

Status of sepsis care in romanian hospitals: insights from the european sepsis care survey

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ABSTRACT

Background: Early recognition of sepsis, standardised management protocols and hospital quality improvement initiatives are considered essential components of modern sepsis care. However, data regarding implementation of these measures in Romanian hospitals remain limited.

Aim: To evaluate sepsis screening, standardised sepsis management, quality improvement initiatives and selected organisational infrastructure components in Romanian hospitals participating in the European Sepsis Care Survey (ESCS), and to compare Romanian results with hospitals from other European Union countries.

Methods: This secondary analysis included Romanian acute care hospitals participating in the ESCS, a multinational cross-sectional survey conducted between 2021 and 2022. Data regarding sepsis screening, standardised management, quality improvement initiatives and organisational infrastructure were analysed across emergency departments (EDs), wards and intensive care units (ICUs). Romanian hospitals were compared with hospitals from European Union countries excluding Romania.

Results: Thirty-six Romanian hospitals were included, representing approximately 18% of the national acute care bed capacity. Sepsis screening implementation in EDs did not significantly differ from the European comparator group, while differences were observed for wards and ICUs. Standardised sepsis management implementation differed across hospital sectors, with significant differences observed for wards but not for EDs or ICUs. Romanian hospitals reported quality improvement initiatives in 39.4% of cases compared with 22.1% in the European comparator group, although no hospital reported regularly conducted hospital-wide sepsis programmes. Additional differences were observed regarding sepsis bundle implementation, antimicrobial stewardship and organisational infrastructure.

Conclusions: Romanian hospitals participating in the ESCS demonstrated variability in implementation of sepsis screening, standardised management and quality improvement initiatives across hospital sectors. These findings may support future national efforts aimed at improving organisational preparedness and sepsis care implementation.

Keywords: Sepsis; sepsis screening; quality improvement; critical care; organisational infrastructure

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■ INTRODUCTION

Sepsis remains a major cause of morbidity and mortality worldwide and represents a substantial burden for healthcare systems(1–3). Early recognition, timely administration of antimicrobial therapy, adequate source control and structured organisational pathways are considered essential elements of effective sepsis management(4–7). International guidelines increasingly emphasise the importance of standardised screening tools, protocolised care and hospital-wide quality improvement initiatives to improve outcomes in patients with sepsis(1,8–10).

In recent years, international organisations and healthcare authorities have highlighted the need to strengthen institutional capacity for sepsis recognition and management(1,4). The World Health Assembly Resolution 70.7 and subsequent international initiatives encouraged member states to improve sepsis awareness, diagnostic infrastructure, implementation of clinical pathways and quality assurance systems(8,11,12). Despite these recommendations, considerable variability in sepsis care implementation persists between countries and healthcare systems(13–16).

The European Sepsis Care Survey (ESCS) was a large multinational cross-sectional survey evaluating sepsis recognition, management practices, diagnostic capacity and quality improvement structures across hospitals in Europe and other regions(13). The primary ESCS analyses demonstrated substantial heterogeneity in the implementation of sepsis screening, standardised management and microbiological support across participating hospitals(15,17).

However, national-level analyses may provide additional insights into local organisational characteristics, implementation gaps and potential targets for healthcare policy interventions(18). Romania participated in the ESCS through a national recruitment strategy endorsed by the Romanian Society of Anaesthesia and Intensive Care and the Department of Emergency Situations. The participating Romanian hospitals represented a substantial proportion of the national acute care bed capacity.

The aim of this secondary analysis was to evaluate sepsis screening, standardised management practices, quality improvement initiatives and selected organisational infrastructure components in Romanian hospitals participating in the ESCS, and to compare these findings with hospitals from other European Union countries(9,17).

■ METHODS

2.1. Study setting

Study design and survey methodology

This study represents a predefined secondary analysis of Romanian data derived from the European Sepsis Care Survey (ESCS), a multinational cross-sectional survey evaluating sepsis recognition, management practices, diagnostic capacity and quality improvement structures in acute care hospitals. The ESCS methodology has been described previously(15,17).

