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CONTENT

BOSNIAN JOURNAL OF HEALTH SCIENCES AND TECHNOLOGIES (BJHST) Vol. 2, No. 3, 2026

Original articles

1. **Nursing Aspects of Communication and Conflict Management in the Emergency Department** 177
Samela Zelić, Senada Džebo, Almedina Alihodžić, Nada Malešić
2. **Diagnostic Significance of Measuring C-reactive Protein Concentration in School-aged Children with Streptococcal Pharyngitis** 184
Danijela Brezovac, Zijo Begić, Hazim Štitkovac
3. **Participation of Healthcare Professionals in Strategic Planning in the Federation of Bosnia and Herzegovina Hospitals: Normative Framework, Organizational Practices and Employee Perceptions** 190
Eldar Vuković, Aida Karić-Halilagić, Eldin Serdarević, Danijela Lovrić, Senada Džebo
4. **Recorded Acute Effects and Documented Nursing Intervention Burden during Medium - versus High-Dose-Rate Brachytherapy for Gynecologic Cancers: A Retrospective Comparison of 2006 and 2013 Cohorts** 203
Elvira Čengić, Senada Džebo, Arma Bašić -Smajić, Amil Družić

Review articles

1. **The Importance of Nursing Care in the Treatment of Malignant Bone Tumors and the Importance of Integrating Palliative Care** 211
Elma Harbinja, Almedina Alihodžić, Emina Nikšić, Almera Borčilo, Žana Macanović, Ramiza Jakubović, Elvira Turulja
2. **Change in Nursing: Between Professional Experience, Resistance, and Evidence-Based Practice** 219
Elmedina Mrkulić, Alma Mizdrak, Amina Lučkin, Senada Džebo, Almedina Alihodžić, Fahira Imamović
3. **Protection of Patient Privacy in Digital Healthcare** 225
Nina Komšić, Mateo Vukoja
4. **Health System Resilience in the Post-Pandemic Period: Challenges and Opportunities for Strengthening Health Security in the Western Balkan Countries - A Literature Review** 234
Yazdan Fayyaz

- Instructions to authors** 244
- Uputstvo za autore** 246

Nursing Aspects of Communication and Conflict Management in the Emergency Department

Sestrinski aspekt komunikacije i upravljanje konfliktom u Urgentnom centru

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ABSTRACT

Introduction: Emergency departments are characterized by time pressure, unpredictable clinical situations, and intensive communication with patients and families. Nurses play a central role in triage, information exchange, early recognition of conflict, and verbal de-escalation.

Aim: To examine the frequency and characteristics of conflict and aggression in emergency care and assess communication and de-escalation competencies, training, perceived safety, and institutional support.

Materials and methods: A cross-sectional anonymous electronic survey was conducted among 109 respondents. The 44-item questionnaire covered professional characteristics, exposure to aggression, causes of conflict, self-assessed competencies, safety, support, and training. Data were analyzed descriptively.

Results: Daily verbal aggression was reported by 42.2% and exposure several times per week by 20.2%; during the previous 12 months, 62.4% experienced a verbal threat, 11.9% an attempted physical assault, and 6.4% a physical assault. The

leading causes were poor understanding of triage (45.9%), long waiting times (43.1%), staff shortages (40.4%), and overcrowding (34.9%). Only 13.8% had completed practical de-escalation training. Peer support was rated more favorably than institutional protection and post-incident support.

Conclusion: Conflict and verbal aggression are common in emergency care, and many contributing factors are organizational. Practical training, clear protocols, adequate staffing, security measures, and systematic post-incident support are required.

Keywords: nurses, emergency department, communication, conflict, aggression, de-escalation, safety

SAŽETAK

Uvod: Urgentni centri su radna okruženja obilježena vremenskim pritiskom, nepredvidivim kliničkim situacijama i intenzivnom komunikacijom s pacijentima i porodicama. Medicinske sestre/tehničari imaju ključnu ulogu u trijaži, razmjeni informacija, ranom prepoznavanju konflikta i verbalnoj deeskalaciji.

Cilj: Ispitati učestalost i obilježja konflikta i agresije u urgentnoj zdravstvenoj zaštiti te procijeniti komunikacijske i deeskalacijske kompetencije, edukaciju, osjećaj sigurnosti i institucionalnu podršku.

Materijali i metode: Provedeno je presječno anonimno elektronsko anketno istraživanje između 109 ispitanika. Upitnik od 44 pitanja obuhvatio je profesionalne karakteristike, izloženost agresiji, uzroke konflikta, samoprocjenu kompetencija, sigurnost, podršku i edukaciju. Podaci su obrađeni deskriptivno.

Rezultati: Verbalnu agresiju svakodnevno je navelo 42,2%, a nekoliko puta sedmično 20,2% ispitanika; 62,4% je u prethodnih 12 mjeseci doživjelo verbalnu prijetnju, 11,9% pokušaj fizičkog napada, a 6,4% fizički napad. Najčešći uzroci bili su nerazumijevanje trijaže (45,9%), dugo čekanje (43,1%), nedostatak osoblja (40,4%) i preopterećenost centra (34,9%). Praktični trening deeskalacije prošlo je 13,8% ispitanika. Podrška kolega ocijenjena je bolje od institucionalne zaštite i postincidentne podrške.

Zaključak: Konflikt i verbalna agresija česti su u urgentnoj zdravstvenoj zaštiti, a značajan dio uzroka povezan je s organizacijom rada. Potrebni su praktična edukacija, jasni protokoli, adekvatno osoblje, sigurnosne mjere i sistematska podrška nakon incidenta.

Ključne riječi: medicinske sestre, urgentni centar, komunikacija, konflikt, agresija, deeskalacija, sigurnost.

INTRODUCTION

Communication is a fundamental nursing competency and an important prerequisite for safe health care. Work in the emergency center takes place under time pressure, with limited information, a large number of patients, and intense emotional reactions. Patients and family members often arrive in a state of fear, pain, and uncertainty, while the healthcare team must determine priorities and

explain the medical triage. A discrepancy between the subjective sense of urgency and the professional assessment can lead to conflict.

Triage and waiting times are particularly sensitive areas. A lack of information can increase frustration, while a timely explanation of the waiting reasons and care process may alleviate tension (1,2). Systematic reviews confirm that violence against emergency department staff is a common international problem, characterized predominantly by verbal abuse and a significant proportion of physical incidents (3,4).

Professional communication involves active listening, empathy, clearly conveying information, controlling own reactions, and setting boundaries. Verbal de-escalation involves early recognition of agitation, a calm tone, brief messages, acknowledging emotions without justifying violence, offering realistic options, and seeking help in a timely manner. In a case of imminent danger, employee safety takes precedence over continuing communication.

The quality of communication within a multidisciplinary team is equally important. Structured handovers, mutual respect, and aligned information reduce the risk of errors and misunderstandings (5). Therefore, violence prevention cannot be solely the individual responsibility of the nurse but it requires organizational measures, available security, a simple incident reporting process, training, and post-incident support.

AIM

The aim of the study was to examine the frequency of conflict and aggressive situations, perceived causes, self-assessed communication and de-escalation competencies, training experience, sense of safety, and institutional support among nurses in emergency and urgent healthcare settings.

MATERIALS AND METHODS

The research was designed as an observational cross-sectional survey which involved 109 nurses. Participation was voluntary and anonymous, and respondents were informed about the purpose and use of the data before accessing the questionnaire. The question regarding whether the respondent currently works in an emergency center, emergency department, or emergency medical service was a descriptive question about the workplace rather than an inclusion or exclusion criterion; therefore, the total analyzed sample size was N=109.

The instrument comprised 44 questions across seven areas: inclusion criteria; sociodemographic and professional characteristics; conflict and aggression; communication and de-escalation competencies; organizational factors and safety; education; and open-ended suggestions. Attitudes were assessed using a 1-to-5 Likert scale. Categorical variables are presented as numbers and percentages, and a positive assessment is defined by combining the responses "mostly agree" and "fully agree." Due to the availability of aggregated data, individual composite scores and inferential tests were not calculated.

RESULTS

A total of 109 participants took part in the study; women accounted for 69.7% of the sample. 63.3% of respondents indicated they were currently working in an emergency service, while 51.4% reported having more than ten years of experience in such a service.

Table 1 Selected sociodemographic and professional characteristics of the respondents.

Characteristics	n	%
Female	76	69.7
Currently work in the emergency department.	69	63.3
Age 46–55 years	39	35.8
Over 10 years in emergency services	56	51.4
Clinical Center University of Sarajevo	72	66.1

42.2% of respondents encountered verbal aggression daily, while 20.2% encountered it several times a week. In the previous 12 months, 62.4% of the respondents experienced verbal threats, 11.9% attempted physical attacks, and 6.4% experienced physical attacks.

Patients and their escort were the most frequent initiators, which show that preventive measures must include communication with both groups.

The leading causes of conflict were lack of the triage system understanding (45.9%), long waiting time (43.1%), staff shortage (40.4%), and overcrowding in the center (34.9%). Good communication was recognized as a key competency by 90.8% of respondents, while 88.1% believed that a high-quality handover reduces misunderstandings. Timely termination of an unsuccessful de-escalation attempt and seeking assistance were positively evaluated by 87.2%, whereas confidence in own de-escalation ability was lower.

89.0% of respondents believed that insufficient staffing increases conflict, 86.2% that excessive workload impairs communication, 92.6% that long waits increase the risk of aggression, and 89.0% of the respondents believed that a lack of understanding regarding triage increases conflict. Support from colleagues was rated more favorably than support from superiors, physical protection, and post-incident psychological assistance.

Formal education in the last two years was received by 17.4% of the respondents, 22.9% received earlier education, while 59.6% did not have any education. Only 13.8% of the respondents underwent practical training in verbal de-escalation. The most important measures identified were a larger total number of healthcare staff (64.2%), a larger number of nurses (63.3%), shorter waiting times (55.0%), and better patient information (50.5%).

Frequency of verbal aggression at work

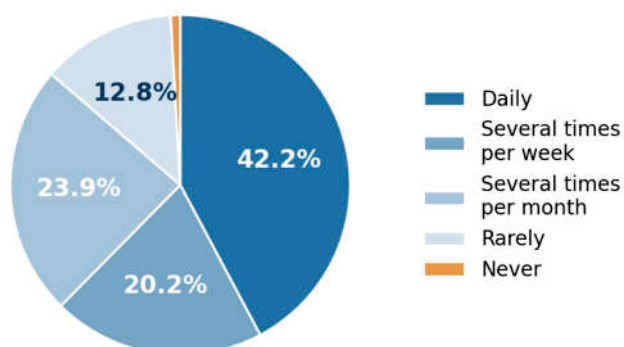


Figure 1 Frequency of encountering verbal aggression at work.

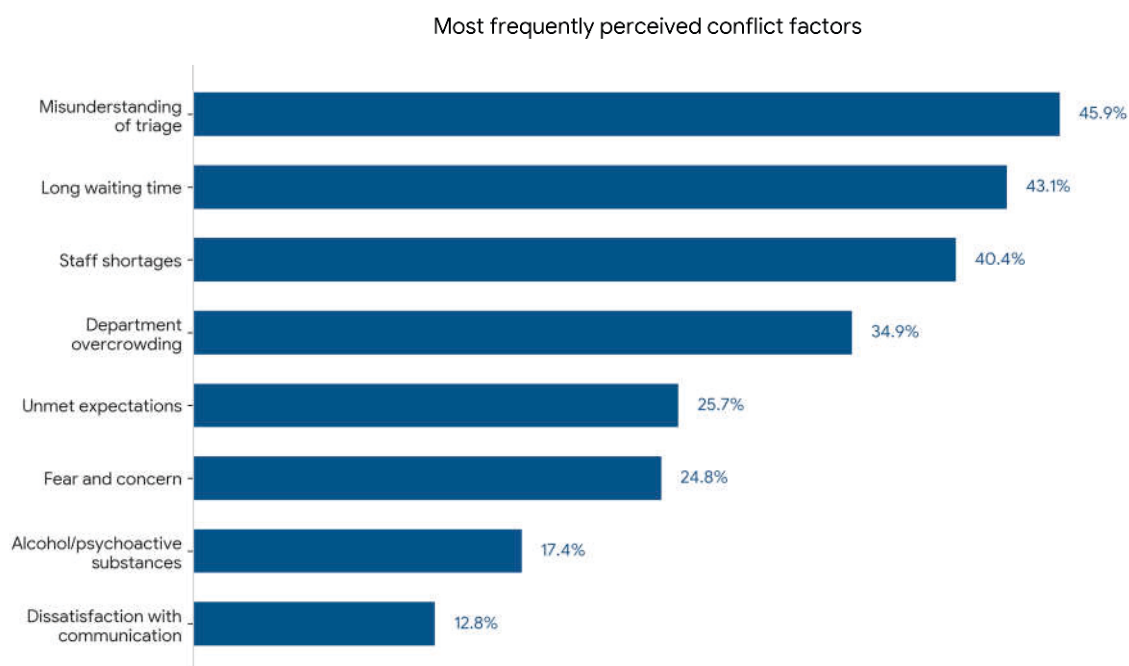


Figure 2 Factors most frequently leading to conflict according to respondents' experience - multiple answers could be selected.

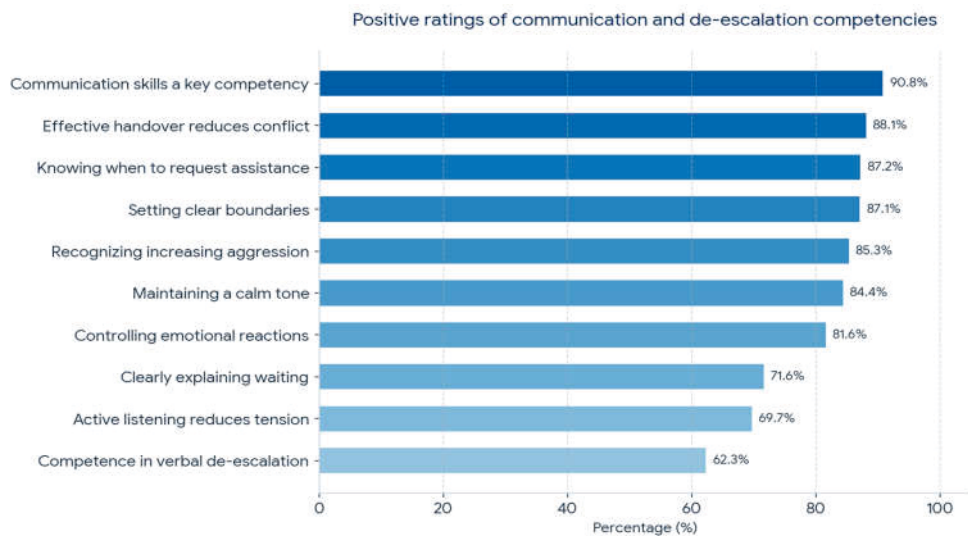


Figure 3 Proportion of "mostly agree" and "fully agree" responses to selected statements.

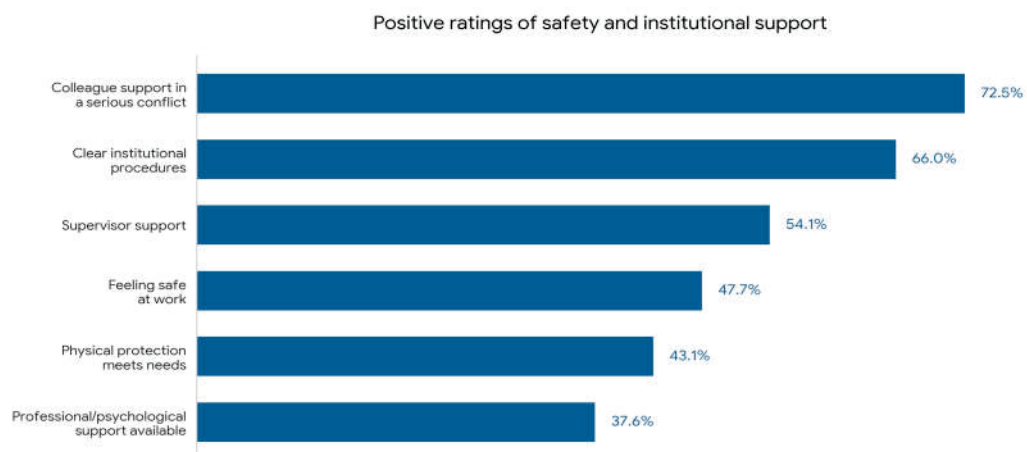


Figure 4 Positive assessments of security and institutional support.

Table 2 Education and self-assessed preparedness of respondents.

Category	Response / Status	Percentage (%)
Formal training	None	59.7%
	Earlier	22.9%
	Within the last 2 years	17.4%
Practical de-escalation training	No training	86.2%
	Completed training	13.8%
Self-assessed preparedness	Well / very well	57.8%
	Moderately	33.0%
	Insufficiently / not at all	9.2%
Need for additional training	Needed	33.9%
	Not needed	33.9%
	Unsure	32.1%

DISCUSSION

The findings confirm that verbal aggression is a regular professional and safety threat. The frequency is consistent with international reviews citing verbal violence as the most common form of violence in emergency departments (3,4). The significant proportion of threats and physical incidents further justifies systematic recording and prevention.

A lack of understanding of triage, waiting times, staff shortages, and overcrowding were the primary causes. This is consistent with earlier findings that communication regarding priorities and waiting times can influence aggressive tendencies (1,2), while team triage can reduce waiting times and improve satisfaction (6). Therefore, conflict cannot be reduced to the behavior of an individual; it arises from the interplay of emotional state, communication, and work organization.

Respondents highly rated the importance of communication, but practical de-escalation training was rare. Simulation programs combining theory, standardized scenarios, and debriefing can improve knowledge and self-confidence (8,9). However, education has a limited range if not accompanied by adequate staffing, protocols, security, and management support (10).

A higher rating for peer support compared to institutional support indicates that a sense of security often relies on the immediate team. There is a need for a culture in which reporting an incident is not a sign of weakness, but a source of data for risk assessment and system improvement. Effective communication between nurses and physicians, along with clear handovers, contributes to both patient safety and the prevention of conflict (5,11).

Limitations of the study include convenience sample, self-reporting, and possible recall bias. The question about the current work in the emergency service was used as a descriptive professional characteristic, but the aggregated data did not allow a stratified analysis of the results according to the workplace or reliable testing of the connection between education, experience, institutional support

and competence. Therefore, the results should be interpreted descriptively, and future research should be conducted on a larger sample using inferential analysis.

