

Evaluating perceived advantages and funding needs to enhance emergency medical services: insights from patients and staff

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Abstract

Introduction: The University Hospital for Active Treatment and Emergency Medicine (UHATEM) "N. I. Pirogov" LTD is a pivotal institution in Bulgaria's emergency medical services (EMS). However, funding challenges adversely affect its operational efficiency and quality of care.

Aim: This study aims to identify the primary perceived advantages of UHATEM "N. I. Pirogov" LTD compared to other medical facilities, assess differences in perceptions between patients and staff, and evaluate the impact of funding limitations on hospital operations:

Materials and methods: A cross-sectional study was conducted between January and July 2023 using a self-administered online questionnaire with 16 questions across four domains. A total of 1,041 participants were surveyed. Data analysis included descriptive statistics, chi-square tests, Cramér's V, and one-way ANOVA to identify significant differences in perceptions and mean scores across age groups.

Results: "Fast and fail-safe 24-hour access" was the most valued advantage among both patients and staff. The staff highlighted the hospital's "multidisciplinary profile and teams" and "unique and unparalleled clinics and structures" as significant strengths. Chi-square analysis confirmed significant associations between perceived advantages and respondent type. Funding-related challenges, such as limited financial resources and high operational costs, were identified as critical issues.

Conclusions: To improve EMS quality and sustainability at UHATEM "N. I. Pirogov" LTD, consistent state funding, public-private partnerships, and operational efficiencies are needed. Addressing these challenges is essential for maintaining high-quality care and operational stability.

Keywords

emergency medical services, funding challenges, patient and staff perceptions, health policy

Introduction

Emergency medical services (EMS) represent a vital aspect of Bulgaria's healthcare infrastructure, providing urgent care and immediate treatment for acute medical emergencies.^[1] As the demands on healthcare systems increase globally, the role of EMS becomes even more pronounced.^[2,3] The University Hospital for Active Treatment and Emergency Medicine (UHATEM) N.I. Pirogov, established in 1951, has firmly positioned itself as a leader in providing specialized multidisciplinary emergency care in Bulgaria.^[4] UHATEM "N. I. Pirogov" is widely recognized for delivering comprehensive 24-hour emergency services across a broad spectrum of medical specialties, including trauma care to emergency surgery, pediatrics, burn treatment, and toxicology, setting a benchmark for emergency medical care in the region.^[5,6]

However, despite its pivotal role in the healthcare system, UHATEM "N. I. Pirogov" faces significant operational challenges that jeopardize its ability to meet the growing healthcare demands of Bulgaria's aging population.^[7] Key issues include outdated infrastructure, insufficient technological upgrades, and the steadily rising prevalence of age-related chronic conditions, such as cardiovascular diseases, diabetes, and respiratory diseases.^[8] These problems overwhelm the hospital's existing resources and impede its operational efficiency.

Evidence suggests that enhancements in healthcare infrastructure and technology in Bulgaria are associated with improved patient outcomes, particularly within emergency care settings.^[9] For example, advancements in healthcare services – such as the introduction of advanced medical equipment and comprehensive training programs for healthcare personnel – have been linked to reductions in preventable and amenable mortality rates. However, challenges persist, as reflected by Bulgaria's above-average rates of avoidable deaths compared to other EU countries.^[10] While progress has been made in certain aspects of healthcare delivery, disparities in health outcomes remain a critical issue. Socioeconomic status and education significantly influence health perceptions and access to quality care. This suggests that infrastructural improvements alone may not be sufficient; addressing these broader determinants is essential for achieving equitable health outcomes across the population.