The ESCS was conducted between august 2021 and February 2022 using a web-based questionnaire harmonised by a multidisciplinary steering committee led by the European Sepsis Alliance and peer-reviewed by several European scientific societies(17). The survey investigated sepsis screening practices, standardised sepsis management, microbiological diagnostic infrastructure, antimicrobial stewardship and quality improvement initiatives across emergency departments (EDs), hospital wards and intensive care units (ICUs).

Romanian recruitment strategy

Romanian hospitals were recruited using the national list of accredited hospitals with acute care beds. Hospital medical directors, heads of ICUs and EDs were contacted via e-mail and/or telephone with the endorsement of the Romanian Society of Anaesthesia and Intensive Care (SRATI) and the Department of Emergency Situations of the Ministry of Internal Affairs. Generally, the first respondent for each institution reported data for the whole institution. Additional information regarding the study protocol and data protection regulations was provided upon request. National coordination was performed by Daniela Filipescu and Mihai Gabriel Ștefan.

Study population

This analysis included Romanian acute care hospitals participating in the ESCS. Romanian results were compared with hospitals from European Union countries(15,17). Participating Romanian hospitals were classified according to hospital type and organisational structure.

Variables of interest

The present analysis focused on:

- implementation of sepsis screening pro-

grammes;

- implementation of standardised sepsis management protocols;
- quality improvement initiatives related to sepsis care;
- sepsis bundle monitoring;
- antimicrobial stewardship programmes;
- organisational and diagnostic infrastructure, including microbiological support, imaging availability and source control capacity.

Survey items were analysed separately for emergency departments (EDs), hospital wards and intensive care units (ICUs), reflecting the sector-specific organisation of sepsis recognition and management within participating hospitals.

Statistical analysis

Categorical variables are presented as numbers and proportions. Romanian hospitals were compared with the European Union comparator group excluding Romania. Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated using the European comparator group as reference. Statistical significance was assessed using χ^2 testing, with p-values <0.05 considered statistically significant.

Ethical considerations

The parent ESCS study received ethical approval from the ethics committee of University Medicine Greifswald, Germany (BB 124/21), where study data were processed and stored. Additional national approvals were obtained according to local legislation. The survey complied with the CHERRIES and CROSS reporting recommendations and was registered at ClinicalTrials.gov (Identifier: NCT05059808)(7,19).

RESULTS

Participating hospitals

A total of 36 Romanian hospitals were included in the analysis, comprising 26 university hospitals, 9 general/community hospitals and 1 independent/private hospital. These hospitals represented 19,315 Romanian acute care beds, corresponding to approximately 18% of the national acute care bed capacity according to 2021 OECD data (Figure 1). The cohort predominantly included tertiary and university-affiliated centres, reflecting the organisational structure of Romanian hospitals participating in the ESCS.