CONCLUSION

Nurses working in emergency and urgent healthcare are frequently exposed to verbal aggression and threats. The most important causes are related to a lack of triage understanding, long wait times, staff shortage, and excessive workload. Although basic communication skills are highly valued, practical training in de-escalation is insufficient, and institutional protection and post-incident support are rated lower than peer support. Priorities include regular simulation-based training, clear protocols, simple reporting procedures, adequate staffing, accessible security, patient information, and professional post-incident support.

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Diagnostic Significance of Measuring C-reactive Protein Concentration in School-aged Children with Streptococcal Pharyngitis

Dijagnostički značaj određivanja koncentracije C-reaktivnog proteina kod djece školskog uzrasta sa streptokoknom anginom

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ABSTRACT

Introduction: C-reactive protein (CRP) is an acute-phase protein synthesized primarily by the liver in response to inflammation, infection, or tissue injury, mainly under the stimulation of the cytokine interleukin-6 (IL-6). It is a sensitive but nonspecific biomarker of systemic inflammation and is widely used to assess inflammatory activity, monitor disease progression, and evaluate response to treatment. Streptococcal pharyngitis is a common bacterial infection in school-aged children. Its clinical presentation may overlap with viral pharyngeal infections, making laboratory markers of inflammation important in the differential diagnosis. C-reactive protein (CRP) is a sensitive acute-phase protein whose concentration increases rapidly in response to bacterial infection.

Aim: To evaluate the analytical reliability of CRP measurement using the Cobas 501 Roche analyzer and to present CRP, leukocyte count, and erythrocyte sedimentation rate (ESR) values in children with microbiologically confirmed streptococcal pharyngitis.

Materials and methods: A retrospective observational study was conducted using data collected at the Public Health Center Breza from 1 January 2021 to 1 January 2023. The study included 50 participants aged 5-17 years. CRP concentration was determined by a latex-enhanced immunoturbidimetric assay using the Cobas 501 Roche analyzer. Analytical precision was evaluated using Control 1 and Control 2 quality control sera.

Results: Elevated CRP concentrations were detected in 48 (96%) participants, elevated leukocyte counts in 45 (90%), and increased erythrocyte

sedimentation rate in 47 (94%) participants. CRP values ranged from 11 to 250 mg/L. The coefficients of variation for the control sera were 9.4% and 5.7%, while the deviation from the expected control value was 4.9%.

Conclusion: CRP measurement using the Cobas 501 Roche analyzer demonstrated satisfactory analytical precision and accuracy. Elevated CRP concentrations were common in children with streptococcal pharyngitis; however, CRP results should always be interpreted in conjunction with clinical findings and microbiological confirmation.

Keywords: C-reactive protein, streptococcal pharyngitis, children, Cobas 501 Roche, immunoturbidimetry

SAŽETAK

Uvod: C-reaktivni protein (CRP) je protein akutne faze koji se prvenstveno sintetizira u jetri kao odgovor na upalu, infekciju ili oštećenje tkiva, pod dominantnim utjecajem citokina interleukina-6 (IL-6). Predstavlja osjetljiv, ali nespecifičan biomarker sistemske upale te se široko koristi u kliničkoj praksi za procjenu prisustva i intenziteta upalnog procesa, praćenje toka bolesti i procjenu odgovora na terapiju. Streptokokna angina je česta bakterijska infekcija kod djece školskog uzrasta. Klinička slika može se preklapati sa virusnim infekcijama ždrijela, zbog čega laboratorijski pokazatelji inflamacije imaju važnu ulogu u diferencijalnoj dijagnostici. C-reaktivni protein (CRP) je osjetljiv protein akutne faze čija se koncentracija brzo povećava kao odgovor na bakterijsku infekciju.

Cilj: Procijeniti analitičku pouzdanost određivanja CRP-a na analizatoru Cobas 501 Roche i prikazati vrijednosti CRP-a, leukocita i sedimentacije eritrocita kod djece sa mikrobiološki potvrđenom streptokoknom anginom.

Materijali i metode: Provedena je retrospektivna opservacijska studija podataka prikupljenih u JU Dom zdravlja Breza od 1. januara 2021. do 1. januara 2023. godine. U istraživanje je uključeno 50 ispitanika dobi od 5 do 17 godina. Koncentracija CRP-

a određena je lateks-imunoturbidimetrijskom metodom na analizatoru Cobas 501 Roche. Analitička preciznost ispitana je kontrolnim serumima Control 1 i Control 2.

Rezultati: Povišena koncentracija CRP-a utvrđena je kod 48 (96%) ispitanika, povišen broj leukocita kod 45 (90%), a ubrzana sedimentacija kod 47 (94%) ispitanika. Raspon CRP-a iznosio je 11-250 mg/L. Koeficijent varijacije kontrolnih seruma iznosio je 9,4% i 5,7%, dok je odstupanje od očekivane kontrolne vrijednosti bilo 4,9%.

Zaključak: Određivanje CRP-a na analizatoru Cobas 501 Roche pokazalo je zadovoljavajuću preciznost i tačnost. Povišene vrijednosti CRP-a bile su učestale kod djece sa streptokoknom anginom, ali rezultat treba tumačiti zajedno sa kliničkim nalazom i mikrobiološkom potvrdom.

Ključne riječi: C-reaktivni protein, streptokokna angina, djeca, Cobas 501 Roche, imunoturbidimetrija

INTRODUCTION

C-reactive protein (CRP) is a pentameric acute-phase protein synthesized predominantly by hepatocytes under the influence of interleukin-6 and other pro-inflammatory cytokines. Its serum concentration begins to increase within a few hours after the onset of an inflammatory stimulus, and the magnitude of the increase generally reflects the intensity of the inflammatory process. Due to its short and relatively constant half-life, CRP is a useful biomarker for assessing the course of infection and monitoring the response to treatment. However, CRP is a nonspecific marker: elevated levels confirm the presence of inflammation but do not, by themselves, determine the etiology or localization of the disease (1-6).

In pediatric practice, CRP is frequently measured together with the white blood cell count and erythrocyte sedimentation rate (ESR). On average, bacterial infections are associated with a greater increase in CRP concentrations than uncomplicated viral infections, although the values may overlap.

Consequently, CRP results should not replace microbiological confirmation of the causative pathogen but should instead be interpreted as part of an integrated assessment that includes medical history, clinical examination, throat swab or rapid antigen detection testing, and other laboratory parameters. The reliability of clinical decision-making also depends on the analytical performance of the assay, including its precision, accuracy, calibration, and internal quality control (7-11,12,13).

Acute tonsillopharyngitis is one of the most common reasons for pediatric consultations in primary health care. Most episodes are caused by viruses, whereas among bacterial pathogens, Group A beta-hemolytic streptococcus (GAS) is the most clinically significant. Timely differentiation between bacterial and viral infections is important for the rational use of antibiotics, reducing symptom duration, and preventing both early and late complications of streptococcal infection. However, individual signs and symptoms, including fever, sore throat, enlarged cervical lymph nodes, and tonsillar exudate, lack sufficient diagnostic specificity. Therefore, clinical assessment should be supplemented with laboratory and microbiological findings (14,15).

AIM

The aim of this study was to evaluate the precision and accuracy of CRP measurement using a latex immunoturbidimetric assay on the Roche Cobas 501 analyzer and to determine the frequency of elevated CRP, white blood cell count, and erythrocyte sedimentation rate in school-aged children with clinically and microbiologically confirmed streptococcal pharyngitis.

MATERIALS AND METHODS

Study design and setting

This was a retrospective observational analysis of existing laboratory and medical records was conducted using data collected at the Biochemistry

and Hematology Laboratory of the Public Health Center Breza (JU Dom zdravlja Breza) in the period from 1 January 2021 to 1 January 2023.

Study population

The study included 50 children aged 5-17 years of both sexes with streptococcal pharyngitis confirmed by clinical examination and microbiological throat swab culture. Only patients with complete medical records were included, whereas records with incomplete data were excluded from the analysis. All data were processed in an anonymized form.

Laboratory method

CRP concentration was measured on the Roche Cobas 501 analyzer using a latex immunoturbidimetric assay. The method is based on the agglutination of latex particles coated with polyclonal anti-CRP antibodies in the presence of CRP from the patient sample. The resulting change in absorbance at 572 nm is directly proportional to the CRP concentration. The assay was performed at 37°C, with a declared analytical measuring range of 0.2-320 mg/L.

Quality control

The precision of the method was evaluated by repeated analysis of Control 1 and Control 2 quality control sera. Accuracy was assessed by comparing the measured values with the assigned target values of a commercial control material and calculating the percentage deviation.

Statistical analysis

Data were analyzed descriptively and presented as absolute numbers, percentages, means, standard deviations, and ranges. Owing to the retrospective study design and the availability of aggregated data, the statistical analysis was primarily descriptive.

RESULTS

The analytical precision of the CRP assay was evaluated using two levels of quality control material. The coefficient of variation (CV) was **9.4%** for **Control 1** and **5.7%** for **Control 2**. The deviation of the measured value from the assigned target value was **4.9%**, which was within the predefined acceptable limit of **±10%**.

Table 1 Precision and Accuracy of CRP Measurement.

Indicator	Control 1	Control 2 / Accuracy control
Average (mg/L)	8.7	36.5
Standard deviation (mg/L)	0.82	2.1
Coefficient of variation (%)	9.4	5.7
Expected / Assigned value (mg/L)	-	10.1 / 10.6
Deviation R (%)	-	4.9

The study included 30 (60%) boys and 20 (40%) girls. The youngest participant was 5 years old, and the oldest was 17.

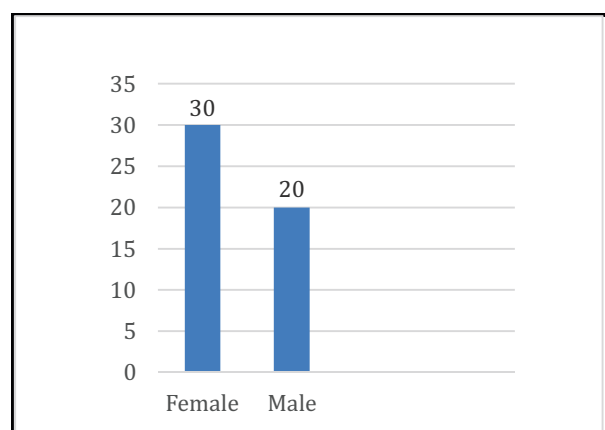


Figure 1 Gender distribution of study participants (N=50).

Elevated CRP concentrations were observed in 48 (96%) participants, elevated leukocyte counts in 45 (90%), and increased erythrocyte sedimentation rate (ESR) in 47 (94%) participants. CRP concentrations ranged from 11 to 250 mg/L. The mean CRP concentration was 60.7 mg/L, the mean leukocyte count was 13.2×10^9 /L, and the mean erythrocyte sedimentation rate was 37.6 mm/h.

Table 2 Summary of Laboratory Findings in Streptococcal Pharyngitis.

Laboratory parameters	Reference value (%)	Increased values (%)	Range
CRP (mg/L)	2 (4%)	48 (96%)	11-250
Leukocytes ($\times 10^9$ /L)	5 (10%)	45 (90%)	7,4-22,9
Sedimentation rate (mm/h)	3 (6%)	47 (94%)	9-160

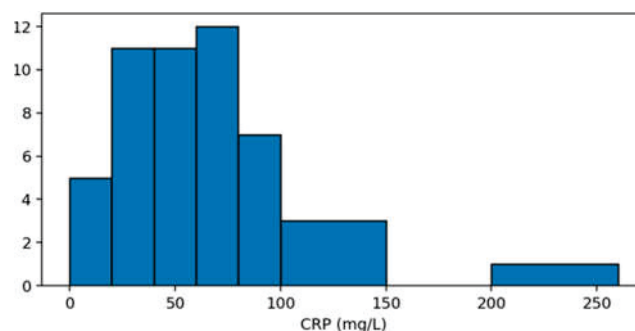


Figure 2 Distribution of CRP Concentrations in Streptococcal Pharyngitis.

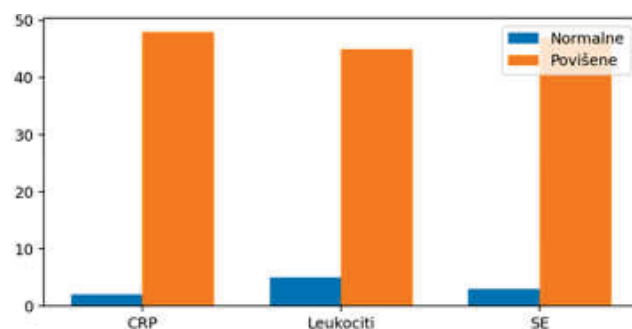


Figure 3 Normal and Elevated Values of Laboratory Parameters.

In an additional descriptive group of 10 participants with viral pharyngitis, CRP concentrations ranged from 4 to 13 mg/L, with a mean concentration of 8.6 mg/L. These findings indicate lower CRP levels than those observed in the group with streptococcal pharyngitis.

However, due to the unequal group sizes, the retrospective study design, and the absence of inferential statistical analysis, these results do not allow an assessment of the diagnostic sensitivity or specificity of CRP.

Table 3 Descriptive Comparison of CRP Concentrations in the Available Groups.

Group	Number of participants	CRP - Range (mg/L)	CRP - Mean value (mg/L)
Streptococcal pharyngitis	50	11-250	60.7
Viral pharyngitis	10	4-13	8.6

DISCUSSION

In this study, elevated CRP concentrations were observed in 96% of children with clinically and microbiologically confirmed streptococcal pharyngitis. At the same time, elevated leukocyte counts and erythrocyte sedimentation rates were observed in the majority of participants. This pattern supports the clinical use of CRP as an indicator of an enhanced inflammatory response in bacterial pharyngeal infection. However, CRP is not an etiological test, and an elevated value alone does not confirm streptococcal infection; the final assessment should be based on a combination of clinical findings and microbiological confirmation.

CRP values in the study group showed a wide range, from 11 to 250 mg/L. Such variability may reflect differences in infection severity, timing of sample collection, duration of symptoms, individual immune response, and possible initiation of therapy before testing. Due to the retrospective study

design, these factors could not be standardized. The additional group of participants with viral pharyngitis had considerably lower CRP values; however, this comparison should be interpreted with caution because the groups were not equal in size and were not matched according to age, disease duration, or clinical severity.

The analytical evaluation showed coefficients of variation of 9.4% and 5.7% at two levels of control material, with a deviation from the assigned value of 4.9%. These results indicate that the method provided reproducible and acceptably accurate results under the laboratory conditions, according to the criterion applied in the original study. For contemporary assessment of laboratory performance, it would be beneficial to apply current quality specifications, document the number of replicates and analytical runs, and present data from both internal and external quality control programs.

The main limitations of the study include the small sample size from a single center, retrospective data collection, the age of the available data, lack of detailed information regarding sampling time and therapy, and the absence of inferential statistical analysis. Furthermore, the available data do not allow determination of an optimal CRP cutoff value or calculation of diagnostic sensitivity, specificity, and predictive values. Future prospective studies should include a larger control group, a standardized microbiological algorithm, and multivariable analysis of clinical and laboratory parameters.

CONCLUSION

Determination of CRP concentration by the latex immunoturbidimetric method on the Cobas 501 Roche analyzer demonstrated satisfactory precision and accuracy according to the criteria applied in the study. Elevated CRP concentrations, leukocyte counts, and erythrocyte sedimentation rates were frequently observed in children with confirmed streptococcal pharyngitis. CRP may contribute to the assessment of the intensity of the inflammatory response and aid in distinguishing probable bacterial from viral infections; however, it should not be used as a standalone indicator of etiology. The results

should be interpreted together with clinical examination findings and microbiological results.

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Participation of Healthcare Professionals in Strategic Planning in the Federation of Bosnia and Herzegovina Hospitals: Normative Framework, Organizational Practices and Employee Perceptions

Participacija zdravstvenih profesionalaca u strateškom planiranju u bolnicama u Federaciji Bosne i Hercegovine: normativni okvir, organizacijske prakse i percepcija zaposlenih

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ABSTRACT

Introduction: Participation of healthcare professionals in planning and decision-making processes is an important element of participatory management in healthcare institutions. In the Federation of Bosnia and Herzegovina, no studies have previously been conducted that simultaneously analyze the normative framework, organizational practices, and healthcare professionals' perceptions of their participation in strategic planning processes.

Aim: to assess the level of development of participatory management in hospitals in the Federation of Bosnia and Herzegovina through an analysis of the normative framework, organizational practices, and healthcare professionals' perceptions of their participation in strategic planning processes.

Materials and methods: Data triangulation involving three data sources was applied: an analysis of the certification and accreditation criteria of the

Hospital Safety and Quality Standards of the Agency for Quality and Accreditation in Healthcare in the Federation of Bosnia and Herzegovina (AKAZ), a review of the public availability of strategic plans of 22 public hospitals, and a secondary analysis of the results of standardized employee satisfaction surveys from AKAZ reports on quality and safety indicators for 2022, 2023, and 2024.

Results: None of the six analyzed mandatory certification criteria requires the participation of healthcare professionals in strategic planning, whereas two of the three voluntary accreditation criteria provide for their participation. A review of the websites of 22 public hospitals identified no publicly available current strategic plan. Employees' perceptions of participation in planning improved: the mean score for their own contribution to the planning process increased from 2.66 in 2022 to 2.87 in 2024, when 69.28% of respondents positively assessed their own participation. Communication with management remained less favorably rated,

while overall job satisfaction increased from 2.97 to 3.11.

Conclusion: Elements of participatory management exist in hospitals in the Federation of Bosnia and Herzegovina, but they are not systematically integrated into the mandatory normative framework, nor are they accompanied by an appropriate level of transparency and organizational communication. The results indicate a need to consider including healthcare professionals' participation in strategic planning among mandatory quality and safety criteria and to improve the transparency of strategic planning.

Keywords: participatory management, strategic planning, healthcare professionals, hospitals, quality of healthcare, Federation of Bosnia and Herzegovina

SAŽETAK

Uvod: Participacija zdravstvenih profesionalaca u procesima planiranja i donošenja odluka predstavlja važan element participativnog upravljanja zdravstvenim ustanovama. U Federaciji Bosne i Hercegovine do sada nisu provedena istraživanja koja istovremeno analiziraju normativni okvir, organizacijske prakse i percepciju zdravstvenih profesionalaca o njihovom učešću u procesima strateškog planiranja.

Cilj: procijeniti stepen razvoja participativnog upravljanja u bolnicama Federacije Bosne i Hercegovine kroz analizu normativnog okvira, organizacijskih praksi i percepcije zdravstvenih profesionalaca o njihovom učešću u procesima strateškog planiranja.

