EMERGENCY GENERAL SURGERY PATHWAYS IN ROMANIA COMPARED WITH EUROPEAN ACUTE CARE SURGERY STANDARDS: A COMPARATIVE REVIEW

Rideg Tereza-Maria[1], Cătălin Cosma[1,2], Călin Molnar[1,2], Vadimir Bacarea Constantin[1]

[1]"George Emil Palade" University of Medicine, Pharmacy, Science and Technology of Târgu Mureș
[2]Emergency Clinical County Hospital of Târgu-Mureș, Surgery Department

REVIEW

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Abstract

Introduction: Emergency General Surgery (EGS) is a major component of modern surgical practice, associated with substantial morbidity, mortality, and resource utilization. In response to the growing complexity of emergency patients, several European countries have adopted Acute Care Surgery (ACS) models featuring dedicated teams, standardized pathways, rapid diagnostic access, and continuous quality assessment. Romania delivers nationwide emergency surgical care through a heterogeneous hospital network, yet its alignment with contemporary European ACS standards remains insufficiently explored. This review compared Romanian emergency general surgery services with established European ACS models and identified opportunities for improvement.

Material & Method: A narrative comparative review was performed using PubMed, Scopus, Web of Science, European surgical society guidelines, and national reports published between 2008 and 2025. Recommendations from the World Society of Emergency Surgery (WSES), the European Society for Trauma and Emergency Surgery (ESTES), National Emergency Laparotomy Audit (NELA), and Romanian strategic documents were analyzed, focusing on workforce, patient pathways, diagnostic imaging, operating room access, critical care integration, minimally invasive surgery, quality indicators, and audits.

Results: European ACS systems are increasingly defined by consultant-led services, dedicated teams, protected theatre access, standardized triage, multidisciplinary perioperative care, and national registries. In contrast, Romanian care is predominantly organized through traditional on-call models, with significant variability in staffing, resources, and infrastructure. Although Romanian tertiary centers demonstrate high expertise in emergency and minimally invasive surgery, standardized ACS pathways, quality indicators, and outcome benchmarking remain limited, and no national emergency surgery registry exists.

Conclusion: Romanian EGS services provide comprehensive care and share core principles with European ACS systems, yet differences persist regarding dedicated structures, quality monitoring, and benchmarking. Adopting standardized pathways, protected resources, multidisciplinary models, and national audits may improve outcomes and align Romanian practice with European standards.

Corresponding author:
Cosma Cătălin
alexandralazar7@gmail.com

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Introduction

Emergency General Surgery (EGS) encompasses a broad spectrum of time-sensitive surgical conditions requiring urgent evaluation and intervention, including acute appendicitis, acute cholecystitis, bowel obstruction, perforated peptic ulcer disease, complicated abdominal wall hernias, gastrointestinal perforations, and intra-abdominal sepsis. EGS represents a substantial proportion of hospital surgical admissions worldwide and is associated with significantly higher morbidity, mortality, and healthcare costs compared with elective surgical procedures. Recent efforts by international surgical societies have emphasized the need for standardized pathways capable of improving the timeliness, safety, and quality of emergency surgical care while optimizing the utilization of healthcare resources [1–4].

Over the last two decades, the concept of Acute Care Surgery (ACS) has emerged as a modern organizational framework integrating emergency general surgery, trauma surgery, and surgical critical care into a coordinated service model. Unlike traditional on-call systems, ACS programs are characterized by dedicated emergency surgical teams, consultant-led decision making, protected operating room access, rapid diagnostic evaluation, and multidisciplinary perioperative management. Several studies have demonstrated that implementation of ACS models may improve patient flow, reduce delays to surgery, increase operative efficiency, and enhance clinical outcomes for emergency surgical patients [5,6]. Parallel developments have occurred in the management of specific emergency surgical pathologies, with evidence-based guidelines now available for acute appendicitis, acute cholecystitis, perforated peptic ulcer disease, and adhesive small bowel obstruction, promoting greater standardization of care across institutions and healthcare systems [7–10].

The growing burden of emergency surgical disease has further highlighted the importance of system-level organization. Epidemiological studies have demonstrated that EGS conditions account for a considerable proportion of surgical morbidity and mortality worldwide, with emergency operations consistently associated with poorer outcomes than elective procedures [11,12]. Consequently, increasing attention has been directed toward the development of quality indicators, performance measurement tools, and national audit systems capable of monitoring outcomes and identifying opportunities for improvement [13,14]. The experience of large-scale initiatives such as the National Emergency Laparotomy Audit (NELA) has shown that continuous evaluation of clinical performance, risk stratification, and perioperative care pathways can contribute significantly to improving outcomes following emergency surgery [15–19]. In parallel, formally developed quality indicators have provided objective frameworks for assessing the effectiveness and efficiency of emergency surgical services [20,21].

