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Review Article

Anaesthesia Section

Modern Paradigms in Sepsis Management: A Journey from Recognition to Personalisation: A Narrative Review

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ABSTRACT

Sepsis is defined as life-threatening organ dysfunction caused by a dysregulated host response to infection and remains a major global health concern, particularly in intensive care settings. Despite advances in medical science, it continues to be one of the leading causes of mortality and long-term morbidity worldwide. The present review highlights recent advances in sepsis diagnosis and treatment, ranging from early detection strategies and personalised therapies to emerging therapeutic interventions. Early and accurate diagnosis is central to successful sepsis management. The introduction of advanced biomarkers such as Procalcitonin (PCT) and Interleukins (ILs), along with Artificial Intelligence (AI) and machine learning platforms, has significantly enhanced early recognition and risk stratification. Point-of-care testing and rapid diagnostic technologies now allow for prompt pathogen identification and antimicrobial resistance profiling, facilitating timely and targeted intervention. Haemodynamic monitoring has also evolved, with goal-directed fluid resuscitation and vasopressor therapy guided by dynamic physiological parameters. Novel vasopressors and adjunctive treatments are under investigation to optimise tissue perfusion while minimising organ injury. Antimicrobial stewardship has gained increasing importance, with emphasis on early pathogen detection, resistance characterisation, and individualised antibiotic dosing to curb the emergence of multidrug-resistant organisms. Immunomodulatory therapies, including corticosteroids, cytokine modulators, and emerging monoclonal antibodies, are being explored to restore immune balance. Extracorporeal organ support technologies have improved survival in refractory cases, while advances in managing sepsis-induced coagulopathy have strengthened supportive care strategies. Furthermore, genomic and proteomic tools are enabling personalised therapeutic approaches, revolutionising precision medicine in sepsis care. Nanotechnology also holds promise for developing novel diagnostic platforms and targeted drug delivery systems. Collectively, these innovations represent a paradigm shift toward timely, patient-centred, and precision-based sepsis management. Continued research and clinical implementation are essential to maximise their benefits and reduce the global burden of this complex syndrome. The present review uniquely integrates emerging precision-based strategies, advanced diagnostics, AI-driven tools, and individualised therapies to demonstrate how novel technologies are reshaping sepsis diagnosis, treatment, and outcomes.

Keywords: Antimicrobial therapy, Artificial intelligence, Biomarkers, Fluid resuscitation, Personalised medicine

INTRODUCTION

Sepsis remains a major cause of morbidity and mortality among critically ill patients worldwide. It is a life-threatening condition resulting from an uncontrolled host response to infection leading to organ dysfunction. Early recognition and aggressive management are essential to improve outcomes; however, sepsis remains challenging due to its complex pathophysiology, unpredictable clinical course, and limitations in early diagnostic methods [1].

Over the past decade, significant advancements in clinical research and technology have transformed sepsis management through improved early detection, individualised therapeutic strategies, and innovative organ support systems. Novel diagnostic approaches, including advanced biomarkers, point-of-care testing, and AI-driven predictive models, have enhanced early identification and risk stratification. Simultaneously, progress in haemodynamic monitoring, immunomodulatory therapies, and precision medicine has enabled more tailored treatment strategies aimed at maximising therapeutic benefit while minimising adverse effects [2].

The present review summarises the current state of sepsis management, encompassing early detection systems, haemodynamic optimisation, antimicrobial stewardship, and personalised therapeutic protocols. By synthesising recent evidence and highlighting future directions, it provides a comprehensive overview of evolving sepsis care and its potential to improve patient survival through focused, individualised treatment pathways. The review aimed to critically appraise recent technological innovations and therapeutic advances, emphasising their clinical relevance and future potential in improving outcomes, reducing long-term morbidity, and guiding patient-centred, evidence-based sepsis care.

Epidemiology and Burden of Sepsis

Sepsis is among the leading causes of death and disability worldwide, affecting millions of individuals each year. According to the Global Burden of Disease Study, sepsis accounts for approximately 11 million deaths annually, representing nearly 20% of global mortality. The incidence and mortality rates vary significantly across regions, with a disproportionate burden in low and middle-income countries due to limited healthcare infrastructure, delayed diagnosis, and restricted access to critical care services. The highest age standardised incidence and mortality rates have been reported in sub-Saharan Africa, Oceania, South Asia, East Asia, and Southeast Asia [3].