Materijali i metode: Primijenjena je triangulacija tri izvora podataka: analiza certifikacijskih i akreditacijskih kriterija Standarda sigurnosti i kvaliteta za bolnice Agencije za kvalitet i akreditaciju u zdravstvu u Federaciji Bosne i Hercegovine (AKAZ), pregled javne dostupnosti strateških planova 22 javne bolnice te sekundarna analiza rezultata standardizovanih anketa o zadovoljstvu zaposlenih iz AKAZ izvještaja o indikatorima kvaliteta i sigurnosti za 2022., 2023. i 2024. godinu.

Rezultati: Nijedan od šest analiziranih obaveznih certifikacijskih kriterija ne zahtijeva participaciju zdravstvenih profesionalaca u strateškom planiranju, dok dva od tri dobrovoljna akreditacijska kriterija predviđaju njihovo učešće. Pregledom internet stranica 22 javne bolnice nije identificiran nijedan javno dostupan aktuelni strateški plan. Percepcija zaposlenih o participaciji u planiranju pokazuje poboljšanje: prosječna ocjena vlastitog doprinosa procesu planiranja porasla je sa 2,66 u 2022. na 2,87 u 2024. godini, kada je 69,28% ispitanika pozitivno ocijenilo vlastito učešće. Komunikacija sa upravom ostala je slabije ocijenjena, dok je ukupno zadovoljstvo radom poraslo sa 2,97 na 3,11.

Zaključak: U bolnicama Federacije Bosne i Hercegovine postoje elementi participativnog upravljanja, ali oni nisu sistemski integrirani u obavezni normativni okvir niti praćeni odgovarajućim nivoom transparentnosti i organizacijske komunikacije. Rezultati ukazuju na potrebu razmatranja uključivanja participacije zdravstvenih profesionalaca u strateškom planiranju među obavezne kriterije kvaliteta i sigurnosti te unapređenja transparentnosti strateškog planiranja.

Ključne riječi: participativno upravljanje, strateško planiranje, zdravstveni profesionalci, bolnice, kvalitet zdravstvene zaštite, Federacija Bosne i Hercegovine

INTRODUCTION

Modern healthcare systems face increasingly complex organizational, financial, and demographic challenges that require the development of effective management models based on the involvement of healthcare professionals in decision-making processes. Traditional hierarchical management models are increasingly being replaced by participatory models that enable employees to participate actively in the planning, organization, and improvement of healthcare services (1,2).

Participatory management is an organizational management model in which employees actively participate in decisions affecting their work, organizational development, and the achievement of organizational goals. In the healthcare sector, this concept has been developed through the shared governance model, which entails shared responsibility of management and healthcare professionals for professional, organizational, and strategic decision-making (2,3,4). The basic premise of this model is that healthcare professionals, owing to their professional knowledge and daily experience in healthcare delivery, constitute a key source of information necessary for high-quality managerial decision-making.

Research confirms that participatory management models contribute to greater professional autonomy, higher job satisfaction, stronger organizational commitment, reduced professional burnout, lower intention to leave the healthcare institution, and improvements in the quality and safety of healthcare (3,4,5,6,7). For this reason, shared governance is now regarded as one of the fundamental elements of organizational excellence in modern healthcare systems.

Strategic planning is a systematic process of defining an organization's long-term goals, determining development priorities, planning the resources required, and identifying activities through which the desired results will be achieved. In healthcare institutions, strategic planning enables organizational development to be aligned with population needs, available resources, and national health policies, and represents one of the fundamental instruments for improving healthcare quality (8,9).

The success of strategic planning largely depends on the level of participation of healthcare professionals in its preparation and implementation. The involvement of physicians, nurses, healthcare technicians, and other healthcare professionals contributes to better definition of development priorities, greater acceptance of strategic objectives, and more successful implementation of planned activities (5,8,10). The World Health Organization

(WHO), in its Global Strategy on Human Resources for Health: Workforce 2030, emphasizes the importance of involving all relevant stakeholders in health-system planning and management processes as one of the key prerequisites for successful health-system reforms (8). The Organisation for Economic Co-operation and Development (OECD) emphasizes that high-quality health workforce planning and health-system development require participatory management models and the active involvement of healthcare professionals in decision-making processes (9).

Considering the above, and taking into account the fact that there are no studies in the Federation of Bosnia and Herzegovina on employee participation in strategic planning processes and planning in general, or on organizational practices in this domain within the healthcare system of the Federation of Bosnia and Herzegovina, investigating the current situation in this area emerges as an issue of importance for the healthcare system of the Federation of Bosnia and Herzegovina as a whole.

The standards of the Agency for Quality and Accreditation in Healthcare in the Federation of Bosnia and Herzegovina require hospitals to establish a strategic planning system by defining their mission, vision, and strategic objectives and by continuously monitoring their achievement (11). However, the standards do not explicitly prescribe the scope or manner of healthcare professionals' involvement in the development, implementation, and evaluation of strategic plans.

A review of the available domestic and international literature identified no studies that systematically analyze the degree of healthcare professionals' participation in hospital strategic planning processes in Bosnia and Herzegovina, nor studies that simultaneously analyze the normative framework, organizational practices, and healthcare professionals' perceptions in this area.

Data from the Agency for Healthcare Quality and Accreditation in the Federation of Bosnia and Herzegovina represent a unique source of information for assessing healthcare professionals'

participation in planning processes. As part of the annual collection of hospital quality and safety indicators in the Federation of Bosnia and Herzegovina, AKAZ conducts a standardized employee satisfaction survey that includes, among other areas, questions related to planning, communication, and management (12–15). A secondary analysis of publicly available data from the reports for 2022, 2023, and 2024 makes it possible to assess healthcare professionals' perceptions of their participation in planning the work of healthcare institutions.

In addition to analyzing healthcare professionals' perceptions, this study analyzes the certification criteria of the AKAZ Hospital Safety and Quality Standards relating to strategic planning, as well as publicly available strategic plans of hospitals in the Federation of Bosnia and Herzegovina, in order to assess the transparency of strategic planning processes. Since the certification criteria of the Standards of the Agency for Quality and Accreditation in Healthcare in the Federation of Bosnia and Herzegovina are mandatory for all healthcare institutions pursuant to the Law on Healthcare of the Federation of Bosnia and Herzegovina and the Rulebook on Detailed Requirements Regarding Premises, Equipment and Staff for the Establishment and Performance of Healthcare Activities in Healthcare Institutions (16,17), this paper analyzes the certification criteria relating to strategic planning and the participation of healthcare professionals therein. Furthermore, by reviewing publicly available information on the websites of hospitals in the Federation of Bosnia and Herzegovina, we aim to determine how many hospitals in the healthcare system of the Federation of Bosnia and Herzegovina have publicly available strategic plans, in order to establish the level of transparency of hospitals in the public healthcare system of the Federation of Bosnia and Herzegovina.

AIM

The aim of the study was to assess the level of development of participatory management in hospitals in the Federation of Bosnia and Herzegovina through an analysis of the normative

framework, organizational practices, and healthcare professionals' perceptions of their participation in strategic planning processes.

To achieve the stated objective, the following research questions were defined:

- a) To what extent the certification criteria of the Hospital Safety and Quality Standards of the Agency for Quality and Accreditation in Healthcare in the Federation of Bosnia and Herzegovina regulated strategic planning, and provided for the participation of healthcare professionals in strategic planning processes in accordance with the principles of participatory management?
- b) To what extent hospitals in the Federation of Bosnia and Herzegovina have publicly available strategic plans, and what their availability indicate about the transparency of strategic planning processes?
- c) To what extent healthcare professionals employed in hospitals in the Federation of Bosnia and Herzegovina perceived themselves as participating in the processes of planning the work of the healthcare institution and making organizational decisions?

Answers to these research questions will enable an assessment of the level of development of participatory management in hospitals in the Federation of Bosnia and Herzegovina and the identification of potential differences between the requirements of the normative framework, organizational practices, and healthcare professionals' perceptions.

MATERIALS AND METHODS

Given that the study respondents encompassed the normative framework, organizational practices, and healthcare professionals' perceptions, a data triangulation methodological approach was applied. Triangulation is a research approach in which the same phenomenon is analyzed using several mutually independent data sources in order to increase the credibility of findings and reduce the limitations of individual research methods (18).

In this study, triangulation comprised three complementary data sources:

- a) Normative analysis, examining the certification criteria of the Hospital Safety and Quality Standards of the Agency for Quality and Accreditation in Healthcare in the Federation of Bosnia and Herzegovina in the section relating to strategic planning and the participation of healthcare professionals in planning processes.
- b) Analysis of publicly available documentation, involving a review of the official websites of hospitals in the Federation of Bosnia and Herzegovina to determine the existence and public availability of strategic plans.
- c) Secondary data analysis based on publicly available reports of the Agency for Quality and Accreditation in Healthcare in the Federation of Bosnia and Herzegovina on hospital quality and safety indicators for 2022, 2023, and 2024. Questions from the standardized employee satisfaction questionnaire relating to planning, communication, and management were analyzed.

RESULTS

Table 1 **Overview of certification and accreditation criteria of the Hospital Safety and Quality Standards related to strategic planning (11).**

Certification (mandatory) criteria of the Hospital Safety and Quality Standards related to strategic planning (AKAZ Hospital Standards)	
Criterion	Participation of healthcare professionals provided for
The healthcare institution has a document expressing its mission, vision and values.	NO (one of the sources of evidence for assessment is a staff interview)
1.1.2. The mission, vision and values document contains a clear commitment of the healthcare institution to achieving optimal quality in healthcare service delivery processes and other processes taking place within the healthcare institution.	NO
The mission, vision and values document has been adopted by the governing board of the healthcare institution.	NO
1.1.4. The document containing the mission, vision and values is publicly available and accessible to patients, accompanying persons, and staff of the healthcare institution.	NO
1.1.6. Staff are familiar with the document expressing the mission, vision and values and work toward achieving the established tasks, objectives and values.	NO
1.2.37. The institution has a strategic development plan adopted by the governing board.	NO
Accreditation (voluntary) criteria of the Hospital Safety and Quality Standards related to strategic planning (AKAZ Hospital Standards)	
1.2.38. The institution's strategic development plan contains a list and description of strategic objectives.	NO
1.2.40. All staff members are involved in the institution's planning and development process and have the opportunity, in accordance with the procedure, to present their proposals and comments on proposed development plans, strategic plans, and work plans.	YES
1.2.41. Official feedback is provided to staff on which proposals have been incorporated into the final development plans, strategic plans, and work plans.	YES

Table 1 presents an overview of the certification (mandatory) and accreditation (voluntary) criteria from AKAZ Hospital Safety and Quality Standards in the Federation of Bosnia and Herzegovina (11). The results show that none of the six certification criteria, i.e. criteria relating to optimal safety standards mandatory for all healthcare institutions in the Federation of Bosnia and Herzegovina (16,17), provide for the participation of healthcare professionals in strategic planning processes. Out of three accreditation criteria, i.e. criteria relating to optimal quality standards that are voluntary and are not mandatory for healthcare institutions (19), two provide for the participation of healthcare professionals in the planning process. It follows that the mandatory section of the Hospital Safety and Quality Standards of Agency for Quality and Accreditation in Healthcare in the Federation of Bosnia and Herzegovina does not promote the participation of healthcare professionals in strategic planning, whereas the voluntary quality criteria partially promote such participation. However, the sources of information used to confirm compliance

with criterion 1.2.41, "Official feedback is provided to staff on which proposals have been incorporated into the final development plans, strategic plans, and work plans," are questionable, given that evidence for compliance consists of an interview with the director and the manager for economic and financial affairs, which, in addition to official records of the consultation process, represents less credible evidence of compliance with the criterion.

Out of nine criteria in the Safety and Quality Standards, only one, the accreditation (voluntary) quality criterion 1.2.40, "All staff members are involved in the institution's planning and development process and have the opportunity, in accordance with the procedure, to present their proposals and comments on proposed development plans, strategic plans, and work plans", fully promotes and, through the evidence used for assessment, verifies the participation of healthcare professionals in strategic planning processes in hospitals in the Federation of Bosnia and Herzegovina.

Table 2 Overview of official websites of public hospitals in the Federation of Bosnia and Herzegovina with information on the public availability of hospital strategic plans (Source: authors' own analysis; data collected by reviewing the official websites of the analyzed hospitals in the Federation of Bosnia and Herzegovina, July 2026.)

Overview of official websites of public hospitals in the Federation of Bosnia and Herzegovina with information on the public availability of hospital strategic plans	
Hospital	Publicly available strategic plan
Hospital for Pulmonary Diseases and Tuberculosis Travnik	NO
Center for Medical Rehabilitation and Spa Treatment "Ilidža" Gradačac	NO
Cantonal Hospital "Fra Mihovil Sučić" Livno	NO
Cantonal Hospital "Dr. Irfan Ljubijankić" Bihać	NO
Cantonal Hospital "Dr. Safet Mujić" Mostar	NO
Cantonal Hospital Goražde	NO
Cantonal Hospital Orašje	NO
Cantonal Hospital Zenica	NO
Clinical Center of the University of Sarajevo	NO
Rehabilitation Center "Reumal" Fojnica	NO
Gata Rehabilitation Center Bihać	NO
General Hospital "Dr. fra Mato Nikolić" Nova Bila	NO
General Hospital "Dr. Mustafa Beganović" Gračanica	NO

General Hospital "Prim. dr. Abdulah Nakaš" Sarajevo	NO
General Hospital Bugojno	NO
General Hospital Jajce	NO
General Hospital Konjic	NO
General Hospital Sanski Most	NO
General Hospital Tešanj	NO
General Hospital Travnik	NO
Psychiatric Hospital of Sarajevo Canton	NO
University Clinical Hospital Mostar	NO

Table 2 shows that none of the publicly owned hospitals has a publicly available and published hospital strategic plan. This does not mean that these hospitals have not developed and adopted strategic plans, but the general public has no information about them. The vast majority of hospitals nevertheless publish statements of values, mission, and vision, which form part of the strategic planning process. In this context, this is also relevant from a normative perspective, because the certification criteria require hospitals to have a document expressing their mission, vision, and

values (11). This may indicate that the healthcare system, through the Agency for Quality and Accreditation in Healthcare in the Federation of Bosnia and Herzegovina and its mandatory certification criteria, could ensure a regular and continuous strategic planning process as well as the public disclosure of hospital strategic plans in the Federation of Bosnia and Herzegovina. Until such a requirement is introduced, however, the fact remains that none of the hospitals in the Federation of Bosnia and Herzegovina has a publicly published hospital development strategy.

Table 3 Overview of healthcare professionals' satisfaction and perceptions regarding planning, communication and management in hospitals in the Federation of Bosnia and Herzegovina, 2022-2024" (11,12,13,14).

Question	Responses	2022 N	2022 %	2023 N	2023 %	2024 N	2024 %
I understand the institution's long-term plan	Strongly agree (4)	205	22.75%	511	22.53%	290	31.15%
	Agree (3)	329	36.51%	878	38.71%	339	36.41%
	Disagree (2)	228	25.31%	546	24.07%	199	21.38%
	Strongly disagree (1)	139	15.43%	333	14.68%	103	11.06%
Mean (1–4)		N = 901	2.67	N = 2268	2.69	N = 931	2.88
There is appropriate planning of the institution's objectives	Strongly agree (4)	212	23.50%	630	27.81%	294	31.48%
	Agree (3)	374	41.46%	839	37.04%	379	40.58%
	Disagree (2)	196	21.73%	525	23.18%	156	16.70%
	Strongly disagree (1)	120	13.30%	271	11.96%	105	11.24%
Mean (1–4)		N = 902	2.75	N=2265	2.81	N = 934	2.92

I contribute to the planning process in the institution	Strongly agree (4)	210	23.26%	582	25.86%	284	30.50%
	Agree (3)	341	37.76%	871	38.69%	361	38.78%
	Disagree (2)	186	20.60%	441	19.59%	167	17.94%
	Strongly disagree (1)	166	18.38%	357	15.86%	119	12.78%
Mean (1–4)		N = 903	2.66	N = 2251	2.75	N = 931	2.87
Communication with management is sufficiently frequent	Strongly agree (4)	143	15.82%	562	24.64%	175	17.78%
	Agree (3)	265	29.31%	595	26.09%	352	35.77%
	Disagree (2)	259	28.65%	640	28.06%	244	24.80%
	Strongly disagree (1)	237	26.22%	484	21.22%	213	21.65%
Mean (1–4)		N = 904	2.35	N = 2281	2.54	N = 984	2.50
Communication with management enables me to keep up to date with developments in the institution	Strongly agree (4)	137	15.21%	525	23.13%	175	18.58%
	Agree (3)	258	28.63%	614	27.05%	303	32.17%
	Disagree (2)	270	29.97%	610	26.87%	243	25.80%
	Strongly disagree (1)	236	26.19%	521	22.95%	221	23.46%
Mean (1–4)		N = 901	2.33	N = 2270	2.50	N = 942	2.46
I feel that I can trust what I am told by management	Strongly agree (4)	198	21.95%	657	28.84%	238	25.29%
	Agree (3)	298	33.04%	709	31.12%	317	33.69%
	Disagree (2)	225	24.94%	534	23.44%	240	25.50%
	Strongly disagree (1)	181	20.07%	378	16.59%	146	15.52%
Mean (1–4)		N = 902	2.57	N = 2278	2.72	N = 941	2.69
My supervisor asks me for information when making decisions	Strongly agree (4)	259	28.68%	787	34.65%	271	29.17%
	Agree (3)	322	35.66%	714	31.44%	369	39.72%
	Disagree (2)	183	20.27%	453	19.95%	160	17.22%

	Strongly disagree (1)	139	15.39%	317	13.96%	129	13.89%
Mean (1–4)		N = 903	2.78	N = 2271	2.87	N = 929	2.84
How would you rate your level of overall job satisfaction in the institution?	Very satisfied (4)	246	26.97%	792	35.09%	314	36.13%
	Satisfied (3)	452	49.56%	935	41.43%	392	45.11%
	Dissatisfied (2)	152	16.67%	368	16.30%	110	12.66%
	Very dissatisfied (1)	62	6.80%	162	7.18%	53	6.10%
Mean (1–4)		N = 912	2.97	N = 2257	3.04	N = 869	3.11

*note: Percentages were recalculated according to the number of respondents who answered the specific question in the given year. The mean represents the weighted arithmetic mean on a four-point scale (4 = most positive response; 1 = most negative response). N denotes the total number of respondents who answered the specific question.

Table 3 presents an overview of healthcare professionals' satisfaction and perceptions regarding planning, communication, and management in hospitals in the Federation of Bosnia and Herzegovina for the period 2022–2024. The data relate to questions that form part of hospitals' regular reporting on quality and safety indicators and concern planning, communication, and management in hospitals in the Federation of Bosnia and Herzegovina.

