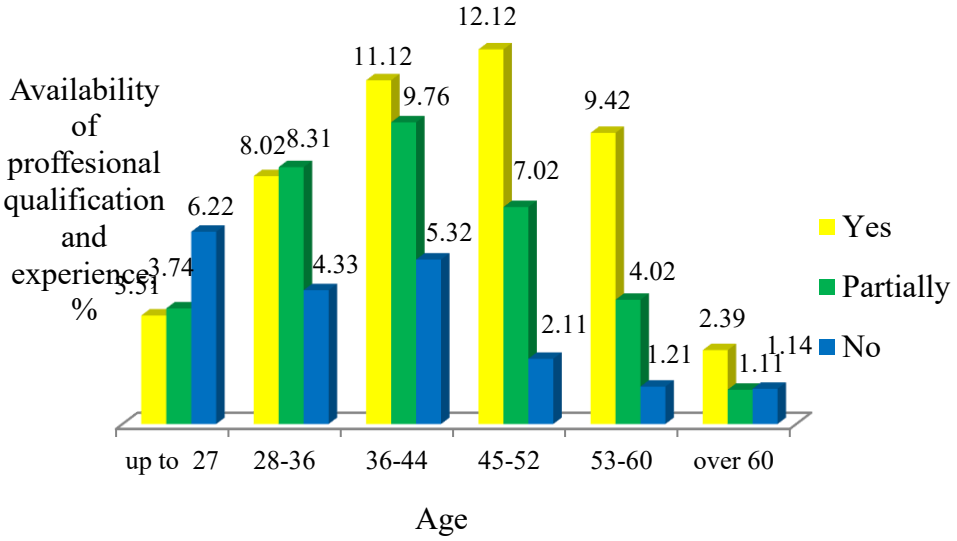


Fig. 1. Statistically significant correlation between the age of healthcare professionals and their qualifications and experience to provide quality healthcare in the intensive care units (p = 0,018 < 0,05)

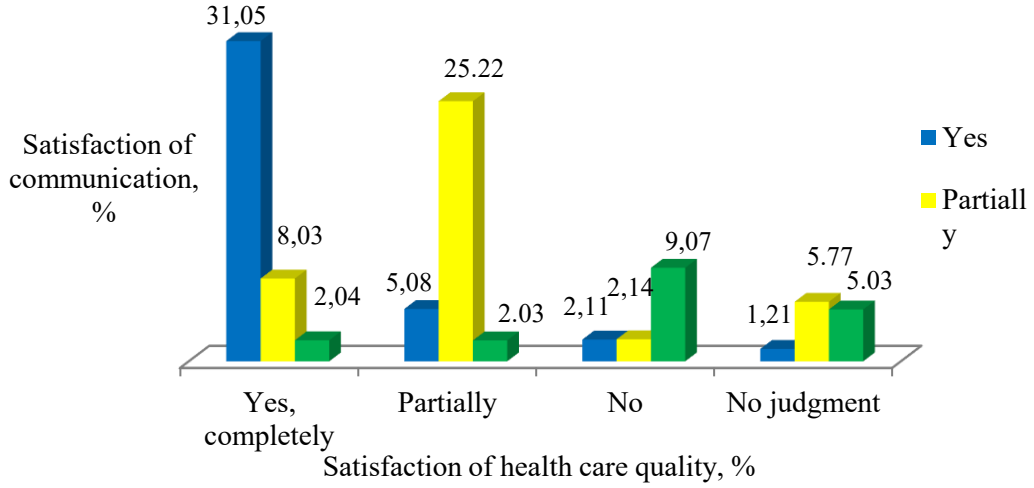
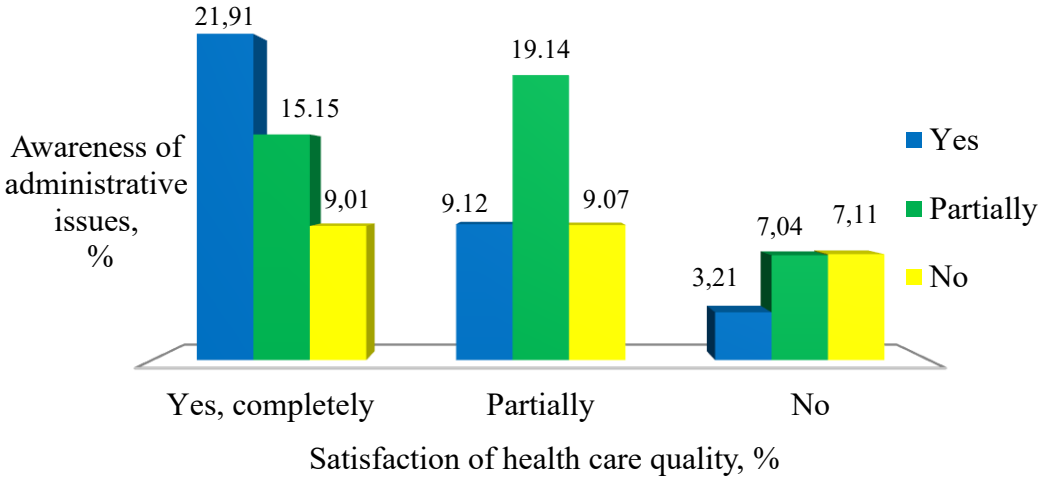


Fig. 2. Statistically significant correlation between patients' relatives satisfaction of the communication with healthcare professionals and their assessment of the quality of healthcare (p = 0,018 < 0,05)

The opportunities for direct communication with healthcare professionals provide patients' relatives with the necessary trust in them, which is essential for their satisfaction with the quality of healthcare. This is confirmed by the results in Fig. 2.

Similar results are presented in Fig. 3, which reflects a statistically significant correlation between the satisfaction of patients' relatives with their information on administrative and social issues and their satisfaction with the quality of healthcare. The data shows that good awareness is a factor in the positive assessment of patients' relatives about the quality of healthcare in intensive care units.



Фиг. 3. Statistically significant correlation between the satisfaction of patients' relatives with their awareness of administrative and social issues and their satisfaction with the quality of healthcare (p = 0,019 < 0,05)

DISCUSSION:

As age increases, both the professional experience and skills of healthcare professionals increase. Respondents who do not feel confident enough in their qualifications and experience to provide quality healthcare predominate among those under the age of 27. With increasing age and the accumulation of professional routine, this ratio gradually changes. In the age groups over 36, the share of those who clearly state that they have the necessary qualifications and practical experience dominates.

The analysis shows a statistically significant correlation between the satisfaction of patients' relatives with oportunities of communication with healthcare professionals and their overall assessment of the quality of healthcare. The satisfaction of communication with healthcare professionals determines a high assessment of the health care quality.

The data obtained clearly outline the requirements for nurses in terms of their professional skills, communication competencies, and attitude towards patients and their relatives. The relationship between patient satisfaction and the quality of communication with nurses highlights the need for change in the organization of work and the creation of conditions for better interaction. This can

be achieved through targeted training and the introduction of models for improving management in the intensive care sector of medical institutions [6,7].

CONCLUSIONS:

Hospitals that invest in good management practices, standardized procedures, and medical team support achieve higher efficiency and better-quality care. The study highlights the importance of effective management as a key factor for safety and successful clinical outcomes in patients in intensive care units. The results show that elements related to effective communication, clearly assigned responsibilities and activities have the strongest impact on the quality of care and professional development of nurses. The lack of professionals continues to be a systemic problem that hinders the sustainable development of healthcare structures. However, better management can partially compensate for the difficulties by optimizing processes and improving team interaction.

REFERENCES:

1. Penev G. E. Grigirov, S. Georgiev. Modern principles and classification of local conduction anesthesia. Medical Review (ISSN 1312-2193). 2022;58(1):11–20. /In Bulgarian/.
2. Penev G., V. Belcheva, E. Grigorov, P. Salchev. Medico-social aspects of pain relief in normal childbirth with epidural analgesia. Bulgarian Journal of Public Health (ISSN 1313-860X). 2020;12(2):21-34. /In Bulgarian/.
3. Banchev A, Ml. Doykov, St. Valkanov, Emergency conditions in urology – diagnostics, clinic and treatment, In: Emergency conditions in general medical practice, volume 1, ed. "Lax Book Ltd." ISBN 978-619-189-114-6, pp. 195-223, 2019. /In Bulgarian/.
4. Chaneva, G. Management approaches for effective health care, Medical University of Sofia, 2015. p. 96. ISBN 978-954-9318-59-3. /In Bulgarian/.
5. K. Bogdanova, Basic aspects of health care management, published by CMB Medical University-Sofia, 2019, p. 112, ISBN: 978-619-7491-08-1. /In Bulgarian/.
6. Bogdanova. K., D. Milikina. Healthcare management in the primary medical care as a factor for quality and sustainable development. Knowledge International Journal, Vol. 40.4, 2020, 807-814, UDK 37, ISSN 2545 – 4439, ISSN 1857 – 923X.
7. Bogdanova K., D. Milikina. Managers' motivation for professional development and qualification improvement as a factor for quality healthcare. Knowledge International Journal, Vol.41.3, 2020, 641-646, ISSN 25-45-4439, ISSN 1857-923X. /In Bulgarian/.

ELEMENTS OF AN OPERATIONAL HOSPITAL DISASTER RESPONSE PLAN FOR ENHANCING RESILIENCE IN THE PLOVDIV REGION

Mariya Georgieva[1], Rostislav Kostadinov[1], Elena Valkanova[1]

1) Department of Epidemiology and Disaster Medicine, Faculty of Public Health, Medical University of Plovdiv, 4000 Plovdiv, Bulgaria

ABSTRACT:
The hospital disaster response plan, encompassing the design and execution of response strategies, the implementation of Standard Operating Procedures (SOPs), disaster medical support management, human resource allocation, and specialized training and drills, constitutes the operational framework for the hospital's disaster resilience. Purpose: The study aims to analyze hospital disaster readiness in the Plovdiv region, Bulgaria, by examining some of the operational components of disaster resilience, including in hospital disaster response plans. Material/Methods: Documentary, descriptive, and comparative methods have been used in the study of documents regulating the organization and conduct of disaster medical support in hospitals in Plovdiv region, Bulgaria and in a hospital outside of the region. Results: In all hospitals, in both the Plovdiv Region and outside of it, disaster response plans exist, but their periodic update status is ambiguous. None of the surveyed hospital plans develops disaster training programs for medical specialists. However, all institutions have the necessary disaster management system, and a dedicated disaster headquarter in place. All plans only address a subset of the required disaster medical support procedures and strategies. Hospitals located in smaller Plovdiv settlements tend to have organized fewer teams. While the plan for the hospital that is outside the region mandates annual disaster drills, only some hospitals in the Plovdiv Region have included this practice. Post-disaster assessment reports are not consistently prepared across all surveyed hospitals in the Plovdiv Region. Conclusions: To enhance operational hospital disaster resilience, planning must focus on 2 key areas: detailed SOPs and specialist readiness.

Keywords: hospital disaster resilience, disaster response plan

INTRODUCTION

A disaster response plan is a coordinated set of measures for preparedness, response, and recovery in emergency situations. It includes a description of responsibilities, management structures, and strategies, as well as the management of resources and information, all with the aim of protecting life, property, and the environment.

In preparing the disaster response plans for the respective municipality, region, and the national plan, the administrative units bear the responsibility for disaster management. Medical preparedness and the planning of emergency medical assistance are an integral part of every disaster management plan.

Hospitals provide emergency medical assistance to the injured during disasters. Therefore, it is necessary to change their working schedules and maintain 24-hour readiness to provide life-saving assistance. This necessitates the planning of Disaster Medical Support and the preparation of disaster response plans for the hospitals located in the respective municipality/region, which must then be included in the existing regional/municipal plans.

The hospital disaster response plan depicts all required activities for assuring the disaster response hospital responsibilities: maximizing the survival rate and promoting the recovery of casualties; maintaining the capability to provide continuous (24-hour) emergency medical care to all in need; securing a sufficient supply of medical staff, capable of addressing the needs of casualties and establishing effective coordination with other internal hospital departments and external hospitals when and if required.

The comprehensive plan, encompassing the design and execution of response strategies, the implementation of Standard Operating Procedures (SOPs), disaster medical support management,

human resource allocation, and specialized training and drills, constitutes the operational framework for the hospital's disaster resilience.
The objective of a hospital disaster response plan is to ensure rapid and adequate medical aid to the maximum number of casualties and to minimize the morbidity and mortality caused by the disaster. To achieve this goal, it is necessary to adequately prepare personnel and to secure resources that can be allocated and utilized during disasters.

The plans must address situations where the hospital is outside the area of damage as well as those where the hospital is located within it. In cases where the area of damage is outside the hospital and does not affect it, the plan's sub-objectives are defined as follows: increasing the capacity for admission and treatment; treating casualties based on an individualized approach, despite their large number; ensuring continued treatment for patients who were hospitalized prior to the disaster, and securing medications, medical supplies, and other resources. In cases where the hospital is located within the area of damage, the plan's sub-objectives are protecting life, the environment, and property within the hospital from any further damage, requesting external assistance and recovery and the fastest possible return to normal working conditions.
This study aims to analyze hospital disaster readiness in the Plovdiv region, Bulgaria, by examining some of the operational components of disaster resilience, included in hospital disaster response plans.[1-11]

MATERIALS AND METHODS:
Documentary, descriptive, and comparative methods have been used in the study of documents regulating the organization and conduct of disaster medical support in hospitals in Plovdiv region, Bulgaria and in a hospital outside of the region- orders, disaster medical support plans. The study was conducted in three multidisciplinary hospitals for active treatment and one university multidisciplinary hospital for active treatment. They were selected on a random (lottery) basis from a list of existing medical facilities for hospital care in the territory of the Plovdiv region. Data collection was carried out in the period July 2019 - September 2019. Written permission was obtained from the heads of hospitals to conduct the study.

