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NEW SURVIVING SEPSIS GUIDELINES FOR THE ANAESTHETIST

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INTRODUCTION

Sepsis is a time-sensitive perioperative condition, as late recognition and treatment have been linked to organ dysfunction, circulatory instability and mortality [1–4]. Sepsis is a serious reaction to infection, which can lead to shock, organ failure and death, according to the World Health Organisation [2]. In 2017, Rudd et al. estimated 48.9 million cases and 11 million deaths due to sepsis [3]. Sepsis care is a multidisciplinary process, involving input from emergency medicine, surgery, anaesthesia, microbiology, radiology and critical care [1,2].

Sepsis is important to anaesthetists because many patients require urgent source-control surgery, such as laparotomy, abscess drainage, necrotising infection debridement, biliary decompression or removal of infected material [1,5]. The peri-operative period is a risky time due to the potential for vasodilatation, relative hypovolaemia, myocardial dysfunction, anaesthetic cardiovascular depression and positive pressure ventilation which can all combine to cause severe instability [5,6]. In patients who are dependent on endogenous sympathetic tone, induction may reveal cardiovascular collapse, so the deterioration should be expected before induction, rather than treated after hypotension or arrest [5,6].

The new Surviving Sepsis Campaign guidelines offer an evidence-based approach to sepsis and septic shock in adults [1]. It focuses on recognition, screening, lactate measurement, cultures, if possible, antimicrobials, haemodynamic resuscitation, vasopressors, source control, perfusion reassessment and continued care [1]. These are directly applicable to the theatre where sepsis can be first recognised, source control is achieved, or shock is exacerbated by anaesthesia [1,5]. The anaesthetist needs to convert the principles of the guidelines into monitoring, access, induction, fluids, vasopressors, surgical communication and transfer [1,5,6].

This booklet is based on Sepsis-3: life-threatening organ dysfunction due to an abnormal host response to infection, defined as an acute increase in the sequential organ failure assessment (SOFA) score of 2 or more points with suspected or documented infection [4]. Septic shock is sepsis complicated by circulatory, cellular, and metabolic abnormalities, defined as the need for vasopressors to maintain a mean arterial pressure ≥65 mmHg and a lactate >2 mmol/L after adequate fluid resuscitation [4]. In theatre, these definitions must be used with caution as anaesthetic drugs, neuraxial blockade, controlled ventilation, bleeding and surgical stimulation can mimic, mask or exacerbate the shock physiology [5,6].

This booklet outlines the translation of sepsis guidance into perioperative anaesthetic practice, focusing on recognition, antibiotic therapy, haemodynamic support, source control, and transfer to the intensive care unit (ICU) [1,5]. When managing these patients, the anaesthetist should demonstrate safe application of sepsis principles for unstable surgical patients, rather than memorisation [1,5,6].

Learning objectives

By the end of this booklet, the reader should be able to:

- Recognise sepsis and septic shock in the perioperative patient by identifying suspected infection, acute organ dysfunction, hypotension, raised lactate and evolving shock before theatre or during surgery [1,4].

- Prepare safely for induction in the septic patient by planning monitoring, vascular access, vasopressors, fluid strategy, airway management, blood products and emergency drugs before loss of sympathetic tone [5,6].

- Translate sepsis guidelines into theatre practice by applying early antibiotics, cultures where feasible, haemodynamic support, source control, ventilation strategy and repeated reassessment during anaesthesia [1,5].

- Communicate and document clearly by recording time zero, antibiotics, lactate, fluids, vasopressors, source-control timing, intraoperative instability and postoperative ICU handover priorities [1,5].

OVERVIEW OF THE 2026 SURVIVING SEPSIS GUIDELINES

The 2026 adult Surviving Sepsis Campaign (SSC) guidelines offer an update of evidence-based guidance for adults with sepsis and septic shock in hospital care, immediate prehospital care and immediate post-hospital recovery [1]. The document should be used as a framework for peri-operative resuscitation, not as a checklist for the theatre anaesthetist [1,5]. Diagnosis, antibiotic therapy, haemodynamic support and operative decision making are often performed simultaneously in emergency source-control surgery [1,5]. Thus, recommendations should be considered in the context of surgical urgency, physiological reserve, comorbid disease, monitoring available, antimicrobial access and local intensive-care capacity [1,5,6]. The goal is to minimize unnecessary delay without compromising clinical judgment in unstable patients with rapidly changing physiology [1,5].

- **Screening, diagnosis and theatre limitations**

Screening and diagnosis remain the gateway to the sepsis pathway. The SSC is used to facilitate structured recognition of sepsis in acutely ill patients, but traditional bedside signs and screening tools can become less accurate when the patient is sedated, paralysed, ventilated or exposed to volatile agents [1,5,6]. Sepsis should be considered in the presence of infection with acute organ dysfunction, as per the Sepsis-3 criteria [4]. Vasopressor-dependent hypotension and hyperlactataemia should raise the suspicion of septic shock after adequate fluid resuscitation [4]. The anaesthetist should consider the patient's history, suspected source, lactate, renal function, urine output, mental status prior to induction, haemodynamic trends, and intraoperative observations [1,4,5]. This integrated assessment is more useful than a single score or an isolated blood pressure reading [1,5].

- **Early treatment priorities**

Antimicrobial treatment remains a time-sensitive intervention. For septic shock, and for probable or definite sepsis without shock, the 2026 SSC suggests immediate broad-spectrum antimicrobial therapy, preferably within one hour [1]. If there is no shock, rapid assessment is acceptable, but treatment should not be delayed if there is concern for sepsis [1]. Cultures should be taken, if possible, but microbiological sampling should not delay antibiotics or emergency incision [1]. The anaesthetist should ensure that therapeutic doses of sepsis have been administered, as these are not the same as routine surgical prophylaxis and may be affected by capillary leak, renal dysfunction, increased volume of distribution, and blood loss [1,5]. Liaising with microbiology is particularly useful if resistance or healthcare-associated infection or immunosuppression is suspected [1].