Advancements in critical care, early recognition, and protocol-based management have improved survival in high-income countries. However, sepsis-related hospitalisation and long-term complications remain significant public health challenges. Survivors often experience persistent immune dysfunction, organ impairment, and post-sepsis syndrome characterised by cognitive decline, recurrent infections, and reduced quality of life [4].

The economic burden of sepsis is substantial. In the United States alone, sepsis-related hospitalisations account for over $24 billion annually, making it the most costly condition requiring inpatient

care. The impact is even greater in resource-limited settings, where delayed diagnosis and limited treatment options contribute to higher mortality and prolonged hospital stays [5]. With increasing antimicrobial resistance and an ageing global population, the burden of sepsis is expected to rise further. Addressing this challenge requires improved surveillance systems, earlier detection strategies, widespread implementation of standardised sepsis protocols, and global collaboration to reduce mortality and long term morbidity [5].

Aetiology

Sepsis develops when an infection triggers an uncontrolled and dysregulated immune response in the body. While most infections remain localised and are effectively cleared, certain pathogens or toxins overwhelm host defences and initiate widespread inflammatory activity. The severity and progression of infection depend on microbial virulence, pathogen load, and host-related factors such as immune status, age, and underlying co-morbidities. Common portals of entry include the respiratory, urinary, gastrointestinal, and integumentary systems, from which pathogens may invade tissues or enter the bloodstream, triggering the cascade that culminates in sepsis [3,6].

In healthcare settings, sepsis frequently arises as a complication of infections that spread or persist despite treatment. Hospitalised patients with invasive devices, recent surgical procedures, or compromised immunity are particularly vulnerable. Antimicrobial resistance further exacerbates the problem by delaying effective therapy and allowing infections to progress unchecked. Once the balance between pathogen burden and host defence is disrupted, inflammatory mediators and immune dysfunction promote systemic injury beyond the initial site of infection, resulting in the clinical syndrome recognised as sepsis [6,7].

Pathophysiology of Sepsis

Sepsis is a dynamic, multifaceted syndrome caused by an abnormal host response to infection, leading to systemic inflammation, immune dysregulation, and multi-organ dysfunction. Its pathophysiology involves a complex interplay of pro-inflammatory and anti-inflammatory responses, endothelial injury, coagulation abnormalities, and metabolic derangements [7].

The initial phase of sepsis is characterised by an exaggerated immune response to invading pathogens. Activation of pattern recognition receptors, such as toll-like receptors, triggers the release of pro-inflammatory cytokines including Tumour Necrosis Factor-alpha (TNF-α), Interleukin (IL)-1, and IL-6. This cytokine storm results in widespread endothelial activation, increased vascular permeability, and excessive leukocyte recruitment, leading to tissue oedema, hypotension, and impaired oxygen delivery [8].

Endothelial dysfunction plays a central role in sepsis pathogenesis. Disruption of vascular integrity promotes microvascular thrombosis and disseminated intravascular coagulation due to overactivation of the coagulation cascade and suppression of anticoagulant mechanisms. These changes contribute to tissue hypoxia, mitochondrial dysfunction, and cellular apoptosis, thereby accelerating organ failure [9].

As sepsis progresses, a compensatory anti-inflammatory response develops, leading to immune suppression characterised by lymphocyte apoptosis and impaired antigen presentation. This immunoparalysis increases susceptibility to secondary infections and delays recovery. Metabolic abnormalities, including altered glucose metabolism, mitochondrial dysfunction, and hyperlactataemia, further contribute to organ dysfunction and poor clinical outcomes [10].

The transition from local infection to septic shock involves profound circulatory and cellular failure. Refractory hypotension and multi-organ dysfunction result from myocardial depression, vasoplegia, and impaired cellular oxygen utilisation. Advances in understanding sepsis pathophysiology have guided the development of targeted therapies such as immunomodulators, endothelial protective agents, and metabolic resuscitation strategies aimed at restoring immune balance and improving patient outcomes [11].

Advances in Early Detection and Diagnosis

Early recognition of sepsis is critical to improving survival, as prompt intervention significantly reduces morbidity and mortality. Traditional diagnostic approaches rely on clinical scoring systems such as the Sequential Organ Failure Assessment (SOFA) score and biomarkers like serum lactate. The SOFA score assesses dysfunction across multiple organ systems, including respiratory, cardiovascular, hepatic, renal, coagulation, and neurological parameters. Rising SOFA scores correlate strongly with increased mortality and are useful for diagnosis and prognostication [12].