RESULTS: Table 1 shows the operational component and its elements as a description in the hospital plan. The three hospitals that participated in the study from the Plovdiv region and a hospital from another region of the country were compared.

Elements	Hospital A	Hospital B	Hospital C	Hospital outside Plovdiv region
Development of specific disaster medical support plans	Yes	Yes	Yes	Yes
Plan update	No	No	No	No
Procedures to increase bed capacity	Yes	No	No	Yes
Strategies for increasing staff in the event of a disaster	No	Yes	No	No
Procedures for sorting casualties	No	No	No	No

Use of evacuation strategies for casualties	No	Yes	Yes	No
Building an incident management system	Yes	Yes	Yes	Yes
Post-disaster assessment reports	Yes	Yes	No	No
Organization of teams for disaster medical support	Yes	Yes	Yes	Yes
Preparation of disaster training programs	No	No	No	No
Conducting disaster drills	No	Yes	No	Yes

Table 1. Elements of the hospital disaster response plan, related to the operational component of disaster resilience.

DISCUSSION:

The analysis of collected data reveals key findings regarding the operational component of disaster resilience across all surveyed hospitals, encompassing those in the Plovdiv Region and the external for the region hospital. A notable finding is the existence of disaster response plans across all hospitals. The periodic update status of these plans is ambiguous. This lack of clarity poses a significant operational risk, as outdated plans may fail to account for current staffing or changes in infrastructure, rendering them ineffective during an actual disaster event.

Furthermore, a critical deficiency is evident in procedural details. None of the surveyed hospital plans clearly detail robust procedures for casualty triage (sorting the casualties). The absence of standardized, documented triage protocols is a major vulnerability, as effective mass casualty management relies entirely on the swift and accurate prioritization of patients. A gap exists in human resources preparedness. The plans of all hospitals do not incorporate developed training programs for medical specialists specifically tailored to disaster response scenarios. Without structured, periodic training, the execution of complex disaster protocols during high-stress events is likely to be compromised. As a positive finding is could be noticed that all health facilities have established the necessary disaster management system and a dedicated disaster headquarters in place, indicating a stabile basis for command and control. However, a significant limitation is observed in the scope of planning. Overall, all plans only address a subset of the required disaster medical support procedures and strategies. This implies that while basic elements of preparation are covered, more complex or inter-agency coordination procedures may be absent, leading to potential problems during a disaster. Within the Plovdiv Region, certain hospital plans demonstrate a higher degree of operational foresight by including crucial elements such as explicit procedures for increasing disaster bed capacity, detailed strategies for augmenting the number of medical specialists, and defined protocols for casualty evacuation when the primary facility is at risk. These inclusions suggest varying levels of planning maturity within the region. Regarding staffing and operational deployment, hospitals located in smaller Plovdiv settlements tend to have organized fewer, primarily fundamental surgical and therapeutic teams. This organizational structure suggests a focus on basic, immediate care capabilities. In sharp contrast, better-resourced hospitals in the region, along with the hospital outside the region, have organized a broader range of specialized

teams (e.g., orthopaedic, burn, or psychiatric teams). This variation points to unequal distribution of specialized disaster response capacity across the region.

Finally, differences in practical application are evident in disaster drills. The plan of the hospital outside the region mandates annual disaster drills, ensuring constant practice and evaluation. Conversely, in the Plovdiv Region, only some hospitals have included this necessary practice in their plans. Compounding this issue, post-disaster assessment reports are not consistently prepared across all surveyed hospitals in the Plovdiv Region. The lack of mandatory drills and consistent assessment reports hinders the critical feedback loop necessary for continuous improvement and the correction of deficiencies identified during simulated or real events.

CONCLUSION/S/: To enhance operational hospital disaster resilience, planning must focus on 2 key areas: detailed SOPs and specialist readiness. It is a must to review and describe the Standard Operating Procedures for disaster response, particularly concerning surge capacity (increasing beds and specialists), patient evacuation when the facility is threatened, and triage. Periodic theoretical and practical disaster training for medical personnel is also required. This set of recommendations will directly improve hospital preparedness, thus strengthening disaster resilience.

REFERENCES:

1. Chimenya G. Hospital emergency and disaster preparedness: a study of Onandjokwe Lutheran Hospital, Northern Namibia [PhD Thesis], South Africa, University of the Free State 2011
2. World Health Organization (WHO) Regional Office for Europe. (2020). Hospital Emergency Response Plan: A Guide for Emergency Response Planning. World Health Organization.
3. World Health Organization (WHO). (2016). Hospital safety index: Guide for evaluators. 2nd Edition. World Health Organization.
4. United Nations Office for Disaster Risk Reduction (UNDRR). (2015). Sendai Framework for Disaster Risk Reduction 2015-2030. United Nations.
5. GOI-UNDP DRM Programme (2002-2008). Guidelines for Hospital Emergency Preparedness Planning. Available on: https://asdma.gov.in/pdf/publication/undp/guidelines_hospital_emergency.pdf
6. Hendrickx I, Lieten F, Sabbe M, & Debacker M. (2016). Principles of hospital disaster management: an integrated and multidisciplinary approach. B-ENT, 12(Suppl 26), 139-146.
7. Council for Disaster Risk Reduction to the Council of Ministers of the Republic of Bulgaria (2017): [Guidelines for the development and readiness for the implementation of disaster protection plans]. [In Bulgarian] Available at: https://www.mvr.bg/docs/librariesprovider43/намаляване-на-риска-от-бедствия/ukazanijapzb-20200601.pdf?sfvrsn=27d020c1_6
8. [Emergency plan for disaster protection of the site "MBAL-Burgas" AD 2015], approved by the Director of "MBAL-Burgas" AD 2015. [In Bulgarian]
9. Etova R, Todorova D, Valkanova E, Atliev K. Meteorological disasters – risks, consequences and medical aid. Knowledge – International Journal 2025, 70(4):311-438.
10. Todorova D, Mihailova T, Etova R. et al. Management of risk situations. Journal of IMAB 2016, 22(3). Available from: http://www.journal-imab-bg.org/issues-2016/issue3/JofIMAB_2016-22-3p1198-1201.pdf
11. Nedkova S, Atanasova P. Measuring attitudes and preparedness to respond in a disaster situation. XII International scientific conference, Engineering. Technologies. Education. Security, Scientific-technical union of mechanical engineering , 02.09 – 05.09.2024 , Varna, Bulgaria, proceedings of the conference, ISSN 2535-0323, p.176-179

Address for correspondence:
Mariya Georgieva
Department of Epidemiology and Disaster Medicine, Faculty of Public Health, Medical University of Plovdiv, Plovdiv, Bulgaria
Address: 15-A "Vasil Aprilov" blvd. Plovdiv 4002
E-mail: mari.georgieva@mu-plovdiv.bg
Each of the authors has provided their ORCID ID (https://orcid.org/) as follows:
Mariya Georgieva: 0000-0001-5108-0846
Rostislav Kostadinov: 0000-0002-1265-5851 Elena Valkanova- 0000-0002-0672-075X

THE NEED FOR INTEGRATED HEALTH AND SOCIAL SERVICES IN SUPPORT OF VULNERABLE GROUPS

Vlaeva, N. [1*], Parashkevova, B. [1], Kostadinova, N. [3], Sivreva, A. [2],Trendafilova, N. [2]

1) Department of Social Medicine, Health Management and Disaster Medicine, Faculty of Medicine, Trakia University - Stara Zagora, Bulgaria.
2) Department of Medical psychology, Social Work, foreign languages, Faculty of Medicine, Trakia University - Stara Zagora, Bulgaria.
3) Department of Health Care, Medical College, Trakia University - Stara Zagora, Bulgaria.

ABSTRACT
The introduction of the Social Services Act establishes the legal framework for the development and provision of integrated health and social services in the Republic of Bulgaria.
Aim: The aim of this article is to analyse the significance of integrated health and social services as a form of specialised support for vulnerable groups in Bulgaria and to outline opportunities for their sustainable development in the context of contemporary social and health policies.
Materials/Methods: A combined qualitative and quantitative approach was applied, including an analysis of national statistical data (NSI, SAA), a review of legislation and international models of integrated care, as well as expert observations. This approach enables the integration of factual indicators with an assessment of the real needs of vulnerable groups.
Results: In 2024, 30.3% of the population was at risk of poverty or social exclusion. Significant disparities persist in health indicators and access to care, particularly among low-income households. Over 700 social services operate nationwide, and the deinstitutionalisation process shows progress; however, coordination between the health and social sectors remains insufficient. Vulnerable groups continue to face challenges arising from fragmented service provision.
Conclusion: Integrated health and social services are essential for improving the quality of life and social inclusion of vulnerable groups. A sustainable coordination model between sectors is needed, supported by a national strategy, resource provision, and monitoring mechanisms. These steps will bring national practices closer to European standards and ensure more effective community-based support.

Keywords: vulnerable groups, support, integrated health and social services, quality

INTRODUCTION
Integrated health and social services provide a unified model of care that combines medical and social support within the community. International experience demonstrates that integrated care contributes to more effective health and social systems [1], while further studies investigate the factors driving its development [2]. In 2016, the World Health Organization (WHO) established a framework for integrated people-centred health services [3], whose practical application highlights a sustainable system based on primary health care and individual needs [4,5]. The framework is further elaborated into 12 overarching strategies for transforming care delivery, supporting policies that promote interaction between the health and social sectors [6]. This model addresses not only health needs but also social isolation, limited mobility and barriers to service access, integrating efficiency, equity and prevention of social exclusion [7,8,9].

At the national level, integrated health and social services are defined in the Social Services Act as specialised support services delivered through activities from both the health and social sectors, provided under a unified organisational and management structure. This support is delivered jointly by health-care professionals and specialists in social service provision [10]. Multidisciplinary teams work to improve access to support for vulnerable groups, including people living in small and remote communities.

PURPOSE

This study aims is to analyse the role of integrated health and social services in improving the quality of life of individuals from vulnerable groups and to explore opportunities for their sustainable integration.

Objectives:

1. To analyse the current state and scope of integrated health and social services in Bulgaria.
2. To assess the effectiveness of these services.
3. To formulate recommendations for the development of social services in Bulgaria.

MATERIALS/METHODS

This study employs both qualitative and quantitative methods, including observation, literature review, and statistical analysis of data related to integrated health and social services and the quality of life of vulnerable groups.

RESULTS

1.Social exclusion and vulnerable groups.

According to data from the National Statistical Institute (2025), in 2024 a total of 30.3% of the Bulgarian population (1,952.7 thousand people) was at risk of poverty or social exclusion, a decrease from 43.3% in 2015 [11].

2.Health indicators and vulnerable groups.

Life expectancy in Bulgaria stands at 75.6 years (2022–2024) [12]. Approximately 13% of the population lives with a mental health disorder, and low income is associated with higher levels of depression and anxiety. Unmet medical needs amount to 1% for the general population, but reach 3.1% among low-income households—significantly above the EU average [13].

3.Social services and deinstitutionalisation.

According to the Social Assistance Agency, as of 2023 there are 734 services for children and families, 426 of which are community-based, with a total capacity of 15,322 places [14,15]. The operational plan for the following year includes 69 new services for adults, demonstrating progress in the process of deinstitutionalisation [16].

4.Financing of social services.

In 2023, Bulgaria spent BGN 34.9 billion on social benefits, including BGN 17.97 billion from the state budget and BGN 28.47 billion from social insurance contributions [17].

These results indicate that, despite the progress in reducing social exclusion and expanding social services, Bulgaria continues to face challenges related to health, service accessibility and social inclusion among vulnerable groups.

DISCUSSION

National data show that vulnerable groups in Bulgaria remain at high risk of social exclusion and limited access to health and social services. Despite positive trends — such as reduced levels of

risk and expansion of social services — the need for an integrated health and social approach remains substantial.

The current division between the health and social systems contributes to unequal access: low income is associated with higher rates of mental health disorders and unmet medical needs, while existing expenditures for social services do not fully compensate for these deficits.

Practical observations and international research confirm that integrated approaches enable more efficient resource use, reduce the risk of re-institutionalisation, and improve the quality of life of vulnerable individuals. However, even in countries with long-standing experience in integrated care, such as England, institutional barriers persist [18].

In Bulgaria, progress is evident in the expansion of community-based social services and improved access at the local level, yet systematic integration with health structures remains lacking. The findings indicate that integrated health and social services are essential for addressing the complex needs of vulnerable groups, enhancing social inclusion, and reducing inequalities in health and social protection.

CONCLUSION

This study highlights the need for systematic development of integrated health and social services in Bulgaria as a key instrument for improving the quality of life of vulnerable populations. The analysis of national data and international practice shows that, although the current health and social systems provide significant services, they often function in a fragmented manner. This results in limited accessibility, duplication of resources, and insufficient response to the specific needs of people at risk.

The findings of this study support the formulation of the following recommendations:

- Development of a national strategy for integrated health and social services linking local health structures and social services.
- Provision of financial and human resources for these services, with emphasis on prevention and early intervention.
- Introduction of monitoring and evaluation mechanisms to ensure sustainability and quality of integrated care.
- Raising awareness and strengthening the training of health and social service professionals regarding the specific needs of vulnerable groups and the principles of the integrated approach.

These recommendations would contribute to systemic change, bringing Bulgaria closer to good European practices and ensuring a higher quality of life for vulnerable groups.