- **Haemodynamic resuscitation and vasopressors**

Haemodynamic resuscitation is a key element of the management of sepsis in the perioperative period. The guideline still recommends crystalloids as the initial fluid therapy and further recommends that at least 30 mL/kg be given within the first 3 hours in cases of sepsis-induced hypoperfusion or septic shock, and that fluid should be reassessed as necessary to prevent hypoperfusion or fluid overload [1]. In theatre, this means interpreting mean arterial pressure, lactate, capillary refill, urine output, arterial waveform variation, echocardiography and response to small fluid challenges [1,5]. Norepinephrine is still the drug of choice for vasopressor therapy, and peripheral initiation is recommended if central access is not obtained in time to start treatment [1]. Vasopressin is used when the need for norepinephrine increases, and epinephrine is used when the shock persists despite norepinephrine and vasopressin [1]. The first haemodynamic goal is to ensure adequate organ perfusion, not just a cosmetically normal monitor display [1,5].

- **Source control, ventilation and recovery**

The point at which sepsis guidance most directly relates to anaesthesia and surgery is source control. Rapid evaluation for anatomical infection that requires source control and early intervention is recommended when indicated by the SSC. The anaesthetist should therefore be the one to lead the resuscitation interface among emergency medicine, surgery, microbiology, and intensive care, ensuring that haemodynamic optimisation is not used as a delaying tactic for definitive treatment. [1,5] The guideline recommends lung-protective ventilation strategies for sepsis-associated acute respiratory distress syndrome [1]. Corticosteroids are recommended in septic shock that still requires vasopressor support, and post-acute care is highlighted as morbidity, functional decline, and risk of recurrent infection persist after hospital discharge [1]. Therefore, the anaesthetist's role is not just to prepare for the induction of anaesthetic, but also to ensure safe handover to the ICU, record important timings and communicate any unresolved physiological risks [1,5].

Table 1. Major 2026 SSC domains relevant to anaesthesia

Domain	Perioperative interpretation
Recognition	Infection plus organ dysfunction, interpreted cautiously under anaesthesia [1,4,5].
Antibiotics	Immediate treatment when shock or probable sepsis is present [1].
Haemodynamics	Balanced fluid, norepinephrine and repeated perfusion reassessment during anaesthesia [1].
Source control	Resuscitation must facilitate urgent definitive source-control surgery [1,5].
Recovery	Clear ICU handover, ventilation, steroids and structured post-acute planning [1].

CLASSIFICATION, DEFINITIONS AND ANAESTHETIC CONFOUNDERS

Definitions are not merely academic labels in perioperative sepsis care. They determine urgency, escalation, documentation, antibiotic timing, haemodynamic targets, ICU referral and the perceived need for urgent anatomical source control [1,4]. In the operating theatre, however, standard sepsis definitions must be interpreted dynamically because anaesthetic interventions can alter the same physiological variables used to recognise deterioration [5,6]. A falling blood pressure may reflect septic vasoplegia, induction-related vasodilatation, neuraxial sympathectomy, haemorrhage, myocardial dysfunction, anaphylaxis or a combination of these processes [5,6]. The anaesthetist must therefore avoid both under-recognition of sepsis and over-attribution of every haemodynamic abnormality to infection alone [1,5].

- **Sepsis and organ dysfunction**

Sepsis is defined by Sepsis-3 as life-threatening organ dysfunction caused by a dysregulated host response to infection [4]. Clinically, organ dysfunction is operationalised as an acute increase in the Sequential Organ Failure Assessment score of two points or more in the context of suspected or documented infection [4]. This definition is useful because it shifts attention away from infection alone and towards the patient's physiological response, including renal dysfunction, altered mentation, respiratory failure, coagulopathy, hyperbilirubinaemia, hypotension and need for cardiovascular support [4]. For the anaesthetist, the key practical question is whether an infected patient is developing new or worsening organ dysfunction that changes perioperative risk and requires urgent escalation [1,4,5]. This requires assessment of lactate, creatinine, urine output, oxygenation, platelet count, bilirubin, blood pressure trends, pre-induction mental status and the suspected infective source [1,4].

- **Septic shock as a perioperative emergency**

Septic shock is a subset of sepsis in which circulatory, cellular and metabolic abnormalities are associated with a higher risk of mortality [4]. In Sepsis-3, septic shock is identified clinically by the need for vasopressors to maintain a mean arterial pressure of at least 65 mmHg and serum lactate greater than 2 mmol/L despite adequate fluid resuscitation [4]. This definition has direct anaesthetic implications. A patient who already requires vasopressor support before induction is at high risk of cardiovascular collapse when sympathetic tone is reduced by anaesthetic drugs and positive-pressure ventilation [5,6]. Consequently, vasopressors, arterial pressure monitoring, large-bore intravenous access, blood products, where indicated, and a shared surgical plan should be prepared before induction rather than after profound hypotension has occurred [1,5,6].

- **Screening tools and their limitations under anaesthesia**

Tools such as NEWS, MEWS, SIRS SOFA, qSOFA and NEWS2 can support recognition of deterioration. qSOFA was developed by Sepsis-3 as an easy to perform and excellent screening tool for in-hospital mortality in patients with suspected sepsis however, it was found to have poor prehospital sensitivity and as such should never be used alone [16]. The NEWS2 score was developed to standardise the assessment of acute illness severity and support early escalation in deteriorating patients [7]. Compared to other scores, it has the highest sensitivity, but this is confounded by a lower specificity. The SCC therefore suggests using NEWS, MEWS or NEWS 2 for in-hospital patients rather than qSOFA as a single screening tool for sepsis[1]. These aforementioned tests are valuable but they do not replace clinical judgement.

However, several components of bedside screening tools become less reliable after induction of anaesthesia. Respiratory rate is controlled by the ventilator, mental status cannot be assessed during general anaesthesia, oxygen requirement is influenced by ventilator settings, and heart rate may be affected by anaesthetic depth, beta-blockers, anticholinergics, conduction disease or surgical stimulation [5–7]. Similarly, hypotension may be caused or amplified by propofol, volatile anaesthetic agents, neuraxial blockade, hypovolaemia, bleeding or reduced venous return from positive-pressure ventilation [5,6]. Therefore, once the patient is anaesthetised, screening tools should be interpreted as background information rather than real-time diagnostic certainty [1,5].