However, these conventional tools lack specificity and may fail to detect sepsis in its earliest stages. Recent advances in diagnostic technology-including novel biomarkers, AI-based predictive models, and point-of-care testing-have greatly enhanced the capacity for rapid and accurate sepsis detection [13].

Biomarkers for Early Diagnosis

Biomarkers play a crucial role in identifying immune dysregulation associated with sepsis before overt clinical deterioration occurs. PCT, one of the most extensively studied biomarkers, has gained prominence for its ability to distinguish bacterial infections from non-infectious inflammatory states, thereby guiding antibiotic therapy. PCT demonstrates approximately 82.7% sensitivity and 80% specificity in differentiating bacterial sepsis from sterile inflammation.

C-Reactive Protein (CRP) is widely used in clinical practice but lacks specificity, as it is elevated in various inflammatory conditions, with reported sensitivity of 74.5% and specificity of 75.6%. Presepsin (soluble CD14 subtype), a marker of monocyte activation, has shown promise in assessing sepsis severity, with sensitivity of 89.1% and specificity of 88.9%. Current research focuses on combining multiple biomarkers into diagnostic panels to improve sensitivity, specificity, and overall diagnostic accuracy for early sepsis detection [14,15].

Role of Artificial Intelligence and Machine Learning

Artificial intelligence and machine learning have transformed sepsis detection by enabling real-time risk stratification and early warning systems through large-scale data analysis. Predictive models continuously analyse electronic health records, laboratory values, and vital signs to identify sepsis risk before overt clinical deterioration occurs.

Tools such as the Sepsis Early Prediction (SEP) algorithm utilise real-time patient data to forecast sepsis onset and prompt early intervention. Many AI-based models report Area Under the Curve (AUC) values ranging from 0.82 to 0.92, with sensitivities exceeding 85% and specificities between 78% and 88%, allowing detection hours before clinical recognition.

Advanced deep learning and neural network approaches further enhance pattern recognition in complex physiological datasets, improving predictive accuracy and prognosis. Integrated clinical decision-support systems embedded within electronic health records generate automated alerts that facilitate timely intervention, optimise antimicrobial therapy, and improve overall sepsis management. These AI-driven approaches are increasingly supporting clinician decision-making in intensive care units and emergency departments [2,16].

Point-of-care Testing and Rapid Diagnostics

Point-of-care testing and rapid diagnostic technologies have significantly improved the speed and accuracy of sepsis diagnosis. Traditional blood cultures, although considered the gold standard, require 24-72 hours for pathogen identification, often delaying targeted antimicrobial therapy. Rapid molecular diagnostic

techniques, such as Polymerase Chain Reaction (PCR)-based assays, have substantially shortened this timeframe by detecting bacterial and fungal Deoxyribonucleic Acid (DNA) within hours. These assays demonstrate sensitivities of approximately 85-95% and specificities ranging from 90-98%, depending on the platform used [17,18].

In addition, microfluidic and biosensor platforms enable real-time bedside blood analysis, facilitating prompt clinical decision-making. Advances in nanotechnology-based diagnostic tools have further enhanced the sensitivity of biomarker detection and pathogen identification, thereby improving early diagnostic performance. The integration of these technologies into clinical practice has the potential to accelerate early sepsis detection, enable timely intervention, and ultimately reduce mortality. Combined with novel biomarkers and AI-driven predictive models, point-of-care testing supports a proactive and precision-based approach to sepsis management, improving outcomes and reducing disease burden [17].

Haemodynamic Monitoring and Resuscitation Strategies

Comprehensive haemodynamic monitoring and timely resuscitation are central to sepsis management, aiming to restore tissue perfusion and prevent multi-organ failure. Sepsis-induced circulatory collapse and hypotension require immediate and targeted interventions to optimise oxygen delivery and maintain haemodynamic stability. Over recent decades, advances in Goal-Directed Therapy (GDT), fluid resuscitation techniques, and vasopressor and inotropic support have significantly improved patient outcomes [19].