Acknowledgements: This work was funded by Bulgarian Ministry of Education and Science (MES) in the frames of Bulgarian National Recovery and Resilience Plan, Component "Innovative Bulgaria", the Project № BG-RRP-2.004-0006-C03 “Development of research and innovation at Trakia University in service of health and sustainable well-being”

REFERENCES:

[1.] Crocker, H., Kelly, L., Harlock, J. et al. Measuring the benefits of the integration of health and social care: qualitative interviews with professional stakeholders and patient representatives. , *BMC Health Serv Res* **20**, 515 2020 https://doi.org/10.1186/s12913-020-05374-4

[2.] Kodner, D. L., & Spreeuwenberg, C. Integrated care: meaning, logic, applications, and implications–a discussion paper. *International journal of integrated care*, *2*, e12, 2002 https://pmc.ncbi.nlm.nih.gov/articles/PMC1480401/

[3.] WHO. Report on the public consultation to inform development of the Framework on integrated people-centred health services (2016)
https://www.who.int/publications/i/item/WHO-HIS-SDS-2016.4
[4.] Hafiz O, Yin X, Sun S, Yang J, Liu H. Examining the Use and Application of the WHO Integrated People-Centred Health Services Framework in Research Globally - a Systematic Scoping Review. *Int J Integr Care*. 2024 Apr 25;24(2):9. doi: 10.5334/ijic.7754. PMID: 38681978; PMCID: PMC11049668. https://pmc.ncbi.nlm.nih.gov/articles/PMC11049668/
[5.] Weaver, C. *Application of the WHO Integrated Person-Centred Care Framework in the development of a large health hub in the northern suburbs of Brisbane.* ***International Journal of Integrated Care*****,** 2021, **20(**1). https://doi.org/10.5334/ijic.s4134
[6.] Struckmann V, Shuftan N, Scarpetti G, Looman W, Bal R, Rutten-van Mölken M, van Ginneken E. How to implement integrated care? A framework with 12 overall strategies to transform care delivery [Internet]. *Copenhagen (Denmark): European Observatory on Health Systems and Policies*; 2024. PMID: 39836795. https://pubmed.ncbi.nlm.nih.gov/39836795/
[7.] Gavaldà-Espelta E, Del Mar Lleixà-Fortuño M, Baucells-Lluis J, Ferré-Ferraté M, Tomàs-Navarro B, Curto-Romeu C, Lucas-Noll J, Ariza MP, Castro-Blanco E, Fernández Sáez J, Martín CA, Gonçalves AQ, Ferré-Grau C. Innovative Health and Social Integrated Care Model Effectiveness to Improve Quality Care for Chronic Patients: A Single Group Assignment Clinical Trial. *Int J Integr Care*. 2023 Oct 11;23(4):2. doi: 10.5334/ijic.6759. PMID: 37842263; PMCID: PMC10573743.
https://pmc.ncbi.nlm.nih.gov/articles/PMC10573743/
[8.] Looman, W. M., Huijsman, R., & Fabbricotti, I. N. The (cost-) effectiveness of preventive, integrated care for community-dwelling frail older people: A systematic review. *Health & social care in the community*, 2019, *27*(1), 1-30. https://onlinelibrary.wiley.com/doi/full/10.1111/hsc.12571
[9.] Allen D, Gillen E, Rixson L. Systematic review of the effectiveness of integrated care pathways: what works, for whom, in which circumstances? *Int J Evid Based Healthc*. 2009 Jun;7(2):61-74. doi: 10.1111/j.1744-1609.2009.00127.x. PMID: 21631848. https://pubmed.ncbi.nlm.nih.gov/21631848/
[10.] [Law on Social Services, State Gazette No. 24 (22 March 2019), as amended, No. 31 (11 April 2025)] [in Bulgarian] https://lex.bg/laws/ldoc/2137191914
[11.] [National Statistical Institute (NSI). (2025). *Statistics on income and living conditions*.] [in Bulgarian] https://www.nsi.bg/press-release/statistika-na-dohodite-i-usloviyata-na-jivot-7909
[12.] National Statistical Institute of Bulgaria. (2025). *Mortality and Life expectancy – 2022–2024*. Retrieved from NSI website
https://www.nsi.bg/en/press-release/mortality-and-life-expectancy-7888?utm_source=chatgpt.com
[13.] OECD / European Observatory on Health Systems and Policies. *Bulgaria: Country Health Profile ,2023***.** OECD Publishing. DOI: 10.1787/8d90f882-en
https://www.oecd.org/content/dam/oecd/en/publications/reports/2023/12/bulgaria-country-health-profile-2023_e40050b2/8d90f882-en.pdf?utm_source=chatgpt.com
[14.] [Ministry of Labour and Social Policy (MLSP). *Second Report on the Implementation of the Action Plan for Deinstitutionalisation 2021–2026, 2023*. Ministry of Labour and Social Policy] [in Bulgarian]
https://www.mlsp.government.bg/uploads/41/pkhurvsp/3-second-report-action-plan-2021-2026-2025-end.pdf?utm_source=chatgpt.com
[15.] [Social Assistance Agency. (2024). *Annual Report 2023*] [in Bulgarian]
https://asp.government.bg/uploaded/files/8271-yearlyasp.pdf
[16.] [Agency for Social Assistance. (2024). *Operational plan of the Social Assistance Agency for 2024*] [in Bulgarian]
https://asp.government.bg/uploaded/files/8900-gop2024asp-aktuariziran-sgl.pdf
[17.] BTA. *Bulgaria allocates BGN 34.867 billion for social benefits in 2023*. Bulgarian News Agency, 2025, September 19 https://www.bta.bg/en/news/970517-bulgaria-allocates-bgn-34-867-bln-for-social-benefits-in-2023
[18.] Miller R, Glasby J, Dickinson H. Integrated Health and Social Care in England: Ten Years On. *Int J Integr Care*. 2021 Oct 29;21(4):6. doi: 10.5334/ijic.5666. PMID: 34754282; PMCID: PMC8555479.
https://pubmed.ncbi.nlm.nih.gov/34754282/

Address for correspondence:
Assoc. Prof. Nadya Vlaeva, Faculty of Medicine, Trakia University-Stara Zagora;
11, Armeiska St., Stara Zagora, Bulgaria. E-mail: nadya.vlaeva@trakia-uni.bg

FORCED CHANGES IN STATIC RESILIENCE HOSPITAL COMPONENT DURING COVID 19 PANDEMIC

Svetoslav Georgiev[1], Rostislav Kostadinov[1], Vasil Topalov[1], Maria Georgieva[1]

[1]*Department of Epidemiology and Microbiology of Infectious Diseases, Faculty of Public Health, Medical University of Plovdiv, Bulgaria*

ABSTRACT

Introduction: The COVID-19 pandemic strained the hospital care systems all over the world, increased their workload and imposed significant changes for maintaining hospital resilience. These changes were related to both operational and static elements of hospital resilience. Different approaches were implemented by the healthcare facilities to implement these changes. **The aim** of this study is to analyze the forced changes in the static resilience component of hospitals – t he permanent elements of hospital structure. **Materials and Methods:** The descriptive method was used to outline the main structural and technological changes within the hospital infrastructure and the factors mandating their implementation. **Results and Discussion:** The analysis of our research results concluded that the most important changes could be divided into two groups: I. Restructuring of Hospital Spaces: creating isolated zone for prehospital triage and pathways for patient and staff flow; converting existing departments into COVID-19 zones, expanding number of intensive care beds and oxygen installations, constructing mobile and temporary structures – such as field offices and laboratories in containers or tents, modifying ventilation and sterilization systems. II.Technological and Digital Adaptations: developing digital systems for tracking patients and supplies, utilizing robotic systems for medication delivery and disinfection. **Conclusion:** The forced changes in the static component of hospital's disaster resilience demonstrated that resilience does not imply immobility, but rather the capacity to adapt. The attention of governing bodies has to be increasingly focused on the adaptability of infrastructure, which must become an integral part of response plans for future health crises.

Keywords: Hospital Disaster Resilience, Static Resilience

INTRODUCTION: In the context of a biological threat such as a pandemic, an epidemic, or an isolated case of a highly pathogenic agent, hospital structures face the need for rapid, effective, and well-structured significant changes.[1] The COVID-19 pandemic subjected hospitals to extraordinary strain and sharply increased their workload. In addition to updates in hospital plans, protocols and safety procedures, as well as the reorganization of personnel – including shifts, team separation, and remote administrative work – significant changes in the static elements of hospital resilience were also required. Different approaches were implemented by the healthcare facilities to achieve this goal. [2]

The aim of this study is to analyze the forced changes in the static resilience component of hospitals – the permanent elements of hospital structure, in order to summarize the key changes required and implemented during the COVID-19 pandemic.

Materials and Methods: The descriptive method was used to outline the main organizational, structural, and technological changes within the hospital system and the factors mandating their implementation. The comparative method was applied to evaluate their impact.

Results and Discussion:

Hospital disaster resilience has to ensure the continuity of medical services under conditions of increasing demand and by taking emergency measures in the presence of a biological threat. Figure 1 presents the elements of static resilience:

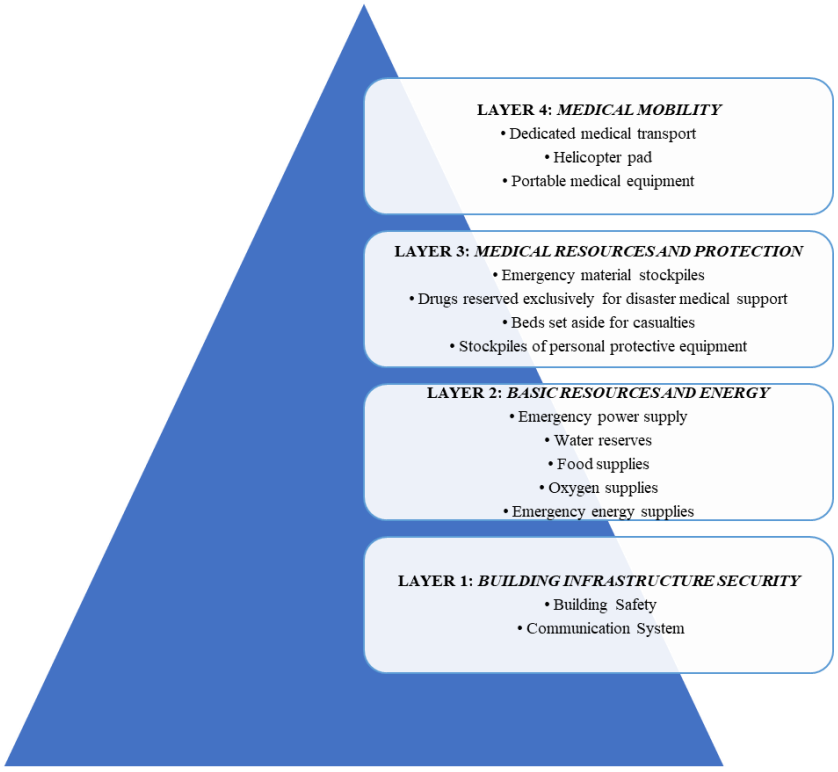


Fig 1. The elements of static resilience

The analysis of results obtained by the thoroughly performed research led to the conclusion that the most important changes could be divided into two groups:

I. Restructuring of Hospital Spaces

Creating isolated pathways for patient and staff flow.

The rapid restructuring of hospital spaces during the COVID-19 pandemic was essential to safeguarding continuity of care and minimizing intra-hospital transmission. A critical measure involved the allocation and establishment of prehospital triage area for division of patients in priority groups. Also was required allocation and establishment of isolation areas for those who were infected and have been in contact with infected. Designated pathways for patient and staff flow were needed for separating suspected or confirmed COVID-19 cases from non-infectious patient groups. This spatial reorganization – achieved through designated entry points, one-directional circulation routes, and controlled access corridors is required in order to reduce cross-contamination risks. [3]. The inability to provide these structural reorganizations had been recognized as a critical factor with significant potential to largely increase the risk for disease transmission in hospitals that provide care for both infected and non-infected patients.

Converting existing departments into COVID-19 zones.

The conversion of existing hospital departments into dedicated COVID-19 zones was a key strategy for expanding surge capacity and ensuring the safe separation of infectious and non-

infectious patient pathways. Hospital repurposing during the pandemic varied in scale, ranging from partial modifications within individual departments to the complete reorganization of entire facilities.

Beyond the repurposing of hospital buildings, numerous temporary field hospitals were established to supplement capacity. Additionally, various non-medical facilities – including rehabilitation centers, hotels, public halls, and other suitable infrastructures - were rapidly adapted into provisional COVID-19 hospitals, outpatient clinics, and diagnostic laboratories. These large-scale repurposing and adaptability should be enhanced for the purpose of maintaining service continuity during pandemic. [3]

Expanding intensive care beds and oxygen installations.

The COVID-19 pandemic underscored the critical importance of rapidly expandable intensive care capacity. Surges in severe cases with respiratory compromise exceeded the limits of existing ICUs. Many hospitals were compelled to reconfigure other clinical and non-clinical departments to accommodate critically ill patients. This strategy demonstrated that flexibility in hospital design can be a decisive factor for resilience.

One effective approach is the pre-planned transformation of adaptable spaces – such as post-anesthesia care units, step-down units, or even non-clinical areas – into functional ICU extensions. In particular, large structural zones like underground parking facilities proved valuable due to their open layouts and high load-bearing capacity. If such areas are equipped in advance with essential infrastructure, including oxygen supply lines, appropriate ventilation systems, medical suction installations, and reliable electrical capacity, they can be rapidly converted into critical-care environments during a public health crisis. [3]

Constructing mobile and temporary structures – such as field offices and container- or tent-based laboratories.

The large number of infected patients during Covid-19 waves overwhelmed the capacities for diagnosis and management of patients. The construction of mobile and temporary structures – such as field offices and container- or tent-based laboratories - served as a critical mechanism for rapidly expanding diagnostic and treatment capacity during the COVID-19 pandemic. These modular facilities enabled hospitals to decentralize testing, accelerate sample processing, and establish segregated spaces for triage and initial patient assessment. Their flexibility, rapid deploy ability, and minimal infrastructure requirements made them particularly valuable in settings facing sudden surges in caseloads, thereby enhancing the overall resilience and adaptability of the healthcare system. [4]

To further alleviate pressure on overstretched hospitals, many health systems identified non-medical buildings suitable for rapid conversion. Training halls, exhibition centers, schools, and commercial venues were temporarily transformed into medical facilities capable of providing shelter, triage, surveillance, and basic care.

Modifying ventilation and sterilization systems.