Overall, the most important conclusion from the presented results is that healthcare professionals are more satisfied with their overall work in the institution than with aspects of communication with management and participation in planning the institution's work. It should be noted that employee satisfaction surveys are conducted in the workplace for the purposes of official reporting to AKAZ, which may constitute a form of pressure; therefore, the presented results should be interpreted with caution with regard to positive employee satisfaction ratings.

Nevertheless, a substantial proportion of employees, almost one quarter, even under workplace survey conditions, report a high level of dissatisfaction with communication with

management and participation in planning. As an additional noteworthy fact concerning the healthcare system of the Federation of Bosnia and Herzegovina, publicly available quality and safety indicator data show that healthcare professionals report lower levels of satisfaction than patients report with their service encounters in healthcare institutions (12,13,14).

DISCUSSION

The results of this study allow participatory management and strategic planning in hospitals in the Federation of Bosnia and Herzegovina to be considered from three interconnected perspectives: the normative framework defined by the Hospital Safety and Quality Standards, the transparency of strategic planning through the public availability of strategic plans, and healthcare professionals' perceptions of their own participation in planning, communication, and decision-making processes. The triangulation applied revealed a degree of discrepancy between formally defined requirements, organizational practices, and employee perceptions.

The first research question concerned the extent to which AKAZ certification criteria regulate strategic

planning and provide for healthcare professionals' participation in accordance with the principles of participatory management. The analysis showed that mandatory certification criteria recognize strategic planning as an element of healthcare institution management but do not require healthcare professionals to participate in its development. None of the six mandatory criteria analyzed explicitly provides for employee participation. By contrast, the voluntary accreditation criteria include requirements for all staff members to be involved in the institution's planning and development process, to have the opportunity to submit proposals and comments, and to receive feedback on accepted proposals.

This finding points to an important distinction between the formal existence of strategic planning and its participatory nature. A healthcare institution may satisfy mandatory criteria relating to its mission, vision, values, and the existence of a strategic plan without healthcare professionals being directly involved in creating it. Participatory management, as conceptualized in the Introduction, however, entails employees' active participation in decisions affecting their work and the development of the organization. It can therefore be concluded that the existing mandatory framework ensures certain elements of strategic planning but does not ensure its participatory character.

Criterion 1.2.40 is particularly significant, as it requires all staff members to be involved in the institution's planning and development process and to have the opportunity to present proposals and comments on development, strategic, and work plans. In substantive terms, this criterion is the closest to the concept of participatory management analyzed in this paper. However, the fact that it is an accreditation criterion, and therefore voluntary, limits its systemic impact. The findings therefore raise the question of whether employee participation should be incorporated into future mandatory safety and quality standards.

The second research question concerned the public availability of strategic plans and the transparency of strategic planning processes. A

review of the official websites of the 22 public hospitals included in the study found no publicly available current strategic plan. This result does not allow the conclusion that hospitals do not have developed or adopted strategic plans; it establishes only that such plans were not publicly available at the time of the analysis. This distinction is important: this part of the study examined not whether a strategic plan existed in a hospital's internal documentation, but whether it was publicly available as an indicator of transparency.

The complete absence of publicly available strategic plans nevertheless represents a significant finding. The strategic plan of a public healthcare institution defines the development priorities of an organization that manages public resources and provides services of direct public interest. Its availability would enable employees, patients, founders, and the wider public to gain insight into the institution's development objectives and priorities. At the same time, the findings show that hospitals much more frequently publish their mission, vision, and values, for which explicit certification requirements concerning existence and availability are in place. This may indicate the importance of regulatory and standardization requirements in shaping organizational practices and provides an argument for considering the introduction of a requirement for the public availability of strategic plans.

The third research question concerned healthcare professionals' perceptions of their own participation in planning and organizational decision-making processes. The results show an overall improvement in perceptions of planning-related elements between 2022 and 2024. The mean score for understanding the institution's long-term plan increased from 2.67 to 2.88, the perception of appropriate planning of objectives from 2.75 to 2.92, and the mean score for respondents' own contribution to the planning process from 2.66 to 2.87. In 2024, 69.28% of respondents agreed or strongly agreed that they contributed to the institution's planning process, whereas 30.72% disagreed.

However, the results concerning communication with management present a less favorable picture. The mean score for the frequency of communication with management was 2.35 in 2022, 2.54 in 2023, and 2.50 in 2024. Even lower values were recorded for the assessment that communication with management enables employees to keep up to date with developments in the institution: 2.33, 2.50, and 2.46, respectively. These findings indicate that formal or individual employee involvement in certain decision-making processes is not necessarily accompanied by well-developed two-way organizational communication.

At the same time, the statement that supervisors ask employees for information when making decisions achieved relatively favorable mean values of 2.78 in 2022, 2.87 in 2023, and 2.84 in 2024. In 2024, 68.89% of respondents responded positively to this statement. This may indicate the existence of certain elements of consultative management, but these data alone do not make it possible to determine whether employee consultation results in actual influence on final strategic and organizational decisions.

The relationship between overall job satisfaction and ratings of individual elements of participatory management is particularly noteworthy. Overall job satisfaction achieved the highest mean values among the questions analyzed: 2.97 in 2022, 3.04 in 2023, and 3.11 in 2024. In 2024, 81.24% of respondents reported being satisfied or very satisfied with their overall work in the institution. At the same time, communication with management, access to information, and certain aspects of participation were rated considerably less favorably. This finding shows that overall job satisfaction should not be used as a proxy indicator for satisfaction with management or the degree of employee participation.

The findings of the secondary analysis should nevertheless be interpreted in light of certain limitations. The number of respondents differs between questions and years, and the analyzed data are aggregate results, making it impossible to track changes at the individual level or establish causal

relationships. In addition, the manner in which the survey is administered may influence employee responses. The document states that the surveys are conducted in the workplace as part of official reporting to AKAZ. Therefore, from a methodological standpoint, it would be safer to refer to the possibility of social desirability bias or a perception of insufficient anonymity rather than to claim that the survey method constitutes a “form of pressure,” because this study did not directly measure the existence of such pressure.

Taken together, the results of all three segments of the study indicate partially developed elements of participatory management, but not its systematic normative institutionalization. Mandatory standards require elements of strategic planning but do not require employee participation. No publicly available strategic plans were found for any of the hospitals analyzed, while employee perceptions indicate a certain level of participation and improvement over the observed period, alongside more pronounced weaknesses in communication with management. This discrepancy between the formal framework, the transparency of organizational practices, and employee perceptions is the key finding of this study.

CONCLUSION

The study showed that elements of strategic planning are present in the normative framework and organizational practices of hospitals in the Federation of Bosnia and Herzegovina, but participatory management has not yet been fully and systematically integrated into the mandatory requirements applicable to all hospitals. Based on the triangulation of results, it can be concluded that elements of participatory management exist in hospitals in the Federation of Bosnia and Herzegovina, but they are insufficiently institutionalized in the normative framework and are not accompanied by an appropriate level of transparency and organizational communication. The results justify considering the inclusion of healthcare professionals’ participation in strategic planning processes among mandatory quality and safety criteria, together with a requirement for the

public availability of strategic plans and the establishment of mechanisms ensuring that employees can submit proposals and receive feedback on whether and how their proposals have been incorporated into final plans. This would transform employee participation from being primarily an element of voluntary accreditation into an integral part of the standard hospital management model in the Federation of Bosnia and Herzegovina.

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Recorded Acute Effects and Documented Nursing Intervention Burden during Medium - versus High-Dose-Rate Brachytherapy for Gynecologic Cancers: A Retrospective Comparison of 2006 and 2013 Cohorts

Zabilježeni akutni efekti i dokumentirano opterećenje intervencijama medicinske sestre tokom brahiterapije srednje i visoke brzine doze kod ginekoloških karcinoma: retrospektivno poređenje kohorti iz 2006. i 2013. godine

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ABSTRACT

Introduction: Treatment duration and immobilization during gynecologic brachytherapy may influence the need for nursing support. The aim of this study was to compare recorded acute effects and documented nursing interventions during medium-dose-rate (MDR) and high-dose-rate (HDR) brachytherapy.

Aim: to compare women treated with MDR brachytherapy in 2006 and HDR brachytherapy in 2013.

Materials and methods: This retrospective comparison included 398 women treated for cervical, uterine corpus, or vaginal malignancy at the Clinic of Oncology, Clinical Center University of Sarajevo. The MDR cohort comprised 152 patients and 296 applications delivered from 1 January to 31 December 2006; the HDR cohort comprised 246 patients and 850 applications delivered from 1 January to 31 December 2013. Source-table counts

were checked for internal consistency. Cohort distributions were compared using Pearson chi-square tests, and adverse-effect proportions using two-sample z tests.

Results: Age-group, diagnosis, and recorded FIGO-stage distributions did not differ significantly between cohorts. MDR applications lasted 7-11 hours, whereas HDR applications lasted 7-10 minutes. Fear/anxiety was recorded in 98.7% of MDR and 93.5% of HDR patients ($p=0.016$); nausea/vomiting in 39.5% and 20.3%, respectively ($p<0.001$). Bleeding did not differ significantly. A total of 1410 additional nursing interventions were documented during 296 MDR applications (4.76 per application), compared with 20 during 850 HDR applications (0.02 per application).

Conclusion: In these historical cohorts, HDR was associated with markedly shorter application time and fewer documented nursing interventions. Because the cohorts were treated in different years, the findings describe associations and should not be

interpreted as proof of causality or oncologic superiority.

Keywords: brachytherapy, genital neoplasms, nursing care, workload, retrospective studies

SAŽETAK

Uvod: Trajanje tretmana i imobilizacija tokom ginekološke brahiterapije mogu uticati na iskustvo pacijentice i potrebu za sestrinskom podrškom. Cilj rada bio je uporediti zabilježene akutne efekte i dokumentirane intervencije medicinske sestre tokom brahiterapije srednje brzine doze (MDR) i visoke brzine doze (HDR).

Cilj: uporediti žene liječene MDR brahiterapijom 2006. godine i HDR brahiterapijom 2013. godine.

Materijali i metode: Retrospektivno su poređene 398 pacijentice liječene zbog malignoma cerviksa, korpusa uterusa ili vagine na Klinici za onkologiju Kliničkog centra Univerziteta u Sarajevu. MDR kohortu činile su 152 pacijentice i 296 aplikacija provedenih od 1. januara do 31. decembra 2006. godine, a HDR kohortu 246 pacijentica i 850 aplikacija provedenih od 1. januara do 31. decembra 2013. godine. Brojevi iz izvornih tabela provjereni su radi interne usklađenosti. Distribucije kohorti poređene su Pearsonovim hi-kvadrat testom, a proporcije neželjenih efekata z-testom za dvije proporcije.

Rezultati: Distribucije prema dobnoj grupi, dijagnozi i evidentiranom FIGO stadiju nisu se značajno razlikovale između kohorti. MDR aplikacije trajale su 7-11 sati, a HDR aplikacije 7-10 minuta. Strah/nemir zabilježen je kod 98,7% MDR i 93,5% HDR pacijentica ($p=0,016$), a mučnina/povraćanje kod 39,5% i 20,3% ($p<0,001$). Krvarenje se nije značajno razlikovalo. Tokom 296 MDR aplikacija dokumentirano je 1410 dodatnih intervencija medicinske sestre (4,76 po aplikaciji), a tokom 850 HDR aplikacija 20 intervencija (0,02 po aplikaciji).

Zaključak: U ovim historijskim kohortama HDR je bio povezan sa znatno kraćim trajanjem aplikacije i

manjim brojem dokumentiranih sestrinskih intervencija. Zbog liječenja kohorti u različitim godinama, nalazi predstavljaju povezanosti i ne dokazuju uzročnost niti onkološku superiornost.

Ključne riječi: brahiterapija, ginekološki tumori, zdravstvena njega, radno opterećenje, retrospektivne studije

INTRODUCTION

Gynecologic malignancies remain an important clinical and public-health burden. Brachytherapy is an essential component of definitive radiotherapy for locally advanced cervical cancer and is also used in selected uterine corpus and vaginal malignancies (1-5). By placing the radiation source close to the target, brachytherapy permits a high local dose while limiting exposure of surrounding organs at risk.

Dose rate strongly affects treatment logistics. Medium-dose-rate (MDR) treatment requires prolonged immobilization and monitoring, whereas high-dose-rate (HDR) remote afterloading delivers each fraction within minutes. The shorter application time may reduce isolation and position-related discomfort, but it does not remove the need for careful preparation, pain and anxiety assessment, monitoring, and post-procedure education (6-10).

Women undergoing gynecologic brachytherapy may experience fear, anxiety, pain, nausea, bleeding, and a sense of vulnerability. Nursing responsibilities include psychological preparation, documentation, catheter and applicator support, symptom management, radiation-safety procedures, and recognition of complications (10-17). Evidence on oncologic outcomes has generally shown comparable results between appropriately delivered HDR and lower-dose-rate techniques, but nursing workload and recorded acute treatment effects are less frequently reported (6-9).

The Clinic of Oncology of the Clinical Center University of Sarajevo replaced MDR with HDR brachytherapy in routine practice. The transition

created two historical treatment cohorts that can be compared from the perspective of recorded acute effects and documented nursing interventions.

AIM

The aim of this study was to compare women treated with MDR brachytherapy in 2006 and HDR brachytherapy in 2013 with respect to age group, diagnosis, recorded FIGO stage, treatment duration per application, acute effects, and the number and type of documented additional nursing interventions.

MATERIALS AND METHODS

Study design and setting

This retrospective comparative study used brachytherapy treatment logs and medical histories from the Clinic of Oncology, Clinical Center University of Sarajevo. The report was prepared in accordance with the STROBE recommendations for observational studies, where applicable.

Participants and study periods

The source study included 398 women with gynecologic malignancies who presented for brachytherapy treatment for the first time. The MDR cohort included 152 patients who received 296 applications from 1 January to 31 December 2006. The HDR cohort included 246 patients who received 850 applications from 1 January to 31 December 2013. Diagnoses recorded in the source tables were carcinoma of the cervix uteri, carcinoma of the corpus uteri, and vaginal tumor. The available age categories were 30-45 and 45-65 years, and the available stage categories were FIGO II and FIGO III. The source thesis did not report additional inclusion or exclusion criteria.

Variables and denominators

The extracted variables were age group, diagnosis, recorded FIGO stage, number of brachytherapy applications, treatment duration per application, recorded acute effects, and documented

additional nursing interventions. Acute effects were analyzed at patient level and included fear/anxiety, nausea/vomiting, bleeding, pain during treatment, and irradiated-tissue reaction after treatment. Nursing interventions were analyzed at application level and included psychological support for fear/anxiety, diuresis checks, applicator-position checks and comfort or positioning care (recorded in the source as 'applicator check and massage'), medication administration, and feeding or nutritional assistance. Routine nursing care was not quantified.

Data verification and statistical analysis

All numerical values were checked against the original thesis tables. When the source narrative conflicted with a table, the tabulated counts were used because they reconciled with the stated cohort totals. Categorical variables are presented as counts and percentages. Pearson chi-square tests compared the distributions of age group, diagnosis, and stage between the MDR and HDR cohorts. Two-sample z tests compared recorded adverse-effect proportions. Absolute risk differences with 95% confidence intervals are reported as MDR minus HDR. Pain and irradiated-tissue reaction were recorded in 100% of both cohorts, so comparative testing was not informative. Nursing interventions are presented descriptively as counts and counts per application because multiple interventions could occur during one application. A two-sided p-value <0.05 was considered statistically significant.

Ethical approval

This article was based on a previously completed and defended master's thesis. The present manuscript represents a secondary analysis and journal-format presentation of previously collected, anonymized retrospective data. No new patient data were collected, no additional interventions were performed, and no patients were contacted for the purposes of this publication. Therefore, additional ethical committee approval was not required.

RESULTS

The study comprised 398 patients and 1146 brachytherapy applications. Age-group, diagnosis, and recorded stage distributions did not differ significantly between the two historical cohorts

(Table 1). Cervical carcinoma was the most frequent diagnosis in both cohorts. Within the categories available in the source tables, the 45-65-year age group and FIGO III stage were more frequent than the corresponding comparison categories.

Table 1 **Baseline characteristics of the historical MDR and HDR cohorts.**

Characteristic	MDR (n=152), n (%)	HDR (n=246), n (%)	p-value
Age group			0.440
30-45 years	64 (42.1)	94 (38.2)	
45-65 years	88 (57.9)	152 (61.8)	
Diagnosis			0.841
Carcinoma of the cervix uteri	104 (68.4)	162 (65.9)	
Carcinoma of the corpus uteri	43 (28.3)	74 (30.1)	
Vaginal tumor	5 (3.3)	10 (4.1)	
Recorded FIGO stage			0.723
FIGO II	56 (36.8)	95 (38.6)	
FIGO III	96 (63.2)	151 (61.4)	

MDR: medium-dose-rate; HDR: high-dose-rate; FIGO: International Federation of Gynecology and Obstetrics. P-values compare the distributions between cohorts and were recalculated from the original table counts.

Treatment duration

MDR brachytherapy required 7-11 hours per application, depending on diagnosis. The approximate midpoint of the reported range was 9 hours for cervical carcinoma, 8 hours for carcinoma of the corpus uteri, and 10 hours for vaginal tumor.

HDR applications lasted 7-10 minutes across diagnoses, with an approximate midpoint of 8.5 minutes (Table 2). These values refer to individual applications, not the full treatment course.

Table 2 **Treatment duration per brachytherapy application.**

Diagnosis	MDR duration per application	HDR duration per application
Carcinoma of the cervix uteri	8-10 h (midpoint approximately 9 h)	7-10 min (midpoint approximately 8.5 min)
Carcinoma of the corpus uteri	7-9 h (midpoint approximately 8 h)	7-10 min (midpoint approximately 8.5 min)
Vaginal tumor	9-11 h (midpoint approximately 10 h)	7-10 min (midpoint approximately 8.5 min)

Durations are reported exactly as ranges in the source thesis; midpoint values are descriptive and were not measured at patient level.

Recorded acute effects

Fear/anxiety was recorded in 98.7% of MDR patients and 93.5% of HDR patients. The absolute difference was 5.2 percentage points (95% CI 1.6 to 8.8; $p=0.016$). Nausea/vomiting was recorded in 39.5% and 20.3%, respectively, an absolute difference of 19.1 percentage points (95% CI 9.9 to

28.4; $p<0.001$). Bleeding was recorded in 39.5% of MDR and 32.5% of HDR patients; the difference was not statistically significant ($p=0.158$). Pain during treatment and irradiated-tissue reaction were recorded in every patient in both cohorts, without severity grading (Table 3).

Table 3 Recorded acute effects by brachytherapy technique.