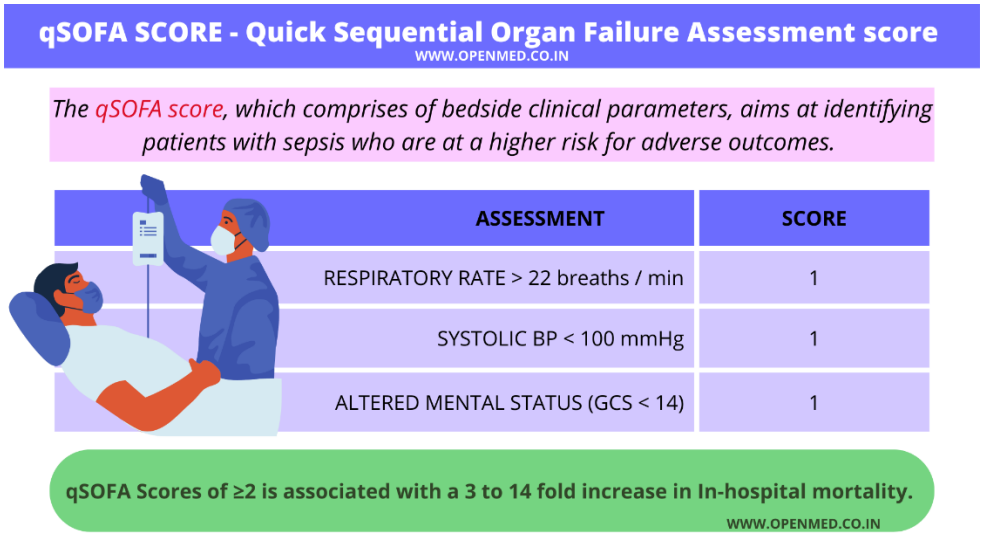


Fig 1. qSOFA score

Singer M, Deutschman CS, Seymour CW, Shankar-Hari M, Annane D, Bauer M, Bellomo R, Bernard GR, Chiche JD, Coopersmith CM, Hotchkiss RS, Levy MM, Marshall JC, Martin GS, Opal SM, Rubenfeld GD, van der Poll T, Vincent JL, Angus DC. The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3). JAMA. 2016 Feb 23;315(8):801-10. doi: 10.1001/jama.2016.0287. PMID: 26903338; PMCID: PMC4968574.

Chart 1: The NEWS scoring system

Physiological parameter	Score 3	2	1	0	1	2	3
Respiration rate (per minute)	≤8		9–11	12–20		21–24	≥25
SpO_2 Scale 1 (%)	≤91	92–93	94–95	≥96			
SpO_2 Scale 2 (%)	≤83	84–85	86–87	88–92 ≥93 on air	93–94 on oxygen	95–96 on oxygen	≥97 on oxygen
Air or oxygen?		Oxygen		Air			
Systolic blood pressure (mmHg)	≤90	91–100	101–110	111–219			≥220
Pulse (per minute)	≤40		41–50	51–90	91–110	111–130	≥131
Consciousness				Alert			CVPU
Temperature (°C)	≤35.0		35.1–36.0	36.1–38.0	38.1–39.0	≥39.1	

Fig 2. NEWS 2 scoring system

- **Anaesthetic confounders and dynamic interpretation**

Anaesthetic confounders are especially important during emergency source-control surgery because the patient's physiology may change rapidly. Induction agents can reduce systemic vascular resistance and myocardial contractility; volatile agents may worsen vasodilatation; neuraxial blockade can produce sympathectomy; and mechanical ventilation can decrease venous return and cardiac output [5,6]. At the same time, surgical pathology may evolve through bleeding, perforation, faecal contamination, necrosis or release of inflammatory mediators during manipulation of an

infected focus [1,5]. The anaesthetist should therefore interpret definitions using the whole clinical story: preoperative trajectory, suspected source, lactate trend, capillary refill, urine output, skin perfusion, arterial waveform, response to fluid, response to vasopressors and intraoperative findings [1,4,5]. A single blood pressure reading is insufficient; the pattern of deterioration and response to treatment is more informative [1,5].

- **Documentation and escalation**

Clear documentation is essential because definitions influence clinical urgency and later review. The anaesthetist should record the suspected source, timing of recognition, haemodynamic state before induction, lactate values, antibiotics, fluids, vasopressors, organ dysfunction and decision-making around source control [1,5]. In practice, the classification may evolve from suspected infection to sepsis or septic shock as new information emerges. This dynamic interpretation is safer than forcing the patient into a fixed category too early. The anaesthetist's role is to recognise risk, initiate resuscitation, communicate uncertainty and escalate promptly when physiology suggests evolving septic shock [1,5,6].

IDENTIFYING SEPSIS AND DEFINING THEATRE TIME ZERO

"Time zero" is a practical documentation point, not a separate diagnostic category. The 2026 Surviving Sepsis Campaign (SSC) guideline emphasises early recognition, timely antimicrobial therapy, haemodynamic resuscitation, lactate assessment, source control and escalation, but it does not create a special theatre definition of time zero [1]. In theatre 'time zero' marks the point from which urgent perioperative actions must be checked, communicated and documented. This is useful because theatre may be where sepsis is first recognised, shock becomes obvious, or the anatomical source is discovered during surgery [1,5,6]. The anaesthetist must therefore recognise sepsis dynamically rather than wait for a complete ICU-style dataset before acting [1,4,5].

- **Time zero in a known septic patient**

For a patient already diagnosed or strongly suspected to have sepsis or septic shock before surgery, theatre time zero may be documented as the moment the patient arrives in theatre for source-control surgery. This does not mean that sepsis begins at the theatre door; it marks the start of anaesthetic responsibility for a high-risk phase of care. At this point, the anaesthetist should confirm the suspected source, preoperative physiology, lactate, organ dysfunction, antimicrobial status, fluid therapy, vasopressors, blood results, allergies, vascular access and postoperative destination [1,4,5]. If antibiotics, cultures, lactate or vasopressors have not yet been addressed, theatre arrival should trigger immediate correction where feasible [1]. In septic shock, induction should be treated as a planned resuscitation event with invasive monitoring and vasopressor readiness whenever time allows [1,5,6].