Contemporary healthcare systems have increasingly recognized the benefits of dedicated emergency surgery services. Studies evaluating 24-hour emergency surgical coverage, shift-based ACS models, and dedicated emergency surgery units have reported reductions in delays to definitive treatment, improved resource utilization, and enhanced patient outcomes [22–25]. Nevertheless, emergency surgery continues to be associated with substantial excess morbidity and mortality, particularly among elderly and physiologically compromised patients, underscoring the need for ongoing organizational improvements and evidence-based perioperative strategies [26,27]. European surgeons have played a central role

in advancing the ACS concept, promoting integrated emergency surgical pathways and multidisciplinary care models adapted to the specific characteristics of European healthcare systems [28,29].

The World Society of Emergency Surgery (WSES) has contributed substantially to the standardization of emergency surgical practice through the development of international guidelines addressing intra-abdominal infections, sepsis, acute pancreatitis, appendicitis, cholecystitis, bowel obstruction, perforated ulcers, and emergency abdominal wall hernias [30,31]. In addition, global collaborative studies have highlighted marked international variations in emergency surgical outcomes and have emphasized the importance of healthcare infrastructure, perioperative management, and system organization as determinants of patient survival [32–35]. Increasing evidence also supports multidisciplinary perioperative pathways and structured emergency surgery systems as important components of modern emergency surgical care [35,36].

In Romania, emergency general surgery services are delivered through a network of county hospitals, emergency county hospitals, and tertiary university centers that provide continuous surgical coverage for a diverse and often complex patient population. Although Romanian surgeons have progressively adopted minimally invasive techniques and contemporary management strategies for many emergency surgical conditions [37–39], the organizational structure of emergency surgical services remains predominantly based on traditional on-call models. Furthermore, limited information is available regarding the degree of alignment between Romanian emergency surgical pathways and contemporary European ACS standards. Given ongoing healthcare reforms and national strategic initiatives aimed at improving healthcare quality and efficiency, understanding current organizational strengths and limitations has become increasingly important [40–45].

Therefore, the aim of this review was to compare current Emergency General Surgery pathways in Romania with established European Acute Care Surgery standards and to identify potential opportunities for future development, quality improvement, and system optimization within the Romanian healthcare system.

Material and Methods

This study was conducted as a narrative comparative review designed to evaluate the current organization of Emergency General Surgery (EGS) pathways in Romania and to compare them with contemporary European Acute Care Surgery (ACS) standards. The review focused on the structural, organizational, and quality-related aspects of emergency surgical care delivery, with particular emphasis on factors influencing patient management, resource utilization, and healthcare outcomes.

A comprehensive literature search was performed using the PubMed, Scopus, and Web of Science databases. Additional information was obtained from official reports, healthcare policy documents, national strategic plans, and publications issued by international surgical societies and healthcare organizations. The search included studies published between January 2007 and March 2025 and utilized combinations of the following keywords: “Emergency General Surgery”, “Acute Care Surgery”, “Emergency Surgery Pathways”, “Emergency Laparotomy”, “Acute Surgical Care”, “Quality Indicators”, “National Emergency Laparotomy Audit”, “WSES”, “ESTES”, “Romania”, “Healthcare Systems”, “Emergency Surgical Services”, and “Surgical Quality Improvement”.

Eligible publications included clinical studies, systematic reviews, consensus statements, international guidelines, national audit reports, registry analyses, healthcare

policy documents, and publications addressing organizational models of emergency surgical care. Particular attention was given to studies evaluating the implementation of Acute Care Surgery models, emergency surgery quality indicators, perioperative optimization strategies, national benchmarking systems, and healthcare system organization. Publications unrelated to emergency surgical care delivery, studies focusing exclusively on elective surgery, conference abstracts lacking sufficient methodological information, and articles without accessible full-text data were excluded from the analysis.

The comparative framework was developed using recommendations from the World Society of Emergency Surgery (WSES), the European Society for Trauma and Emergency Surgery (ESTES), National Emergency Laparotomy Audit (NELA) reports, and contemporary literature regarding Acute Care Surgery systems. Romanian emergency surgical pathways were evaluated through analysis of published national literature, healthcare system reports, governmental policy documents, and available evidence regarding emergency surgical practice within Romanian hospitals. These findings were subsequently compared with organizational characteristics commonly reported in European ACS models.