Recorded acute effect	MDR (n=152), n (%)	HDR (n=246), n (%)	Absolute difference, percentage points (95% CI)	p-value
Fear/anxiety	150 (98.7)	230 (93.5)	5.2 (1.6 to 8.8)	0.016
Nausea/vomiting	60 (39.5)	50 (20.3)	19.1 (9.9 to 28.4)	<0.001
Bleeding	60 (39.5)	80 (32.5)	7.0 (-2.8 to 16.7)	0.158
Pain during treatment	152 (100.0)	246 (100.0)	0.0	Not informative
Irradiated-tissue reaction	152 (100.0)	246 (100.0)	0.0	Not informative

Absolute difference is MDR minus HDR. CI: confidence interval. Pain and irradiated-tissue reaction were recorded in all patients and were not graded.

Documented nursing interventions

During 296 MDR applications, 1410 additional nursing interventions were documented, corresponding to 4.76 interventions per application. During 850 HDR applications, 20 additional interventions were documented, corresponding to 0.02 per application. In the HDR cohort, the recorded

additional interventions were limited to psychological support for fear/anxiety. In the MDR cohort, feeding or nutritional assistance, applicator-position or comfort-related care, and diuresis checks were the most frequently documented interventions (Table 4).

Table 4 Documented additional nursing interventions by brachytherapy technique.

Documented additional nursing intervention	MDR count	MDR per application	HDR count	HDR per application
Psychological support for fear/anxiety	70	0.24	20	0.02
Diuresis check	350	1.18	0	0.00
Applicator-position check and comfort/positioning care*	400	1.35	0	0.00
Medication administration	80	0.27	0	0.00
Feeding or nutritional assistance	510	1.72	0	0.00
Total	1410	4.76	20	0.02

*The source thesis used the term 'applicator check and massage'; the journal wording clarifies this as applicator-position checking and comfort/positioning care. Counts do not represent all routine nursing care.

DISCUSSION

The main finding of this historical comparison was a marked reduction in application time and documented additional nursing-intervention burden after the transition from MDR to HDR brachytherapy. The diagnosis, age-group, and recorded stage distributions were similar across cohorts, but the two cohorts were treated seven years apart. The results therefore describe associations with treatment era and technique rather than isolated causal effects of dose rate.

The difference in application duration was clinically and operationally substantial. MDR applications required prolonged immobilization for several hours, while HDR applications were completed within minutes. This is consistent with the broader transition toward HDR remote afterloading, which allows fractionated outpatient treatment, shorter room occupancy, and reduced staff radiation exposure (3-9). The present study did not evaluate tumor control, recurrence, late toxicity, or survival and cannot be used to claim oncologic superiority of HDR.

Recorded nausea/vomiting showed the largest between-cohort difference. Prolonged immobilization, fasting, anxiety, concomitant chemotherapy, analgesic or anesthetic practice, and general treatment fatigue could all contribute, but these factors were not available for adjustment. The absolute difference in fear/anxiety was statistically significant but modest. Previous studies show that information, communication, and supportive nursing care influence how women cope with gynecologic brachytherapy (10-17).

Pain and irradiated-tissue reaction were recorded in all patients. Because the source used only present-or-absent categories and did not apply validated pain or toxicity scales, these variables have limited discriminatory value. Their universal recording should not be interpreted as indicating equal severity. Similarly, the intervention counts reflect documentation practices and additional actions, not the complete nursing workload.

The intervention profile nevertheless illustrates how nursing work changes with treatment technique. Prolonged MDR treatment required feeding assistance, diuresis monitoring, applicator-position or comfort-related care, medication administration, and repeated psychological support. HDR reduced the duration of bedside monitoring, but preparation, identification, documentation, bladder and bowel management, analgesia support, audio-visual monitoring, observation for bleeding and pain, and discharge education remained essential.

This study has important limitations. It was retrospective and compared different calendar years, so changes in equipment, staffing, anesthesia, analgesia, chemotherapy, external-beam radiotherapy, and documentation may have influenced the findings. Only aggregate source-table counts were available for the present verification, preventing multivariable adjustment and patient-level sensitivity analyses. The source tables contained only two age groups and two stage categories, without an explanation of patients outside those categories. FIGO stage was analyzed as recorded even though staging systems differ by tumor site and may have changed between treatment eras. Missing-data procedures were not reported. Treatment duration was provided as ranges rather than patient-level measurements. Finally, the dataset is historical and does not represent current brachytherapy practice at the institution.

Despite these limitations, the study documents a local transition in technology and its likely implications for patient support and nursing workflow. Its most defensible contribution is historical and operational: HDR was associated with shorter applications and fewer documented additional nursing actions, while structured nursing preparation and symptom assessment remained necessary.

CONCLUSION

In this single-center retrospective comparison of 2006 MDR and 2013 HDR cohorts, HDR

brachytherapy was associated with much shorter application time, fewer documented additional nursing interventions per application, and lower recorded frequencies of nausea/vomiting and fear/anxiety. Bleeding did not differ significantly. The findings should be interpreted as historical associations given that treatment era, supportive care, and documentation practices could not be separated from a dose-rate technique. Standardized nursing preparation, symptom assessment, monitoring, and post-procedure education remain important for both approaches.

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The Importance of Nursing Care in the Treatment of Malignant Bone Tumors and the Importance of Integrating Palliative Care

Značaj zdravstvene njege u tretmanu malignih tumora kostiju i značaj rane integracije palijativne njege

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ABSTRACT

Introduction: Malignant bone tumors are a rare type of cancer occurring in the bones. The most common types include osteosarcoma, chondrosarcoma, Ewing's sarcoma, and fibrosarcoma. Although rare, these tumors can seriously threaten patients' lives. Palliative care is essential in managing symptoms, such as pain, and improving patients' quality of life by providing physical, emotional and psychological support.

Aim: The aim of this review was to show how the early introduction of palliative care affects the quality of life of patients, including the knowledge and expertise of nurses in the care process.

Materials and methods: The study used secondary data analysis and a review of the literature related to malignant bone tumors and palliative care. Similar studies, statistics, and experiences from global practice were also examined. The literature used included scientific journals and case studies.

Results: Medical technicians play a key role in the care of patients with malignant bone tumors,

particularly in monitoring symptoms such as pain, mobility issues, and emotional difficulties. Early integration of palliative care significantly improves quality of life, reduces pain and stress, and improves patient functionality.

Conclusion: Palliative care is of crucial importance for patients with malignant bone tumors, by improving the quality of life and reducing symptoms. Early integration of this care has significant benefits, while nurses play a key role in the implementation of this approach. In addition, this integration reduces the emotional burden on families and optimizes healthcare resources.

Keywords: bone tumors, palliative care, pain management, medical technicians, quality of life

SAŽETAK

Uvod: Maligni tumori kostiju su rijetka vrsta karcinoma koja počinje u kostima. Najčešći tipovi uključuju osteosarkom, hondrosarkom, Ewingov sarkom i fibrosarkom. Iako rijetki, ovi tumori mogu ozbiljno ugroziti život pacijenata. Palijativna njega je ključna u upravljanju simptomima, poput bola i u poboljšanju kvalitete života pacijenata, pružajući

fizičku, emocionalnu i psihološku podršku.

Cilj: Cilj ovog preglednog rada jeste predstaviti kako rano uvođenje palijativne njege utiče na kvalitetu života pacijenata, uključujući znanje i stručnost medicinskih sestara i tehničara u procesu njege.

Materijali i metode: Ovo istraživanje koristi analizu sekundarnih podataka i pregled literature koja se bavi malignim tumorima kostiju i palijativnom njegom. Proučeni su slični radovi, statistike i iskustva u globalnoj praksi. Korištena literatura uključuje naučne časopise i studije slučaja.

Rezultati: Medicinski tehničari imaju ključnu ulogu u njezi pacijenata sa malignim tumorima kostiju, posebno u praćenju simptoma poput bola, mobilnosti i emocionalnih poteškoća. Rana integracija palijativne njege značajno poboljšava kvalitetu života, smanjuje bol i stres, te poboljšava funkcionalnost pacijenata.

Zaključak: Palijativna njega je od presudne važnosti za pacijente sa malignim tumorima kostiju, jer poboljšava kvalitet života i smanjuje simptome. Rana integracija ove njege donosi značajne koristi, dok medicinske sestre i tehničari igraju ključnu ulogu u implementaciji ovog pristupa. Ova integracija takođe smanjuje emocionalni teret porodica i optimizira zdravstvene resurse.

Ključne riječi: tumori kostiju, palijativna njega, upravljanje bolom, medicinski tehničari, kvalitet života.

INTRODUCTION

Malignant bone tumors are a type of cancer originating in the bones. These tumors are usually referred to as primary bone tumors, meaning that they start in the bone itself not spreading to bone from other body parts (known as metastatic cancer). Although bone cancer is relatively rare compared to other types of cancer, it can be a serious and life-threatening condition if not detected and treated in time (1).

Malignant bone tumors are growths which develop when abnormal cells in the bone grow uncontrollably and form a mass or tumor. These tumors have the potential to invade surrounding tissues and spread (metastasize) to other parts of the body. There are several different types of malignant bone tumors, each affecting different types of bone tissue and with its own characteristics:

Osteosarcoma: the most common type of primary malignant bone tumor. Osteosarcoma usually affects long bones, such as the arms and legs, and is most commonly diagnosed in children and young adults. It is usually formed at the bone ends near the growth plates, which explains why it is common in people who are still growing.

Chondrosarcoma is a tumor arising from cartilage cells, not bones. It usually affects the elderly and can occur in different of bones, including the pelvis, ribs, and long bones. Unlike osteosarcoma, chondrosarcoma usually grows more slowly, but can be very aggressive.

Ewing's sarcoma is a rare but aggressive form of bone cancer affecting mainly children and young adults. It can occur in any bone, but is most commonly found in the pelvis, thighs, and arms. This type of tumor is part of a group of cancers known as the Ewing sarcoma family of tumors (ESFT).

Fibrosarcoma is a type of malignant tumor arising in the fibrous tissue of the bone. It can occur in both children and adults, but is more common in middle-aged adults. It usually develops in the long bones and is most often found in the arms and legs.

Chondromyxoid fibroma is a rare type of bone tumor usually affecting the knee area. Although less common than other bone tumors, it can be aggressive and require treatment such as surgery or radiation therapy.



Figure 1 **Overview of malignant bone tumors.**

Bone cancer is a relatively rare disease, usually affecting the arms and legs long bones. According to the World Health Organization, the highest incidence of bone cancer is osteosarcoma, occurring in about 4-5 per 1,000,000 inhabitants of all populations, with the estimated annual occurrence of 1,072-1,340 new cases. The incidence of bone cancer is constantly rising, reaching 8-11 cases per 1 million population per year in the 15-19 age group. Studies show that the incidence of primary malignant bone cancer in China between 2000 and 2015 was 11,655 cases, while the incidence of osteosarcoma type bone cancer in the Dr. Cipto Mangunkusumo hospital in Indonesia amounted to 219 cases (16.8 cases per year). Osteosarcoma is the most common type of malignant bone tumors (70.59%), followed by chondrosarcoma, Ewing's sarcoma and chordoma.

The prevalence of cancer in Central Java, Indonesia, is higher than in other provinces, accounting for 2.11% or 132,565 cases. The bone cancer ratio in men and women is 3:2.

Primary bone cancer occurs in adolescents during

the second decade of life, accounting for 60% of cases occurring in individuals under the age of 25. The incidence of bone cancer increases with age, and is most prominent at the age of 60, with a bimodal distribution. Secondary bone cancer develops in adulthood due to the spread of cancerous cells to the bone tissue.

The diagnosis and management of bone cancer require a multidisciplinary approach, including the role of nurses and medical oncologists. Healthcare professionals in hospitals are expected to play a key role in providing optimal care. Medical treatment for bone cancer includes surgical amputation, chemotherapy, or radiotherapy using high-energy radiation. Patients with bone cancer experience various disorders causing a decline in their general condition. This problem leads to further health issues affecting various aspects of life, impacting the patient's ability to remain independent in daily activities. Reduced physical condition is associated with changes in daily activities and physiological responses to the disease and its treatment (2).

Symptoms of malignant bone tumors can vary depending on the tumor location and size. In the early stages, symptoms may not be noticeable or may be mistaken for other, less serious conditions, such as a muscle strain. However, as the tumor grows, pain, swelling, fatigue, weight loss or even fractures may occur, as malignant tumors can weaken the bone making it more prone to fracture. Bones can break with little or no impact, especially if the tumor has significantly weakened the bone structure (3).

The exact cause of malignant bone tumors is not always known, but some factors can increase the risk of developing this type of cancer. One of the known risk factors includes genetic factors. Some genetic conditions, such as Li-Fraumeni syndrome, retinoblastoma, and Paget's disease of bone, can increase the chance of developing bone cancer. Likewise, certain bone conditions, such as bone diseases caused by chronic infections or previous injuries, can increase the risk of developing a malignant bone tumor (4).

In addition to surgery, palliative care plays an important role in the treatment of malignant bone tumors. Palliative care is a specialized medical care focused on improving the quality of life of patients facing serious, severe or terminal illnesses. Unlike traditional treatment, focused on treating the disease itself, palliative care relates to symptom reduction, pain relief, and the providing emotional, psychological, and social support to patients and their families.

The goal of palliative care is not only physical relief but also the improvement of the patient's overall well-being, regardless of the disease stage (5).

With regard to patients with bone tumors, palliative care is of particular importance given that bone cancer can cause severe pain, problems with movement, and emotional and psychological difficulties due to the disease severity and the therapies that the patient must undergo. Given that bone tumors often require long-term treatments such as surgery, chemotherapy, or radiotherapy, patients are faced with number of challenges, including pain, fatigue, and emotional exhaustion. Palliative care assists in managing these symptoms and provides a holistic approach to patient care (6).

AIM

The aim of the review was to show how the early introduction of palliative care affects the quality of life of patients, including the knowledge and expertise of nurses in the care process.

MATERIALS AND METHODS

This paper is conceived as a review article based on an analysis of available scientific and professional literature addressing malignant bone tumors and the importance of palliative care in their treatment. This paper used secondary research methods, including searches of relevant databases such as PubMed, Google Scholar, and other scientific sources. The literature inclusion criteria referred to works published in the last ten years dealing with malignant bone tumors, the role of nurses and

technicians in treatment, and the importance of early integration of palliative care. The analysis included review and original research papers, case studies, as well as relevant international organizations guidelines. The data were analyzed using a descriptive analysis method, comparing the results of various studies to identify common conclusions and significant findings. A special focus was put on the role of nurses in improving the quality of life of patients through the use of palliative care.

RESULTS

An analysis of the available literature established that malignant bone tumors, although rare, represent a significant clinical problem due to their aggressiveness, complexity of treatment and significant effect on patients' quality of life. Majority of studies indicate that the most common symptoms are pain, reduced mobility, and psychological difficulties, which significantly influence the daily functioning of those affected.

The results of the reviewed studies show that nurses play a key role in the care of patients with malignant bone tumors. Their role is reflected in of continuously monitoring patients' health status, assessing and managing pain, administering therapeutic procedures, and providing emotional and psychological support. The importance of their training in recognizing complications and responding in a timely manner is also emphasized.

Further analysis indicates that early integration of palliative care has a significant positive impact on patients' quality of life. Studies show that the inclusion of palliative care in the early stages of the disease contributes to better control of symptoms, reducing the intensity of pain, anxiety and depression, as well as improving the functional status of patients. In addition, a reduction in the number of hospitalizations and more efficient use of healthcare resources has been recorded.

Furthermore, the results indicate that not only patients but also their families benefits from early palliative care by reducing emotional stress and

improving communication with healthcare professionals. The role of nurses is particularly significant in educating the family and providing support throughout the entire course of the illness.

Despite a number of advantages, the literature analysis shows that the application of early palliative care is still marginalized, especially in countries with limited resources. A lack of education and specialized training for healthcare personnel is stated as one of the main reasons, indicating the need for further improvement of the healthcare system.

The Role of Nurses in the Care of Patients with Malignant Bone Tumors

Nurses in palliative care play a key role given that they provide not only physical care, but also emotional support, thus facilitating the entire process of treatment and recovery and enabling patients to go through their illness with dignity (7). Bone tumors, although rare, represent a significant medical challenge due to their aggressiveness, specific symptoms and the need for a multidisciplinary treatment approach (8).

Considering the complexity of the disease and therapeutic options, this paper was focused on the importance of knowledge and practical skills of nurses in the care of patients with bone tumors and the importance of introducing palliative care in the early stages of treatment (9). The aim of this research is to present how the early introduction of palliative care affects the quality of life of patients, including the knowledge and expertise of nurses in the care process.

As part of regular care, nurses carefully monitor the skin condition of patients undergoing radiotherapy, and become aware of changes in physiological indicators, such as blood tests. Also, they provide care through the adjustment of diet and the administration of appropriate medication. This care starts from the moment the patient is admitted to the hospital and continues until his/her discharge. In the context of pain care, medical technicians carefully assess the location, profile, and

intensity of a patient's pain and adjust care procedures, including repositioning the patient and applying cold compresses, to reduce negative stimuli (10).

In addition, the analgesic dose is adjusted as needed, applying the three-step pain management strategy in accordance with World Health Organization (WHO) guidelines and physician advice. Furthermore, psychological care and health counseling include encouraging patients to engage in physical activities to divert attention from the pain (11).

As part of the care optimization, nurses regularly monitor various parameters and side effects of therapies such as changes in serum creatinine levels, which enable timely recognition of any changes in the patient's condition. One of the important methods for monitoring these parameters is maintaining patient status records, which nurses use to document all relevant information during every patient visit. The record is completed at each patient visit, and the nurses compare the new data with the initial information before administration of any treatment. In addition, medical technicians have a responsibility to counsel patients on the importance of adequate hydration, maintaining good oral hygiene, taking calcium and vitamin D supplements, and how to best manage potential side effects of treatment. The main problem reported by patients with bone cancer is pain. Pain is the most common problem reported by patients in the hospital and represents the most distressing symptom. Pain can be caused by tumor growth, surgery or as a side effect of treatment, such as chemotherapy and radiotherapy (12). Nurses often use opioids and other medications to control pain.

In addition to pain, patients with bone cancer often experience reduced physical mobility. Due to tumor growth, joint pressure, and decreased muscle strength, many patients become dependent on aids such as crutches, wheelchairs, or other mobility devices. The role of the nurses here is to support patients in maintaining their mobility and independence, and to help them with their daily activities (13).

In addition, sleep disturbances and a need for

rest are common among patients with bone cancer. Pain, especially at night, can impair sleep quality, negatively affecting patients' recovery and functional ability. Nurses play a key role in helping patients optimize their sleep, advising them on techniques to improve sleep quality, and monitoring their need for rest.