Modifying ventilation and sterilization systems emerged as an essential measure to reduce airborne transmission and maintain environmental safety within hospital settings during the COVID-19 pandemic. Facilities introduced or expanded negative-pressure rooms, upgraded air filtration units, and optimized airflow patterns to ensure adequate dilution and extraction of contaminated air. [5]

Enhanced sterilization protocols, including increased frequency of surface disinfection and the use of advanced technologies such as ultraviolet germicidal irradiation strengthened infection control practices and supported safer operational functioning in high-risk clinical environments.

II. Technological and Digital Adaptations

Developing digital systems for tracking patients and medical supplies.

Integrated electronic platforms allowed real-time monitoring of patient status, bed availability, and clinical workflows, thereby improving coordination across departments and supporting timely decision-making. Parallel systems for inventory management enabled hospitals to track essential supplies—such as personal protective equipment, medications, mechanical ventilation equipment and oxygen—in order to anticipate shortages and optimize distribution during periods of heightened demand. By enhancing situational awareness and streamlining resource allocation, these digital tools contributed significantly to maintaining operational continuity and ensuring an effective response in rapidly evolving clinical environments. [6]

Utilizing robotic systems for medication delivery and disinfection.

The utilization of robotic systems for medication delivery and disinfection represented an important technological adaptation during the COVID-19 pandemic, aimed at enhancing safety and reducing healthcare worker exposure. Additionally, robotic platforms equipped with ultraviolet or vaporized disinfectant technologies were used to perform environmental decontamination, ensuring consistent and efficient sterilization of high-risk zones. These innovations only supported infection control by minimizing the exposure of healthcare staff to the biological agent. [7]

Conclusion: The forced changes in the static component of hospital disaster resilience demonstrated that resilience does not imply immobility, but rather the capacity to adapt. Many of the temporary adjustments have evolved into permanent improvements. The attention of governing bodies is increasingly focused on the adaptability of infrastructure, which must become an integral part of response plans for future health crises. COVID-19 has served as a catalyst for the modernization of the hospital sector and for strengthening post-pandemic resilience.

REFERENCES:

1. Todorova D, Mihailova Ts, Etova R, Garov Sv. Management of risk situations. J IMAB. 2016 Jul–Sep;22(3):1198–1201. doi:10.5272/jimab.2016223.1198
2. Slavova V, Ivanov V, Taleva P, Etova R, Todorova D. Savremenno sastoyanie na sistemata za zashtita na naselenieto pri bedstveni situatsii v Republika Balgaria. In: Sbornik s rezyumeta i dokladi ot Părva natsionalna konferentsiya „Obshchestvenoto zdrave – globalen prioritet v naukata i praktikata"; 2017. p. 116–120. ISBN: 978-619-221-087-8; 978-619-221-088-5 (e-book).
3. Ndayishimiye C, Sowada C, Dyjach P, Stasiak A, Middleton J, Lopes H, Dubas-Jakóbczyk K. Associations between the COVID-19 pandemic and hospital infrastructure adaptation and planning: a scoping review. Int J Environ Res Public Health. 2022;19(13):8195. doi:10.3390/ijerph19138195.
4. Goh KJ, Choong MC, Cheong EH, Kalimuddin S, Duu Wen S, Phua GC, Tan GM, Kot Khiang L. Preparing your intensive care unit for the COVID-19 pandemic: practical considerations and strategies. Crit Care. 2020;24(1):215. doi:10.1186/s13054-020-02916-4.
5. Marczyk CES, Saurin TA, Bulhões IR, Patriarca R, Bilotta F. Slack in the infrastructure of intensive care units: resilience management in the post-pandemic era. BMC Health Serv Res. 2023;23:495. doi:10.1186/s12913-023-09495-4.
6. National Academy of Medicine. Digital Health COVID-19 Impact Assessment: Lessons Learned and Compelling Needs. Washington, DC: National Academy of Medicine; 2020. Available from: https://nam.edu/perspectives/digital-health-covid-19-impact-assessment-lessons-learned-and-compelling-needs/
7. McGinn C, Gu Y, Moss M, et al. Exploring the applicability of robot-assisted ultraviolet germicidal irradiation (UVGI) for surface disinfection in hospital radiology environments. Frontiers in Robotics and AI. 2021;8:590306.

Address for correspondence:
Svetoslav Georgiev, MD
Mobile: +359898735243
Email: svetoslav.georgiev@mu-plovdiv.bg
Assistant Professor Disaster Medicine
at Medical University of Plovdiv
15-A Vasil Aprilov Blvd. Plovdiv 4002
Bulgaria

FACTORS INFLUENCING THE PARTICIPATION OF HEALTHCARE PROFESSIONALS IN CONTINUING EDUCATION - RESULTS OF A QUALITATIVE STUDY

Stela Miteva[1], Boryna.Parashkevova [1], Todorka Kostadinova[2,]

[1]Trakia University, St.Zagora,Medical Faculty, Department of Social Medicine, Health Management, and Disaster Medicine
[2]Department of Healthcare Economics and Management, Faculty of Public Health, Medical University - Varna

ABSTRACT
INTRODUCTION
In the modern conditions of a dynamically developing healthcare system, continuing education of healthcare professionals is becoming a key element for ensuring quality and safe medical practice. European and national policies emphasize the concept of "lifelong learning" as a prerequisite for professional competence, adaptability and sustainability of healthcare professionals in the rapidly changing healthcare environment.
Despite the regulatory framework and institutional opportunities, the participation of healthcare professionals in continuing education programs remains limited and uneven. Many factors — organizational, personal and economic — influence the decision of specialists to participate or refrain from participation.
AIM The present study aims to identify and analyze the factors influencing the participation of nurses and midwives in continuing education, focusing on personal attitudes, organizational support and opportunities for improving the process.
Keywords: continuing education; healthcare professionals; factors; motivation; organizational support;
INTRODUCTION
In the modern conditions of a dynamically developing healthcare system, continuing education of healthcare professionals is becoming a key element for ensuring quality and safe medical practice. European and national policies emphasize the concept of "lifelong learning" as a prerequisite for professional competence, adaptability and sustainability of healthcare professionals in the rapidly changing healthcare environment.
Despite the regulatory framework and institutional opportunities, the participation of healthcare professionals in continuing education programs remains limited and uneven. Many factors — organizational, personal and economic — influence the decision of specialists to participate or refrain from participation.
AIM The present study aims to identify and analyze the factors influencing the participation of nurses and midwives in continuing education, focusing on personal attitudes, organizational support and opportunities for improving the process.
MATERIALS AND METHODS
The study has a qualitative-quantitative nature, combining in-depth interviews and frequentist statistical analysis. Its main objective is to identify the factors influencing the participation and motivation of healthcare professionals in continuing education, as well as to outline the

opportunities for improving this process in the context of the modern healthcare system. A qualitative study was conducted through in-depth interviews and thematic coding of open-ended responses. The present analysis includes 30 respondents - 16 nurses and 14 midwives (representing the first stage of a planned sample of 60 participants), working in healthcare facilities in Southeastern Bulgaria (Burgas, Sliven, Yambol and Stara Zagora districts). The research instrument is an in-depth interview containing 43 questions - 35 main 8 demographic. The questions explore: the frequency and forms of participation in training; motivating factors; main obstacles and barriers; organizational support and guiding policies; the impact of training on professional practice; preferred forms and future development directions. The interviews were conducted individually, both in person and online through platforms such as Zoom and MS Teams, lasting between 30 and 45 minutes. The responses were transcribed and subjected to thematic analysis, with the following main categories being identified: motivational factors, demotivational factors, organizational support and perceived effect of the training. For the quantitative summary, the statistical package SPSS v.29 was used, through which frequency distributions (Frequencies) and percentage values were calculated for each question. The combined approach allows for both in-depth qualitative understanding and objective quantitative presentation of the results. All participants signed an informed consent, guaranteeing voluntariness, anonymity and the right to refuse at each stage of the study.

Theoretical foundations

Continuing education is a purposeful process of systematically upgrading knowledge, skills and competencies after acquiring a professional qualification. It is a key element of the concept of "lifelong learning", enshrined in a number of international and national regulatory documents, enshrined in the strategies of the World Health Organization (WHO, 2023)(1). In the field of healthcare, continuing education is directly related to the quality and safety of patient care, to the professional autonomy of medical specialists and to their adaptability to new scientific and technological realities. Modern theories of motivation emphasize that participation in professional training is determined by the interaction between internal and external factors. According to the Self-Determination Theory (Deci & Ryan, 2000)(2), internal motivation – the pursuit of competence, improvement and professional recognition – has a longer-lasting and sustainable effect than external incentives such as pay or administrative requirements. In the context of healthcare, this means that the desire of professionals to participate in training often stems from professional ethics and responsibility to patients, and not solely from institutional obligations. At the same time, a number of studies (Mlambo et al., 2021; Hassapidou et al., 2023)(3,4) show that organizational conditions are crucial for active involvement in continuing training. Employer support, availability of time, access to funding and opportunities for replacement are structural prerequisites without which even the highest personal motivation can hardly be realized.

This is consistent with the social context model of learning, according to which participation in educational activities depends not only on individual attitudes, but also on the presence of a supportive organizational culture and leadership. In the Bulgarian context, professional development is regulated by the Bulgarian Association of Healthcare Professionals (BAHP), which requires systematic improvement of qualifications through participation in various forms of training, courses and seminars. Despite the regulatory framework, a number of empirical studies show limited real activity, which is due to a combination of factors: staff shortages, workload, financial barriers and lack of incentives from employers (Bacheva, Ivanova, Doinovska, 2021)(5). In this context, the training of healthcare managers, which requires specific management competencies, also acquires particular importance. According to Dimitrova and Gospodinova(2021)(6), effective management depends on communication skills, active listening,

empathy, coordination and innovative leadership styles. According to their research, students and young professionals prefer innovative approaches that combine different leadership styles, and attach great importance to planning and time management skills (Dimitrova and Gospodinova, 2021, pp. 89–90)(6).

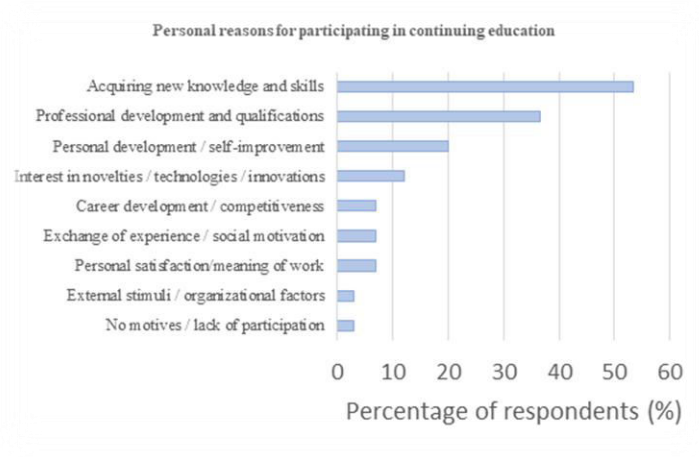
Therefore, the theoretical framework of this study is based on the integration of motivational theories (intrinsic and extrinsic motivation), andragogical learning principles, and organizational support models. Understanding these interrelationships is key to developing effective policies and practices that ensure sustainable professional development of healthcare professionals and improve the quality of healthcare services in Bulgaria.

Analysis of the results

The data analysis paints a diverse picture regarding the participation and motivation of healthcare professionals in continuing education. Although some of the respondents are active, the results show the presence of structural and organizational barriers that limit sustainable participation in such forms. In terms of frequency and forms of participation, it was found that nearly a third of respondents (36.7%) did not participate in continuing education, and 20% did so very rarely. About one tenth (13.3%) participated frequently or regularly (at least once a year), and a similar share participated in congresses, conferences and trainings. Face-to-face training and qualification courses remain the dominant form of improvement, while online participation is reported by a limited number of specialists. Regarding participation in the last three years, half of the participants (50%) indicated that they did not participate in training, and only 25% participated in professional or specialized courses. These results confirm a trend towards low intensity and fragmentation of continuing education among nursing and midwifery staff in the region.

Personal motives focus mainly on acquiring new knowledge and skills (53.3%), professional development and qualification (36.7%) and personal improvement (20%).

There is a clearly expressed desire for self-development and maintaining professional competence, while external incentives (salary, recognition) are of secondary importance. This confirms the prevalence of intrinsic motivation among the participants. The main obstacles are related to a busy schedule and lack of time (13.3%), financial difficulties (6.7%) and insufficient support from the employer (10%). However, 43% of respondents do not report serious difficulties, which may reflect differences in access and organizational culture between healthcare institutions.



/Fig. 1. Personal motivations in continuing education/

Regarding support from management, only 16.7% of participants stated that they receive full assistance (including organizational and financial), while 30% indicated partial support (e.g. leave or substitution). Almost a third of respondents said that they receive no assistance or rely on self-financing. This highlights the need for a more systematic institutional commitment to stimulate training. The effect of continuing education on practice is clearly positive. The most frequently mentioned outcomes are practical application of knowledge (33.3%) and increased efficiency and

quality of work (30%), as well as improved confidence and satisfaction. These trends show that even limited participation leads to real professional benefits.

Regarding the preferred types of training. the face-to-face form is categorically dominant (73.3%), due to the possibility of personal contact, practical focus and better absorption. On the issue of recognition after participation, over 63% of respondents did not receive any remuneration or recognition, and only 13% received a certificate or document. This indicates a lack of institutional mechanism for official recognition of the achieved results and probably demotivates some specialists to continue their training. When looking for what is missing in existing training, the leading answers are "lack of recognition and assessmet" (43%) and "insufficient practical focus" (20%). Participants express a need for more feedback, reflection of the real needs of practice and opportunity for career growth.

When asked about initiatives to improve access, participants suggested local courses and online training (13.3% each), as well as greater support from institutions and employers (20%). A significant share of responses highlighted the need for more publicity, awareness and coordination between healthcare facilities.