Sepsis screening

Implementation of sepsis screening programmes dif-

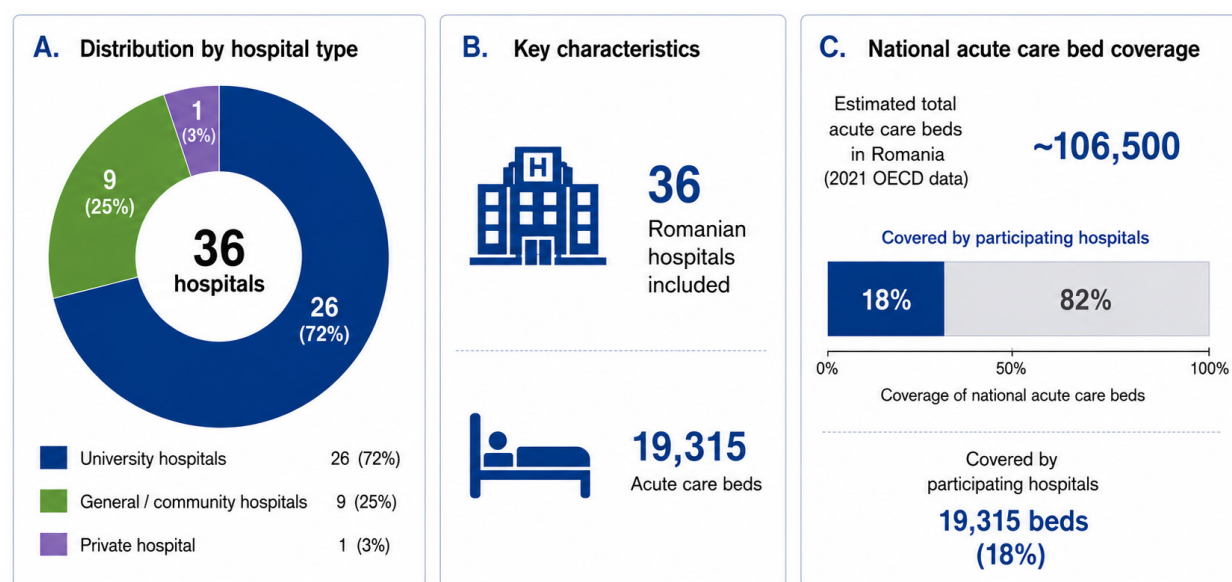


Figure 1. Characteristics of Romanian hospitals included in the analysis. (A) Distribution of participating hospitals according to institutional category. (B) Summary characteristics of the Romanian cohort included in the European Sepsis Care Survey, including the number of participating hospitals and cumulative acute care bed capacity. (C) Estimated proportion of national acute care bed capacity represented by participating hospitals according to 2021 OECD data. OECD: Organisation for Economic Co-operation and Development.

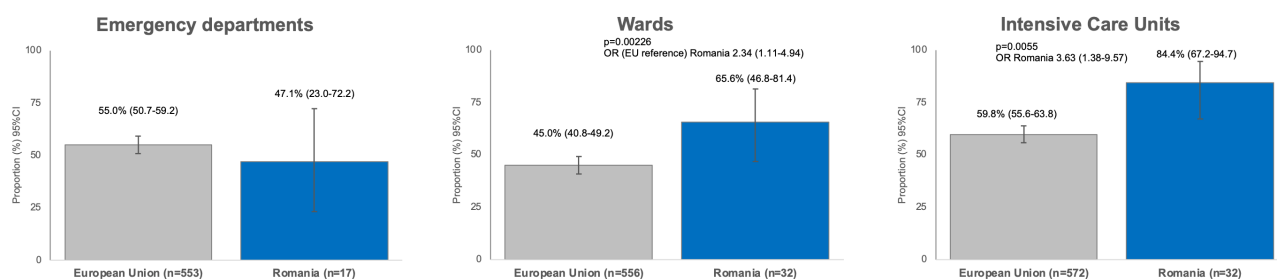


Figure 2. Implementation of sepsis screening programmes in Romanian hospitals compared with hospitals from other European Union countries across emergency departments (EDs), wards (all other surgical and medical departments except ICUs) and intensive care units (ICUs). Odds ratios (ORs) were calculated using the European comparator group as reference. Non-significant p values are not reported.

ferred across clinical settings (Figure 2). In EDs, sepsis screening programmes were reported in Romanian hospitals without significant differences compared with hospitals from other European Union countries ($p=0.51846$; OR 0.73, 95% CI 0.28–1.91). In contrast, significant differences were identified for hospital wards and ICUs. Romanian hospitals demonstrated lower implementation rates of sepsis screening programmes in wards, whereas ICU implementation was more frequent compared with the European comparator group (Figure 2).

Standardised sepsis management

Implementation of standardised sepsis management protocols, procedures and pathways differed across hospital sectors (Figure 3). In EDs, no statistically significant difference was observed between Romanian hospitals and hospitals from other European Union countries ($p=0.8638$; OR 6.41, 95% CI 0.81–50.97). Significant differences were identified for hospital wards,

whereas ICU implementation rates did not significantly differ between groups ($p=0.5069$; OR 1.34, 95% CI 0.57–3.17). Wards were defined as all other existing medical and surgical departments, other than ICUs and Eds. Romanian hospitals reported lower implementation of standardised sepsis management pathways in wards compared with the European comparator group, while ICU implementation rates were comparable between groups (Figure 3).