As a result, UHATEM "N. I. Pirogov" is now facing more complex emergency cases that require specialized, often resource-intensive, interventions. Coupled with the hospital's role as a national leader in treating severe trauma and acute medical conditions, these demands have placed an unsustainable strain on its financial and human resources.^[9]

Role of UHATEM "N. I. Pirogov" in Bulgaria's EMS network

UHATEM "N. I. Pirogov" is currently under unprecedented pressure due to increasingly complex emergency

cases that require specialized and resource-intensive interventions. As a national leader in treating severe trauma and acute medical conditions, the hospital is tasked with addressing some of the most challenging cases in Bulgaria.^[11] However, these responsibilities have placed an unsustainable strain on its financial and human resources. The growing complexity of EMS in Bulgaria, fueled by the rise in multimorbidity among patients, has further intensified demands on hospital staff and heightened the need for specialized medical resources.^[12] Additionally, the demographic transition toward an aging population has significantly amplified the burden on emergency services, underscoring the need to reevaluate the hospital's role and capacity to meet the demands of contemporary healthcare standards and provide adequate care.^[5,9] The rapid evolution of healthcare technologies, such as telemedicine, advanced diagnostic tools, and digital health solutions, has outpaced the hospital's current capacity to integrate these advancements, limiting its ability to deliver state-of-the-art care.^[13]

Aim

Our study aimed to assess: I) the perceived advantages of UHATEM "N.I. Pirogov" compared to other medical facilities across Bulgaria, and II) the potential need for granting UHATEM "N. I. Pirogov" a special designation as a national emergency and urgent care center. The insights gained from these findings are intended to assist health policy-makers in Bulgaria in evaluating the potential benefits of direct state funding for UHATEM "N. I. Pirogov" and to reinforce its pivotal role within Bulgaria's healthcare system.

Materials and methods

Participants and study design

A total of 1387 participants aged 18 years and older from UHATEM "N. I. Pirogov" were initially included in this cross-sectional study, conducted between January and July 2023. After excluding hospital staff members with incomplete data (n=119) and patients with missing information (n=227), the final sample consisted of 1041 participants. Of these, 572 were hospital staff, and 469 were patients (**Table 1**).

The study participants were categorized into two main groups: (1) patients aged 18 years or older who had received treatment at UHATEM "N. I. Pirogov" within the past year, and (2) hospital staff employed at UHATEM "N. I. Pirogov" for at least six months. Convenience sampling was used to ensure representation from both groups. The study followed a non-randomized, voluntary participation model, with hospital staff recruited through internal announcements and patients invited during outpatient visits.

Table 1. Demographic characteristics of study participants

Characteristic	Hospital staff (n=572)	Patients (n=469)	Total (n=1041)
Sex			
Male	326 (57.0%)	231 (49.3%)	557 (53.5%)
Female	246 (43.0%)	238 (50.7%)	484 (46.5%)
Age group			
<30 years	123 (21.5%)	84 (17.9%)	207 (19.9%)
30–39 years	165 (28.8%)	121 (25.8%)	286 (27.5%)
40–49 years	138 (24.1%)	115 (24.5%)	253 (24.3%)
50–59 years	91 (15.90%)	93 (19.8 %)	184 (17.7%)
≥60 years	55 (9.6%)	56 (12.0%)	111 (10.7%)
Education level			
High school	198 (17.1%)	237 (50.5%)	335 (32.2%)
Bachelor's degree	269 (47.0%)	140 (29.8%)	409 (39.3%)
Master's/Doctoral degree	205 (35.8%)	92 (19.6%)	297 (28.5%)

Data collection

An Executive Committee composed of representatives from UHATEM “N. I. Pirogov” was tasked with defining the survey’s key objectives and outcome measures. In collaboration with health policy experts from the Faculty of Public Health, Prof. Dr. Tzecomir Vodenicharov, DSc, at the Medical University of Sofia, Bulgaria, the Committee refined the study design to ensure methodological rigor. Invitations outlining the survey’s purpose were distributed to hospital staff across the 33 departments and clinics at UHATEM “N. I. Pirogov” that expressed interest in participating. This collaborative approach ensured the survey was not only scientifically robust but also aligned with the hospital’s operational goals (Table 1).

A self-administered online anonymous questionnaire comprising 16 questions across four key domains was developed to comprehensively assess participants’ perceptions of the hospital’s operations, focusing on both strengths and areas needing improvement. The survey aimed to capture a broad range of insights to support policy and operational enhancements (Table 2).