CONCLUSION

The results show that although the motivation for continuing education among nurses and midwives is present, actual participation is hindered by limited resources, workload and lack of organizational support. The study shows that healthcare professionals are aware of the importance of continuing education, but their actual participation remains limited. The main motives are the pursuit of new knowledge, professional development and personal improvement, while the main barriers are busy schedules, financial difficulties and lack of institutional support. The face-to-face form of training continues to be preferred, and recognition after participation is often lacking. A targeted policy for easier access, greater practical focus, and official recognition of the results achieved is needed, which will increase the motivation and effectiveness of specialists.

REFERENCES

1. World Health Organization. (2023). Global strategic directions for nursing and midwifery 2021–2025: Report. Geneva: WHO.

2. Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. Psychological Inquiry, 11(4), 227–268.

3. Mlambo, M., Silén, C., & McGrath, C. (2021). Lifelong learning and nurses' continuing professional development: A metasynthesis of the literature. BMC Nursing, 20(62).

4. Hassapidou, M.N., Papageorgiou, A., & Vassou, C. (2023). Continuing professional development for nurses: Factors influencing participation and motivation. International Nursing Review, 70(1), 45–55. https://doi.org/10.1111/inr.12776

5. Bacheva, M., Ivanova, M., Doinovska, R. (2021). Professional and personal competence of healthcare professionals and attitudes towards training. Blagoevgrad: Southwestern University "Neofit Rilski".

6. Dimitrova, S. and Gospodinova, P. (2021). Healthcare professionals as managers in the COVID-19 situation. Trakia Journal of Sciences, 19 (Suppl. 2), 88–90.

AUTISM IN BULGARIA: MEDICAL AND SOCIO-DEMOGRAPHIC INSIGHTS FROM A NORTHEAST COHORT

Rozalina Braykova[1,2], Albena Toneva[1,2], Rositsa Chamova[1,2], Stanislava Hadzhieva[1,2], Reni Petkova[1], Yana Petkova[1], Ruzha Pancheva-Dimitrova[1,2]

1) Department of Hygiene and Epidemiology, Faculty of Public Health, Medical University - Varna, Varna, Bulgaria
2) Research Group NutriLect, Department of Neuroscience, Research Institute, Medical University - Varna, Varna, Bulgaria

ABSTRACT:
Purpose: To investigate the perinatal, medical, and socio-demographic characteristics of children with Autism Spectrum Disorder (ASD) in Northeastern Bulgaria.
Material/Methods: A cross-sectional study was conducted from August 2023 to June 2024 among 62 children aged 2–12 years with ASD in Northeastern Bulgaria. Data were collected via standardized parental questionnaires and structured interviews in collaboration with rehabilitation centers in eight cities. Descriptive statistics and non-parametric tests (Mann–Whitney U, chi-square) were applied using Jamovi 2.6.17.
Results: The median age of participants was 7.1 years, with a male-to-female ratio of 6.75:1. First ASD symptoms appeared at a median age of 2.0 years; diagnosis followed at a median age of 4.0 years. Nearly 46% of children had no intelligible speech. Most children (91.7%) were born at term with a birth weight between 2.5–4 kg. Preterm birth and low birth weight occurred in 22.2% and 8.3% respectively, with a significant association between gestational age and birth weight ($p=0.011$). Severe disability (≥65%) was recorded in 89.4% of children. Maternal higher education correlated with earlier diagnosis ($p=0.017$).
Conclusion: This study provides the first structured regional data on children with ASD in Northeastern Bulgaria, highlighting early symptom onset, high prevalence of speech impairment, and notable socio-economic influences on healthcare access. Findings underline the need for earlier screening and more equitable support services tailored to regional needs.
Keywords: ASD, child, medical signs, socio-demographic data

INTRODUCTION:

Autism is a heterogeneous disorder and the term "autism" has been used in various ways to describe both a broader presentation as well as a specific diagnosis [1]. ASD symptoms are typically visible between 12 and 24 months [2]. Autism acceptance within the family involves creating a safe and supportive home environment [3]. There are currently no official statistics in Bulgaria for the number of children with autism in the country [4].

The main aim of this work was to analyze the medical characteristics and related socio-demographic factors affecting children with ASD in Northeastern Bulgaria.

MATERIALS AND METHODS: This cross-sectional study was conducted between August 2023 and June 2024 in Northeastern Bulgaria. The study received ethical approval from the Ethics Committee of the Medical University of Varna (Protocol No. 134/20.07.2023).

A total of 62 children diagnosed with ASD participated in the study. Participants were recruited with the assistance of organizations providing professional support to children with special needs and their families. Data collection encompassed both demographic and medical assessments, utilizing structured questionnaires and direct surveys to ensure comprehensive and standardized data acquisition.

Statistical analysis Descriptive statistics were used to summarize the key characteristics of the sample. Categorical data are presented as frequencies and percentages, while continuous variables are reported as median and interquartile range (IQR).

To identify significant differences in variables, cross-tabulation, chi-square (χ^2) tests and independent t-tests (Mann-Whitney U test) were applied. Statistical analyses were conducted using Jamovi 2.6.17, with significance set at $p<0.05$.

RESULTS:Demographic and Social Data The median age of the children was 7.11 ± 3.13 years, rangi ng from 2.20 to 12.0 years. The ratio of boys to girls was 6.75:1. There were no statistical differences between genders. Children of Bulgarian origin formed the largest group (n=42; 67.7%), followed by children of Turkish origin (n=17; 27.4%). The age range of mothers in the study varied from 25 to 52 years, while fathers' ages ranged from 31 to 58 years. Regarding educational attainment, the majority of mothers had an education level up to middle school, while less than half had a higher education degree. Mothers with higher education were more likely to reside in large cities (56.7%) compared to those with lower educational levels (40.6%), a difference that was statistically significant ($p = 0.023$). Over half of the study participants (53.5%) who have income above the national average wage, are raising children in a family environment or with a partner, compared to those who are raising them alone (18.8%) ($p=0.012$).

Neonatal characteristics The majority of children were born with a weight of 2500g to 4000g. The Mann-Whitney U test showed a significant difference in the median scores of birth weight and gestational ages (<37 GW and >37) ($p = 0.011$). Of all the examined children, 7.4% were born before 37 weeks, weighing less than 2500g, and over 75% weighed more than 2500g, born after 37 weeks ($x^2=11.5$; $p=0.001$). The median age for mothers has a statistically significant difference ($p=0.046$) with the mode of delivery.

ASD-Related Characteristics The age at ASD diagnosis varied significantly, ranging from 1.4 to 9 years. The majority of children (76.7%, n=33) received a diagnosis between 2 and 5 years, with 67.4% of these being male. A statistically significant difference was observed in speech impairments based on gender ($\chi^2=11.7$; $p=0.039$) (Table 1). Severe disability was more prevalent in children whose mothers were employed (78.9%) and had higher education (65%), compared to children of unemployed mothers (21.1%) and those with lower education levels ($p < 0.014$; $p < 0.041$). Additionally, up to 50% of families caring for children with mild to moderate disabilities did not receive additional social support ($p=0.006$).

Table 1. ASD-Related Characteristics

Variable	Male (n%, Median ± IQR)	Female (n%, Median ± IQR)	Total (n%, Median ± IQR)	p
Age of the Child with ASD (Years)				
2-5	20 (37%)	2 (25%)	22 (35.5%)	0.692

6-8	25 (46.3%)	5 (62.5%)	30 (48.4%)	
9-12	9 (16.7%)	1 (12.5%)	10 (16.1%)	
Age of first symptoms in years	2.00±1.25	2.50±0.5	2.0 ± 1.13	0.351
Age at diagnosis in years	4.00±2.25	4.00±2.85	4.0±2.00	0.290
Communication				
Speech is not affected by motor disorder	3 (6.1%)	0	3 (5.3%)	0.039
Speech is imprecise, but generally understandable to unfamiliar listeners	3 (6.1%)	2 (25%)	5 (8.8%)	
Speech is slurred and usually not intelligible to strangers listening	17 (34.7%)	1 (12.5%)	18 (31.6%)	
No intelligible speech	23 (46.9%)	3 (37.5%)	26 (45.6%)	
Not known	3 (6.1%)	2 (25%)	5 (8.8%)	

M: Median; n: Number; IQR: Interquartile range; %: Percentage

Medication Use and Health-Related Events in the Last 6 Months

Over the past six months, the median frequency of acute infections was 1.0, though girls had a significantly higher frequency compared to boys (p=0.024). More than 40% of the children were affected by acute disease of the upper respiratory tract (n=27; 43.5%). Mothers with higher education were significantly more likely to administer prescription medications to their children alongside nutritional supplements and general stimulants (77.8%) compared to mothers with lower education levels (22.2%; p = 0.017). According to parental reports, children with severe speech impairments were more likely to have received only nutritional supplements, such as vitamins, minerals, amino acids, immunostimulants, and probiotics in the past month (72.2%), while only 11.1% received prescription medications (p=0.029). Parents living in small towns were more likely to administer both nutritional supplements and prescription medications (83.3%) compared to those in large cities (16.7%; p < 0.01). Additionally, the Mann-Whitney U test revealed a significant association between the degree of disability and the presence of gastrointestinal diseases in the last six months (p=0.040)

DISCUSSION: A cross-sectional study was conducted in Bulgaria among children with ASD, collecting and analyzing data on disease characteristics, neonatal and medical parameters, and socio-demographic factors influencing their environment.

Most children in our study were raised in a family environment, regardless of parental marital status. Previous research suggests that single-parent families experience higher levels of deprivation and an increased prevalence of ASD compared to intact family units [5]. In our study, 16.4% of mothers were aged over 36 years, while 36.1% were 30–35 years old at the time of childbirth. Advanced parental age is a well-documented ASD risk factor, with maternal age >35 years and paternal age >39 years increasing ASD risk by 1.3 and 1.4 times, respectively [6]. More than one-fifth (22.2%) of the children in our study were born prematurely. Birth weight was normal in 83.3% of ASD cases, while 16.6% were classified as low birth weight, consistent with findings by Sefrioui et al. [7]. Early diagnosis is critical, as timely intervention improves outcomes. The median age of ASD diagnosis in our study was 4.00 years, aligning with previous findings of 3.0 (1.3–6.8) year [8]. Most children were given nutritional supplements such as vitamins, minerals, amino acids, immunostimulants, probiotics, prebiotics, and homeopathy—either alone or in

combination with prescription drugs—while the use of prescription medications alone was relatively limited. The preference for Complementary and alternative medicine (CAM) is consistent with existing literature suggesting that parents often seek alternative approaches when they perceive conventional treatments as insufficient or wish to enhance their effectiveness [9]. In Western countries, the most commonly used CAM therapies for children with ASD include special diets and biological supplements [10].

CONCLUSION/S/:

This research provides significant insights into the Bulgarian population, contributing to the enhancement of diagnostic approaches, interventions, and policy development aimed at supporting families of children with autism. Comprehending the clinical and sociodemographic characteristics of individuals with ASD enables clinicians to identify their crisis intervention requirements, optimize service delivery, and advise governmental bodies on ensuring accessible services. Raising awareness among parents and professionals regarding the early detection and intervention of Autism Spectrum Disorder is crucial. Bulgarian statistics about ASD children could contribute to the epidemiological knowledge gleaned from Western countries' scientific studies.

Abbreviations:

ASD: Autism spectrum disorders; CP: cerebral palsy; M: Median; n: Number; IQR: Interquartile range; %: Percentage; CAM: Complementary and alternative medicine.

Acknowledgements:

This study was funded by the European Union-NextGenerationEU, through the National Plan for Recovery and Resilience of the Republic of Bulgaria, project No. BG-RRP-2.004-0009-C02.

REFERENCES:

1. American Psychiatric Association. Autism Spectrum Disorder (ASD) 2024. [Internet https://www.psychiatry.org/patients-families/autism/what-is-autism-spectrum-disorder].
2. McDougle, Christopher (ed.), *Autism Spectrum Disorder*, 1 Feb. 2016. [Internet - https://doi.org/10.1093/med/9780199349722.001.0001].
3. Megan Anna Neff. Neurodivergent insights by dr. Neff: Autism acceptance. 2024. Website https://neurodivergentinsights.com/autism-infographics/autism-in-families.
4. Pancheva R, Toneva A, Nikolova S, Huysentruyt K, Dimitrov L, Yoncheva N, et al.. Malnutrition in Institutionalized and non-institutionalized neurologically impaired children in Bulgaria. Annals of Nutrition and Metabolism. 2024 February; 80(1), 21-28. [PubMed- https://pubmed.ncbi.nlm.nih.gov/37944496/]
5. Delobel-Ayoub, Malika, et al. "Socioeconomic Disparities and Prevalence of Autism Spectrum Disorders and Intellectual Disability." *PLoS One*, vol. 10, 2015. [PubMed- https://pubmed.ncbi.nlm.nih.gov/26540408/]
6. Kolevzon A, Gross R, Reichenberg A. Prenatal and perinatal risk factors for autism: a review and integration of findings. Arch Pediatr Adolesc Med. 2007;161:326-333. [PubMed- https://pubmed.ncbi.nlm.nih.gov/17404128/]
7. Sefrioui MR, Elidrissi I, El Othmani IS, Derfoufi S, Said AAH, Benmoussa A et al.. Profile of autism spectrum disorders in Morocco: cross-sectional retrospective study of parents of children with autism. Med Pharm Rep. 2023 Jan; 96(1):71-78. [PubMed-https://pubmed.ncbi.nlm.nih.gov/36818321/]
8. Alnemary FM, Alnemary FM, Simon-Cereijido G, Aldhalaan HM, Hernandez A, Alyahya A et al. Factors associated with age of diagnosis of autism spectrum disorder among children in Saudi Arabia: new insights from a cross-sectional study. BMC Res Notes. 2022 May 10;15(1):161. [PubMed-https://pubmed.ncbi.nlm.nih.gov/35538579/]
9. Lindly O J, Thorburn S, Heisler K, Reyes N M & Zuckerman K E. Parents' use of complementary health approaches for young children with autism spectrum disorder. Journal of Autism and Developmental Disorders 2018; 48(5): 1803–1818. [PubMed-https://pubmed.ncbi.nlm.nih.gov/29243100/]
10. Hofer J, Hoffmann F & Bachmann C. Use of complementary and alternative medicine in children and adolescents with autism spectrum disorder: A systematic review. Autism: The International Journal of Research and Practice 2017; 21(4): 387–402. [PubMed-https://pubmed.ncbi.nlm.nih.gov/27231337/]

TECHNOLOGICAL, DEMOGRAPHIC, AND DIETARY INFLUENCES ON GLYCEMIC CONTROL IN PEDIATRIC TYPE 1 DIABETES MELLITUS: A CROSS-SECTIONAL STUDY IN BULGARIA

Lyubomir Dimitrov[1], Rositsa Stoycheva[2], Violeta Iotova[3], Michal Gillon-Keren[4], Ruzha Pancheva[2]

[1]*Prof. Paraskev Stoyanov Medical University of Varna, Bulgaria*
[2]*Department of Hygiene and Epidemiology, Faculty of Public Health, Prof. Paraskev Stoyanov Medical University, Bulgaria*
[3]*Department of Pediatrics, Faculty of Medicine, Prof. Paraskev Stoyanov Medical University of Varna, Bulgaria*
[4]*The Institute of Endocrinology and Diabetes, Schneider Children's Medical Center, Petah Tikva, Israel*

Abstract

Background: Glycemic control in pediatric patients with type 1 diabetes mellitus (T1DM) is critical for preventing long-term complications. This study aims to assess the influence of demographic characteristics, dietary patterns and mobile applications on glycemic control in children and adolescents with T1DM in Bulgaria.