The Importance of Early Integration of Palliative Care

Palliative care (PN) can be integrated at any time after diagnosis, regardless of whether the patient is receiving disease-modifying treatments. However, it has been proven that early integration of PN has greater benefits in terms of improving quality of life and symptom management, and may even contribute to increasing the overall survival rate. Collaboration between palliative care teams and oncologists to integrate early palliative care interventions has shown improvements in patient well-being. Moreover, early integration helps reduce the emotional burden on family members, enabling them to provide better support to their loved ones. In addition to immediate benefits for patients and families, palliative care also improves the health care system by reducing costs and maximizing the use of resources. The rising prevalence of diseases such as cancer, particularly in low- and middle-income countries with limited healthcare resources, results in a growing demand for palliative care services that remains dissatisfied. Studies have shown that nurses need specialized training to effectively respond to the diverse needs of patients and their families, whether physical, emotional, social or spiritual, at the end of life. In countries with limited resources, nurses are usually the main care providers, which emphasize the urgent need for comprehensive education and training programs. In addition, training in palliative care has shown improvement in communication and collaboration among healthcare professionals (14).

DISCUSSION

The results of this review paper confirm the significant role of nurses in the care of patients with malignant bone tumors, especially in the context of

early palliative care integration. The findings are consistent with contemporary research indicating that palliative care should not be limited solely to the terminal stages of illness, but rather that its early implementation contributes to improved quality of life and more effective symptom control. The World Health Organization guidelines emphasize that timely palliative care contributes to better control of symptoms and improvement of patients' quality of life (3), whereas research by Temel JS, et al. confirms that early inclusion of palliative care improves patients' functional status and quality of life (4).

Guidelines from the American Society of Clinical Oncology (ASCO) emphasize that integrating palliative care into routine oncology practice requires a multidisciplinary approach and continuous education for healthcare professionals (5). The results of this study, indicating that pain is the dominant symptom, are consistent with contemporary reviews stating that pain is the most common and most reported symptom in patients with malignant bone diseases (6). In accordance with the World Health Organization recommendations, adequate assessment and treatment of pain represent the basis of quality palliative care and significantly contribute to reducing the physical and psychological burden of patients (12).

Recent studies also emphasize that symptom management should encompass the control of pain, fatigue, sleep disturbances, and reduced mobility, confirming the need for a holistic approach to the healthcare of these patients (13).

Regarding the role of nurses, the literature emphasizes the importance of a multidisciplinary approach, with nurses playing a key role in coordinating care and communicating with patients and their families (7). This view is confirmed by Hayek MF, et al. who emphasize that the level of knowledge and attitudes of nurses directly affect the quality of palliative care provided (9).

However, Ali W, et al. indicate that nurses' attitudes towards dying patients can vary, which can be an obstacle in providing adequate care, especially in environments with insufficient education (8). In

the context of resource-limited settings, Abu-Odah H. et al. highlight numerous challenges in the implementation of palliative care, including a lack of education, resources, and organizational support. These findings are consistent with the results of this paper, where it was also observed that the application of early palliative care is still underrepresented (11). Additionally, Sagica T, et al. highlight specific challenges in the care of patients undergoing radiotherapy, noting that nurses play a key role in monitoring side effects and educating patients (10).

CONCLUSION

The role of nurses in the care of patients with malignant tumors is crucial for providing comprehensive, high-quality care. Nurses play a central role in monitoring vital signs, assessing pain, adjusting therapies, and providing physical, emotional, and psychological support to patients. Early integration of palliative care, which includes specialized training of nurses, shows significant benefits for improving the quality of life of patients, reducing the emotional burden on families, and improving the overall health system. Ensuring quality education and training for nurses, especially in resource-limited settings, is essential for optimizing care and improving symptom management during the terminal stages of illness.

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Change in Nursing: Between Professional Experience, Resistance, and Evidence-Based Practice

Promjena u sestrinstvu: između profesionalnog iskustva, otpora i prakse zasnovane na dokazima

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ABSTRACT

Introduction: Contemporary nursing is facing continuous changes arising from the development of scientific knowledge, new technologies, changes in the organization of healthcare, and increasingly complex patient needs. In addition to performing procedures correctly, nurses are nowadays expected to demonstrate critical thinking, clinical decision-making, and the ability to apply the best available evidence in everyday practice. However, the introduction of new ways of working may be accompanied by various forms of resistance.

Aim: to analyze the factors influencing the acceptance and implementation of changes in nursing practice, with particular emphasis on professional experience, evidence-based practice, organizational culture, leadership, and continuing professional development.

Materials and methods: A narrative review of the literature in the fields of nursing, evidence-based practice, professional development, and healthcare management was made. The study included original research articles, integrative and systematic reviews, as well as studies analyzing barriers to and factors facilitating changes in nursing practice.

Results: The literature indicates that the acceptance of change depends on the interaction of individual and organizational factors. Lack of time, knowledge, resources, leadership support, and opportunities for professional development may hinder the implementation of new practices. At the same time, involving nurses in the change process, supportive leadership, an organizational culture promoting evidence-based practice, education, mentorship, and continuing professional development may facilitate the adoption of new ways of working.

Conclusion: Resistance to change should not automatically be interpreted as nurses' unwillingness to develop. It may reflect professional values, previous experiences, and the way in which change is introduced. Sustainable transformation of nursing practice requires the integration of professional experience with contemporary scientific evidence, supported by an appropriate organizational environment and continuing education.

Keywords: nursing, change, resistance to change, evidence-based practice, organizational culture

SAŽETAK

Uvod: Savremeno sestrinstvo suočava se s kontinuiranim promjenama koje proizlaze iz razvoja naučnih spoznaja, novih tehnologija, promjena u organizaciji zdravstvene zaštite i sve složenijih potreba pacijenata. Osim pravilnog izvođenja postupaka, od medicinskih sestara se danas očekuje i sposobnost kritičkog mišljenja, kliničkog odlučivanja i primjene najboljih dostupnih dokaza u svakodnevnoj praksi. Međutim, uvođenje novih načina rada može biti praćeno različitim oblicima otpora.

Cilj: analizirati faktore koji utiču na prihvatanje i provođenje promjena u sestrinskoj praksi s posebnim osvrtnom na profesionalno iskustvo, praksu zasnovanu na dokazima, organizacijsku kulturu, rukovođenje i kontinuirani profesionalni razvoj.

Materijali i metode: Proveden je narativni pregled literature iz područja sestrinstva, prakse zasnovane na dokazima, profesionalnog razvoja i zdravstvenog menadžmenta. Razmatrani su originalni istraživački radovi, integrativni i sistematski pregledi te radovi koji analiziraju prepreke i faktore koji olakšavaju promjene u sestrinskoj praksi.

Rezultati: Literatura pokazuje da prihvatanje promjena zavisi od međusobnog djelovanja individualnih i organizacijskih faktora. Nedostatak vremena, znanja, resursa, podrške rukovodstva i mogućnosti profesionalnog razvoja mogu otežati primjenu novih praksi. Istovremeno, uključivanje medicinskih sestara u proces promjene, podržavajuće rukovođenje, organizacijska kultura koja podstiče praksu zasnovanu na dokazima, edukacija, mentorstvo i kontinuirani profesionalni razvoj mogu olakšati usvajanje novih načina rada.

Zaključak: Otpor promjenama ne treba automatski tumačiti kao nespremnost medicinskih sestara za razvoj. On može odražavati profesionalne vrijednosti, prethodna iskustva i način na koji je promjena uvedena. Održiva transformacija sestrinske prakse zahtijeva povezivanje profesionalnog iskustva sa savremenim naučnim dokazima, uz odgovarajuću organizacijsku podršku i kontinuirano obrazovanje.

Ključne riječi: sestrinstvo, promjene, otpor promjenama, praksa zasnovana na dokazima, organizacijska kultura

INTRODUCTION

Over the past several decades, healthcare has undergone significant changes associated with the development of medical science, technological advances, changes in the organization of healthcare systems, and increasingly complex patient needs. These changes have simultaneously transformed the professional role of nurses. In contemporary nursing practice, more is expected than the implementation of predefined procedures. It requires the ability to think critically, evaluate available information, and make decisions based on the best available evidence (1).

Evidence-Based Practice (EBP) represents an important element of contemporary nursing because it integrates scientific evidence with nurses' professional experience and the needs of individual patients. Although nurses recognize the importance of EBP, this does not necessarily mean that they can implement it without difficulties in everyday practice. A significant gap may exist between knowledge of EBP and its actual implementation (2,3).

Change may affect existing work patterns, professional roles, nurses' sense of competence, and their autonomy. Difficulties in accepting new ways of working cannot be explained solely by a lack of individual motivation. Responses to change may be influenced by an individual's knowledge and experience, but also by communication, leadership style, team relationships, and the support nurses receive within the organization. Resistance to change among nurses may be associated with fear of the unknown, lack of information, a sense of loss of control, insufficient preparation, or previous experiences in which decisions affecting their work were made without their involvement (4).

McMillan K, et al. (2021) offered a particularly interesting perspective on resistance to change. Their qualitative study suggests that resistance is not always simply a rejection of change. Under certain circumstances, resistance to change may represent a way in which nurses attempt to protect professional values and what they consider to be morally appropriate nursing practice. Such resistance may be related to how nurses perceive the change, its impact on professional values, and their own role in the change process (5).

This understanding of resistance changes the perspective from which change in healthcare organizations is viewed. Rather than automatically considering every form of disagreement as an obstacle, it is important to examine what underlies such a response and whether it indicates shortcomings in communication, preparation, or the way in which the change is implemented (4,5).

Professional Experience and Traditional Patterns of Practice

Professional experience represents an important component of nursing competence. Years of practice enable the development of clinical judgment, recognition of changes in a patient's condition, and safer responses in complex situations. A potential problem arises when experiential knowledge is used without continuously reassessing existing practices and without considering new scientific evidence. Under such circumstances, experience may contribute to maintaining traditional patterns of practice if it is not accompanied by continuous critical reflection and integration with new scientific evidence (1,4,6).

This issue is particularly important in the context of evidence-based practice. A nurse may have extensive professional experience, but experience alone cannot substitute for contemporary scientific evidence. Competent practice requires the ability to integrate knowledge gained through experience with findings from contemporary research (4,6).

Therefore, the statement "this is how we have always done it" should not automatically be interpreted as a sign of unprofessionalism.

Such an attitude among experienced nurses may result from the way nursing knowledge has traditionally been transmitted through experience, the work environment, and mutual learning. However, contemporary nursing requires continuous reassessment of existing practices and evaluation of whether there is a safer, more effective, and evidence-based way of providing nursing care (5,6).

Barriers to the Implementation of Evidence-Based Practice

Although EBP is an important approach to improving the quality of nursing practice, its implementation may be hindered by various barriers. These barriers may exist at the individual, team, and healthcare organizational levels (2,7).

Frequently reported barriers include lack of time, high workload, limited resources, insufficient knowledge, and the complexity of organizational processes. A particular challenge arises when nurses are expected to apply new knowledge while, at the same time, they are not provided with the time, education, resources, and support necessary for its practical implementation (2).

Research also indicates an association between nurses' work engagement, existing barriers, and their implementation of EBP. Creating conditions for the application of evidence requires not only educating staff but also addressing barriers present in their everyday work environment (3).

The systematic review by Berthelsen C, et al. (2021) further emphasizes the importance of context and organizational culture. Their findings indicate that barriers to the use of research are not limited to the characteristics of individual nurses but are also associated with the organizational environment in which practice takes place (7).

Organizational Culture and Leadership

Changes in nursing practice take place within a specific healthcare organization. The way nurses respond to change may be influenced by communication practices, the availability of resources, relationships among employees, opportunities to participate in decision-making, and leadership attitudes toward new ideas (7).

An organizational culture that promotes learning, knowledge sharing, and the use of evidence can create more favorable conditions for change. In contrast, a work environment characterized by routine, insufficient communication, and limited opportunities for employee participation may make it more difficult to accept new ways of working (7,8).

Hu S, et al. (2025) highlighted an association between an organizational culture that supports EBP, leadership during the implementation process, and nurses' competencies. These findings support the view that the development of EBP should not be regarded solely as an individual responsibility, as the organizational environment may influence a nurse's ability to actually apply acquired knowledge in practice. Nursing leaders play an important role in creating such an environment. Their attitudes toward change, communication with staff, and involvement of nurses in the implementation process may influence the acceptance of new ways of working (8).

Huo M, et al. (2024) demonstrated that an organizational climate oriented toward EBP may be associated with nurses' evidence-based practice behaviors. Within this relationship, competencies, perceived control over work, and intention to implement EBP play an important role (9).

Education and Continuing Professional Development

Nursing education represents an important foundation for developing the competencies required for contemporary practice. In addition to practical skills, education should promote the development of critical thinking, the ability to

evaluate scientific information, problem-solving skills, and evidence-based decision-making. A systematic review and meta-analysis by Jeong et al. (2024) indicated that educational programs focused on EBP can contribute to the development of evidence-based practice competencies among nursing students. The findings of this review support the importance of incorporating EBP education into the education of future nurses, particularly because of its potential to develop EBP competencies, critical thinking, and problem-solving abilities (10).

Continuing professional development (CPD) represents an additional mechanism for maintaining and improving nurses' competencies after completion of formal education. The literature indicates an association between continuing professional development and the quality of nursing care, patient safety, and other professional outcomes (11).

Continuing professional development should not be reduced solely to mandatory participation in educational activities. Its value is greater when it is connected to the actual needs of clinical practice and when it enables nurses to develop the knowledge and competencies required to improve nursing care (11).

Nursing professional development specialists may also play an important role in the implementation of EBP. Their support may include educating nurses about the EBP process, providing mentorship, supporting the implementation of new practices, and creating an environment that facilitates the transition from theoretical knowledge to clinical practice (1).

The development of research competencies also represents an important component of professional development. A systematic review by Lei Y, et al. (2026) highlighted the importance of education, research training, motivation, and institutional support in developing the research capacity of clinical nurses. Professional development may sometimes be hindered by lack of time, limited knowledge, and insufficient organizational support (12).

Professional Development as a Link between Knowledge and Change

Changes in nursing practice can be viewed as a process that connects three interdependent levels: nurses' competencies, organizational support, and continuing professional learning. When one of these elements is absent, the potential for sustainable implementation of new ways of working may be limited (2,8).

If nurses are expected to change existing practices, they must simultaneously be provided with opportunities to develop the competencies required for such change. Education alone is not sufficient if, after completing education, a nurse returns to a work environment where there is insufficient time, resources, or support to apply the acquired knowledge (1,8,11).

Implications for Nursing Practice

The findings of the reviewed literature indicate that change in nursing should be viewed as a shared responsibility of the individual, the healthcare organization, and the educational system. Nurses should be expected to demonstrate a willingness to learn and reassess existing practices, while at the same time, organizations must provide conditions that make such behavior possible (2,7).

Nurses should be involved in the planning, implementation, and evaluation of changes. Their direct experience of working with patients represents an important source of information regarding the practical applicability of specific solutions. Involving staff can also help identify potential problems before a change is introduced (4,5).

Healthcare institutions should provide access to education, relevant literature, mentorship, and other forms of professional support. Nursing leaders should develop an organizational culture in which employees' questions, suggestions, and professional concerns can serve as a basis for improving practice (8,9).

CONCLUSION

Change in nursing does not represent a simple replacement of one procedure with another. It is a complex professional process in which experience, knowledge, professional values, individual competencies, and the organizational context are closely interconnected. The reviewed literature indicates that resistance to change should not automatically be viewed as a sign of nurses' unwillingness to accept new practices. In certain situations, it may be associated with the way in which change is introduced, the degree of nurses' involvement, their sense of professional autonomy, and their assessment of the impact of change on the quality of nursing care. The goal of contemporary nursing is not to reject experience, but to use it together with evidence in order to make higher-quality and safer decisions. The transition from a culture of "this is how we have always done it" to a culture of continuous improvement does not mean rejecting tradition and professional experience. On the contrary, it involves the development of a profession in which experience is continuously reassessed, complemented by new knowledge, and integrated with the best available evidence. Sustainable change requires the simultaneous development of nurses' competencies, provision of continuing professional development, organizational support, and leadership that involves staff in change processes.

Limitations of the Study

This paper represents a narrative review of the literature and therefore does not have the methodological characteristics of a systematic review, such as a predefined protocol and formal quality assessment of all included studies. The selection and interpretation of the literature may therefore be subject to selection bias. An additional limitation is the heterogeneity of the studies analyzed in terms of healthcare systems, organizational contexts, and nurse populations. Consequently, the findings of individual studies cannot automatically be generalized to all nursing settings.

Nevertheless, the different types of studies included in this review allow change in nursing to be examined from multiple perspectives, ranging from individual attitudes toward change and barriers to the implementation of EBP to the importance of organizational culture, leadership, education, and professional development.

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Protection of Patient Privacy in Digital Healthcare

Zaštita privatnosti pacijenta u digitalnom zdravstvu

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ABSTRACT

Introduction: Digital health represents an important segment of the modern healthcare system, enabling improvements in the quality, accessibility, and efficiency of healthcare services through the application of information and communication technologies. However, the development of digital solutions also brings numerous challenges, particularly in the area of patient privacy protection. Health data, as a highly sensitive category of personal data, require a high level of security and responsible management.

Aim: This paper analyzed the key aspects of digital health, including electronic health records, telemedicine, mobile applications, and the application of Big Data technologies and artificial intelligence. Special attention is given to the types of health data and their sensitivity, as well as the security risks associated with their processing. Ethical issues such as confidentiality, patient autonomy, and informed consent are also examined, along with the legal framework governing data protection.

Materials and methods: the paper is designed as a review of the available professional and scientific literature in the field of digital health.

Results: The results of the analysis indicate the need for an integrated approach to privacy

protection, which includes the implementation of technical and organizational measures, compliance with legal regulations, and continuous education of healthcare professionals and IT specialists.

Conclusion: This paper demonstrated that digital technologies, such as electronic health records, telemedicine, and artificial intelligence, have significant potential to improve healthcare services while simultaneously increasing the risk of security threats and data misuse.

Keywords: digital health, patient privacy, data protection, health data

SAŽETAK

Uvod: Digitalno zdravstvo predstavlja važan segment suvremenog zdravstvenog sustava koji omogućuje unapređenje kvalitete, dostupnosti i učinkovitosti zdravstvene skrbi kroz primjenu informacijsko-komunikacijskih tehnologija. Međutim, razvoj digitalnih rješenja donosi i brojne izazove, posebno u području zaštite privatnosti pacijenata. Zdravstveni podaci, kao izrazito osjetljiva kategorija osobnih podataka, zahtijevaju visoku razinu sigurnosti i odgovornog upravljanja.