The first domain, “Perceived Advantages”, comprised eight questions using a five-point Likert scale. Participants rated the significance of various positive aspects, such as the 24/7 availability of services. This approach allowed for nuanced responses, offering valuable insights into the perceived importance of different hospital services. The domain regarding “Perceived Disadvantages” included seven questions, also employing a five-point Likert scale, to identify areas where respondents noted deficiencies, such as the lack of digitalization.^[13] This structured format facilitated a quantifiable analysis of negative perceptions and highlighted areas requiring attention. The third domain, “Areas for Improvement”, featured 10 questions using a five-point Likert scale to capture participants’ views on potential enhancements, such as upgrading hospital infrastructure. The data gathered helped prioritize initiatives based on participant feedback. The fourth domain, “Special Status and Funding”, consisted of five Yes/No questions addressing critical topics, such as whether the hospital should receive direct state funding.^[14,15] The binary format provided clear and decisive responses on significant policy matters. The survey’s design enabled a balanced assessment of the

Table 2. Characteristics of survey

Domains	Number of questions	Scale used	Focus	Example item
Perceived advantages	8	5-point Likert scale	Evaluates the importance of positive hospital attributes	24/7 availability of services
Perceived disadvantages	7	5-point Likert scale	Identifies perceived shortcomings	Lack of digitalization
Areas for improvement	10	5-point Likert scale	Assesses views on potential improvements	Upgrading hospital infrastructure
Special status and funding	5	Yes/No questions	Gathers opinions on key policy issues	Direct state funding for the hospital

hospital's performance by collecting both positive and critical feedback. This approach offered actionable data to support policy and operational improvements. The structured format ensured comprehensive data collection, with Likert-scale questions providing a detailed understanding of participant attitudes and Yes/No questions yielding straightforward answers to key policy-related issues, especially concerning the hospital's funding and status.

Ethical considerations

The study protocol was approved by the Ethical Committee of UHATEM "N.I. Pirogov". Written informed consent was obtained from all participants before their inclusion in the study. Participants were informed about the purpose of the study, and their anonymity and confidentiality were assured. The collected data were anonymized and stored securely, in compliance with General Data Protection Regulation (GDPR) guidelines and institutional data protection policies. All participants provided written informed consent, and the Ethics Committee at UHATEM "N. I. Pirogov" approved the study.

Statistical analysis

Data analysis was conducted using SPSS Statistics for Windows (IBM, version 26.0, Armonk, NY, USA) and Excel 2016 (Microsoft Corporation, Redmond, WA, USA), with statistical significance set at $p < 0.05$. Descriptive statistics, including means, standard deviations, frequencies, and percentages, were calculated to summarize demographic variables and questionnaire responses. Chi-square tests and Cramér's V were utilized to explore relationships between categorical variables, such as demographic characteristics

(age, sex, and education level) and perceptions of hospital operations, to assess the strength of associations. The significance level for these tests was set at $p < 0.05$. Additionally, one-way ANOVA analysis of variance was performed to examine differences in mean perception scores for specific hospital attributes across age groups.

Results

Table 1 presents the baseline characteristics of the study participants, highlighting significant differences in demographic variables such as sex, age, and educational level between hospital staff and patients. The total sample ($n=1.041$) showed a slightly higher proportion of males (53.5%) than females (46.5%). Among hospital staff, males were more prevalent (57.0%), while the sex distribution was more balanced in the patient group, with 49.3% male and 50.7% female patients. The higher proportion of male staff may reflect broader trends in healthcare employment, while the near-equal sex distribution among patients suggests similar healthcare utilization patterns across sexes. Participants were distributed across various age categories, with the 30-39 age group being the most common among hospital staff (28.8%) and patients (25.8%). Younger respondents (under 30 years) were more frequently found among staff (21.5%) compared to patients (17.9%), whereas older participants (≥ 60 years) were slightly more represented in the patient group (12.0%) than among staff (9.6%). These age-related differences may affect healthcare delivery, especially as older patients are likely to have advanced healthcare needs. Educational attainment showed notable disparities between the two groups. Among staff, 47.0% had a bachelor's degree, and 35.8% had a master's or doctoral degree. In contrast, a