Methods: This cross-sectional study included pediatric T1DM patients with at least six months of disease duration. Data on demographics, parental education, socioeconomic status, dietary intake, mobile applications and insulin application were collected through structured questionnaire and medical records. Glycemic control was evaluated using glycated hemoglobin (HbA1c) levels, medical history for hypo- and hyperglycemias and continuous glucose monitoring (CGM). The statistical software Jamovi 2.2.2 was used, and a threshold of statistical significance of 0.05 was accepted.

Results: A total of 77 participants were analyzed. The use of mobile applications for carbohydrate counting ($p = 0.01$) and CGM ($p = 0.03$) correlated with better glycemic control (HbA1c < 7.0%). Children experiencing daily hypoglycemia were more likely to be fed in childcare facilities ($p = 0.01$). BMI z-score correlated negatively with time in range (rho = -0.37, $p = 0.01$) and positively with time above range (rho = 0.36, $p = 0.02$). No significant differences were observed in other sociodemographic, clinical, or lifestyle factors across glycemic control groups.

Conclusions: Socioeconomic status, dietary patterns and technologies are key determinants of glycemic control in pediatric patients with T1DM. These findings underscore the importance of implementing targeted nutritional interventions and providing additional support for socioeconomically disadvantaged families to improve clinical outcomes in this patient population.

Keywords: type 1 diabetes, glycemic control, Bulgaria

INTRODUCTION

Glycemic control in type 1 diabetes mellitus (T1DM) is a critical determinant of long-term health outcomes, influencing the risk of both acute and chronic complications. Despite improvements in insulin formulations and delivery systems, glycemic variability remains a major challenge, contributing to acute and chronic complications such as hypoglycemia, diabetic ketoacidosis, and long-term microvascular and macrovascular damage [1].

Dietary intake, particularly carbohydrate content, plays a pivotal role in postprandial glucose excursions. This necessitates careful carbohydrate counting and precise adjustment of insulin-to-carbohydrate ratios [2,3]. However, individual variability in meal responses complicates this process [4].

Physical activity is another key determinant of glycemic control, with exercise improving insulin sensitivity and time in range (TIR) but increasing hypoglycemia risk [5,6,7]. Psychological factors such as treatment adherence, anxiety, and depression is proven to influence diabetes self-management and metabolic outcomes [8,9]. Insulin therapy remains the cornerstone of T1DM management, with innovations in insulin analogs and delivery systems enhancing glycemic outcomes, reducing fluctuations and minimizing hypoglycemic episodes [10,11]. These technological advances enable more individualized treatment approaches and real-time adaptation to glucose levels. The intricate interplay between demographic dietary habits, and glycemic control remains underexplored in pediatric T1DM, particularly in Bulgaria, where specific cultural and genetic predispositions may exert a significant influence [12]. Personalized nutrition management is crucial for maintaining glycemic control, which can be challenging for both individuals with diabetes and diabetes educators, due to the variations in individual glycemic responses [13].

The purpose of this study is to examine the relationship between demographic factors, dietary patterns, management strategies and glycemic control among children with T1DM.

MATERIALS AND METHODS

Study Design This cross-sectional study was conducted over a one-year period, from 2022 to 2023, in the city of Varna, Bulgaria.

Participants and Recruitment Caregivers of pediatric patients with T1DM were recruited for participation in the study. Data collection was carried out via a direct individual structured telephone interview. Additionally, data on HbA1c and TIR was extracted from the medical records of pediatric endocrinologists. A total of 77 parents (caregivers) completed the survey.

Statistical Analysis Data were analyzed using *Jamovi* 2.2.2. Continuous variables were summarized as medians (IQR) and compared with the Mann–Whitney U test. Categorical variables were expressed as frequencies (%) and analyzed using Fisher's exact test. Normality was checked with Shapiro–Wilk. Nutritional status was assessed via BMI z-score, WAZ, and HAZ according to WHO standards. Associations between glycemic outcomes (HbA1c, CGM metrics) and clinical variables were evaluated using Spearman's ρ. Statistical significance was set at $p < 0.05$.

Ethical approval Ethical approval was obtained from the Ethics Committee of the Medical University of Varna (Protocol No. 11/20.01.2022), ensuring compliance with ethical standards for human research. Parents or legal guardians signed a written informed consent.

RESULTS

Basic Characteristics The study included 77 pediatric patients with T1DM (54.5% males). Median age was 13.0 years in boys and 11.0 years in girls ($p = 0.17$). Parental age and ethnicity did not differ by gender. Fathers of male patients were more often university graduates ($p = 0.03$), with a similar trend in mothers ($p = 0.07$). No differences were observed in parental occupation, anthropometrics, or insulin administration. Diabetes duration tended to be longer in males ($p = 0.06$).

Glycemic Control and Associated Factors No significant demographic or clinical differences were found between HbA1c <7.0% and ≥7.0%. However, mobile app use ($p = 0.01$) and CGM ($p = 0.03$) were more common among those with better glycemic control.

Hypoglycemia Frequency Children with daily hypoglycemia were younger ($p = 0.01$), had younger mothers ($p = 0.04$), and were more likely to eat in childcare facilities ($p = 0.01$). App use was higher in this group ($p = 0.04$). CGM use showed a trend toward significance ($p = 0.09$).

Hyperglycemia Frequency No significant differences were found in demographic, clinical, or technological factors across hyperglycemia frequency groups.

Dietary Adjustments Carbohydrate–protein substitution was more common in older children (36.5% vs. 14.3%; p = 0.108), while fat substitution was rare (2.6%). Hypoglycemia was more frequent in children >7 years (p < 0.001).

Correlations with CGM Metrics HbA1c correlated negatively with TIR (ρ = –0.63, p < 0.01) and positively with time above range (ρ = 0.67, p < 0.01). BMI z-score showed similar but weaker associations (TIR ρ = –0.37, p = 0.01; TAR ρ = 0.36, p = 0.02). Age and diabetes duration were not significantly correlated.

Table 1. Correlation of Clinical and Anthropometric Factors with CGM in T1DM

	Time in range	Time above range	Time under range
Age (y), rho; p-value	-0.02; p=0.91	0.13; p=0.39	-0.25; p=0.10
HbA1c, rho; p-value	**-0.63; p<0.01**	**0.67; p<0.01**	-0.12; p=0.44
BMI z-score, rho; p-value	**-0.37; p=0.01**	**0.36; p=0.02**	-0.04; p=0.79
WAZ, rho; p-value	**-0.30; p=0.04**	0.24; p=0.12	0.21; p=0.17
HAZ, rho; p-value	-0.05; p=0.75	-0.02; p=0.91	0.24; p=0.11
Diabetes duration, rho; p-value	0.02; p=0.88	0.05; p=0.74	-0.01; p=0.96

DISCUSSION

This study provides insights into the demographic, dietary, and technological factors influencing glycemic control in pediatric patients with T1DM in Bulgaria. While sociodemographic factors did not significantly differentiate children with well-controlled versus poorly controlled diabetes, specific dietary behaviors and the use of technology played a notable role in glycemic outcomes.

Parental education levels, particularly maternal education, showed a trend toward influencing glycemic control, with higher HbA1c levels in children of mothers with lower education. This finding is consistent with studies reporting that higher parental education levels are associated with better diabetes management, likely due to improved health literacy and engagement with diabetes-related resources [14].

Children with HbA1c <7.0% were significantly more likely to use mobile applications and CGM systems. These findings align with previous studies showing that real-time glucose monitoring and digital tools improve glycemic outcomes by providing immediate feedback and aiding decision-making regarding insulin dosing and dietary intake. The American Diabetes Association (ADA) highlights that CGM, when used in conjunction with insulin, can lower HbA1c levels and reduce hypoglycemia in individuals with T1DM who are not meeting glycemic targets or have hypoglycemia unawareness [15,3].

Children experiencing daily hypoglycemia were significantly younger and more likely to be enrolled in childcare facilities, where structured meal schedules might contribute to glycemic fluctuations. Increased hypoglycemia frequency in older children may be linked to higher insulin sensitivity or variations in physical activity levels, as seen in previous research [16,17].

Older children were more likely to substitute carbohydrates with proteins, indicating dietary independence that may occasionally lead to insulin–meal mismatches [18].

CONCLUSION

This study underscores insufficient dietary management among caregivers of children with T1DM, regardless of parental education. It highlights the positive role of CGM and mobile applications in glycemic control and calls for tailored, technology-supported dietary and insulin strategies to improve diabetes management in pediatric populations.

References

1. Garcia-Tirado J, Brown SA, Laichuthai N, Colmegna P, Koravi CL, Ozaslan B, Breton MD, et al. Anticipation of historical exercise patterns by a novel artificial pancreas system reduces hypoglycemia during

and after moderate-intensity physical activity in people with type 1 diabetes. Diabetes Technol Ther. 2021;23(4):277–285.
2. Annan SF, Higgins LA, Jelleryd E, et al. ISPAD Clinical Practice Consensus Guidelines 2022: Nutritional management in children and adolescents with diabetes. Pediatr Diabetes. 2022;23(8):1297–1321. doi:10.1111/pedi.13429.
3. American Diabetes Association Professional Practice Committee. 7. Diabetes Technology: Standards of Care in Diabetes—2025. Diabetes Care. 2025;48(Suppl 1):S146–S166. doi:10.2337/dc25-S007.
4. Bell KJ, Smart CE, Steil GM, Brand-Miller JC, King B, Wolpert HA. Impact of fat, protein, and glycemic index on postprandial glucose control in type 1 diabetes: implications for intensive diabetes management in the continuous glucose monitoring era. Diabetes Care. 2015;38(6):1008–1015. doi:10.2337/dc15-0100.
5. Reddy R, Wittenberg A, Castle JR, El Youssef J, Winters-Stone K, Gillingham M, Jacobs PG. Effect of aerobic and resistance exercise on glycemic control in adults with type 1 diabetes. Can J Diabetes. 2019;43(6):406–414.
6. Särnblad S, Ponsot E, Leprêtre PM, Kadi F. Acute effects of aerobic continuous, intermittent, and resistance exercise on glycemia in adolescent males with type 1 diabetes. Pediatr Diabetes. 2021;22(4):610–617.
7. Riddell MC, Li Z, Gal RL, Calhoun P, Jacobs PG, Clements MA, Rickels MR, et al. Examining the acute glycemic effects of different types of structured exercise sessions in type 1 diabetes in a real-world setting: the type 1 diabetes and exercise initiative (T1DEXI). Diabetes Care. 2023;46(4):704–713.
8. Sińska BI, Rzońca E, Kucharska A, Gałązkowski R, Traczyk I, Rzońca P. Factors influencing the control of diabetes measured via glycated hemoglobin concentrations in adults with type 1 diabetes. Eur J Investig Health Psychol Educ. 2023;13(10):2035–2045.
9. Souto DL, de Miranda MP. Physical exercises on glycemic control in type 1 diabetes mellitus. Nutr Hosp. 2011;26(3):425–429.
10. Silva JD, Lepore G, Battelino T, et al. Real-world performance of the MiniMed 780G system: first report of outcomes from 4120 users. Diabetes Technol Ther. 2022;24(2):113–119. doi:10.1089/dia.2021.0203.
11. Varanauskiene E, Varanauskaite I, Ceponis J. An update on multiple insulin injection therapy in type 1 and type 2 diabetes. Medicina (Kaunas). 2006;42(9):770–779.
12. Tamayo T, Rosenbauer J, Wild SH, Spijkerman AMW, Baan CA, Forouhi NG, Herder C, Rathmann W. Diabetes in Europe: an update. Diabetes Res Clin Pract. 2013;103(2):206. doi:10.1016/j.diabres.2013.11.007.
13. Albers DJ, Levine ME, Gluckman BJ, Ginsberg HN, Hripcsak G, Mamykina L. Personalized glucose forecasting for type 2 diabetes using data assimilation. PLoS Comput Biol. 2017;13(4):e1005232. doi:10.1371/journal.pcbi.1005232.
14. Hanna KM, Guthrie DW. Parental involvement in adolescents' diabetes management. Diabetes Spectr. 2003;16(3):184–187.
15. Sacks DB, Arnold M, Bakris GL, Bruns DE, Horvath AR, Lernmark Å, Metzger BE, Nathan DM, Kirkman MS. Guidelines and recommendations for laboratory analysis in the diagnosis and management of diabetes mellitus. Diabetes Care. 2023;46(10):e151–e199. doi:10.2337/dci23-0036.
16. Hormazábal-Aguayo I, Huerta-Uribe N, Muñoz-Pardeza J, Ezzatvar Y, Izquierdo M, García-Hermoso A. Association of physical activity patterns with nocturnal hypoglycemia events in youth with type 1 diabetes. J Clin Endocrinol Metab. 2025;110(2):564–571. doi:10.1210/clinem/dgae451.
17. Chiang JL, Maahs DM, Garvey KC, Hood KK, Laffel LM, Weinzimer SA, Wolfsdorf JI, Schatz D. Type 1 diabetes in children and adolescents: a position statement by the American Diabetes Association. Diabetes Care. 2018;41(9):2026–2044. doi:10.2337/dci18-0023.
18. Peters A, Laffel L; American Diabetes Association Transitions Working Group. Diabetes care for emerging adults: recommendations for transition from pediatric to adult diabetes care systems. Diabetes Care. 2011;34(11):2477–2485. doi:10.2337/dc11-1723.