- **Time zero when sepsis is discovered intraoperatively**

A second scenario occurs when sepsis is not formally recognised before anaesthesia, but an infective source is identified intraoperatively. Examples include pus, perforated viscus, necrotic tissue, bowel ischaemia, faecal contamination, infected prosthetic material or unexpected abscess. In this setting, theatre time zero may be documented as the moment the source is identified by the surgical team and communicated to anaesthesia. This matters because the anaesthetist may become the first clinician to formalise that the patient has sepsis or evolving septic shock [1,4,5]. The response should be immediate: announce the concern, request help, obtain cultures if feasible, confirm or administer therapeutic antibiotics, send lactate and relevant blood tests, reassess haemodynamics, prepare or escalate vasopressors, and discuss ICU admission [1,5]. Source recognition should also prompt review of whether drainage, resection, debridement or damage-control surgery is required [1].

- **Immediate anaesthetic actions after time zero**

After theatre time zero, the anaesthetist should prioritise actions that reduce delay and prevent avoidable collapse. First, escalation should occur early: senior anaesthetic support, senior surgical input, ICU and microbiology should be contacted according to local availability and urgency [1,5]. Second, cultures should be obtained where feasible, but sampling should not delay antimicrobial therapy in septic shock or probable sepsis [1]. Third, antimicrobial therapy should be therapeutic rather than prophylactic; the anaesthetist should clarify whether the patient has received an appropriate broad-spectrum regimen for sepsis, not only routine pre-incision prophylaxis [1,5]. Fourth, lactate should be measured and trended because it supports risk assessment and reassessment of tissue hypoperfusion, although it must not be interpreted in isolation [1,4]. Fifth, monitoring should be escalated according to severity, including arterial pressure monitoring, urinary catheterisation, temperature monitoring and point-of-care ultrasound or echocardiography where available [1,5].

- **Communication and documentation**

Theatre time zero is most valuable when it improves team behaviour. The anaesthetist should clearly state the working diagnosis, current haemodynamic problem, antibiotic status, vasopressor plan, fluid strategy and postoperative destination [1,5,6]. Communication should include whether the patient is in suspected sepsis, established sepsis or septic shock; whether source control is definitive or incomplete; and whether further radiology, surgery or ICU intervention is likely [1,4]. Documentation should record the time of recognition, suspected or confirmed source, lactate values, cultures, antibiotics, fluids, vasopressors, major haemodynamic events and handover discussion [1,5]. When uncertainty exists, it should be documented explicitly, because classification often evolves as surgical findings, microbiology and haemodynamic response become clearer [1,4,5].

- **Practical summary**

Theatre ‘time zero’ should not be presented as an official replacement for guideline definitions. It is a perioperative safety tool that helps anaesthetists identify when sepsis actions must be triggered, checked and documented. Whether the patient arrives already septic or sepsis is discovered intraoperatively, the anaesthetist coordinates recognition, resuscitation, antimicrobial therapy, monitoring, vasopressor support, source-control communication and safe postoperative transfer [1,5,6].

ANTIMICROBIAL TIMING, STEWARDSHIP AND PHARMACOKINETICS

In perioperative sepsis, antimicrobial therapy must be understood as treatment of a life-threatening infection, not as routine surgical prophylaxis. Standard prophylactic antibiotic dosing is designed to reduce surgical-site infection risk in patients undergoing an operation; it is not necessarily adequate for patients with septic shock, capillary leak, tissue hypoperfusion, major fluid shifts, hypoalbuminaemia, renal dysfunction or blood loss [1,8,9]. This distinction is important in theatre because a septic patient may arrive having received only a prophylactic pre-incision dose, while still requiring immediate broad-spectrum therapeutic treatment directed at the likely source [1,5]. The anaesthetist should therefore ask a specific question: “Has this patient received sepsis-treatment antibiotics, or only surgical prophylaxis?” [1,5]. If septic shock or probable sepsis is present, antibiotics should not be delayed while waiting for perfect access, complete investigations or transfer to ICU [1].

- **Timing, cultures and empirical cover**

The 2026 Surviving Sepsis Campaign recommends immediate broad-spectrum antimicrobial therapy, ideally within one hour, for adults with septic shock and antibiotics within three hours for probable or definite sepsis without shock [1]. For possible sepsis without shock, rapid assessment is appropriate, but treatment should proceed if concern persists or the patient deteriorates [1]. In theatre, blood cultures and source cultures are valuable because they support later narrowing of therapy, but they should not become a barrier to urgent treatment in shock [1]. If cultures can be obtained quickly before antibiotics, this is preferable; if not, antibiotics should proceed and cultures

should still be taken from blood, pus, peritoneal fluid, tissue, bile, urine or devices as clinically relevant [1]. Empirical choice should consider the suspected anatomical source, community versus healthcare-associated infection, recent antibiotics, immune status, colonisation history and local antibiograms [1,12].

- **Pharmacokinetic changes in the septic surgical patient**

Sepsis alters antimicrobial pharmacokinetics in ways that may reduce early target attainment. Hydrophilic antibiotics, including many beta-lactams and aminoglycosides, are particularly affected by expanded extracellular fluid volume caused by capillary leak, aggressive crystalloid resuscitation, oedema, ascites, burns, pregnancy or major surgical fluid shifts [8,9]. Hypoalbuminaemia can alter protein binding, while renal dysfunction, augmented renal clearance or renal replacement therapy may change drug clearance unpredictably [8,9]. Blood loss and transfusion can further complicate distribution and concentration during emergency laparotomy, trauma surgery or major debridement [5,8]. These changes explain why an adequate loading dose is important at the beginning of therapy: early sepsis is not the time to under-dose a life-threatening infection [8,9]. Maintenance dosing can then be adjusted according to renal function, organ support, therapeutic drug monitoring where available, and microbiology advice [9].