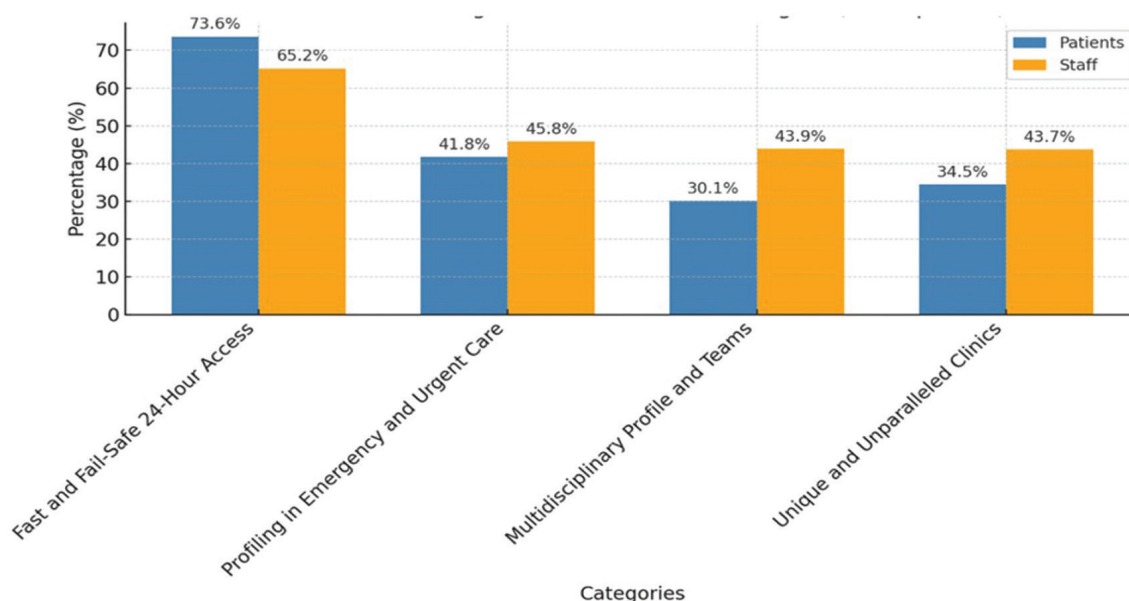


Figure 1. Grouped bar chart showing the differences in perspectives between patients and staff at UHATEM "N. I. Pirogov".

higher proportion of patients had completed high school (50.5%), with fewer holding advanced degrees (19.6% with a master’s or doctoral qualification). **Fig. 1** compares the perceived advantages of UHATEM “N. I. Pirogov” from the perspectives of patients and staff across key service-related aspects. A significant difference in perceptions was noted regarding fast and reliable 24-hour access, with a larger proportion of patients (73.6%) recognizing this as an advantage compared to staff (65.2%) ($\chi^2=8.57, p=0.003$, Cramér’s $V=0.09$) summarized in **Table 3**. The trends in the perception of 24-hour access at the UHATEM “N. I. Pirogov” across different age groups are shown in **Fig. 2**. The line chart reflects the increasing importance placed on 24-hour access by older respondents (≥ 60 years), which aligns with demographic shifts where aging populations demand more frequent and urgent healthcare services. Men consistently assign higher importance to 24-hour access compared to women, potentially due to differing healthcare utilization patterns or expectations.