Quality improvement initiatives

Romanian hospitals reported quality improvement initiatives related to sepsis care in 39.4% of cases compared with 22.1% in hospitals from other European Union countries ($p=0.1233$) (Figure 4). However, no Romanian hospital reported the existence of regularly conducted hospital-wide sepsis programmes implemented across EDs, wards and ICUs. Reported initiatives in Romanian hospitals were limited either to individual hospital sectors or to programmes conducted

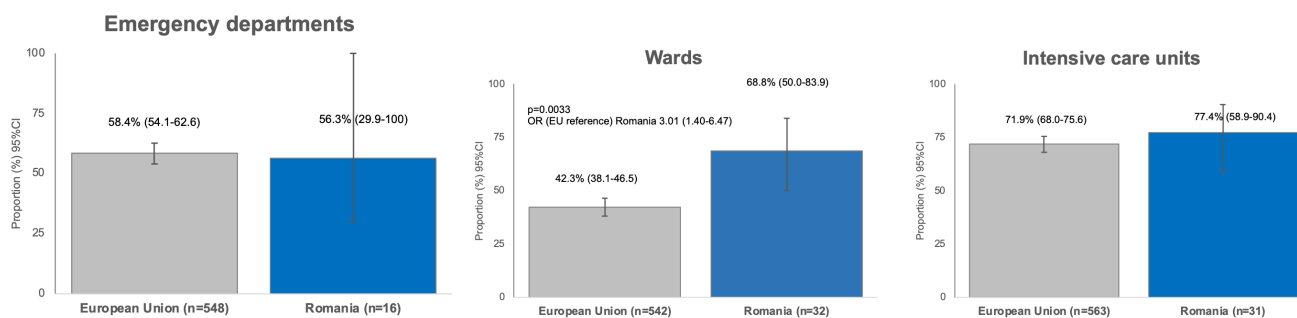


Figure 3. Implementation of standardised sepsis management protocols, procedures and pathways in Romanian hospitals compared with hospitals from other European Union countries across emergency departments (EDs), wards and intensive care units (ICUs). Odds ratios (ORs) were calculated using the European comparator group as reference. Non-significant p values are not reported.

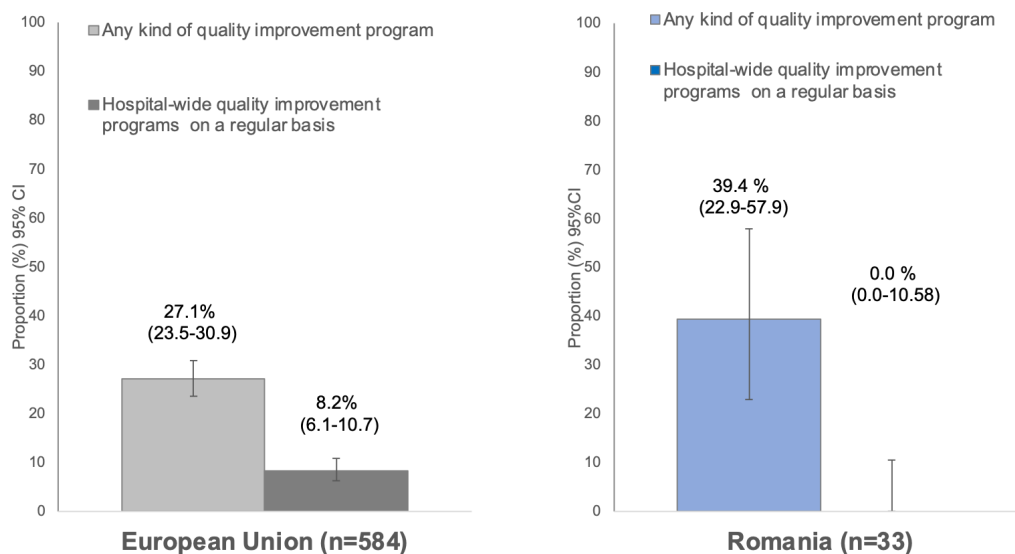


Figure 4. Quality improvement initiatives related to sepsis care in Romanian hospitals compared with hospitals from other European Union countries. Non-significant p values are not reported.