The analysis focused on several key domains including workforce organization and surgical staffing structures, emergency department triage and patient flow pathways, access to diagnostic imaging, emergency operating theatre availability, integration of critical care services, implementation of minimally invasive emergency surgery, utilization of quality indicators, and the presence of national registries and audit systems. The comparison was qualitative in nature and aimed to identify similarities, differences, strengths, and potential areas for improvement within the Romanian emergency surgical system when evaluated against contemporary European standards.

Results

Current Organization of Emergency General Surgery in Romania

Emergency General Surgery (EGS) services in Romania are delivered through a hierarchical healthcare network composed of municipal hospitals, county hospitals, county emergency hospitals, and tertiary university referral centers. This structure ensures nationwide access to emergency surgical care and allows the management of a broad spectrum of acute surgical conditions ranging from uncomplicated appendicitis and acute cholecystitis to complex abdominal sepsis, bowel obstruction, gastrointestinal perforations, and major abdominal emergencies [40–42].

The Romanian emergency healthcare system is largely organized around county emergency hospitals and tertiary referral centers, which provide continuous surgical coverage through 24-hour on-call services. Emergency surgical patients are typically admitted through Emergency Departments (EDs), where initial assessment, stabilization, laboratory investigations, and imaging studies are performed before surgical consultation. Depending on disease severity, patients may be managed locally or transferred to higher-level centers with advanced surgical, anesthesiology, intensive care, and interventional radiology capabilities [40,41].

Unlike many contemporary European Acute Care Surgery (ACS) models, emergency surgical care in Romania remains predominantly based on the traditional on-call system. In most institutions, the same surgical teams are responsible for elective clinical activities, inpatient ward management, outpatient consultations, and emergency surgical coverage. While this approach ensures continuous availability of surgical expertise, it may create variability in workload distribution, response times, and resource utilization, particularly in high-volume

hospitals with significant emergency case burdens [41,42].

Despite these organizational characteristics, Romanian emergency surgical services have undergone substantial modernization during the last two decades. The widespread availability of computed tomography, improvements in perioperative care, increased access to intensive care services, and progressive adoption of minimally invasive surgical techniques have significantly enhanced the management of emergency surgical patients. Laparoscopic approaches are now routinely employed for common emergency procedures such as appendectomy and cholecystectomy, while advanced minimally invasive techniques are increasingly utilized in selected cases of bowel obstruction, perforated ulcer disease, and other acute abdominal pathologies [43].

Nevertheless, important differences continue to exist between institutions regarding staffing levels, access to diagnostic resources during off-hours, operating theatre availability, and integration of multidisciplinary perioperative care. Resource disparities between tertiary academic centers and smaller regional hospitals may influence both the complexity of cases managed locally and the need for interhospital transfers. Furthermore, although local quality assurance mechanisms are present, Romania currently lacks a dedicated national Emergency General Surgery registry capable of providing standardized benchmarking data and facilitating nationwide evaluation of surgical outcomes [40–45].

Overall, the Romanian EGS system provides comprehensive emergency surgical coverage and benefits from a well-established network of emergency hospitals and experienced surgical teams. However, its organizational framework remains primarily centered on traditional on-call models, with ongoing opportunities for further development through implementation of dedicated ACS pathways, standardized performance indicators, and national quality monitoring initiatives [40–45].

European Acute Care Surgery Standards and Organizational Models

Over the past two decades, the concept of Acute Care Surgery (ACS) has emerged as a comprehensive organizational framework designed to address the growing complexity and increasing volume of emergency surgical patients. Initially developed to overcome the limitations of traditional on-call systems, ACS integrates emergency general surgery, trauma surgery, and surgical critical care within a dedicated service structure aimed at improving efficiency, continuity of care, and patient outcomes [1,4–6].

Contemporary European ACS models are characterized by several core organizational principles. These include dedicated emergency surgical teams, consultant-led clinical decision-making, rapid access to diagnostic investigations, protected emergency operating theatre capacity, multidisciplinary perioperative management, and continuous quality assessment through audit and benchmarking programs [1–3]. The primary objective of these systems is to ensure timely diagnosis and treatment while minimizing delays that may negatively influence patient outcomes in acute surgical conditions.

The World Society of Emergency Surgery (WSES) and the European Society for Trauma and Emergency Surgery (ESTES) have played central roles in promoting the standardization of emergency surgical care across Europe. Through the publication of evidence-based guidelines, consensus statements, quality indicators, and research priorities, these organizations have established a framework for the development of modern emergency surgical services. Current recommendations emphasize structured clinical pathways, perioperative optimization, multidisciplinary collaboration, and outcome

monitoring as essential components of high-quality emergency surgical care [1–4].