Table 2. Simple pharmacokinetic model in sepsis

Septic physiology	Pharmacokinetic effect	Practical consequence
Capillary leak and oedema	Increased volume of distribution	Higher or full loading dose may be required to reach early target concentrations [8,9].
Large crystalloid shifts	Dilution and expanded extracellular fluid	Prophylactic dosing may be inadequate in shock [8,9].
Hypoalbuminaemia	Altered free drug fraction	Drug exposure may be unpredictable, especially for highly protein-bound agents [8,9].
Acute kidney injury or renal replacement therapy	Altered clearance	Maintenance dosing must be reviewed repeatedly [8,9].
Augmented renal clearance	Increased elimination	Standard doses may fail to maintain target exposure [8,9].

- **Loading dose, renal function, obesity and pregnancy**

The initial loading dose is usually driven by volume of distribution rather than clearance, whereas maintenance dosing is more strongly influenced by renal and hepatic elimination [8,9]. Therefore, renal impairment should not automatically lead to an inadequate first dose, although drug-specific toxicity and local renal dosing protocols must still be respected [8,9]. In obese patients, antimicrobial dosing should follow drug-specific guidance because total body weight, adjusted body weight or ideal body weight may be appropriate depending on the antibiotic and target exposure [9].

Pregnancy is also relevant because increased plasma volume, increased renal blood flow and altered clearance may reduce antimicrobial target attainment for some agents, including penicillins [11]. In pregnant septic patients, the anaesthetist should involve obstetrics, microbiology or pharmacy early, but maternal resuscitation and timely sepsis treatment remain the immediate priority [1,11].

None of these special populations should be managed by guesswork; dosing must be deliberate, documented and reviewed [1,9,12].

- **Infusion strategy and stewardship**

For beta-lactams, the 2026 SSC guideline supports prolonged infusion after an appropriate loading dose in adults with sepsis or septic shock [1]. This reflects the time-dependent pharmacodynamics of beta-lactams, where maintaining concentrations above the minimum inhibitory concentration is

central to bacterial killing [9,10]. However, prolonged or extended infusion should be implemented practically: give the loading dose first, ensure vascular access and pump availability, check compatibility with other infusions, and follow local stability and administration policies [1,9,10]. It should not delay the first antibiotic dose [1].

Antimicrobial stewardship is equally important. Early broad-spectrum therapy in shock and later narrowing is not contradictory; they are two phases of responsible care [1,12]. Once cultures, sensitivities, surgical findings and clinical response are available, therapy should be narrowed, stopped, shortened or adjusted where appropriate [1,12]. The anaesthetist contributes by documenting the indication, time, drug, dose, cultures, allergies and source-control findings clearly enough for ICU and microbiology teams to reassess treatment safely [1,5,12].

Table 3. Antimicrobial priorities for the anaesthetist

Priority	Practical action in theatre	Point to cover in the final text
Timing	Confirm whether antibiotics have already been given; administer promptly when indicated [1].	Do not allow cultures, lines, imaging or transfer delays to postpone treatment in shock [1].
Cultures	Take blood cultures before antibiotics if this can be done quickly [1].	Cultures are useful, but should not become a barrier to urgent therapy [1].
Dose	Use therapeutic loading doses rather than prophylactic surgical doses [1,8,9].	Shock and fluid shifts increase apparent volume of distribution [8,9].
Infusion strategy	Discuss prolonged or extended beta-lactam infusion where locally available [1,10].	Loading dose first, followed by pharmacokinetic optimisation [1,9,10].
Stewardship	Document indication, time, agent and source; support de-escalation later [1,12].	Early broad therapy and later narrowing are complementary, not contradictory [1,12].

SOURCE CONTROL AND SURGICAL PRIORITISATION

Source control refers to the physical intervention required to eliminate the infective focus, stop ongoing contamination and restore anatomical control where possible [1,13]. In perioperative sepsis, this may include drainage of an abscess, debridement of infected necrotic tissue, resection of perforated or ischaemic bowel, removal of infected prosthetic material, decompression of an obstructed infected system, or control of faecal, biliary, urinary or soft-tissue contamination [1,13].

For the anaesthetist, source control is not a surgical detail occurring in the background; it is often the definitive treatment that anaesthesia must make possible [1,5]. Antimicrobials and vasopressors may temporise the patient, but persistent infection or contamination can continue to drive shock until the source is controlled [1,13].

- **Concurrent resuscitation and incision**

The 2026 Surviving Sepsis Campaign recommends rapid evaluation for anatomical sources requiring emergent source control and suggests early source control, ideally within six hours of diagnosis when source control is required [1]. This recommendation is particularly important in emergency theatre because resuscitation and source control should occur concurrently rather than sequentially [1,5,13].

A profoundly shocked patient may not become stable until pus is drained, necrotic tissue is removed or contamination is controlled [1,13]. Therefore, “optimisation” should not become an open-ended reason to delay incision.

The anaesthetist should instead create the safest achievable conditions for surgery by preparing invasive monitoring, vascular access, vasopressors, fluids, warming, blood products and postoperative ICU admission [1,5,6].

- **Anaesthetic preparation for urgent source control**

Preparation should be proportional to the urgency and physiological instability of the patient. If time allows, an arterial line should be inserted before induction in patients with shock, escalating vasopressor requirements or unreliable non-invasive blood pressure readings [1]. Large-bore intravenous access, blood grouping and cross-matching, active warming, vasopressor infusions and a plan for rapid sequence induction should be considered according to aspiration risk and haemodynamic status [5,6]. Norepinephrine should be available before induction in septic shock, because induction drugs and positive-pressure ventilation may remove compensatory sympathetic tone and precipitate severe hypotension [1,5,6]. The surgical plan should be explicit: definitive surgery, limited source control, staged procedure or damage-control approach [1,13].

- **Communication of urgency and physiological limits**

Effective source control depends on communication between anaesthesia, surgery, ICU and microbiology [1,5,13]. The anaesthetist should state the patient's haemodynamic trajectory, lactate trend, vasopressor requirement, fluid responsiveness, bleeding risk, temperature, acidosis and anticipated postoperative organ support [1,5]. The surgeon should state the suspected source, planned incision or procedure, expected contamination, likely blood loss and whether source control is expected to be complete [1,13]. When physiological reserve is limited, the team may need to prioritise rapid control of contamination over prolonged reconstructive surgery [13]. The ICU handover must include whether source control was complete, partial or unsuccessful, because incomplete control changes antimicrobial, vasopressor, imaging and re-operation planning [1,13].