The one-way ANOVA analysis examined whether perceptions of 24-hour access differed across age groups. Older age groups demonstrated the highest perceived importance of continuous, around-the-clock hospital access, likely reflecting their more frequent healthcare needs

(**Fig. 3**). No significant difference was measured between the two groups regarding the hospital’s EMS specialization. Patients (41.8%) and staff (45.8%) expressed similar views, with no statistically significant association observed ($\chi^2=1.68, p=0.194$, Cramér’s $V=0.04$) (**Table 3**). A statistically significant difference was observed in perceptions of the hospital’s multidisciplinary profile and teams, with 43.9% of staff identifying this as an advantage compared to 30.1% of patients (**Fig. 3**). Similarly, 43.7% of the staff recognized the value of unique clinics and specialized structures, compared to 34.5% of patients ($\chi^2=9.17, p=0.002$, Cramér’s $V=0.09$) (**Table 3**). Although the effect size was small (Cramér’s $V=0.09$), this statistically significant difference likely reflects staff members’ greater familiarity with the hospital’s specialized infrastructure (**Fig. 4**).

Discussion

This was a cross-sectional study aimed to examine the perceived advantages of UHATEM “N.I. Pirogov” relative to other medical facilities by collecting perspectives from both patients and hospital staff. The findings offer valuable insights into how respondents from both study groups

Table 3. Comparison of perceived advantages of UHATEM “N. I. Pirogov” between patients and hospital staff

Perceived advantage	Hospital staff (n=469)	Patients (n=572)	Chi-square (χ^2)	p-value	Cramér’s V
Fast and fail-safe 24-hour access	373 (65.2%)	345 (73.6%)	8.57	0.003	0.09
Profiling in the field of emergency and urgent care	262 (45.8%)	196 (41.8%)	1.68	0.194	0.04
Multidisciplinary profile and teams	251 (43.9%)	141 (30.1%)	21.67	<0.001	0.14
Unique and unparalleled clinics and structures	250 (43.7%)	162 (34.5%)	9.17	0.002	0.09

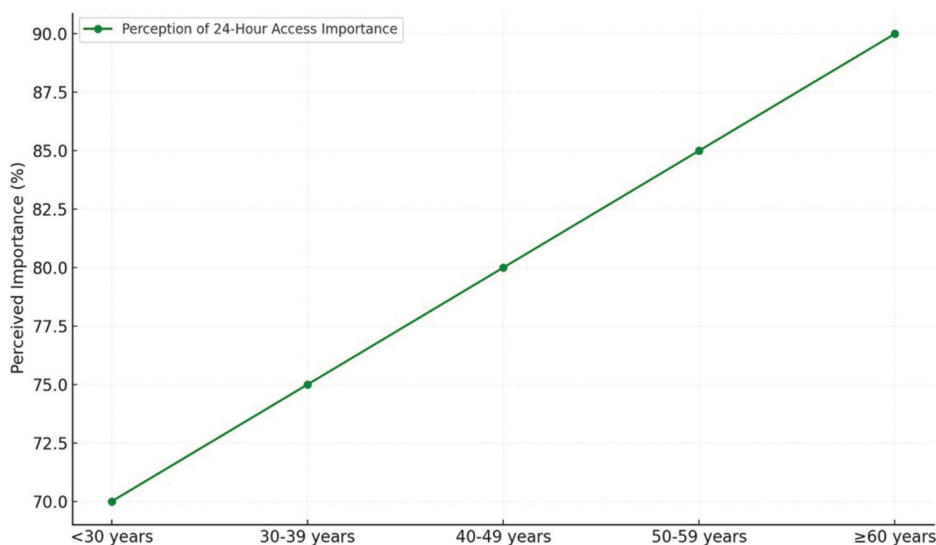


Figure 2. Line chart showing trends in the perception of 24-hour access importance across different age groups.