KINESIOTHERAPY, ART THERAPY AND ERGOTHERAPY IN A CHILD WITH CONGENITAL ANOMALY

Ruska Paskaleva, Tsvetali Nedeva, Nora Taneva-Georgieva

Department of Kinesiotherapy, Faculty of Medicine, Trakia University – Stara Zagora, Bulgaria

Introduction: One of the rare genetic diseases with duplication of a region of chromosome 14 into chromosome 9 is characterised with affection of important genes responsible for the development of the individual with various disorders. In such children, a part of DNA from one chromosome is copied and inserted into another chromosome.
Aim: The aim of this study is to describe the impact of kinesiotherapy, art therapy and ergotherapy in terms of stimulation of motor and neuropsychiatric development of a child with a genetic anomaly and impaired basic activities of daily living and quality of life.
Material and methods: The subject of the study was an 8-year-old child with short stature, congenital chromosome 14 duplication in chromosome 9 and congenital optic nerve anomaly. The child was with retarded physical and mental development. Diagnosis was performed by means of tests of upper motor neuron (UMN), activities of daily living (ADL) and the gait.
Results: The applied kinesiotherapy included massage, active assisted exercises for lower and upper limbs in the possible range, stretching of shortened muscles, fine motor and grip strength exercises, breathing exercises, coordination and balance exercises, training in proper walking. Ergotherapy is aimed at the basic everyday life and self-care motor habits.

Key words: *congenital anomaly*, *chromosome duplication, kinesiotherapy, ergotherapy, art therapy*

INTRODUCTION

Congenital anomalies (CA) encompass structural or functional abnormalities in the embryonic development of the fetus, which affect 2–4% of newborns in Europe. The most common congenital anomalies are: spina bifida; cerebral palsy, Down syndrome and cardiovascular malformations. Regardless of their type, they lead to numerous motor, sensory, emotional and mental abnormalities, which without early complex rehabilitation progress to secondary disabilities and social isolation. In medical practice, treatment is complex and focuses on life-saving measures and the stimulation of the motor and neuro-psychic development of children [1]. To improve the quality of life of these children, it is necessary to include alternative, but scientifically based therapeutic approaches. In the last two decades, kinesitherapy (KT), art therapy (AT) and ergotherapy (ET) have become established as a “golden triangle” of children’s rehabilitation, which simultaneously affects the development of the body, psyche and motor activity [2].
Congenital anomalies are a large group of genetic disorders of normal child development manifested at birth with various clinical signs. They are the leading cause of infant mortality, with a prevalence of 3–4% of all births, and are the fourth cause of neonatal mortality in Europe and worldwide, with approximately 295,000 deaths per year [3]. One of the rare genetic diseases with duplication of a region of chromosome 14 into chromosome 9 is characterised with affection of important genes responsible for the development of the individual with various disorders. In such children, a part of DNA from one chromosome is copied and inserted into another chromosome. The phenomenon when a segment from one chromosome is copied and inserted into another chromosome is called interchromosomal duplication [4].

At the genetic level, several options are possible: ***incorrect recombination during meiosis*** - duplication of a segment of chromosome 14 and transfer of the duplicated segment to chromosome 9; ***unbalanced translocation*** - a segment of chromosome 14 is copied and inserted into chromosome 9, leading to an excess of genes from chromosome 14, and possible loss of material from chromosome 9; ***errors in DNA replication*** - duplication of a segment of chromosome 14, incorrect insertion on chromosome 9. The genetic results show disrupted gene regulation which is a possible prerequisite for delayed development, malformations and other clinical symptoms depending on the affected genes [5].
In addition to genetic factors, other potential causes that lead to the birth of a child with such an anomaly also play a role [6]. These can be: ***environmental factors*** - toxins and environmental pollutants, exposure to chemicals or toxic substances can affect the embryo; alcohol and drugs, which can lead to serious congenital anomalies; smoking, associated with premature birth and also a cause of fpetal damage; ***infections during pregnancy*** caused by viruses or bacteria. Some infections, such as rubella, cytomegalovirus, toxoplasmosis, herpes viruses can lead to heart defects, impaired hearing and vision, mental disorders; ***malnutrition and lack of important vitamins*** – the lack of folic acid in the early stages of pregnancy can cause neural tube defects, such as spina bifida [7].
Additional factors are also known - failure to follow a balanced diet, the mother's age, mechanical trauma during pregnancy from the environment that can cause defects in the unborn child.

The aim of the present study was to describe the impact of kinesiotherapy and occupational therapy in terms of stimulation of motor and neuropsychiatric development of a child with a genetic anomaly and impaired basic activities of daily living and quality of life.

MATERIAL AND METHODS

The subject of the study was an 8-year-old child with short stature, congenital chromosome 14 duplication in chromosome 9 and congenital optic nerve anomaly. He was born at 38 gestational week from a second pregnancy, during which the mother experienced hyperemesis and later, a decrease in amniotic fluid was detected. The anomaly was diagnosed immediately after birth. The child is raised well in a family environment. In the visited day care center, a multidisciplinary team of specialists in different fields involving a physiotherapist, pediatrician, speech therapist, etc. worked every day individually with the child
The child was with retarded physical and mental development, accompanied by muscle imbalance of the upper and lower extremities, impaired coordination and equilibrium, impaired gait. Sensitivity - tactile and proprioceptive - was also impaired. Significant assistance from a therapist or a parent was required when performing a variety of activities. Both knee joints of the child were slightly flexed. He stood up slowly, with impaired coordination and equilibrium,. walked held by one hand with flexed knees. His speech was impaired and underdeveloped.
The initial diagnosis was performed by tests of upper motor neuron (UMN), activities of daily living (ADL) and the gait [8].

RESULTS

A comprehensive rehabilitation programme, including individual kinesiotherapeutic tools adapted to the child's condition: anomaly type, degree of involvement of important brain centers and age, was developed and implemented. This programme included a set of multiple tools for development and improvement of the child's motor and cognitive abilities.

Kinesiotherapy aim: To improve of motor skills and locomotor system function.
Kinesiotherapy tasks: Strengthening of weak muscles; relaxition of shortened muscles; Improvement of fine motor skills; improvement of learned movements - rolling on the tummy, on the back and vice versa, sitting, kneeling; improvement of the balance and coordination of movements; improvement of gait and posture; improvement of the psycho-emotional tone of the child; training parents for home rehabilitation.
Kinesiotherapy means: relaxing massage; stretching for shortened muscles; active exercises for upper and lower limbs; fit-ball and balance boards exercises [9]; isometric exercises for activation and stimulation of muscles with reduced tone; proprioceptive exercises for stimulation of balance, posture and gait [10]; different types of walking on different terrains.
The ergotherapy is an recognised independent science, part of the rehabilitation programme that helps disadvantaged people with permanent structural or functional changes, to improve their quality of life and gain independence [11]. In the case of congenital anomaliesy, an individual approach with creation of compensatory mechanisms is required, and it is very important to take into account the interests and preferences of the patient in order to achieve successful development and progress.
Ergotherapy aim: The purpose of the present study was to evaluate the effect of ergotherapy for improvement of independence, helping the child's equal chances for life and development as other children, and basic everyday life and self-care motor habits
Ergotherapy tasks: Improving self-care activities; improving motor skills; improving cognitive and communication skills; improving social skills and emotional regulation
Ergotherapy means: ***for activities of daily living,*** adapted eating utensils are used, clothes are chosen so that they are easier to put on and take off, various facilitating devices are installed in the child's home [8]; ***for improvement of fine motor skills*** stringing toys, puzzles, clips, buttons, arranging cubes, rolling and inserting figures, etc. are used to stimulate the sensitivity of the hands and grips [9]; ***for motor activity***, large therapeutic balls, balancing boards and swings, a dry pool with balls in the form of a game, etc. are used; ***for sensory development*** - pictures, applications for tablet, communication boards, visual charts, etc.
The art therapy is a branch of ergotherapy, using various work activities for therapeutic purposes. Art therapy is one of the directions of creative therapy through art, which has accompanied man since the past. Later it was instated with a therapeutic and prophylactic purpose and is a very valuable and indispensable modern tool in the treatment of patients. For children with congenital anomalies, different diverse art therapy spheres are combined, which can develop many senses and body structures [10]. The classical art therapy is based on visual creativity, and in modern times, it ever more increases its creativity through painting therapy; clay, plasticine therapy, etc.; dance therapy; music therapy; therapeutic photography [11].
Each therapy is applied in a dosed manner, depending on the child's condition. These activities develop the creativity of both cerebral hemispheres, and children can also participate in the creation of art projects and exhibitions [12]. The activities are pleasant and improve the child's psycho-emotional tone, help to combine movements, develop fine motor skills, stimulate the ability to perceive colours and work with geometric shapes [13]. The use of art creates habits for working with two- and three-dimensional objects, develops abstract logical thinking and normalises psychological states.
The applied therapy has significantly improved the child's motor function. The muscle tone and joint mobility were improved. The function of the locomotor apparatus, respiratory and cardiovascular systems was stimulated. Blood and lymph circulation, general endurance of the joints and activities of daily life were superior. Through functional restorative ergotherapy, the

mental development and imagination of the child were stimulated. This set of means significantly stimulated the child's physical and mental state.

CONCLUSION

The integrated approach of kinesitherapy, art therapy and ergotherapy transforms rehabilitation into a meaningful, enjoyable and functionally oriented experience. it improves physical abilities and stimulates the development of young patients - this is the most accurate indicator of successful therapy:

- The combined application of kinesitherapy, art therapy and occupational therapy leads to a clinical and significant improvement of motor, functional and psycho-emotional functions in children with congenital anomalies.
- Art therapy contributes to reducing anxiety and stimulates creativity, which increases motivation to participate in CT and ET activities.
- Occupational therapy stimulates achievements in real everyday activities, accelerating independent skills and reducing parental burden.
- Parental education is a key factor in stimulating the effect and a better quality of life.

REFERENCES

1. Tasika, N., & Papadopoulou, S. (2020). Effectiveness of kinesiotherapy in children with congenital musculoskeletal disorders: A systematic review. European Journal of Physiotherapy, 22(4), 210–218.
2. Patterson, S., Blickensderfer, A., & Perkins, K. (2018). Art therapy as a supportive intervention for children with congenital disabilities: A systematic review. Arts in Psychotherapy, 59, 1–8. https://doi.org/10.1016/j.aip.2018.03.001
3. Rita P. Verma.Evaluation and Risk Assessment of Congenital Anomalies in Neonates. Department of Pediatrics, Division of Neonatology, Nassau University Medical Center, East Meadow, NY 11554, USA Children 2021, 8(10), 862; https://doi.org/10.3390/children8100862
4. Ji Yoon Han, In Goo Lee. Genetic tests by next-generation sequencing in children with developmental delay and/or intellectual disability. Clinical and Experimental Pediatrics. 2020;63(6):195-202.Published online: November 4, 2019. DOI: https://doi.org/10.3345/kjp.2019.00808
5. Blackwood, J.K.; Whittaker, R.G.; Blakely, E.L.; Alston, C.L.; Turnbull, U.M.; Taylor, R.W. The investigation and diagnosis of pathogenic mitochondrial DNA mutations in human urothelial cells. Biochem. Biophys. Res. Commun. 2010, 393, 740–745. [Google Scholar] [CrossRef] [PubMed]
6. Grossi, M.; Crawford, S.; Chandra, S. Advanced Maternal Age and Incidence of Non-Chromosomal Congenital Anomalies: A Population-based Study [35Q]. Obstet. Gynecol. 2017, 129, 182S. [Google Scholar] [CrossRef]
7. Timnea Olivia Carmen, Potop Larisa, Timnea Andreea Consuela. Using kinesiotherapy programs in children with down syndrome. Science, Movement and Health, Vol. XVIII, ISSUE 2 Supplement, 2018 September 2018, 18 (2 supplement): 414 - 421
8. Taleska, Marija Arsovski, Denis (2025) Optimizing quality of life through individualized rehabilitation for persons with disabilities New Horizons - Journal of Student Research Volume II Number I 2025 pp. 57-66. ISSN 2955-2354. DOI: 10.20544/NEWHORIZONS.2.1.25.P06
9. Paskaleva R, S. Mihaylova, K. Mollova, M. Petrova. Features of kinesitherapy and ergotherapy for children with cerebral damage. Trakia Journal of Sciences, 2010; 8 (suppl. 2): 346-348.
10. Ali Kashi, Zahra Sarlak, Malihe Abbaspourany. The of specialized exercises package for students with Down syndrome: the principles of exercise, the best type of sports practices and the details of prescription of the exercise program. https://doi.org/10.22089/mbj.2023.14184.2075
11. Zulfiqar H, Rehman HM, Razzaq A, Nisa ZU, Hina M, Bashir H, Saeed H. Effect Of Core Stability Exercises and Balance Training in Postural Control Among Children with Down Syndrome: Stability Exercises and Balance Training in Postural Control Among Children. Pakistan BioMedical Journal. 2022 Jul 31:18-22.
12. Alba-Rueda A, Moral-Munoz JA, De Miguel-Rubio A, Lucena-Anton D. Exergaming for Physical Therapy in Patients with Down Syndrome: A Systematic Review and Meta-Analysis of Randomized-Controlled Trials. Games for Health Journal. 2022 Apr 1;11(2):67-78.
13. Adina Sorina Mitrică, Carmen Avram, Ada Bargau Petrache, Adrian CANTEMIR, Vlad Teodor Iacob. Particularities and limitations of kinesiotherapy in genetic disorders and their medical recovery – Russell-Silver Syndrome: a case report**.** Buletin de Psihiatrie **Integrativa.** Issue Year: 90/2021Issue No: 3Page Range: 133-1**37Page Count: 5.**

PARTICULARITIES AND PREFERENCES IN CONSUMPTION OF POTENTIALLY EROSIVE BEVERAGES AMONG STUDENTS FROM THE CITY OF PLOVDIV

Tanya Nihtyanova[1], Tanya Zalamova[1], Svetla Petrova[1], Tsonka Miteva-Katrandzhieva[2], Ani Belcheva[1]

1) Department of Paediatric Dentistry, Faculty of Dental Medicine, Medical University of Plovdiv, Bulgaria
2) Department of Social Medicine and Public Health, Faculty of Public Health Departments, Medical University of Plovdiv, Bulgaria

ABSTRACT

Dental erosion is a common condition in both adults and children. Dietary habits are formed during childhood and adolescence and determine the preferences of the individual for life. The intake of acidic beverages is a major risk factor in the aetiology of dental erosion.