Table 4. Source-control prioritisation checklist

Priority	Anaesthetic action	Reason
Confirm source	Clarify suspected or confirmed anatomical focus with the surgeon [1,13].	Determines urgency, incision and antimicrobial relevance.
Avoid avoidable delay	Resuscitate while preparing for incision [1,5].	Shock may persist until the source is controlled.
Prepare circulation	Secure access, arterial monitoring, vasopressors, fluids and blood products [1,5,6].	Reduces peri-induction and intraoperative collapse risk.
Maintain physiology	Actively manage temperature, acidosis, ventilation and perfusion [1,5].	Supports tolerance of surgery and transfer.
Handover control status	Document complete, partial or failed source control [1,13].	Guides ICU treatment, imaging and possible re-operation.

ANAESTHETIC ASSESSMENT AND PRE-INDUCTION PREPARATION

- **Induction as a high-risk resuscitation event**

Induction of anaesthesia in septic shock should be treated as a planned resuscitation event, not as a routine start to surgery. Patients with sepsis may preserve blood pressure through high endogenous sympathetic tone, tachycardia and peripheral vasoconstrictive compensation, even while tissue perfusion is already impaired [5,6]. Induction drugs, opioids, volatile agents and positive-pressure ventilation can abruptly reduce systemic vascular resistance, myocardial performance and venous return, exposing severe vasoplegia or relative hypovolaemia [5,6]. The result may be profound hypotension, worsening acidosis, cardiac arrest or inability to proceed safely to source control [5,6]. Preparation before induction is therefore often more important than the choice of a single "safe" induction agent [5].

- **Structured pre-induction assessment**

The pre-induction assessment should identify infection source, organ dysfunction, haemodynamic trajectory, lactate, renal function, oxygenation, aspiration risk, bleeding risk and likely postoperative destination [1,4,5]. The anaesthetist should clarify whether the patient has sepsis or septic shock, whether antibiotics have been administered, whether source control is urgent, and whether ICU admission has been accepted or is being arranged [1,5]. Senior anaesthetic and surgical decision-making should occur early because delays, unclear plans and incomplete preparation increase risk during emergency source-control surgery [1,5]. Assessment should be brief but deliberate: airway, breathing, circulation, disability, exposure, source, drugs, allergies, blood availability and anticipated physiological collapse should all be considered [5,6].

- **Monitoring, access and vasopressor readiness**

Monitoring should match severity and urgency. Standard monitoring must include ECG, pulse oximetry, capnography after intubation, non-invasive or invasive blood pressure, and temperature monitoring [5,6]. In septic shock, an arterial line before induction is desirable where feasible because beat-to-beat pressure measurement allows early detection and treatment of collapse [5,6]. However, invasive monitoring should not cause harmful delay when immediate source control is required [1,5]. At least two reliable large-bore intravenous lines should be secured, with central access considered if it can be placed without delaying care [1,5]. The 2026 Surviving Sepsis Campaign recommends norepinephrine as first-line vasopressor therapy and supports peripheral vasopressor initiation if waiting for central venous access would delay treatment [1]. Norepinephrine should therefore be prepared before induction in patients with septic shock or severe sepsis-associated hypotension [1,5].

- **Airway, drugs and rescue plans**

Many septic abdominal patients have delayed gastric emptying, ileus, bowel obstruction, peritonitis, opioid exposure or emergency surgical pathology, making aspiration risk an important part of airway planning [5,6]. A rapid-sequence approach may be appropriate, but the plan should be individualised according to airway difficulty, oxygen reserve, haemodynamic status and available expertise [5,6]. Induction drug choice should be balanced. Ketamine or etomidate may be considered when cardiovascular instability is prominent, but no induction drug is universally safe in septic shock [5,6]. Dose titration, readiness with vasopressors, adequate monitoring, airway preparation and anticipation of post-induction hypotension are more important than naming one preferred agent [5,6]. A rescue plan should include treatment of refractory hypotension, difficult airway, hypoxaemia, major bleeding, severe acidosis and the possibility of abbreviated or damage-control surgery [1,5].

- **Postoperative destination before incision**

The postoperative plan should be agreed before incision whenever possible. Septic patients may require postoperative ventilation, vasopressor support, renal support, serial lactate measurement, further imaging, re-operation or ongoing antimicrobial adjustment [1,5]. ICU handover should include pre-induction physiology, antibiotics, cultures, fluids, vasopressors, lactate trend, source-control status and unresolved risks [1,5]. Safe transfer is part of anaesthetic management, not an afterthought.

HAEMODYNAMIC OPTIMISATION AND VASOPRESSORS

- **Perfusion, not blood pressure alone**

Haemodynamic optimisation in perioperative septic shock should not be reduced to achieving a single mean arterial pressure (MAP). The 2026 Surviving Sepsis Campaign recommends an initial MAP target of 65 mmHg in adults with septic shock, but the clinical aim is restoration of organ perfusion rather than cosmetic normalisation of the monitor [1]. The anaesthetist should assess MAP together with mentation where assessable before induction, urine output, lactate trend, capillary refill, peripheral temperature, skin mottling, arterial waveform quality, acid-base status and response to fluids or vasopressors [1,4,14]. Capillary refill is useful because it is rapid, repeatable and reflects peripheral perfusion, although it should be interpreted alongside lactate and the overall clinical picture [1,14].

- **Dynamic assessment in theatre**

The septic surgical patient may be vasodilated, hypovolaemic, bleeding, acidotic or developing sepsis-induced myocardial dysfunction [1,5,6]. Static observations are therefore insufficient. Small fluid challenges, passive leg raising where feasible, stroke-volume response, pulse-pressure variation, arterial waveform analysis and focused echocardiography can help determine whether hypotension is fluid responsive, vasoplegic or related to myocardial dysfunction [1,5]. Echocardiography is especially useful when shock persists despite apparently adequate preload, when pulmonary oedema limits further fluid, or when right ventricular dysfunction, left ventricular impairment or tamponade must be excluded [5]. These assessments support safer titration of fluids, vasopressors and inotropes during induction, laparotomy and transfer [1,5].