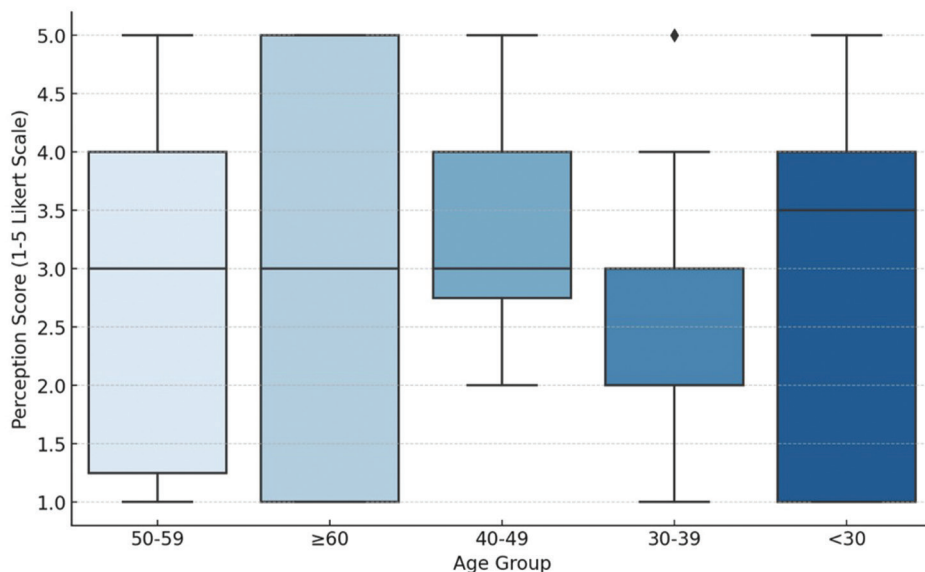


Figure 3. ANOVA analysis of 24-hour access perception across various age groups.

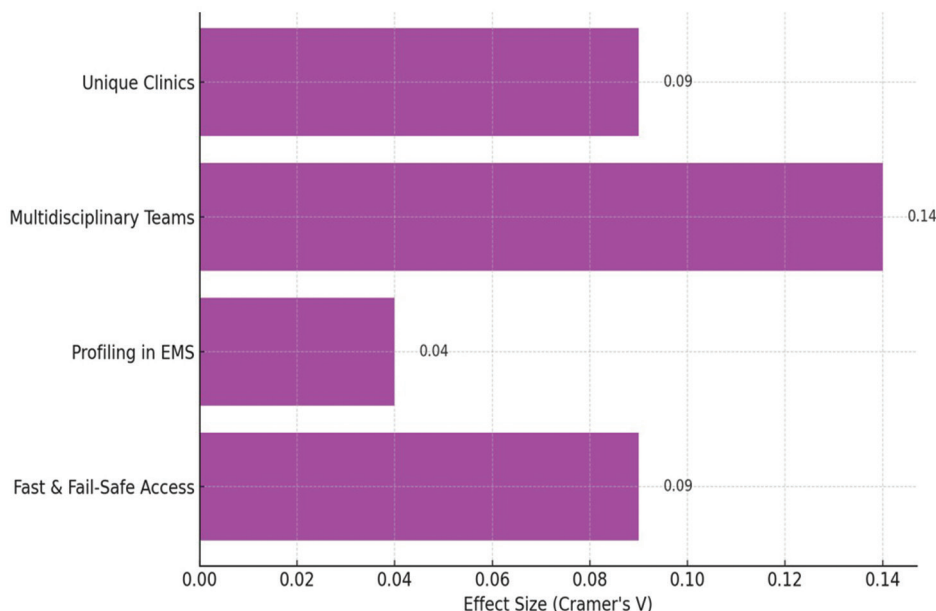


Figure 4. Horizontal bar chart displaying effect sizes (Cramer's V) for the perceived advantages.

perceive the hospital's strengths, providing actionable information that can enhance patient communication and increase staff engagement.

The prominence of "Fast and fail-safe 24-hour access" as a valued feature among both patients (73.6%) and staff (65.2%) underscores the essential role of reliable EMS at UHATEM "N. I. Pirogov". This strong endorsement reflects the hospital's commitment to ensuring uninterrupted, dependable access to emergency care, which is critical for patient outcomes and overall satisfaction (Fig. 1). However, the one-way ANOVA analysis on 24-hour access demonstrated that older respondents of our study, who often have more frequent healthcare needs, assigned the highest per-

ceived importance to this service within their age group (Fig. 3).

For instance, Venesoja et al. found that patients' perceptions of safety in EMS are significantly tied to consistent, rapid access to care.^[16] In this context, "fast and fail-safe" access plays a vital role, as delays or interruptions in EMS can significantly impact patient health outcomes. Additionally, the cited study emphasized that patients associate quick access with both physical safety and emotional reassurance, directly influencing their overall trust and satisfaction with EMS.