A defining characteristic of European ACS systems is the implementation of dedicated emergency surgical teams whose primary responsibility is the management of acute surgical admissions. Unlike traditional surgical services where emergency cases compete with elective activities for personnel and operating room resources, ACS teams focus exclusively on emergency patients during designated service periods. This model facilitates faster clinical decision-making, improves continuity of care, and reduces delays to operative intervention [5,6].

Many European healthcare systems have also adopted protected emergency operating theatre access as a key organizational strategy. Dedicated emergency theatre capacity allows urgent procedures to be performed without interference from elective surgical schedules and has been associated with improved operating room efficiency, reduced waiting times, and enhanced patient safety. Similar emphasis has been placed on rapid access to advanced imaging modalities, particularly computed tomography, which is considered an essential component of modern emergency surgical pathways [1,3].

Another important feature of European ACS models is the integration of multidisciplinary perioperative care. Emergency surgeons increasingly collaborate with anesthesiologists, intensivists, radiologists, emergency physicians, and specialized nursing teams to optimize patient management throughout the perioperative period. This approach is particularly important for elderly patients, individuals with significant comorbidities, and those presenting with severe sepsis or physiological instability [1,3].

Quality improvement and performance monitoring represent fundamental pillars of contemporary ACS systems. Several European countries have established national emergency surgery audits and registries that enable continuous evaluation of clinical outcomes and adherence to evidence-based standards. These initiatives provide objective performance indicators, facilitate benchmarking between institutions, and support the implementation of targeted quality improvement strategies. The National Emergency Laparotomy Audit (NELA) in the United Kingdom remains one of the most influential examples of such a system and has demonstrated the value of structured outcome monitoring in improving emergency surgical care [3].

Overall, European Acute Care Surgery standards emphasize organizational efficiency, multidisciplinary collaboration, timely access to diagnostic and therapeutic resources, and continuous quality improvement. These principles have become increasingly recognized as essential components of modern emergency surgical practice and provide an important benchmark against which national emergency surgery systems can be evaluated [1–6].

Workforce Organization and Emergency Surgical Staffing

Workforce organization represents one of the most significant distinctions between the Romanian Emergency General Surgery (EGS) system and contemporary European Acute Care Surgery (ACS) models. The structure and allocation of surgical personnel directly influence patient flow, decision-making processes, operative timing, continuity of care, and overall healthcare efficiency [5,6].

In Romania, emergency surgical coverage is predominantly provided through traditional on-call systems integrated within general surgery departments. Surgical teams responsible for emergency admissions frequently maintain simultaneous responsibilities that include elective operative activity, inpatient ward management, outpatient consultations, teaching obligations, and emergency surgical care. Depending on hospital size and institutional resources, on-

call teams typically consist of attending surgeons, residents, and supporting nursing staff available on a 24-hour basis. This organizational model ensures continuous availability of surgical expertise across the national healthcare network and remains the foundation of emergency surgical care delivery in most Romanian hospitals [40–42].

Although the traditional on-call model provides broad accessibility and flexibility, it may create variability in workload distribution and resource utilization. Emergency surgical activity often competes with elective responsibilities for personnel, operating room access, and perioperative resources. During periods of increased patient volume, surgical teams may be required to manage multiple urgent consultations and operative cases simultaneously, potentially contributing to delays in definitive treatment or increased organizational complexity [40–42].

By contrast, many European healthcare systems have progressively adopted dedicated Acute Care Surgery models specifically designed to optimize emergency surgical workforce allocation. These systems typically employ consultant-led emergency surgery teams whose primary responsibility is the management of acute surgical admissions during designated service periods. By separating emergency and elective activities, ACS models allow surgeons to focus exclusively on emergency patient care, facilitating rapid assessment, timely decision-making, and improved continuity of treatment [5,6].

Dedicated ACS services have been associated with several organizational advantages. Studies evaluating these models have demonstrated reductions in waiting times for surgical consultation, shorter intervals between admission and operative intervention, improved operating room efficiency, and enhanced coordination between emergency departments, surgical teams, and critical care services. Furthermore, consultant-led emergency surgery pathways may contribute to more consistent clinical decision-making and greater adherence to evidence-based treatment protocols [22–25].

Another important aspect of workforce organization involves continuity of care. In traditional on-call systems, patient management may be transferred between different surgical teams following admission or operative intervention. Conversely, dedicated ACS models frequently provide continuous supervision by the same emergency surgery service throughout hospitalization, potentially improving communication, accountability, and multidisciplinary coordination [5,6].