- **Norepinephrine and peripheral initiation**

Norepinephrine is the usual first-line vasopressor for septic shock because it supports vascular tone and is recommended as the initial vasopressor in current guideline-based management [1]. In perioperative care, norepinephrine should be prepared before induction when shock, severe vasoplegia or escalating hypotension is likely [1,5,6]. The 2026 SSC also supports starting vasopressors peripherally rather than delaying treatment while central venous access is obtained [1]. This is highly relevant in theatre because untreated hypotension during prolonged line placement may be more dangerous than carefully monitored peripheral norepinephrine [1,5]. A reliable proximal cannula should be used where possible, the site should be visible and checked frequently, extravasation protocols should be available, and transition to central access should occur when practical [1].

- **Escalation and inotropic support**

If hypotension persists despite norepinephrine and appropriate resuscitation, vasopressin may be added according to guideline direction and local ICU protocol [1]. Vasopressin can reduce norepinephrine exposure, but it should be viewed as an adjunct rather than a replacement for source control, fluids where responsive and correction of severe physiological derangement [1,5]. Adrenaline is an escalation option when shock remains refractory despite norepinephrine and vasopressin, although lactate interpretation, arrhythmia risk and myocardial oxygen demand must be considered [1].

When persistent hypoperfusion is associated with cardiac dysfunction, an inotrope may be required, supported by echocardiography and perfusion assessment rather than blood pressure alone [1,5]. During ongoing surgery, vasopressor escalation should be reassessed after major changes such as incision, drainage, bleeding control, abdominal closure, warming or transfusion, because the required dose may fall once source control improves or rise when acidosis, hypocalcaemia or hypothermia worsen [1,5]. The anaesthetist should document the rationale, response and handover plan clearly [1,5].

Table 5. Vasopressor and inotrope framework for perioperative septic shock

Agent/approach	Typical role	Anaesthetic comment
Norepinephrine	First-line vasopressor in septic shock [1].	Prepare before induction when shock or severe vasoplegia is likely [1,5,6].
Peripheral norepinephrine	Bridge when central access would delay treatment [1].	Use a reliable proximal cannula, observe the site and transition when possible [1].
Vasopressin	Adjunct when norepinephrine requirement escalates [1].	May reduce norepinephrine dose; follow local ICU protocol [1].
Epinephrine	Escalation option in refractory shock [1].	Consider lactate effects, arrhythmia risk and myocardial oxygen demand [1].
Inotrope	For myocardial dysfunction with persistent hypoperfusion [1,5].	Use echocardiography and perfusion assessment to support the decision [1,5].

FLUID STEWARDSHIP AND ADVANCED MONITORING

Fluid resuscitation in septic shock should not be reduced to a mechanical prescription. The 2026 Surviving Sepsis Campaign recommends early intravenous crystalloid resuscitation for sepsis-induced hypoperfusion or septic shock, including at least 30 mL/kg within the first three hours, but this must be followed by reassessment and adjustment to the patient's response [1]. For the anaesthetist, the important distinction is between initial resuscitation and ongoing intraoperative fluid administration. Early fluid may restore preload and improve perfusion, but repeated boluses without evidence of fluid responsiveness can worsen pulmonary oedema, tissue oedema and postoperative organ dysfunction [1,5,15]. Fluid stewardship therefore means giving enough fluid to support perfusion, while stopping when additional fluid no longer improves stroke volume or clinical endpoints [1,15]. Of note, the SCC suggests using ideal or adjusted body weight for obese patients, and actual body weight in patients who have a normal BMI or in underweight patients[1].

- **Choosing and reassessing fluid**

Crystalloids remain first-line for initial resuscitation in sepsis and septic shock, and balanced crystalloids are generally preferred over 0.9% saline unless a specific indication favours saline, such as traumatic brain injury [1]. In theatre, each bolus should have a defined purpose and endpoint: improved arterial pressure, increased stroke volume, better capillary refill, improved urine output, reduced vasopressor requirement or correction of clinically relevant hypovolaemia [1,5,15]. Surgical losses, bowel oedema, peritonitis, ascites, blood loss, preoperative dehydration and prior ward resuscitation must all be considered [5,6]. The anaesthetist should avoid both under-resuscitation, which worsens tissue hypoperfusion, and over-resuscitation, which may impair gas exchange and abdominal closure [1,5].

- **Dynamic monitoring in theatre**

Dynamic assessment is more useful than static pressure measurements alone. Pulse pressure variation, stroke volume variation, passive leg raising, mini-fluid challenge, arterial waveform analysis and echocardiography can help determine whether additional fluid is likely to increase cardiac output [1,15]. These measures have limitations: controlled ventilation, tidal volume, arrhythmia, spontaneous respiratory effort, open abdomen, low lung compliance and right ventricular dysfunction can affect interpretation [15]. Echocardiography is particularly useful when hypotension persists despite fluid, when pulmonary oedema is developing, when right ventricular failure is suspected, or when sepsis-induced myocardial dysfunction may be contributing to shock [5,15]. Urine output, lactate trend, capillary refill and skin temperature remain important because haemodynamic monitors should support clinical judgement, not replace it [1,14,15].

- **When fluids become harmful**

Additional fluid becomes harmful when it increases venous pressure and tissue oedema without improving forward flow [1,15]. Warning signs include worsening oxygenation, pulmonary oedema, rising airway pressures, increasing abdominal tension, poor abdominal closure conditions, right ventricular dilation, absent stroke-volume response, persistent oliguria despite adequate perfusion pressure, and escalating vasopressor requirement after repeated boluses [5,15]. In these situations, the anaesthetist should reassess the diagnosis: the patient may require vasopressor escalation, inotropic support, blood products, source control, correction of acidosis or renal support rather than more crystalloid [1,5,15].

PROTECTIVE VENTILATION AND METABOLIC SUPPORT

- **Perioperative ventilation goals**

Ventilation in septic patients must support oxygen delivery, carbon dioxide clearance and acid-base management while avoiding ventilator-induced lung injury [1,16]. In sepsis-associated acute respiratory distress syndrome, lung-protective ventilation is recommended, using predicted-body-weight tidal volumes rather than actual body weight [1,16].