Goal-Directed Therapy (GDT)

The GDT is a structured resuscitation approach designed to optimise haemodynamic parameters through early intervention. The Surviving Sepsis Campaign recommends an individualised strategy guided by measures such as Mean Arterial Pressure (MAP), Central Venous Pressure (CVP), serum lactate levels, and mixed venous Oxygen Saturation (SvO_2). Early GDT focused on aggressive fluid administration, vasopressor therapy, and blood transfusions to achieve predefined physiological targets.

However, large clinical trials including ProCESS, ARISE, and ProMISe demonstrated that protocolised early GDT did not confer a survival advantage over contemporary standard care [20]. Consequently, emphasis has shifted toward personalised resuscitation guided by dynamic indices such as Stroke Volume Variation (SVV), Pulse Pressure Variation (PPV), and echocardiography-derived measurements. These approaches allow for more precise fluid administration, minimising fluid overload while ensuring adequate tissue perfusion [20].

Advances in Fluid Resuscitation

Fluid resuscitation remains a cornerstone of sepsis therapy, aimed at restoring intravascular volume and improving cardiac output. Traditionally, normal saline and balanced crystalloid solutions have been used. Emerging evidence supports the preferential use of balanced crystalloids, such as Ringer's lactate and Plasma-Lyte, due to their lower risk of hyperchloraemic acidosis and acute kidney injury.

The debate between liberal and conservative fluid strategies continues, with recent trends favouring more restrictive approaches after initial shock reversal. Ongoing studies such as the CLASSIC (Conservative vs. Liberal Approach to Septic Shock in Intensive Care) and CLOVERS (Crystalloid Liberal Or Vasopressors Early Resuscitation in Sepsis) trials are evaluating optimal fluid volumes to avoid complications related to fluid overload, including pulmonary oedema and worsening organ dysfunction. Albumin has also been investigated as a resuscitation fluid, particularly in hypoalbuminaemic patients, although its routine use remains controversial [21-23].

Vasopressor and Inotropic Therapies

When fluid resuscitation alone is insufficient to restore adequate perfusion, vasopressors and inotropes are employed to maintain haemodynamic stability. Norepinephrine remains the first-line vasopressor due to its potent α-adrenergic effects, which increase vascular tone and sustain MAP. Vasopressin is commonly used as a second-line agent to reduce norepinephrine requirements, particularly in refractory septic shock.

Other agents, including epinephrine and dopamine, are used selectively based on individual haemodynamic profiles, with dopamine generally avoided due to its higher risk of arrhythmias. In patients with myocardial dysfunction and low cardiac output, inotropes such as dobutamine are administered to enhance contractility and improve tissue oxygen delivery. Therapy is increasingly individualised using advanced haemodynamic monitoring tools, including cardiac output measurement, echocardiography, and tissue perfusion indices. Novel agents such as angiotensin II have shown promise in refractory septic shock by providing an alternative mechanism for restoring vascular tone [24].

Immunomodulatory and Adjunctive Therapies

The immune response in sepsis involves a complex interplay between excessive inflammation and subsequent immune suppression. While the early phase is dominated by hyperinflammatory cytokine release, many patients later develop immunoparalysis, increasing susceptibility to secondary infections and adverse outcomes. Immunomodulatory and adjunctive therapies aim to restore immune balance either by attenuating harmful inflammation or enhancing immune function. Corticosteroids, cytokine-targeted therapies, and emerging immunomodulators are being explored as therapeutic options. These evolving strategies offer new opportunities to improve outcomes in sepsis by addressing immune dysregulation alongside conventional supportive care [6].

Corticosteroids and Immunomodulators

Corticosteroids were first explored decades ago as adjunctive therapy for sepsis due to their potent anti-inflammatory properties. By inhibiting nuclear factor kappa B (NF-κB) signalling and suppressing cytokine release, corticosteroids can potentially attenuate the inflammatory cascade responsible for sepsis-induced organ dysfunction. Their role in septic shock has been evaluated in several major clinical trials.

The ADRENAL (Adjunctive corticosteroid treatment) trial demonstrated that hydrocortisone did not significantly reduce overall mortality but was associated with faster shock reversal, reduced duration of mechanical ventilation, and shorter Intensive Care Unit (ICU) stays. The APROCCHSS (Activated Protein C and Corticosteroids for Human Septic Shock.) trial showed that the combination of hydrocortisone and fludrocortisone improved survival, accelerated vasopressor discontinuation, and increased vasopressor-free and organ failure-free days. Similarly, the CORTICUS (Corticosteroid Therapy In Critical Illness-Related Unexplained Septic Shock) trial did not show a mortality benefit but confirmed earlier shock reversal and improved haemodynamic stability with hydrocortisone therapy. Current clinical practice supports low-dose corticosteroid therapy (e.g., hydrocortisone 200 mg/day) in patients with refractory septic shock [25-28].