Training and surgical education also represent important considerations. Romanian university hospitals provide extensive exposure to emergency surgical pathology through high-volume on-call services, contributing significantly to resident education and operative experience. Similarly, European ACS systems have increasingly been recognized as valuable educational environments, offering structured exposure to complex emergency surgical conditions, perioperative management, and multidisciplinary decision-making [5,6].

Overall, while the Romanian workforce model successfully ensures nationwide access to emergency surgical expertise, contemporary European ACS systems place greater emphasis on dedicated emergency surgery staffing, consultant-led care, and separation of emergency and elective activities. These organizational differences may influence efficiency, continuity of care, and resource utilization, representing potential areas for future development within the Romanian emergency surgical system.

Emergency Department Pathways and Access to Diagnostic Resources

Rapid diagnosis and efficient patient flow are fundamental components of modern emergency surgical care. The timely

identification of patients requiring urgent operative intervention has a direct impact on morbidity, mortality, length of hospital stay, and overall healthcare resource utilization. Consequently, contemporary Acute Care Surgery (ACS) systems place significant emphasis on standardized emergency department pathways, early surgical involvement, and unrestricted access to diagnostic resources [1,3,13,21].

In Romania, emergency surgical patients are generally evaluated through hospital Emergency Departments, where initial clinical assessment, laboratory investigations, hemodynamic stabilization, and diagnostic imaging are performed prior to surgical consultation. Most county emergency hospitals and tertiary referral centers maintain continuous access to emergency surgical services, allowing prompt evaluation of patients presenting with acute abdominal pain, bowel obstruction, gastrointestinal perforation, abdominal sepsis, incarcerated hernias, and other urgent surgical conditions [40–42]. The widespread availability of emergency medicine specialists and the development of modern emergency departments have significantly improved the initial management of surgical emergencies during recent decades.

Despite these advances, emergency patient pathways remain largely institution-dependent. Formalized triage algorithms and standardized emergency surgery pathways are not uniformly implemented across the Romanian healthcare system, resulting in variations in patient flow, consultation timing, and prioritization of surgical interventions. The absence of nationally standardized EGS protocols may contribute to differences in management strategies between hospitals, particularly regarding the evaluation of high-risk or elderly patients with complex surgical pathology [40–45].

European ACS systems increasingly utilize structured triage models designed to facilitate rapid identification of patients requiring urgent surgical intervention. These pathways often incorporate predefined diagnostic algorithms, early consultant review, risk stratification tools, and multidisciplinary collaboration between emergency physicians, surgeons, radiologists, and anesthesiologists. Such approaches aim to reduce unnecessary delays, improve resource allocation, and accelerate progression toward definitive treatment [3,13,21].

Access to diagnostic imaging represents a critical determinant of emergency surgical decision-making. In Romania, computed tomography (CT) and ultrasonography are widely available in tertiary and most secondary-level hospitals, providing clinicians with essential tools for the diagnosis of acute abdominal pathology. CT imaging has become particularly important in the evaluation of bowel obstruction, perforated viscus, abdominal sepsis, complicated diverticular disease, acute pancreatitis, and traumatic abdominal injuries. However, disparities in imaging availability, reporting times, and specialist coverage may still exist between urban tertiary centers and smaller regional institutions, particularly during nighttime hours and weekends [40–42].

European ACS standards emphasize immediate and unrestricted access to advanced diagnostic imaging as an integral component of emergency surgical pathways. Rapid CT acquisition and interpretation are considered essential for reducing diagnostic uncertainty and facilitating timely operative decision-making. Several studies have demonstrated that early imaging integration improves diagnostic accuracy, decreases delays to surgery, and contributes to better patient outcomes, particularly in complex abdominal emergencies [1,3].

Another important aspect of contemporary emergency pathways involves risk stratification and perioperative assessment. European emergency surgery systems increasingly employ validated scoring systems and standardized assessment tools to

identify high-risk patients who may benefit from enhanced monitoring, intensive care involvement, or expedited intervention. Such protocols facilitate individualized management and support multidisciplinary decision-making throughout the perioperative period [13,21].

Overall, both Romanian and European healthcare systems recognize the importance of rapid assessment and early diagnosis in emergency surgical patients. While Romania has achieved substantial progress in emergency department development and diagnostic imaging availability, European ACS models generally demonstrate greater standardization of patient pathways, triage protocols, and risk stratification processes. These differences highlight potential opportunities for further optimization of emergency surgical care delivery and pathway standardization within the Romanian healthcare system.