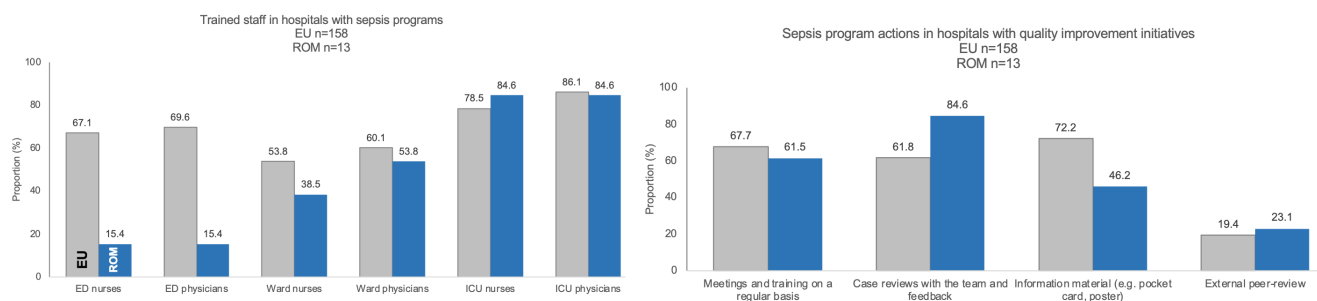


Figure 5. Detailed quality improvement activities related to sepsis care across hospital sectors in Romanian hospitals and comparator hospitals from the European Union. Non-significant p values are not reported.

on a non-regular basis. Compared with the European comparator group, Romanian hospitals more frequently reported quality improvement activities restricted to specific departments rather than institution-wide implementation (Figure 4).

Among hospitals reporting quality improvement initiatives, implementation differed between hospital sectors (Figure 5). Lower implementation rates were observed in EDs, whereas ICUs more frequently reported quality improvement activities related to sepsis care. Romanian hospitals also reported higher rates of case review and feedback activities compared with hospitals from other European Union countries. Dedicated financial support for sepsis programmes or specialised sepsis personnel was reported in 8.6% of Romanian hospitals compared with 4.5% in the European com-

parator group.

Organisational infrastructure

Comparative analyses regarding organisational infrastructure related to sepsis care are presented in Figure 6. Analysed organisational measures included antimicrobial stewardship programmes, availability of 24/7 surgical source control, hospital antimicrobial treatment guidelines, continuous imaging availability, microbiological diagnostic support and medical emergency teams. Differences between Romanian hospitals and hospitals from other European Union countries were observed across several organisational and diagnostic infrastructure domains(15,17,20,21).

Lower implementation rates were observed in Romanian hospitals regarding continuous microbiological

diagnostic support and availability of 24/7 microbiological services. Similarly, continuous access to imaging modalities required for identification of infection source control was less frequently reported compared with hospitals from other European Union countries. Variability was also observed regarding availability of 24/7 surgical source control and implementation of antimicrobial stewardship programmes. In contrast,

hospital antimicrobial treatment guidelines and availability of medical emergency teams demonstrated more comparable implementation patterns between Romanian hospitals and the European comparator group (Figure 6)(17,20,22).