This outcome, consistent with findings from our study, underscores the importance of continuous emergency

access in addressing immediate health needs and fostering long-term patient trust in the healthcare system. This insight holds particular value for health policymakers in Bulgaria, emphasizing the need for targeted resource allocation and supportive policies to ensure round-the-clock access to EMS. Strengthening infrastructure and staffing for continuous access can enhance patient satisfaction, improve emergency care quality, and promote a safer healthcare environment.

While respondents acknowledge the value of specialized profiling in emergency settings, staff members, likely due to their operational roles and direct exposure to hospital processes may have a more nuanced appreciation of the benefits that profiling can bring to urgent care delivery (**Table 3**). Recent studies indicated that profiling in EMS, involving targeted triage, resource allocation, and specialized treatment pathways, can enhance efficiency and patient outcomes.^[17,18]

Our finding underscores the importance of profiling strategies in emergency departments, particularly when acknowledged by staff who understand how these approaches can optimize workflows and enhance patient care quality. Staff awareness of profiling benefits, such as targeted resource allocation and tailored patient management, indicates familiarity with the operational efficiencies that profiling can bring to EMS settings. By applying these strategies effectively, emergency departments can reduce wait times, better manage high patient volumes, and ensure that care delivery aligns with the immediate needs of patients, thereby supporting more satisfactory patient experiences.^[6,19]

These insights further suggest that investing in staff training to effectively use profiling tools may be crucial for enhancing EMS care outcomes. Additionally, clear communication with patients about the role of profiling can promote transparency and build trust, helping patients understand how personalized approaches can improve both the speed and quality of their care. Research suggests that well-implemented profiling can significantly enhance both healthcare outcomes and patient satisfaction, reinforcing an institution's capacity to deliver timely, efficient, and high-quality EMS.

The largest effect size for “Multidisciplinary profile and teams” underscores hospital staff's recognition of the critical role that collaborative care plays in operational efficiency and patient outcomes (**Fig. 4**). This finding aligns with Srinivas et al., who highlighted the benefits of multidisciplinary approaches, such as integrating specialists from diverse fields, fostering collaboration through structured clinical rounds, and implementing standardized care pathways, in enhancing clinical outcomes.^[20] Their work also emphasized how integrated team approaches facilitate communication and continuity of care, key factors in high-performing healthcare settings. Similarly, our results validate the importance of coordinated care in achieving measurable improvements, highlighting the pivotal role of multidisciplinary approaches in optimizing patient man-

agement. Epstein et al., underlined the essential role of multidisciplinary frameworks in driving improvements in healthcare quality.^[21] At UHATEM “N.I. Pirogov”, where collaborative care is a cornerstone, the integration of specialized clinical structures and multidisciplinary teams creates a setting that effectively addresses complex patient needs through collective expertise.

Conversely, the smallest effect size for “Profiling in EMS” suggests a gap in understanding or perceived utility among respondents (**Fig. 4**). Although profiling systems are integral for targeted triage and resource allocation, their benefits may not yet be fully recognized by staff and patients. Raising awareness and providing education on how profiling optimizes care delivery could bridge this gap. Strengthening multidisciplinary frameworks while fostering an understanding of EMS profiling systems can simultaneously enhance workflow efficiency, improve patient satisfaction, and ensure a more cohesive and effective healthcare environment.

Furthermore, both studies highlighted how multidisciplinary and specialized frameworks not only elevate patient care but also optimize resource allocation and staff efficiency, supporting strategic quality improvement initiatives across healthcare settings.^[20,21] These insights suggest that as Bulgarian healthcare policymakers consider expanding specialized profiles and unique clinical structures, there is strong evidence that investing in multidisciplinary team frameworks could reinforce both clinical and operational outcomes.