Operating Theatre Access and Perioperative Management

Timely access to operative intervention is one of the most important determinants of outcome in Emergency General Surgery (EGS). Delays in surgical treatment have been associated with increased morbidity, prolonged hospitalization, higher rates of postoperative complications, and increased mortality, particularly among patients presenting with bowel ischemia, gastrointestinal perforation, abdominal sepsis, or other time-critical surgical emergencies [1,14–19]. Consequently, contemporary Acute Care Surgery (ACS) systems prioritize organizational strategies that facilitate rapid access to operating theatre resources and standardized perioperative management.

In Romania, emergency surgical procedures are generally performed within existing operating theatre infrastructures shared with elective surgical activity. Most county emergency hospitals and tertiary referral centers maintain continuous operating room availability for urgent and emergent procedures; however, the degree of dedicated emergency theatre access varies considerably among institutions. In many hospitals, emergency operations are integrated into daily surgical schedules, requiring dynamic prioritization based on clinical urgency, operating room occupancy, and institutional workload. While this model ensures that emergency procedures are ultimately performed when clinically indicated, competition with elective activity may occasionally contribute to scheduling challenges and delays in operative management [40–42].

The impact of operative timing has been extensively demonstrated through large-scale emergency laparotomy audits and perioperative outcome studies. The National Emergency Laparotomy Audit (NELA) has consistently highlighted the importance of prompt surgical intervention, consultant involvement, and structured perioperative pathways in reducing mortality and improving postoperative outcomes among high-risk emergency surgical patients [14–19]. These findings have significantly influenced the development of contemporary European ACS standards.

Many European ACS systems have responded by implementing protected emergency operating theatre capacity or dedicated emergency surgery lists. Such organizational models provide guaranteed access to operating room resources for urgent surgical cases, minimizing competition with elective procedures and facilitating earlier intervention when required. Dedicated emergency theatres have been associated with improved operating room efficiency, reduced waiting times, enhanced resource utilization, and greater adherence to recommended treatment timelines [14–19].

Perioperative management has similarly evolved into a highly structured component of emergency surgical care. Modern ACS

pathways emphasize comprehensive preoperative assessment, risk stratification, physiological optimization, and multidisciplinary collaboration between surgeons, anesthesiologists, intensivists, emergency physicians, and specialized nursing teams. Particular attention is directed toward elderly patients, individuals with significant comorbidities, and those presenting with severe physiological derangement, as these groups account for a disproportionate share of postoperative morbidity and mortality [15–19].

In Romania, perioperative management standards have improved substantially over recent decades owing to advances in anesthesiology, critical care medicine, perioperative monitoring, and evidence-based clinical practice. Tertiary referral centers increasingly employ multidisciplinary approaches for complex emergency surgical cases, incorporating advanced imaging, intensive care support, and individualized perioperative planning. Nevertheless, the degree of protocol standardization and multidisciplinary integration remains variable across institutions and is often influenced by local resources and staffing availability [40–45].

European ACS models increasingly incorporate formal perioperative optimization protocols designed to standardize patient assessment and management throughout the surgical pathway. These protocols frequently include early consultant review, structured risk assessment tools, sepsis screening, goal-directed resuscitation strategies, and predefined postoperative care pathways. Such measures aim to reduce variability in clinical practice and improve outcomes through systematic delivery of evidence-based care [1,35].

Overall, both Romanian and European emergency surgical systems recognize the critical importance of timely operative intervention and effective perioperative management. However, European ACS models generally demonstrate greater integration of dedicated emergency operating theatre resources and standardized perioperative pathways. These organizational characteristics may contribute to improved efficiency and represent important areas for future development within Romanian Emergency General Surgery services.

Critical Care Integration and Management of High-Risk Patients

The management of high-risk emergency surgical patients represents a major challenge for healthcare systems due to the increased incidence of advanced age, multiple comorbidities, physiological instability, and sepsis at presentation. Numerous studies have demonstrated that patients undergoing emergency surgical procedures experience significantly higher morbidity and mortality rates than those undergoing elective operations, highlighting the importance of comprehensive perioperative assessment and critical care support [15–20,26].

In Romania, access to intensive care services is generally available in county emergency hospitals and tertiary referral centers, allowing postoperative monitoring and organ support for critically ill surgical patients. Complex emergency cases frequently require multidisciplinary collaboration involving surgeons, anesthesiologists, intensivists, radiologists, and emergency medicine specialists. However, the availability of intensive care resources may vary between institutions, particularly in smaller hospitals where ICU capacity and specialized personnel may be limited [40–42].