Beyond corticosteroids, other immunomodulatory agents have been investigated to restore immune balance in sepsis. Interleukin-7 (IL-7) and Granulocyte-Macrophage Colony-Stimulating Factor (GM-CSF) have demonstrated efficacy in reversing immune suppression by enhancing T-cell proliferation and monocyte function, thereby reducing susceptibility to secondary infections. Immune checkpoint inhibitors, such as anti-programmed cell death protein-1 (anti-PD-1) antibodies, are also under investigation to counter immune exhaustion and restore host defence mechanisms [29].

New Therapies

With increasing understanding of sepsis immunopathology, targeted therapies aimed at specific inflammatory pathways have gained attention. Monoclonal antibodies targeting cytokines, endotoxins, and immune checkpoints represent promising therapeutic avenues. Cytokine modulators, including inhibitors of interleukin-6 (IL-6) and tumour necrosis factor-alpha (TNF-α), have been explored for their ability to suppress excessive inflammation. Tocilizumab, an IL-6 receptor antagonist, has demonstrated benefit in hyperinflammatory states such as Coronavirus Disease 2019 (COVID-19)-associated cytokine storm and is currently being evaluated for sepsis-related hyperinflammation. TNF-α inhibitors initially showed promise but have produced inconsistent clinical benefits, highlighting the need for refined patient selection and timing of intervention [13,14,30].

Extracorporeal blood purification strategies, including cytokine adsorption using haemoperfusion devices such as CytoSorb, have been proposed to reduce circulating inflammatory mediators and improve haemodynamic stability. While early results are encouraging, their clinical efficacy remains under investigation. Additionally, polymyxin B haemoperfusion has been explored for endotoxin neutralisation in Gram-negative sepsis. Novel agents such as recombinant human alkaline phosphatase and sphingosine-1-phosphate receptor modulators are also being studied for their ability to restore endothelial integrity and reduce vascular leakage associated with sepsis-induced organ dysfunction [31].

Progress in Organ Support and Critical Care Interventions

Extracorporeal Membrane Oxygenation (ECMO) has emerged as a valuable intervention in refractory septic shock and sepsis-associated Acute Respiratory Distress Syndrome (ARDS). By providing temporary cardiopulmonary support, ECMO allows time for infection control while maintaining adequate oxygenation and tissue perfusion. Technological improvements, including enhanced membrane oxygenators, heparin-coated circuits, and reduced pump-related complications, have improved its safety and effectiveness.

Although ECMO is not routinely indicated for all septic patients, it has demonstrated benefit in select cases, particularly in those with severe cardiovascular collapse or refractory ARDS. Lung-protective ventilation strategies-such as low tidal volume ventilation, prone positioning, and optimised Positive End-Expiratory Pressure (PEEP)-remain foundational in ARDS management. Adjunctive therapies including neuromuscular blockade and inhaled nitric oxide may be considered in refractory cases, though mortality benefits remain limited [32,33].

Continuous Renal Replacement Therapy (CRRT) is a cornerstone of management for sepsis-induced acute kidney injury, particularly in haemodynamically unstable patients. Unlike intermittent haemodialysis, CRRT provides gradual fluid removal and electrolyte correction. Recent advances include high cut-off membranes capable of removing inflammatory mediators, improved circuit designs, and personalised dosing strategies guided by dynamic renal and metabolic assessments.

The integration of blood purification techniques, such as cytokine adsorption filters, into CRRT circuits is being explored as a method to modulate systemic inflammation. Additional organ support strategies-including advanced haemodynamic monitoring, liver support systems, and novel extracorporeal carbon dioxide removal devices-are under investigation for patients with multi-organ failure, although their clinical use remains largely experimental [34].