The findings of this cross-sectional study provide valuable insights into respondents' perceptions of the hospital's strengths, offering actionable information to improve patient communication and foster greater staff engagement. Moreover, significant funding issues and financial challenges affect the operational continuity of EMS at UHATEM “N. I. Pirogov”. Addressing both is critical for sustaining high-quality emergency care delivery and ensuring long-term operational stability. Recent studies have highlighted that government-supported EMS can enhance service reliability, reduce patient wait times, and ultimately lead to better health outcomes by ensuring that critical resources, such as advanced medical equipment and well-trained personnel, are consistently available.^[22-24]

A multifaceted funding approach could effectively address the financial constraints of UHATEM “N. I. Pirogov” Public-Private Partnerships (PPPs) present an innovative solution for supplementing direct state funding.^[25,26] We estimate that involving the private sector, UHATEM “N. I. Pirogov” could access additional resources for infrastructure upgrades, advanced technology integration, and expanding EMS, thus enhancing patient care and satisfaction. PPPs have been shown to accelerate healthcare improvements by leveraging public and private expertise.^[27,28]

Finally, grants and donations could also play a pivotal role in supporting specific projects, particularly those requiring capital-intensive upgrades and research initiatives aimed at driving innovation in patient care. By

diversifying funding streams to include these sources, UHATEM can achieve greater flexibility in addressing urgent needs and strategic priorities without over-reliance on state funding. This approach not only supplements operational budgets but also fosters collaborations with philanthropic organizations and research entities, further strengthening the hospital's capacity to innovate and improve service delivery.

Strengths and limitations

For the first time in Bulgaria, a cross-sectional study was conducted incorporating data from 1041 participants, providing a robust representation of both hospital staff and patients. The study used a self-administered, anonymous online questionnaire to gather responses. The large sample size enhances the generalizability of the findings, making them applicable to similar healthcare settings. The inclusion of diverse demographic characteristics, such as age, sex, and educational attainment, offers a comprehensive understanding of the perspectives of different groups within the hospital environment. By comparing perceptions between hospital staff and patients, the study identifies potential areas for improvement in communication and service delivery, which is critical for enhancing patient experience and staff engagement.

Several limitations should be considered when interpreting the findings of this study. Firstly, the cross-sectional design restricts the ability to draw causal conclusions regarding the relationships between perceptions and demographic variables. Longitudinal studies would provide a deeper understanding of how perceptions evolve over time. Additionally, the reliance on self-reported data introduces the potential for response bias, as participants may answer in ways they perceive to be favorable rather than reflecting their true opinions. Future research could benefit from incorporating objective measures of service quality to complement self-reported data. While the survey assessed perceived advantages, it may not fully capture the complexity of participants' views. Qualitative methods, such as interviews or focus groups, could offer richer insights into the reasons behind these perceptions.

Conclusion

This cross-sectional study offers valuable insights into the perceived advantages of UHATEM "N.I. Pirogov" from both hospital staff and patient perspectives. The findings highlight significant differences in perceptions regarding key hospital attributes, particularly in terms of 24-hour access and the hospital's multidisciplinary profile. The results also point to the need for enhanced efforts to bridge the perception gap between staff and patients, fostering a shared understanding of the hospital's capabilities. Addressing challenges in funding through direct state support, pub-

lic-private partnerships, and efficient resource allocation will be essential for maintaining and improving the quality of EMS.

Future research should aim to examine the long-term impact of these perceptions on patient outcomes and staff satisfaction, employing diverse methodologies to provide a more comprehensive understanding. By prioritizing effective communication and addressing the identified areas of improvement, UHATEM "N.I. Pirogov" can strengthen its position as a leading institution in EMS, benefiting both patients and healthcare professionals.

Author contributions

Conceptualization: V.D., N.D., and J.P.; content design: A.V., D.P.D., and S.D.; writing – original draft preparation: V.D., N.D., and J.P.; writing – review and editing: L.B. and J.P.; visualization: S.D., D.P.D., and A.V.; supervision: V.D., N.D., and J.P. All authors have read and agreed to the published version of the manuscript.

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Competing Interests

The authors have declared that no competing interests exist.

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