DISCUSSION

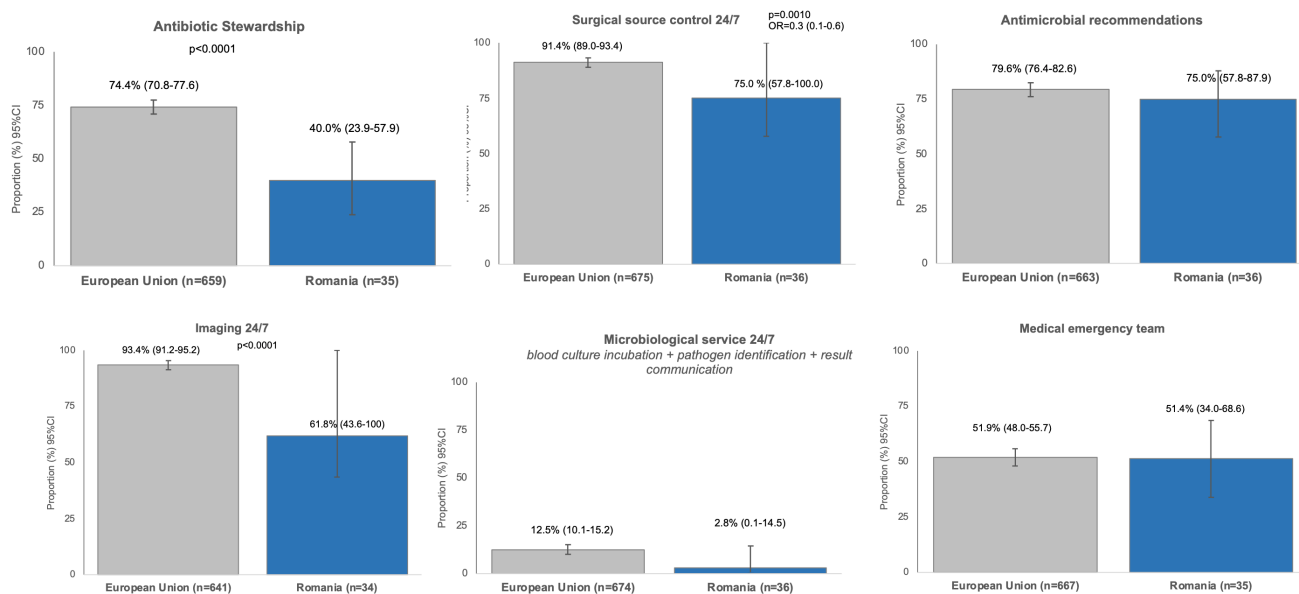


Figure 6. Organizational infrastructure related to sepsis care, including antimicrobial stewardship programmes, microbiological support, continuous imaging availability, surgical source control capacity and medical emergency teams, in Romanian hospitals compared with hospitals from other European Union countries. Non-significant p values are not reported.

This secondary analysis of the European Sepsis Care Survey provides an overview of sepsis recognition, standardised management and organisational infrastructure in Romanian hospitals participating in the ESCS(13). The results demonstrate substantial variability between hospital sectors regarding implementation of sepsis screening programmes, standardised management pathways and quality improvement initiatives. These sector-dependent differences are clinically relevant because sepsis recognition and early treatment frequently occur across multiple hospital environments, including emergency departments (EDs), hospital wards and intensive care units (ICUs). Differences between these sectors likely reflect variability in patient acuity, monitoring capacity, staffing structure, protocol availability and familiarity with structured sepsis management pathways.

The findings should be interpreted within the broad-

er context of the primary ESCS analyses, which demonstrated marked heterogeneity in implementation of sepsis care measures across European hospitals(15,17). In the parent ESCS cohort, sepsis screening was implemented in only 54.2% of EDs, 47.9% of wards and 61.7% of ICUs, while standardised sepsis management was reported in 57.3% of EDs, 45.2% of wards and 70.7% of ICUs. Moreover, only 9.8% of hospitals reported ongoing quality improvement initiatives and only 4.6% reported dedicated investment in sepsis programmes. These observations highlighted substantial implementation gaps across Europe and emphasised the importance of organisational preparedness in sepsis care(14).

The Romanian results appear broadly consistent with these European observations, particularly regarding differences between EDs, wards and ICUs. ICU implementation of sepsis screening and standardised

management pathways was generally more comparable with European hospitals, whereas lower implementation rates were observed outside intensive care settings, particularly in wards (19). This includes infectious disease wards, where available although sub-stratified data is not available. Similar sector-dependent variability has also been reported in other healthcare systems and likely reflects differences in monitoring intensity, protocol availability, staffing structure and familiarity with sepsis pathways between ICUs and non-critical care settings(15,17).

One of the principal findings of the present analysis was the absence of regularly conducted hospital-wide sepsis quality improvement programmes in participating Romanian hospitals. Although local initiatives and unit-based activities were reported, comprehensive multidisciplinary programmes implemented consistently across EDs, wards and ICUs were not identified. This observation is relevant because the primary ESCS analyses demonstrated associations between hospital-wide quality improvement initiatives and higher implementation rates of sepsis screening and standardised management pathways(13,15). Organisational integration of sepsis care across multiple hospital sectors therefore remains an important challenge(17).

The present findings may also be interpreted in the context of the Catalanian secondary ESCS analysis, which evaluated hospitals in a region with an established regional sepsis programme ("Sepsis Code"). In that analysis, Catalanian hospitals demonstrated substantially higher implementation rates of sepsis screening programmes and standardised sepsis management pathways, particularly in EDs and wards, compared with hospitals from other European Union countries(15,23–26). These findings suggest that coordinated regional or national implementation strategies may influence adoption of organisational sepsis measures across hospital sectors(27).