Cilj: U radu su analizirani ključni aspekti digitalnog zdravstva, uključujući elektroničke zdravstvene zapise, telemedicinu, mobilne aplikacije te primjenu Big Data tehnologija i umjetne inteligencije. Posebna

pažnja posvećena je vrstama zdravstvenih podataka i njihovoj osjetljivosti, kao i sigurnosnim rizicima povezanim s njihovom obradom. Također su razmotrena etička pitanja, poput povjerljivosti, autonomije pacijenta i informiranog pristanka, te zakonodavni okvir koji regulira zaštitu podataka.

Materijal i metode: rad je koncipiran kao pregledni rad dostupne stručne i naučne literature iz oblasti digitalnog zdravstva.

Rezultati analize ukazuju na potrebu integriranog pristupa zaštiti privatnosti koji uključuje primjenu tehničkih i organizacijskih mjera, usklađenost sa zakonodavstvom te kontinuiranu edukaciju zdravstvenog osoblja i IT stručnjaka.

Zaključak: rad je pokazao da digitalne tehnologije, poput elektroničkih zdravstvenih kartona, telemedicine i umjetne inteligencije, imaju značajan potencijal za poboljšanje zdravstvenih usluga, a istovremeno povećavaju rizik od sigurnosnih prijetnji i zlouporabe podataka.

Ključne riječi: digitalno zdravstvo, privatnost pacijenata, zaštita podataka, zdravstveni podaci

INTRODUCTION

The digital transformation of the healthcare system has brought numerous benefits in terms of the accessibility, efficiency, and quality of healthcare services. The development of information and communication technologies has enabled the collection, storage, and analysis of large volumes of health data, thereby improving diagnostics, treatment, and patient monitoring. However, alongside these advancements, significant challenges have emerged, particularly in the areas of privacy protection and the security of sensitive patient data (1). Health data are among the most sensitive categories of personal data because they include information about an individual's physical and mental health. Their misuse may lead to serious consequences, including discrimination, stigmatization, and the erosion of trust in the healthcare system. Therefore, protecting patient

privacy has become a fundamental component of modern digital healthcare (2).

Digital healthcare encompasses the application of information and communication technologies to improve healthcare delivery, including electronic health records, telemedicine, mobile health applications, as well as the use of artificial intelligence and big data analytics (3). This concept represents the integration of technology and medicine with the aim of improving treatment outcomes, enhancing healthcare system efficiency, and increasing access to healthcare services. Electronic health records enable the centralized and secure storage of patient information, while telemedicine facilitates the remote delivery of healthcare services. Furthermore, advances in artificial intelligence and the analysis of large datasets enable more accurate diagnostics and a personalized approach to patient care (4).

The protection of patient privacy is a fundamental ethical and legal principle in healthcare. The confidentiality of health information is essential for maintaining trust between patients and healthcare professionals, which is a prerequisite for high-quality care and open communication (5). In the digital environment, privacy risks are further amplified due to the potential for unauthorized access, data breaches, and cyberattacks. Although electronic health records offer numerous benefits, they also represent potential targets for security threats (2).

In addition to technical challenges, the protection of patient privacy also has a significant ethical dimension. Patients have the right to exercise control over their personal data, including the right to provide informed consent for its processing. Inadequate data protection may result in a loss of trust in the healthcare system and reduce patients' willingness to share the information necessary for the provision of high-quality healthcare (3).

AIM

This paper analyzed the key aspects of digital health, including electronic health records,

telemedicine, mobile applications, and the application of Big Data technologies and artificial intelligence. Special attention is given to the types of health data and their sensitivity, as well as the security risks associated with their processing. Ethical issues such as confidentiality, patient autonomy, and informed consent are also examined, along with the legal framework governing data protection.

DIGITAL HEALTH AND DATA MANAGEMENT

Digital health represents one of the key components of modern healthcare systems and is founded on the effective processing and management of large volumes of health data. Data management encompasses the processes of collecting, storing, analyzing, and exchanging information with the aim of improving the quality of healthcare, supporting clinical decision-making, and optimizing healthcare services (1).

Electronic Health Records

Electronic Health Records (EHRs) are digital versions of patients' medical records that enable the systematic collection and storage of information on patients' health status, diagnoses, treatments, and medical procedures. EHR systems provide faster access to patient information, enhance the coordination of healthcare services, and reduce administrative errors (6).

One of the key advantages of EHR systems is their ability to integrate data from different healthcare institutions, thereby ensuring continuity of care and facilitating informed clinical decision-making. In addition, the digitization of medical records contributes to greater healthcare system efficiency and lower healthcare costs (7).

Despite these advantages, EHR systems also pose significant challenges with respect to data security and patient privacy. Unauthorized access, cyberattacks, and data breaches represent major risks that necessitate the implementation of advanced security measures, including encryption, authentication, and access control mechanisms (2).

Telemedicine and Mobile Health Applications

Telemedicine refers to the delivery of healthcare services remotely through the use of digital communication technologies, including video consultations, remote patient monitoring, and the electronic exchange of medical information. This approach is particularly important for improving access to healthcare services in remote and rural areas (3).

Obile health (mHealth) applications enable users to monitor their health status, manage chronic conditions, and communicate with healthcare professionals. These applications collect various types of data, including vital signs, physical activity levels, and lifestyle habits, thereby supporting a more personalized approach to healthcare and disease management (1).

Despite their numerous advantages, telemedicine and mobile health applications also present certain risks, particularly with regard to data privacy and security. Health information is often transmitted over the internet, increasing the risk of interception and unauthorized access. Furthermore, many mobile health applications do not consistently meet stringent security standards, which may result in the misuse or unauthorized disclosure of sensitive health information (8).

Big Data and Artificial Intelligence in Healthcare

Big Data in healthcare refers to the processing of large volumes of structured and unstructured data generated from various sources, such as electronic health records, medical devices, and genetic analyses. The analysis of such data enables the identification of patterns, disease prediction, and improvements in public health outcomes (4).

Artificial intelligence (AI) utilizes algorithms and machine learning models to analyze healthcare data, enabling faster and more accurate diagnostics, personalized medicine, and the optimization of healthcare processes. AI systems can process large amounts of data in a short period of time and provide support for clinical decision-making (3).

Nevertheless, the application of Big Data technologies and artificial intelligence raises numerous privacy and ethical concerns. The accumulation of large volumes of data increases the risk of misuse, and there is also a possibility of re-identifying patients even when data have been anonymized (9). Therefore, it is essential to develop clear regulations and security mechanisms to ensure the responsible and secure implementation of these technologies in healthcare.

TYPES OF HEALTH DATA AND THEIR SENSITIVITY

Health data represent a special category of personal data due to their high level of sensitivity and their potential impact on an individual's privacy. In the context of digital healthcare, the volume and diversity of data have increased significantly, further emphasizing the need for adequate protection. The processing of health data includes the collection, storage, analysis, and exchange of information that may contain identifying, medical, genetic, and biometric data (4).

Personal and Medical Data

Personal data in healthcare include all information that enables the identification of an individual, such as name, surname, date of birth, address, and identification number.

Medical data include information regarding a patient's health status, diagnoses, treatments, laboratory test results, and medical history (2).

In digital healthcare systems, personal and medical data are often integrated into Electronic Health Records (EHRs), enabling faster access to information and improved coordination of healthcare services. However, such integration also increases the risk of unauthorized access, particularly if appropriate security measures are not adequately implemented (6).

The sensitivity of these data arises from the fact that their misuse may result in discrimination, stigmatization, or even financial and legal consequences for patients. Therefore, it is essential

to ensure their confidentiality, integrity, and availability through the implementation of appropriate technical and organizational measures (7).

Genetic and Biometric Data

Genetic data refer to information obtained through DNA analysis, which reveals hereditary characteristics, predispositions to certain diseases, and individual biological traits. This type of data is particularly sensitive because it does not provide information only about an individual but also about their family members (9).

Biometric data include unique physical and behavioral characteristics, such as fingerprints, facial recognition, voice patterns, or iris scans. In healthcare, they are used for patient identification and access control to healthcare systems; however, their misuse may have serious consequences because they are difficult or impossible to change (10).

Due to their permanent and immutable nature, genetic and biometric data require a particularly high level of protection. Even when anonymized, there is still a possibility of re-identification, which represents an additional challenge in the context of digital healthcare (9).

Risks Associated with Data Processing

The processing of health data in a digital environment involves numerous risks, including unauthorized access, data loss, identity theft, and cyberattacks. Healthcare systems are often targeted by attacks due to the high value of the data they contain, which can lead to serious consequences for patients and healthcare institutions (8).

One of the significant risks is the possibility of secondary use of data without the patient's knowledge or consent, for example, for research or commercial purposes. Such practices can undermine patients' trust and raise ethical concerns regarding the use of health information (5).

An additional challenge is the lack of sufficient standardization and interoperability of systems, which can increase data vulnerability during exchanges between different healthcare institutions. Furthermore, the human factor, such as negligence or insufficient training of healthcare personnel, is often one of the main causes of security incidents (2).

Considering these risks, it is essential to develop and implement comprehensive security strategies that include technical protection measures, user education, and compliance with relevant legal frameworks in order to ensure the protection of patient privacy in digital healthcare.

HEALTH DATA SECURITY

Health data security represents one of the key aspects of digital healthcare, considering the high sensitivity of the information processed within healthcare systems. The aim of security is to ensure the confidentiality, integrity, and availability of data, which are the fundamental principles of information security. In a digital environment, health data are exposed to numerous risks, including unauthorized access, data loss, and cyberattacks, making the implementation of comprehensive security measures essential (7).

Technical Protection Measures

Technical protection measures represent the foundation of healthcare information system security and include the application of various technologies to protect data from unauthorized access. One of the most important methods is encryption, which enables the conversion of data into an unreadable format, thereby ensuring its protection during transmission and storage (6).

User authentication represents another key security measure and involves verifying the identity of users before granting access to the system. In modern healthcare systems, multi-factor authentication is increasingly used, combining passwords, biometric data, and security codes to enhance the level of protection (2).

In addition to encryption and authentication, important technical measures also include access control, data backups, network protection (firewalls and antivirus systems), and intrusion detection and prevention systems. These measures enable the timely identification of security threats and reduce the risk of data compromise (8).

Organizational Protection Measures

Organizational protection measures refer to policies, procedures, and employee training aimed at ensuring the proper management of health data. They include defining clear rules for data access, assigning responsibilities, and establishing security protocols within healthcare institutions (4).

One of the key elements of organizational measures is the education of healthcare personnel regarding the importance of data protection and security practices. The human factor often represents the weakest link in the security system, which is why continuous training is necessary to reduce the risk of security incidents (7).

Furthermore, organizations are required to conduct risk assessments, develop incident management plans, and ensure compliance with relevant legislation. In the event of a data breach, it is necessary to promptly notify the competent authorities and affected individuals, in accordance with regulations such as the GDPR (10).

Cybersecurity Threats in Healthcare (hacking attacks, data breaches)

The healthcare sector is becoming an increasingly common target of cyberattacks due to the high value of the data it possesses. Hacking attacks, such as ransomware attacks, can paralyze healthcare systems, prevent access to data, and jeopardize patient safety. Such attacks often result in financial losses and damage to the reputation of healthcare institutions (11).

Data breaches represent another serious security issue and may occur due to technical failures, human error, or intentional activities. In such cases,

unauthorized disclosure of sensitive information can occur, which may have serious consequences for patients, including identity theft and discrimination (5).

In addition to external threats, healthcare systems also face internal risks, such as misuse of access privileges by employees. A combination of technical and organizational measures is essential for effective protection against all types of threats and for maintaining patients' trust in digital healthcare systems (2).

ETHICAL ISSUES IN DIGITAL HEALTHCARE

The development of digital healthcare brings numerous benefits, but at the same time it raises complex ethical issues related to the processing and use of health data. Ethical challenges arise from the need to reconcile technological progress with fundamental patient rights, such as privacy, autonomy, and dignity. In a digital environment, where data are collected, stored, and analyzed in large quantities, it is essential to ensure that their use is carried out in accordance with ethical principles and legislative standards (3).

Patient Confidentiality and Autonomy

The confidentiality of health data is a fundamental ethical principle in medicine that involves protecting patient information from unauthorized access and disclosure. In digital healthcare, maintaining confidentiality becomes even more important due to the increased availability and exchange of data through various information systems (5).

Patient autonomy refers to an individual's right to make independent decisions regarding their own health and the use of their personal data.

In the digital context, this includes the patient's right to be informed about how data are collected and processed, as well as the right to provide or withhold consent for their use (10).

However, challenges arise when complex digital systems and algorithms make it difficult to understand how data are being used. This may lead to a reduction in patients' actual control over their own information, representing an ethical concern in the modern healthcare system (3).

Informed Consent

Informed consent represents a key element of ethical practice in healthcare and implies that a patient voluntarily agrees to the processing of their data after being clearly and comprehensibly informed about the purpose, methods, and scope of its use. In digital healthcare, this concept becomes more complex due to various technologies and methods of data collection (1).

In practice, informed consent is often obtained through digital platforms, which can make it more difficult for patients to fully understand the information provided and make an informed decision. Lengthy and complex terms of use are often insufficiently transparent, which may result in formal rather than genuine consent (3).

An additional challenge is the secondary use of data, for example, for research or commercial purposes, about which patients are often not adequately informed. Therefore, it is necessary to develop clearer and simpler models of informed consent that will enable patients to have greater control over their data (5).

Trust Between Patients and the Healthcare System

Trust between patients and the healthcare system is a key prerequisite for effective healthcare delivery. Patients must be confident that their data will be protected and used exclusively for the purpose of improving their health. A loss of trust may lead to patients being less willing to share information, which can negatively affect the quality of care (7).

The digitalization of healthcare further emphasizes the importance of transparency in data management. Healthcare institutions must clearly

communicate how data are collected, used, and protected in order to build and maintain patients' trust (4).

In addition, security incidents, such as data breaches or cyberattacks, can significantly undermine public confidence in the healthcare system. Therefore, it is essential to continuously invest in security measures, education, and the development of ethical standards to ensure the long-term stability and reliability of digital healthcare (3).

PROTECTING PRIVACY IN DIGITAL HEALTH PRACTICE

The implementation of privacy protection in digital health requires the integration of legal, technical, and organizational measures into the daily practice of healthcare systems. Although clear legal frameworks and technological solutions exist, their effective implementation depends on the coordinated efforts of multiple stakeholders, including healthcare professionals, IT specialists, and healthcare management. In practice, privacy protection involves continuous adaptation to emerging technologies and evolving security threats, while ensuring transparency and maintaining patients' trust (4).

Examples of Good Practice

Good practices in privacy protection within digital health include the implementation of advanced security technologies, clear data governance policies, and continuous staff education and training. One example of good practice is the use of data encryption and multi-factor authentication in electronic health record (EHR) systems, which significantly reduces the risk of unauthorized access (6).

In addition, many healthcare institutions apply the principle of least privilege, whereby users are granted access only to the information necessary to perform their job responsibilities. This approach minimizes the potential for data misuse and enhances the overall security of healthcare information systems (7).

Transparency in data processing and providing patients with clear information about how their personal data are used are also essential elements of good practice. Successful healthcare organizations actively involve patients in decisions regarding the use of their health information, thereby strengthening trust, promoting ethical data governance, and supporting patient-centered care (3).

Implementation Challenges

Despite the availability of advanced technologies and regulatory frameworks, the implementation of privacy protection in digital health continues to face numerous challenges. One of the primary obstacles is the lack of financial and technical resources, particularly in smaller healthcare institutions, which limits the adoption of modern security solutions (1).

Another significant challenge is the complexity of healthcare information systems and their interoperability. The exchange of data between different systems increases the risk of security vulnerabilities, especially when standards are inconsistent or insufficiently harmonized (2).

The human factor also plays a critical role in data security. Inadequate staff training, human error, and failure to comply with established security protocols can result in serious incidents, including data breaches and unauthorized access to sensitive information (8).

Furthermore, the rapid pace of technological advancement often outstrips the development of legal and regulatory frameworks, creating legal and ethical uncertainties regarding the use of health data, particularly in the context of artificial intelligence and big data analytics (3).

The Role of Healthcare Professionals and Information Technology Experts

Privacy protection in digital health is not solely a technical issue but requires collaboration among professionals from multiple disciplines. Healthcare professionals play a crucial role in maintaining the

confidentiality of patient information, as they interact with patients and their health data on a daily basis. Their responsibilities include the proper handling of personal data, adherence to ethical principles, and compliance with established security protocols (5).

IT specialists, on the other hand, are responsible for the development, implementation, and maintenance of security systems that safeguard health information. Their role includes implementing technical measures such as data encryption, access control, and network security, as well as continuously monitoring and improving cybersecurity systems (6).

Effective privacy protection requires an interdisciplinary approach in which healthcare professionals and IT specialists work collaboratively to ensure both data security and the quality of healthcare delivery. Education, effective communication, and clearly defined roles and responsibilities are essential components of a successful privacy protection framework (4).

CONCLUSION

Health data, as a particularly sensitive category of personal information, require a high level of protection to ensure their confidentiality, integrity, and availability. This paper demonstrated that digital technologies, such as electronic health records, telemedicine, and artificial intelligence, have significant potential to improve healthcare services while simultaneously increasing the risk of security threats and data misuse. Cyberattacks, data breaches, and insufficient user education represent key challenges that may compromise patient privacy and undermine trust in healthcare systems.

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Health System Resilience in the Post-Pandemic Period: Challenges and Opportunities for Strengthening Health Security in the Western Balkan Countries - A Literature Review

Otpornost zdravstvenih sustava u postpandemijskom razdoblju: izazovi i mogućnosti unapređenja zdravstvene sigurnosti u zemljama zapadnog balkana - pregled literature

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ABSTRACT

Introduction: The COVID-19 pandemic represented the most severe shock to health systems in recent European history, and the Western Balkan countries recorded some of the highest excess mortality rates worldwide.

Aim: to synthesise and critically appraise the evidence on health system resilience and health security in Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia and Serbia in the post-pandemic period, and to identify the principal challenges and opportunities.

Materials and methods: A structured literature review was conducted. PubMed/MEDLINE, Scopus and Google Scholar were searched, together with documents of the World Health Organization, the European Observatory on Health Systems and Policies, the European Centre for Disease Prevention and Control and the European Commission, issued between January 2015 and May 2026. Findings were mapped onto the conceptual framework of absorption, adaptation and transformation, and onto the health system building blocks.

Results: Database searching identified 541 records; 27 sources were included. The evidence consistently indicates that the health systems of the subregion absorbed the shock at a very high human cost. Recurrent structural constraints were identified: fragmented governance, insufficient public financing with high out-of-pocket payments, health workforce emigration, weak information systems, and low institutional trust. Adaptive responses were numerous but largely temporary; evidence of transformative reform is almost absent.