Sepsis and Nanotechnology

Nanotechnology has emerged as a promising frontier in sepsis management, offering innovative approaches to early diagnosis, targeted drug delivery, and immune modulation. Given the complex and dynamic nature of sepsis pathophysiology, nanotechnology-based strategies aim to enhance diagnostic precision, personalise therapeutic interventions, and minimise systemic adverse effects. These technologies hold significant potential to transform sepsis care by improving treatment efficacy and patient outcomes [35].

Nanotechnology in sepsis diagnosis: Early and accurate diagnosis of sepsis is essential for prompt intervention and improved outcomes. Traditional diagnostic methods, including blood cultures and conventional biomarker assays, are often delayed and lack sufficient sensitivity. Nanotechnology has revolutionised sepsis diagnostics by enabling highly sensitive and rapid detection of pathogens and inflammatory biomarkers.

Nanosensors, nanobiosensors, and nanoparticle-based assays have been developed to detect bacterial DNA, endotoxins, and sepsis-related biomarkers such as PCT and CRP with greater speed and precision. Gold nanoparticles, quantum dots, and magnetic nanoparticles are commonly incorporated into point-of-care testing platforms to enhance signal detection, facilitating early diagnosis and timely therapeutic decision-making. However, regulatory approval requires rigorous evaluation of reproducibility, biosafety, and device reliability before clinical implementation [35].

Nanoparticle-based drug delivery systems: One of the major challenges in sepsis management is achieving effective antimicrobial and anti-inflammatory therapy while minimising systemic toxicity. Nanoparticle-based drug delivery systems offer targeted delivery and controlled release, improving drug bioavailability and tissue penetration.

Lipid nanoparticles, including liposomes and polymeric nanocarriers, can encapsulate antibiotics and anti-inflammatory agents, enhancing therapeutic efficacy while reducing adverse effects. These targeted systems can be engineered to accumulate preferentially in infected or inflamed tissues, allowing localised treatment and minimising damage to healthy cells. Nonetheless, concerns regarding nanoparticle stability, long-term toxicity, and immunogenicity necessitate extensive preclinical testing and well-designed clinical trials prior to regulatory approval [36].

Nanotechnology in immunomodulation and adjunctive therapies: Sepsis is characterised by an initial hyperinflammatory response followed by immune suppression. Nanotechnology has enabled the development of immunomodulatory therapies capable of precisely regulating immune activity. Nanoparticles loaded with anti-inflammatory agents, such as corticosteroids and cytokine inhibitors, can suppress excessive inflammation while avoiding profound immunosuppression. Additionally, exosome-mimetic nanoparticles and nanocarriers delivering immunotherapeutic agents, including monoclonal antibodies and cytokine modulators, show promise in restoring immune homeostasis in septic patients [37].

Extracorporeal blood purification using nanotechnology: Nanotechnology-based extracorporeal blood purification systems have been explored for removing sepsis-related toxins and inflammatory mediators from circulation. Nanoparticle-coated filtration membranes and nanoengineered sorbents can selectively capture bacterial endotoxins, pro-inflammatory cytokines, and circulating pathogens, thereby reducing systemic inflammatory burden. Studies have demonstrated that nanomaterial-based filtration systems may improve haemodynamic stability and limit organ dysfunction in sepsis, although further clinical validation is required [38].

CONCLUSION(S)

Sepsis remains a major global cause of mortality and morbidity, necessitating continued advances in diagnosis and management. This review highlights recent progress in sepsis care, ranging from early detection technologies to personalised treatment strategies. Innovations in biomarkers, artificial intelligence, and point-of-care diagnostics have enhanced early recognition and facilitated timely intervention. Advances in haemodynamic monitoring, antimicrobial

stewardship, immunomodulatory therapies, and organ support technologies have strengthened therapeutic approaches and improved patient outcomes. Furthermore, precision medicine-driven by genomic, proteomic, and AI-based tools-is transforming sepsis management by enabling patient-specific treatment strategies with improved efficacy and reduced toxicity. Despite these achievements, significant challenges remain, including cost, accessibility, and the need for large-scale, high-quality clinical trials to validate emerging therapies. Future sepsis care will require a multidisciplinary approach integrating technological innovation, data-driven medicine, and personalised patient care. Clinicians should prioritise the adoption of evidence-based diagnostic and therapeutic advances, while researchers must continue to generate robust multicentre evidence to guide clinical practice. Together, these efforts will ensure that translational advances reach the bedside efficiently, ultimately reducing the global burden of sepsis and improving patient survival.

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