Aim: To study the particularities and preferences of school-age children when consuming potentially erosive beverages.

Materials and methods: The study was designed as a self-reported anonymous questionary. The study group consisted of a random sample of 230 school children from Plovdiv aged 9 to 17 years old.

Results: Water, carbonated drinks and fruit juices were the most preferred beverages among students. Taste was the primary factor influencing beverage choice, with less importance being factors such as the influence of the opinions of friends, parents or advertising. The relative part of those who considered carbonated drinks "healthy" was 6.09%. Energy drinks were consumed daily by 5.22% of children, and 2 to 5 times weekly by 12.17%. Daily consumption of carbonated drinks was observed in 14.35% of participants. More than 86% of students were unfamiliar with the term "dental erosion", and boys consumed soft and energy drinks significantly more often than girls. Over half of the respondents stated they would change their drinking habits if better informed about oral health risks.

Conclusion: The intake of potentially erosive beverages among school-age children in the city of Plovdiv is high. Targeted education is needed to promote healthier beverage choices.

Key words: dental erosion, soft drinks consumption, preferences, energy drinks

INTRODUCTION

Dental erosion is defined as the loss of hard dental tissue caused by the chemical action of exogenous and endogenous acids without bacterial involvement. Excessive intake of acidic beverages and foods remains the main focus of research on this condition. Recent systematic reviews confirm that frequent consumption of carbonated/soft drinks is the leading dietary factor associated with erosive tooth wear [1]. Epidemiological studies over recent decades indicate that dental erosion affects a large proportion of young people [2], with a clear trend of increasing prevalence during childhood and adolescence. This phenomenon is primarily linked to changes in lifestyle and dietary habits [3]. Although consumption of carbonated drinks in developed countries has gradually declined since 2000, overall intake remains high, especially among younger children and individuals from lower socioeconomic groups [4]. The wide availability and easy access to acidic foods and beverages further increases the risk of erosive lesions. Children's beverage choices are influenced by multiple factors, including their level of awareness of the potential benefits and harms to general and oral health. Dietary habits formed in childhood and adolescence play a decisive role in shaping long-term preferences [5].

The aim of the present study was to assess the particularities and preferences of school-age children when consuming potentially erosive beverages, the influences on their choice of drinks and their subjective knowledge of the potential health harm from consuming certain beverages.

MATERIALS AND METHODS

The study was designed as a self-reported anonymous questionary. The study group consisted of a cluster random sample of 230 (138 girls and 92 boys) school children from Plovdiv aged 9 to 17 years old (Age Mean 12.79±0.16; Mode 9±2.49). Children participated voluntarily and independently. The survey includes data on the child's gender and age, questions regarding the types of preferred beverages, the motivation behind beverage choice, subjective knowledge about dental erosion and the potential health risks associated with the consumption of certain drinks, the willingness to make an informed change in beverage selection for health-prevention purposes, the children's opinions on which beverages are considered healthy, and the frequency of consumption of carbonated and energy drinks. Descriptive statistics was performed. For the purposes of statistical analysis, children were divided into three age groups: 9-11, 12-14 and 15-17 years old. Gender- and age-related differences in consumption were analysed with nonparametric analysis (Chi-square). Statistical significance was set at 0.05.

RESULTS

Children reported water, carbonated drinks and fresh juices as their preferred beverages (Table 1). Taste was the main determinant of choice, while factors such as peers, parents or advertising were less influential (Table 2).

Table 1. Distribution of children according to the answers to the question "What types of drinks do you prefer the most?"

		Soda		Soft drinks		Juices		Tea/coffee		Water		Energy drinks		Freshly squeezed	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
Age	9-11	11	18.3	20	33.33	31	51.67	16	26.7	54	90	9	15	37	61.7
	12-14	31	29.8	56	53.85	51	49.04	37	35.6	88	84.6	20	19.2	55	52.9
	15-17	17	25.8	45	68.18	25	37.88	28	42.4	54	81.8	16	24.2	23	34.9
Gender	Girls	28	20.3	73	52.9	67	48.55	48	34.8	118	85.5	21	15.2	66	47.8
	Boys	31	33.7	48	52.17	40	43.48	33	35.9	78	84.8	24	26.1	49	53.3
Total		59	25.7	121	52.61	107	46.52	81	35.2	196	85.2	45	19.6	115	50

* Total percentages exceed 100% due to the possibility of more than one answer.

Table 2. Percentage distribution of children according to the indicated factors motivating the choice.

		Taste		Advertisement		Recommendation from friends		Parents' opinion		Other	
		n	%	n	%	n	%	n	%	n	%
Age	9-11	46	76.7	12	20	6	10	21	35	4	6.67
	12-14	88	84.6	14	13.46	20	19.23	22	21.2	17	16.4
	15-17	61	92.4	7	10.61	17	25.76	6	9.09	6	9.09
Gender	Girls	120	87	17	12.32	29	21.01	27	19.6	12	8.7
	Boys	75	81.5	16	17.39	14	15.22	22	23.9	15	16.3
Total		195	84.8	33	14.35	43	18.7	49	21.3	27	11.7

*Total percentages exceed 100% due to the possibility of more than one answer.

Water (94.35%) and milk (48.26%) were viewed as the healthiest options; 21.74% considered juices healthy, and 6.09% regarded carbonated drinks as healthy. Most children (76.09%) said they were aware of the potential risks of consuming soft and energy drinks. Soft drink intake was daily in 14.35%, 2–5 times weekly in 26.09%, less than once weekly in 36.09%, and absent in 23.48% of respondents. Energy drink consumption was daily in 5.22%, 2–5 times weekly in 12.17%, less than once weekly in 22.61%, while 60% did not consume them at all. Boys consumed carbonated ($p=0.027$) and energy drinks ($p=0.045$) significantly more often than girls. A total of 86.09% were unfamiliar with the term "dental erosion," and 49.13% (61.96% boys; 41.30% girls; $p=0.02$) did not use a straw when drinking soda or juice. Overall, 58.26% (61.59% girls; 53.26% boys; $p>0.05$) stated they would change beverage habits if better informed about oral health risks. Boys were more often influenced by advertising (35.87% vs. 16.67%; $p=0.01$) and were more likely to consider juices and soft drinks healthy. In the 9–11 age group, significantly more children were unfamiliar with "dental erosion" (96.67%; $p=0.000$) and unaware of the health risks of soft and energy drinks (53.33%; $p=0.000$), compared to older groups (12–14 years: 92.31% and 11.54%; 15–17 years: 66.67% and 12.12%). Children who did not consume carbonated drinks were 36.67% among 9–11-year-olds, 22.12% among 12–14-year-olds, and 13.64% among 15–17-year-olds ($p=0.021$). Daily energy drink consumption increased with age: 1.67% in 9–11-year-olds, 4.81% in 12–14-year-olds, and 9.09% in 15–17-year-olds ($p=0.012$). Younger children (9–11 years) were also more likely to accept juices (25.00%) and soft drinks (10.00%) as healthy compared to those aged 15–17 (12.12% and 4.55%, respectively).

DISCUSSION:

The present study provides valuable insights into the preferences and behavioural characteristics of school-aged children in Plovdiv regarding the consumption of potentially erosive beverages. The observed tendencies were consistent with international findings indicating high intake of carbonated drinks, fruit juices, and energy drinks among children and adolescents, as well as limited awareness of the risks of erosive tooth wear associated with such habits [3, 6-8].

Taste emerged as the main factor determining beverage choice, confirming its decisive role as documented in previous research on young populations [9]. Social influences - such as the opinions of parents, friends, or advertising - played a secondary role, as boys were more strongly influenced by advertising and more likely to perceive certain drinks as healthy. These findings highlight the need for differentiated educational approaches tailored to behavioural and psychological characteristics of specific groups.

Although most children reported being aware of the potential risks of consuming soft and energy drinks, their self-declared knowledge contrasted with their actual behaviour. The proportion of children with daily consumption of carbonated drinks (14.35%), as well as the significant percentage of children consuming energy drinks several times a week or daily, represent a risk pattern that may contribute to the development of erosive lesions. A similar discrepancy between awareness and behaviour has been reported in previous studies and reflects the complex nature of food choices in childhood [8, 10].

The observed increase in the frequency of energy drink consumption aligns with global data showing a marked rise in their popularity among adolescent groups. This is particularly important because energy drinks combine low pH, high sugar content and other stimulant ingredients, making them one of the most aggressive dietary factors for damage to oral and general health [11].

It is deeply concerning that over 86% of participants do not know the concept of "dental erosion", with this lack of knowledge being most pronounced among the youngest children (9–11 years).

This deficit may contribute to the early establishment of harmful dietary habits, given the long-term nature of behaviour formation during childhood and adolescence [5].
A positive aspect of the results is that more than half of the respondents regardless of gender expressed willingness to change their beverage choices if they were better informed about oral health risks. However, nearly a third of children express hesitation in wanting to change their dietary habits. This underlines the potential and need for school-based preventive initiatives.
Several limitations of the study must be acknowledged. The findings rely on self-reported data, which may be affected by subjectivity, socially desirable responses and inaccurate self-assessment of knowledge and habits, which probably leads to overestimation of students' actual health knowledge. Furthermore, the study was conducted within a single city, limiting the generalizability of the results.

CONCLUSION/S/:

In conclusion, the study reveals a high prevalence of consumption of acidic beverages among students, combined with insufficient knowledge regarding dental erosion and its contributing factors. The identified behavioural, age-related and gender differences define the need for targeted, structured educational interventions aimed at improving health literacy and guiding informed beverage choices. Comprehensive preventive strategies within the school environment are essential to reduce the risk of erosive tooth wear from an early age.

REFERENCES:

1. Saads Carvalho T, Lussi A. Chapter 9: Acidic Beverages and Foods Associated with Dental Erosion and Erosive Tooth Wear. Monogr Oral Sci. 2020;28:91-8.
2. Salas MM, Nascimento GG, Huysmans MC, Demarco FF. Estimated prevalence of erosive tooth wear in permanent teeth of children and adolescents: an epidemiological systematic review and meta-regression analysis. J Dent. 2015;43(1):42-50.
3. Lussi A, Carvalho TS. Erosive tooth wear—a multifactorial condition of growing concern and increasing knowledge. Monogr Oral Sci. 2014;25:1-15.
4. Chatelan A, Lebacq T, Rouche M, Kelly C, Fismen AS, Kalman M, et al. Long-term trends in the consumption of sugary and diet soft drinks among adolescents: a cross-national survey in 21 European countries. Eur J Nutr. 2022;61(5):2799-813.
5. Gambon DL, Brand HS, Veerman EC. Dental erosion in the 21st century: what is happening to nutritional habits and lifestyle in our society? Br Dent J. 2012;213(2):55-7.
6. Gambon DL, Brand HS, Boutkabout C, Levie D, Veerman EC. Patterns in consumption of potentially erosive beverages among adolescent school children in the Netherlands. Int Dent J. 2011;61(5):247-51.
7. Al-Dlaigan YH, Shaw L, Smith A. Dental erosion in a group of British 14-year-old school children. Part II: influence of dietary intake. Br Dent J. 2001;190(258-261).
8. Melbye EL, Naess L, Berge AB, Bull VH. Consumption of acidic drinks, knowledge and concern about dental erosive wear in Norwegian high school students. Acta Odontol Scand. 2020;78(8):590-8.
9. May J, Waterhouse PJ. Dental erosion and soft drinks: a qualitative assessment of knowledge, attitude and behaviour using focus groups of schoolchildren. A preliminary study. Int J Paediatr Dent. 2003;13(6):425-33.
10. Schmidt J, Huang B. Awareness and knowledge of dental erosion and its association with beverage consumption: a multidisciplinary survey. BMC Oral Health. 2022;22(1):35.
11. Visram S, Cheetham M, Riby DM, Crossley SJ, Lake AA. Consumption of energy drinks by children and young people: a rapid review examining evidence of physical effects and consumer attitudes. BMJ Open. 2016;6(10):e010380.

Address for correspondence:
Tanya Nihtyanova
Department Paediatric Dentistry, Faculty of Dental Medicine, Medical University of Plovdiv
Adress: 3 Hristo Botev Blvd, 4002 Plovdiv, Bulgaria
E-mail: Tanya.Nihtyanova@mu-plovdiv.bg