Conclusion: There is insufficient evidence that the resilience of Western Balkan health systems has measurably improved since 2022. Regional and European instruments constitute a concrete but under-exploited opportunity. Comparative studies using an agreed set of resilience indicators are required.

Keywords: health system resilience, health security, COVID-19, Western Balkans, pandemic preparedness

SAŽETAK

Uvod: Pandemija bolesti COVID-19 predstavljala je najteži šok zdravstvenim sustavima u novijoj europskoj povijesti, a zemlje Zapadnog Balkana zabilježile su najvišu stopu smrtnosti u svijetu.

Cilj: prikazati i kritički vrednovati objavljene dokaze o otpornosti zdravstvenih sustava i zdravstvenoj sigurnosti u Albaniji, Bosni i Hercegovini, Crnoj Gori, Kosovu, Sjevernoj Makedoniji i Srbiji u postpandemijskom razdoblju te identificirati ključne izazove i mogućnosti unapređenja.

Materijal i metode: Proveden je strukturirani pregled literature. Pretražene su baze PubMed/MEDLINE, Scopus i Google Scholar te dokumenti Svjetske zdravstvene organizacije, Europske opservatorije za zdravstvene sustave i politike, Europskog centra za prevenciju i kontrolu bolesti i Europske komisije, objavljeni između siječnja 2015. i svibnja 2026. Nalazi su razvrstani prema konceptualnom okviru apsorpcije, prilagodbe i transformacije te prema gradivnim elementima zdravstvenog sustava.

Rezultati: Pretragom baza identificiran je 541 zapis; uključeno je 27 izvora. Dokazi dosljedno upućuju na to da su zdravstveni sustavi regije apsorbirali šok uz vrlo visoku ljudsku cijenu. Utvrđeni su ponavljajući strukturni ograničavajući čimbenici: rascjepkano upravljanje, nedostatno javno financiranje uz visoka izravna plaćanja, iseljavanje zdravstvenih radnika, slabi informacijski sustavi i nizak stupanj institucionalnog povjerenja. Prilagodbeni odgovori bili su brojni, ali uglavnom privremeni; dokaza o transformacijskim reformama gotovo da nema.

Zaključak: Nema dovoljno dokaza da je otpornost zdravstvenih sustava Zapadnog Balkana mjerljivo poboljšana nakon 2022. godine. Regionalni i europski instrumenti predstavljaju konkretnu, ali još neiskorištenu priliku. Potrebna su usporedna istraživanja s dogovorenim skupom pokazatelja otpornosti.

Ključne riječi: otpornost zdravstvenog sustava, zdravstvena sigurnost, COVID-19, Zapadni Balkan, pripravnost za pandemiju

INTRODUCTION

Health system resilience is the capacity of a system to prepare for and respond to crises, to maintain core functions when a crisis strikes, and to reorganise if conditions require (1). The concept, which entered health policy after the West African Ebola epidemic, is operationalised through the triad of absorption, adaptation and transformation maintaining performance with existing resources, reconfiguring them, and durable structural change (2). In its 2021 position paper, the World Health Organization (WHO) placed resilience at the intersection of universal health coverage and health security, arguing that both rest on strong primary health care (3).

The pandemic subjected European health systems to a shock of unprecedented scale and generated substantial comparative work on how systems governed it (4). A 2023 reappraisal nonetheless warned that resilience research has too often neglected equity and who bears the cost of resilience strategies (5).

The Western Balkans - here Albania, Bosnia and Herzegovina, Kosovo (designated in accordance with United Nations Security Council resolution 1244 of 1999), Montenegro, North Macedonia and Serbia form a subregion with a shared institutional inheritance and a common political trajectory. Most derive from the Yugoslav social insurance tradition and Albania's from the Semashko model; all six have undergone protracted transition and all have committed to European Union (EU) accession. This has not produced convergence: analyses of health indicators from 2000 to 2019 found that only half of those examined moved towards EU averages, with financing and regulation of the priority policy areas for all six (6).

Against this background, the pandemic exposed the subregion with severity: all-cause mortality placed North Macedonia and Serbia among the countries with the highest excess mortality per capita worldwide during the first eighteen months (7). In response, WHO and the countries of the subregion endorsed the Roadmap for Health and Well-being in the Western Balkans 2021–2025, comprising ten action areas and seventeen reform initiatives, the first directed explicitly at increasing resilience to health emergencies (8).

More than four years after the acute phase, the question is no longer how the subregion coped but whether that experience has been converted into durable capacity. This review therefore aimed to synthesise and critically appraise the published evidence on health system resilience and health security in the Western Balkan countries in the post-pandemic period, and to identify the challenges that constrain and the opportunities that could advance it.

AIM

The aim of the study was to synthesise and critically appraise the evidence on health system resilience and health security in Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia and Serbia in the post-pandemic period, and to identify the principal challenges and opportunities

MATERIALS AND METHODS

This is a structured narrative review of published and institutional literature. It was not registered as a protocol and does not claim to be a systematic review.

Sources were identified by searching PubMed/MEDLINE, Scopus and Google Scholar, supplemented by targeted searching of the repositories of WHO, the European Observatory on Health Systems and Policies, the European Centre for Disease Prevention and Control (ECDC) and the European Commission. The search combined three concept blocks: (i) "health system resilience" OR

"health security" OR "pandemic preparedness"; (ii) "Western Balkans" OR Albania OR "Bosnia and Herzegovina" OR Kosovo OR Montenegro OR "North Macedonia" OR Serbia; and (iii) COVID-19 OR SARS-CoV-2 OR "post-pandemic" OR recovery. Reference lists were screened manually.

Publications issued between January 2015, and May 2026 were eligible, the lower boundary reflecting the post-Ebola origin of the modern formulation (1). Records in English, Bosnian, Croatian and Serbian were considered. Studies were included if they were peer-reviewed studies, reviews, or official reports of WHO, the European Observatory, ECDC or the European Commission, and if they addressed health system resilience, pandemic preparedness, health security, health financing, health workforce or health system performance in at least one of the six settings or in the subregion as a whole. Purely clinical or laboratory studies, commentaries without original data, and non-institutional grey literature were excluded.

Searches were run on 7 August 2026 and yielded 11 records in PubMed/MEDLINE, 16 in Scopus and 514 in Google Scholar, giving 541 records before deduplication. The disproportionate Google Scholar yield reflects indexing of grey literature, preprints and citing documents; those records were screened in relevance order. Titles and abstracts were screened against the eligibility criteria; potentially eligible records were assessed in full text, and 13 peer-reviewed articles were retained. A further 14 institutional documents position papers, monitoring reports, guidance and official communications of WHO, the European Observatory, ECDC and the European Commission were identified through targeted repository searching, giving 27 sources in total.

Extracted findings were charted against the health system building blocks of governance, financing, workforce, medicines and health products, information systems and service delivery, combined with the absorb–adapt–transform typology (1,2). Source categories are summarised in Table 1. Because the studies were heterogeneous in design, setting and outcome definition, no quantitative

synthesis was undertaken; the strength of the evidence is described narratively, distinguishing findings supported by primary data, findings from institutional assessment, and interpretations offered by the author.

As a review of published literature, the study involved no human participants and no personal data and required no ethics committee approval; the Declaration of Helsinki does not apply to this design.

Table 1 **Categories of the 27 sources included in the review.**

Source category	n	Reference numbers	Principal contribution
Conceptual and framework literature	4	1, 2, 5, 27	Definition and operationalisation of resilience; critique of the concept
Peer-reviewed empirical studies	7	7, 9, 10, 11, 18, 19, 20	Excess mortality, surveillance, service continuity, trust and vaccination
Peer-reviewed policy analyses and reviews	3	6, 12, 26	Cross-country comparison of health policy, preparedness and health promotion
WHO and European Observatory position papers and guidance	4	3, 4, 8, 24	Normative framing and the subregional reform agenda
WHO global monitoring reports	2	16, 17	Disruption of essential health services
WHO and ECDC regional and country communications	7	13, 14, 15, 21, 22, 23, 25	Financial protection, workforce, digital health, legal architecture, lessons identified

Explanation: distribution of the 27 sources included by publication type. Thirteen are peer-reviewed journal articles retrieved by database searching; the remaining 14, including the policy brief in the first category, are institutional documents retrieved from repositories. Reference numbers follow the order of first citation in the text.

RESULTS

Twenty-seven sources met the inclusion criteria (Table 1). Findings are presented below under six themes.

The magnitude of the shock. Estimates based on all-cause mortality rather than notified deaths place the subregion among the most severely affected worldwide (Table 2). In the Federation of Bosnia and Herzegovina notified deaths and modelled excess deaths differ by several thousand over overlapping periods (9,10). The figures are not directly subtractable, but the gap indicates that notification captured only part of the burden.

Governance and coordination. Institutional fragmentation was the most consistently reported governance constraint. Bosnia and Herzegovina exemplifies it: competence for health rests with the entities and Brčko District rather than the state, and the Federation alone operates ten cantonal ministries of health, mirrored during the pandemic by ten cantonal crisis headquarters (10). Intra-action reviews in Montenegro, Kosovo and North Macedonia identified convergent priority actions across all participating settings: sustainable staffing and technical capacities, regular simulation exercises, updated legislation, better communication between levels of care, and digitalisation of health information systems (11). A parallel European analysis found that national pandemic preparedness plans generally map poorly onto health system

functions, with financing and workforce provisions particularly underdeveloped (12).

Financing and financial protection. Public expenditure on health remained below recommended levels in most of the subregion before the pandemic, while out-of-pocket payments remained above the range compatible with a negligible incidence of catastrophic spending in all six countries and areas (6). Outpatient medicines drive financial hardship in both Montenegro and North Macedonia (13,14).

Health workforce. The workforce dimension is under sustained pressure from projected regional shortfalls combined with emigration, and Albania and Kosovo record the lowest physician densities in the subregion (6,15). Workforce factors were also the most cited cause of service disruption globally (16).

Continuity of essential services. Global monitoring documented widespread disruption in late 2021 followed by partial but incomplete recovery (16,17). Population-level evidence from the Federation of Bosnia and Herzegovina shows that older respondents and those with chronic conditions postponed care significantly more often than others, principally because appointments were unavailable and because of fear of infection (18).

Trust, communication and vaccination. Societal trust emerged as a measurable determinant of protective behaviour, differing significantly between countries and predicting vaccination behaviour in all five settings surveyed (19). Related work examined the determinants of vaccination intention among unvaccinated adults (20). In both, primary care physicians were the most trusted source of information. WHO convened the first European workshop on risk communication and community engagement in Tirana in 2022 (21).

Table 2 **Principal quantitative findings by the health system domain.**

Domain	Finding	Setting and period	Ref.
Mortality	Excess mortality approximately 420 per 100 000 (North Macedonia) and 400 per 100 000 (Serbia), exceeded only by Peru and Bulgaria	North Macedonia and Serbia, to mid-2021	7
Mortality	Approximately 12 000 excess deaths in three distinct waves; burden highest at ages 45–74 years and among men	Federation of Bosnia and Herzegovina, 2020–2022	9
Surveillance	249 495 confirmed cases and 8 845 notified deaths	Federation of Bosnia and Herzegovina, to 31 March 2022	10
Financing	Out-of-pocket payments above the range compatible with a negligible incidence of catastrophic spending	All six countries and areas, before 2020	6
Financing	Catastrophic health spending in approximately 9% of households overall and 33% of households in the poorest fifth, driven by outpatient medicines	Montenegro	13
Workforce	Projected shortfall of approximately 950 000 health workers by 2030	WHO European Region, to 2030	15
Workforce	Lowest physician densities in the subregion	Albania and Kosovo	6

Domain	Finding	Setting and period	Ref.
Service continuity	More than 90% of surveyed countries reported disruption of essential services	Global, November–December 2021	16
Service continuity	23% of tracer services still disrupted, against 56% in mid-2020	Global, November 2022 – January 2023	17
Service use	64% sought care. Postponement: 39% at ages 55+ against 31% at ages 18–34 ($p = 0.01$); 55% with a chronic condition against 31% without ($p < 0.001$). 40% reported higher spending on medicines	Federation of Bosnia and Herzegovina, $n = 1\,068$	18
Trust	Societal trust differed significantly between countries ($F[24, 4002] = 7.574$, $p < 0.001$); highest in North Macedonia (3.74, SD 0.99), lowest in Albania (3.21, SD 1.03)	Five Western Balkan settings, $n = 1\,157$	19

Explanation: quantitative findings extracted from the included sources, with the setting and period to which each applies. SD, standard deviation; p, probability value; F, F-statistic of one-way analysis of variance. Excess mortality values are modelled estimates, not counts.

The emerging opportunity structure. The WHO Roadmap 2021–2025 sets action areas that include resilience to health emergencies, financial protection and access to medicines, and primary health care strengthened through digital transformation (8). The Western Balkans Digital Health Network was launched in 2021 to accelerate that transformation (22). Globally, the 2024 amendments to the International Health Regulations introduced the category of pandemic emergency, and the WHO

Pandemic Agreement was adopted on 20 May 2025, entering into force after sixty ratifications (23). The WHO has issued operational guidance for implementing resilience at country level (24). ECDC has published its own lessons identified (25). Nonetheless, a 2026 review found that the Western Balkan countries continue to lag the EU in implementing effective health promotion despite the existence of national strategies (26).

Table 3 Evidence mapped to the absorb–adapt–transform framework.

Resilience function	Evidence documented in the Western Balkans	Strength of evidence	Ref.
Absorb	Essential functions sustained and surge response mounted, at very high mortality cost	Strong; population-level empirical data	7, 9, 10
Adapt governance	– Crisis headquarters established at federal and cantonal level	Moderate; single-setting descriptive	10
Adapt information	– Web-based surveillance system built during the response	Moderate; single-setting descriptive	10
Adapt – learning	Intra-action reviews conducted while the response was under way	Moderate; qualitative and self-reported	11
Adapt – service delivery	Digital tools accelerated; subregional digital health network established	Weak; institutional reporting only	22

Resilience function	Evidence documented in the Western Balkans	Strength of evidence	Ref.
Transform legislation	– Updating identified as a priority action; no implementation evidence found	Absent	11
Transform workforce	– Sustainable staffing identified as a priority; emigration continues	Absent	6, 15
Transform financing	– Financial protection remains a Roadmap target; catastrophic spending persists	Absent	8, 13
Transform preparedness architecture	– International Health Regulations amended and Pandemic Agreement adopted; national implementation pending	Pending	23

Explanation: retrieved evidence mapped onto the three resilience functions, with the strength of the underlying evidence graded. "Absent" denotes that no published evidence of implementation was retrieved, not that no activity has taken place.

DISCUSSION

Read against the absorb-adapt-transform framework (Table 3); the evidence permits a clear if uncomfortable interpretation. Absorption was achieved, but at a cost the excess mortality estimates render explicit (7,9). Adaptation is well documented and represents genuine reconfiguration under pressure. Transformation is where the evidence is too much. No published comparative assessment was found demonstrating that the six systems have institutionalized the capacities generated during the emergency, and the priority actions identified in the intra-action reviews legislative updating, sustainable staffing, simulation exercises are precisely those for which implementation evidence is absent (11).

Three observations follow. First, the determinants of performance appear structural rather than acute: fragmented governance, low public financing with heavy reliance on out-of-pocket payments, workforce depletion and weak information systems were all documented before 2020 (6). All reappear in the pandemic literature as explanations for poor outcomes. This supports the WHO position that resilience is not a byproduct of emergency spending but must be deliberately built into ordinary health system functions (3,24). Second,

the gap between notified and estimated excess deaths is not merely a measurement artefact: timely and complete mortality registration is itself a resilience function, and its weakness degrades the evidence base on which decisions rest (9). Third, trust operates as a system asset. Societal trust predicted vaccination behaviour in all five countries surveyed (19). Primary care physicians were consistently identified as the most credible information source (20). Together, these suggest that investment in primary care carries a communication dividend rarely counted in preparedness planning.

The opportunity structure is unusually favourable and, at present, under-exploited. EU accession creates both an obligation and a financing channel for reform (6). The WHO Roadmap supplies an agreed subregional agenda (8). The 2024 amendments to the International Health Regulations, together with the 2025 Pandemic Agreement, establish a legal architecture requiring national implementation (23). Whether these translate into resilience depends on domestic political and fiscal choices, the literature reviewed here does not address.

Several limitations of the evidence base deserve emphasis. Definitional heterogeneity is substantial:

the literature contains competing conceptualisations and no consensus measurement framework (5,27). Much of the subregional evidence is descriptive and cross-sectional. The vaccine hesitancy studies relied on online convenience samples, a design vulnerable to selection bias and of uncertain external validity (19,20). The intra-action reviews are qualitative and self-reported and were designed for programme improvement rather than evaluative inference (11). Several key subregional studies were funded through European Commission instruments; this is disclosed by the authors and is not in itself a source of bias, but it does mean the evidence base is shaped by a particular policy agenda. Evidence on Kosovo is markedly sparser than for the other five settings.

The review itself has limitations. It is a narrative rather than systematic review: there was no registered protocol, no dual screening, and no formal risk-of-bias assessment, so selection bias cannot be excluded. Restriction to English and Bosnian, Croatian and Serbian may have excluded relevant Albanian- and Macedonian-language literature, and no quantitative synthesis was possible. Finally, the excess mortality figures cited depend on baseline modelling assumptions and on the completeness of civil registration and should be treated as estimates rather than as counts.

Returning to the aim stated at the outset, this review confirms it only in part. The evidence is sufficient to characterise the constraints on resilience in the Western Balkans and to identify the opportunities now open to the subregion; in that respect the aim is met. It is not sufficient to determine whether resilience has improved since the acute phase, and in respect of that evaluative question the aim must be negated.

CONCLUSION

Two affirmative conclusions are supported. The health systems of the Western Balkans absorbed the COVID-19 shock and sustained essential functions, but at a human cost ranking among the highest recorded internationally; and the principal constraints were long-standing structural features fragmented governance, insufficient public financing

with high out-of-pocket reliance, workforce emigration, weak information systems and low institutional trust rather than deficiencies specific to the emergency response. Two negative conclusions are equally warranted. There is insufficient evidence to conclude that the resilience of these systems has measurably improved since 2022, because no comparative post-pandemic resilience assessment covering all six countries and areas has been published. Nor can any specific reform be causally linked to improved preparedness outcomes on the basis of the studies reviewed. The priorities following most directly from the evidence are institutionalisation of intra-action and after-action review cycles, an agreed subregional set of resilience indicators, investment in complete and timely mortality registration, and workforce retention. Further research should include prospective comparative health system performance assessment across the subregion, with particular attention to Kosovo, where the evidence base is thinnest.

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