Contemporary European Acute Care Surgery systems increasingly incorporate structured perioperative pathways that facilitate early identification of high-risk patients and prompt involvement of critical care teams. Risk stratification tools, consultant-led decision making, perioperative optimization protocols, and multidisciplinary

management strategies are routinely employed to improve patient outcomes and reduce postoperative complications [15–19,35]. Large-scale audits such as the National Emergency Laparotomy Audit (NELA) have demonstrated that early senior clinician involvement and appropriate allocation of critical care resources are associated with improved survival following emergency surgery [14–19].

Although Romanian emergency surgical services have achieved significant progress in perioperative and intensive care management, further standardization of risk assessment protocols and multidisciplinary perioperative pathways may facilitate closer alignment with contemporary European ACS standards and contribute to improved outcomes among high-risk emergency surgical patients.

Quality Indicators, Audits, and Benchmarking Systems

Quality assessment and continuous performance monitoring have become fundamental components of modern Acute Care Surgery systems. Contemporary European emergency surgical services increasingly rely on standardized quality indicators, national audits, and benchmarking programs to evaluate clinical outcomes, identify areas requiring improvement, and promote adherence to evidence-based standards of care [13,21]. These initiatives provide objective measures of healthcare performance and facilitate comparisons between institutions at regional and national levels.

One of the most influential examples is the National Emergency Laparotomy Audit (NELA), which has established standardized metrics for evaluating perioperative care, operative timing, risk assessment, critical care utilization, and postoperative outcomes in emergency surgical patients [14–19]. The implementation of such audit systems has been associated with improvements in clinical practice, enhanced multidisciplinary collaboration, and reductions in postoperative mortality among high-risk patients.

In contrast, although Romanian hospitals routinely monitor surgical activity and clinical outcomes through internal quality assurance mechanisms, a dedicated national Emergency General Surgery audit or registry is currently not available. Consequently, opportunities for nationwide benchmarking and systematic comparison of institutional performance remain limited. The development of standardized national quality indicators and a comprehensive emergency surgery database could facilitate outcome monitoring, support healthcare planning, and contribute to the implementation of targeted quality improvement initiatives across the Romanian healthcare system [40–45].

Overall, European ACS systems demonstrate a greater degree of integration of quality assessment tools and benchmarking frameworks. Adoption of similar national audit mechanisms in Romania may represent an important step toward improving transparency, promoting evidence-based practice, and enhancing the overall quality of emergency surgical care.

Future Perspectives for Alignment with European Acute Care Surgery Standards

The findings of this review suggest that Romanian Emergency General Surgery services share many fundamental characteristics with contemporary European surgical systems, including widespread access to emergency surgical care, increasing utilization of minimally invasive techniques, and the availability of advanced diagnostic and critical care resources in major referral centers. Nevertheless, several organizational differences remain, particularly regarding dedicated Acute Care Surgery structures, standardized emergency surgical pathways, and national quality monitoring systems.

Future efforts aimed at aligning Romanian emergency surgical services with European ACS standards should focus on the progressive implementation of structured emergency surgery pathways, consultant-led multidisciplinary care models, and standardized perioperative protocols. The establishment of dedicated emergency operating theatre capacity in high-volume centers could improve operating room efficiency and reduce delays to definitive treatment. Similarly, broader integration of risk stratification tools and perioperative optimization strategies may contribute to improved outcomes among high-risk surgical patients [1–3,13,21].

Another important priority is the development of national quality indicators and a centralized Emergency General Surgery registry capable of facilitating benchmarking, outcome monitoring, and healthcare planning. Such initiatives would provide valuable epidemiological data, support quality improvement programs, and enable objective assessment of institutional performance across the Romanian healthcare system. In addition, increased participation in international collaborative studies and emergency surgery research networks may further accelerate the adoption of best practices and strengthen the evidence base supporting future organizational reforms [3,4].

Collectively, these measures may contribute to the gradual evolution of Romanian Emergency General Surgery services toward a more integrated Acute Care Surgery model, promoting greater standardization, improved resource utilization, and enhanced quality of care for patients presenting with acute surgical emergencies.

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Collectively, these measures may contribute to the gradual evolution of Romanian Emergency General Surgery services toward a more integrated Acute Care

Surgery model, promoting greater standardization, improved resource utilization, and enhanced quality of care for patients presenting with acute surgical emergencies. The principal organizational differences identified between Romanian EGS pathways and European ACS standards are summarized in Table 1.

Discussions

Emergency General Surgery represents one of the most resource-intensive components of modern surgical practice, requiring rapid diagnosis, timely intervention, and coordinated multidisciplinary management. The present review demonstrates that Romanian emergency surgical services provide comprehensive nationwide coverage through a well-established network of county hospitals, emergency hospitals, and tertiary referral centers. Furthermore, substantial progress has been achieved in recent decades through the widespread adoption of advanced diagnostic imaging, improvements in perioperative care, and increasing utilization of minimally invasive surgical techniques.