An important finding of the present Romanian analysis relates to organisational and diagnostic infrastructure. Romanian hospitals reported lower availability of continuous microbiological diagnostic support and 24/7 microbiological services compared with hospitals from other European Union countries. Continuous access to imaging modalities required for identification of infectious sources was also less frequently reported(28,29). These findings are particularly relevant because timely microbiological diagnosis and rapid source identification are central components of guide-

line-recommended sepsis management(17).

The dedicated ESCS analysis regarding blood culture practices and microbiological diagnostic capacity provides additional perspective for interpretation of the Romanian results(15,17). In that European analysis, only 10% of hospitals reported around-the-clock microbiological services and only 7.4% combined 24/7 microbiology with rapid testing capacity. Limited microbiological operating hours and delayed processing of blood cultures were identified as major organisational challenges across European hospitals. The Romanian findings therefore appear consistent with broader European limitations in microbiological infrastructure, although lower reported availability of continuous microbiological support and imaging access may further affect implementation of sepsis pathways.

Variability was also observed regarding implementation of antimicrobial stewardship programmes and access to 24/7 surgical source control. These findings further highlight the complexity of sepsis care implementation, which depends not only on clinical protocols but also on broader organisational and multidisciplinary infrastructure.

The organisational aspects identified in this study may have implications for future national sepsis strategies in Romania. International initiatives, including the World Health Assembly Resolution 70.7, emphasise the importance of institutional preparedness, structured sepsis pathways, microbiological support, multidisciplinary collaboration and quality monitoring systems(8). The present findings suggest that implementation of these elements remains heterogeneous between Romanian hospitals and hospital sectors. Multiple factors may contribute to these implementation gaps, including differences in hospital resources, availability of trained personnel, access to continuous microbiological and imaging support, variability in institutional prioritisation of sepsis programmes and the absence of coordinated national implementation frameworks. In addition, organisational fragmentation between hospital sectors and limited availability of dedicated quality improvement structures may further affect integration of standardised sepsis pathways across EDs, wards and ICUs.

This study has several limitations. First, the ESCS was a self-reported survey and responses were not externally audited. Second, participating hospitals represented a convenience sample and may not fully reflect all Romanian acute care hospitals. Third, the relatively

high proportion of university hospitals may limit generalisability to smaller institutions. Finally, the survey evaluated organisational structures and reported practices rather than patient-level clinical outcomes.

Nevertheless, this study also has important strengths. Romanian hospitals included in the analysis represented approximately 18% of the national acute care bed capacity and the study used a standardised multinational methodology allowing benchmarking against hospitals from other European Union countries. In addition, this analysis represents one of the first multicentre evaluations of organisational sepsis care implementation and diagnostic infrastructure in Romanian hospitals.

■ CONCLUSIONS

This secondary analysis of the European Sepsis Care Survey identified variability in implementation of sepsis screening, standardised management and quality improvement initiatives across Romanian hospitals. Differences between hospital sectors were observed regarding organisational pathways and quality structures. These findings may contribute to future national initiatives aimed at improving sepsis recognition, management and organisational preparedness in Romania.

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■ AUTHORS' CONTRIBUTION

MGS and CSS conceptualised the Romanian secondary analysis of the European Sepsis Care Survey, participated in data analysis and drafted the manuscript. MA, FTB, GC, CC, EC, GCh, TC, CCo, MC, DC, SAF, MF, GPG, IG, AH, LI, DI, JK, MNL, ML, MM, IRM, IRM,

AMM, MP, LP, DS, TS, CSt, JS, ST, CP, LV, LVI, RA, ŞA and CA contributed to national survey dissemination, hospital recruitment, data acquisition and critical revision of the manuscript. EJG-B contributed to the ESCS methodology, interpretation of data and critical revision of the manuscript. DF coordinated the Romanian participation in the ESCS, contributed to study conceptualisation, data interpretation and manuscript revision. All authors reviewed and approved the final manuscript.

■ CONFLICT OF INTEREST

The European Sepsis Care Survey received educational grant support from Becton Dickinson SA. The sponsor had no role in the present secondary analysis, manuscript preparation or decision to submit for publication. The authors declare no other conflict of interest related to this manuscript.

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