Despite these advances, important organizational differences remain when compared with contemporary European Acute Care Surgery models. European healthcare systems have progressively transitioned toward dedicated ACS services characterized by consultant-led care, protected emergency operating theatre access, standardized clinical pathways, and comprehensive quality monitoring frameworks. In contrast, Romanian emergency surgical care continues to rely predominantly on traditional on-call models, which, although effective in ensuring continuous patient access, may generate variability in resource allocation, workflow efficiency, and perioperative management between institutions.

One of the most important findings of this review is the limited availability of national benchmarking mechanisms within the Romanian emergency surgical system. European initiatives such as the National Emergency Laparotomy Audit have demonstrated that systematic outcome monitoring, quality indicators, and registry-based evaluation can contribute significantly to improvements in surgical care and patient outcomes. The absence of a dedicated national Emergency General Surgery registry in Romania currently limits opportunities for large-scale performance assessment and quality improvement initiatives.

The findings of this review suggest that future development of Romanian emergency surgical services should focus on the gradual implementation of standardized emergency surgery pathways, enhanced multidisciplinary perioperative collaboration, dedicated emergency operating resources in high-volume centers, and the establishment of national audit and registry systems. Such measures may facilitate closer alignment with contemporary European Acute Care Surgery standards while preserving the strengths of the existing Romanian healthcare infrastructure.

Although this review is based on available literature and healthcare policy documents rather than direct outcome analysis, it provides a comprehensive overview of the current organizational landscape of Emergency General Surgery in Romania and highlights several opportunities for future system optimization and research development.

Domain	Romania	European ACS Standards
Healthcare organization	Emergency surgical care delivered through municipal, county, county emergency, and tertiary referral hospitals	Dedicated ACS services integrated within regionalized emergency surgical networks
Workforce organization	Traditional on-call general surgery teams responsible for both elective and emergency activities	Dedicated consultant-led ACS teams with exclusive responsibility for emergency surgical patients
Consultant involvement	Variable according to hospital level and local staffing patterns	Early consultant-led assessment and decision-making routinely implemented
Emergency department pathways	Institution-dependent patient flow and triage systems	Standardized ACS pathways and structured triage protocols
Access to diagnostic imaging	CT and ultrasound widely available in county emergency and tertiary hospitals, with some institutional variability	Immediate access to advanced imaging considered a core ACS component
Operating theatre access	Emergency procedures frequently performed within shared operating theatre schedules	Protected emergency operating theatre capacity or dedicated emergency surgery lists
Perioperative management	Multidisciplinary collaboration available mainly in larger centers	Standardized multidisciplinary perioperative pathways involving surgeons, anesthesiologists, intensivists, and radiologists
Critical care integration	ICU access available but dependent on institutional resources and capacity	Early critical care involvement and structured management of high-risk patients
Minimally invasive emergency surgery	Routine laparoscopic appendectomy and cholecystectomy; increasing adoption for complex emergencies	Minimally invasive surgery widely integrated into emergency surgical practice whenever appropriate
Quality indicators	Primarily local institutional monitoring systems	Nationally standardized quality indicators and performance metrics
Audit systems	Local quality assurance mechanisms without national EGS audit programs	National audits such as NELA and other benchmarking initiatives
National registries	No dedicated national Emergency General Surgery registry	Registry-based outcome monitoring increasingly utilized across multiple healthcare systems
Research participation	Primarily institutional and university-based initiatives	Extensive participation in multicenter audits, registries, and collaborative ACS research networks
Standardization of care	Variable implementation of emergency surgery protocols	Broad adoption of evidence-based guidelines and standardized ACS pathways
Future development priorities	National registry development, pathway standardization, dedicated emergency operating resources	Further optimization of quality metrics, digital integration, and precision emergency surgery approaches

Table 1. Comparative Analysis of Emergency General Surgery Pathways in Romania and European Acute Care Surgery Standards

Conclusions

Romanian Emergency General Surgery services provide comprehensive and accessible emergency surgical care through a well-established national hospital network. Although many clinical practices are aligned with contemporary European standards, important organizational differences persist, particularly regarding dedicated Acute Care Surgery structures, national benchmarking systems, and standardized emergency surgery pathways. Progressive implementation of ACS principles, quality monitoring frameworks, and national registry-based evaluation may further improve the efficiency, standardization, and quality of emergency surgical care in Romania.

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