A tidal volume around 6 mL/kg predicted body weight and limitation of plateau pressure to 30 cmH_2O or less remain central ARDS principles [1,16]. In theatre, these targets must be balanced against surgical conditions, pneumoperitoneum, open abdomen, obesity, pregnancy, acidosis and haemodynamic instability [5,6].

If ventilation is not absolutely necessary, the 2026 guideline suggest that septic patients with acute hypoxaemia be managed with high flow nasal cannula rather than conventional low-flow therapy[1].

The anaesthetist should monitor oxygenation, end-tidal carbon dioxide, airway pressures, compliance, arterial blood gases and haemodynamic response to ventilator changes [5,6].

- **Peep, recruitment and positioning**

Positive end-expiratory pressure should be individualised to maintain alveolar recruitment while avoiding excessive intrathoracic pressure, reduced venous return and right ventricular strain [1,5]. Recruitment manoeuvres may transiently improve oxygenation, but they can worsen hypotension in septic shock and should be used cautiously, especially in hypovolaemic or vasopressor-dependent patients [1,5]. In moderate-to-severe ARDS, prone positioning is an evidence-based ICU strategy and is supported in appropriate patients, but intraoperative use depends on surgical access, staffing, monitoring safety and urgency [1,17]. Laparoscopic insufflation and open abdominal surgery both affect respiratory mechanics; pneumoperitoneum can increase airway pressure and reduce venous return, while an open abdomen may alter compliance and heat loss [5,6]. These changes should be handed over clearly to ICU [1,5].

- **Metabolic and organ support**

Metabolic support is part of perioperative sepsis management. The 2026 SSC recommends starting insulin therapy when glucose is at least 10 mmol/L, with ongoing monitoring to avoid hypoglycaemia [1].

Temperature management should prioritise detection and prevention of perioperative hypothermia, because septic emergency surgery, exposure, cold fluids and prolonged procedures increase heat loss [5,6]. Transfusion should follow a restrictive strategy in most stable septic patients, while recognising that active bleeding, myocardial ischaemia, severe hypoxaemia or poor reserve may require individualised decisions [1].

Renal support should not be started for acute kidney injury without a definitive indication, but either continuous or intermittent renal replacement therapy may be used when renal replacement is required [1].

- **Corticosteroids and ICU handover**

Corticosteroids are suggested in septic shock when vasopressor support remains necessary despite appropriate resuscitation [1]. In theatre, this decision should usually align with ICU or local protocol rather than isolated anaesthetic preference [1,5]. The anaesthetist must hand over ventilator settings, plateau pressure, PEEP, oxygen requirement, blood gases, lactate trend, glucose, temperature, transfusion, renal status, vasopressor dose, steroid decision and source-control completeness [1,5].

The key principle is continuity: protective ventilation and metabolic support started in theatre must be understood, continued and reassessed in ICU [1,5].

POSTOPERATIVE ICU TRANSFER AND STRUCTURED HANDOVER

The end of surgery is not the end of sepsis care. Source control may reduce the infective burden, but the patient may still have vasoplegia, myocardial dysfunction, respiratory failure, acute kidney injury, coagulopathy, hypothermia, acidosis or ongoing lactataemia requiring intensive care [1,5]. The anaesthetist must therefore view transfer to ICU as a continuation of resuscitation rather than a simple postoperative destination [1,5]. The 2026 Surviving Sepsis Campaign suggests ICU admission within six hours for adults with sepsis or septic shock who require ICU care, reinforcing the importance of avoiding avoidable delays after theatre [1]. A safe transfer requires stabilisation, appropriate monitoring, adequate oxygenation, reliable vascular access, secured infusions and clear communication with the receiving team [1,5,6].

- **What must be handed over**

A structured handover should give the ICU team a clear starting point for ongoing treatment. Airway status must be stated, including whether the patient is intubated, ventilated, extubated or at risk of re-intubation [5,6]. Ventilator settings should include mode, inspired oxygen concentration, tidal volume, respiratory rate, PEEP, plateau pressure where measured, recent arterial blood gas and any recruitment, proning or oxygenation concerns [1,5].

Cardiovascular handover should include pre-induction instability, current vasopressor or inotrope doses, arterial pressure target, response to fluids, estimated blood loss, transfusion, calcium or coagulation concerns, and whether hypotension was fluid responsive, vasoplegic or associated with myocardial dysfunction [1,5].

Fluid balance should include crystalloid, colloid if used, blood products, urine output, surgical losses and concern for overload or ongoing third spacing [1,5].

- **Infection, source control and pending results**

The infection handover should be explicit. The anaesthetist should state the suspected or confirmed source, whether source control was complete, partial or unsuccessful, and whether re-look surgery, imaging, drainage or further debridement is anticipated [1,13]. Antibiotic details must include drug, dose, time given, allergies, cultures taken, source specimens sent and whether microbiology advice has been obtained [1,12].

Lactate values and trends should be handed over with timing, because persistent or rising lactate may indicate ongoing hypoperfusion, incomplete source control, severe shock or impaired clearance [1,14]. Renal status should include urine output, creatinine trend where known, potassium, acidosis and whether renal replacement therapy may be needed [1].

Temperature, glucose management, steroid administration, VTE prophylaxis and stress-ulcer prophylaxis should also be communicated according to local ICU practice [1].

- **Documentation, limitations and escalation plans**

Structured handovers reduce the risk that critical information will be omitted during transfer. Dusse et al. found that operating-room or post-anaesthesia handovers to ICU are often affected by time pressure, interruptions and incomplete information transfer, supporting the use of adequate time and communication tools [18]. The anaesthetist should document the decisions made in theatre, including limitations of monitoring, difficult access, haemodynamic uncertainty, incomplete source control, bleeding risk, suspected myocardial dysfunction and escalation plans [1,18].

Where prognosis is poor or treatment limits are relevant, goals-of-care discussions and family communication should be flagged for the ICU team in line with guideline principles [1]. A concise, structured handover protects continuity, accountability and patient safety [1,18].

KEY EXAMINATION POINTS AND CONCLUSION

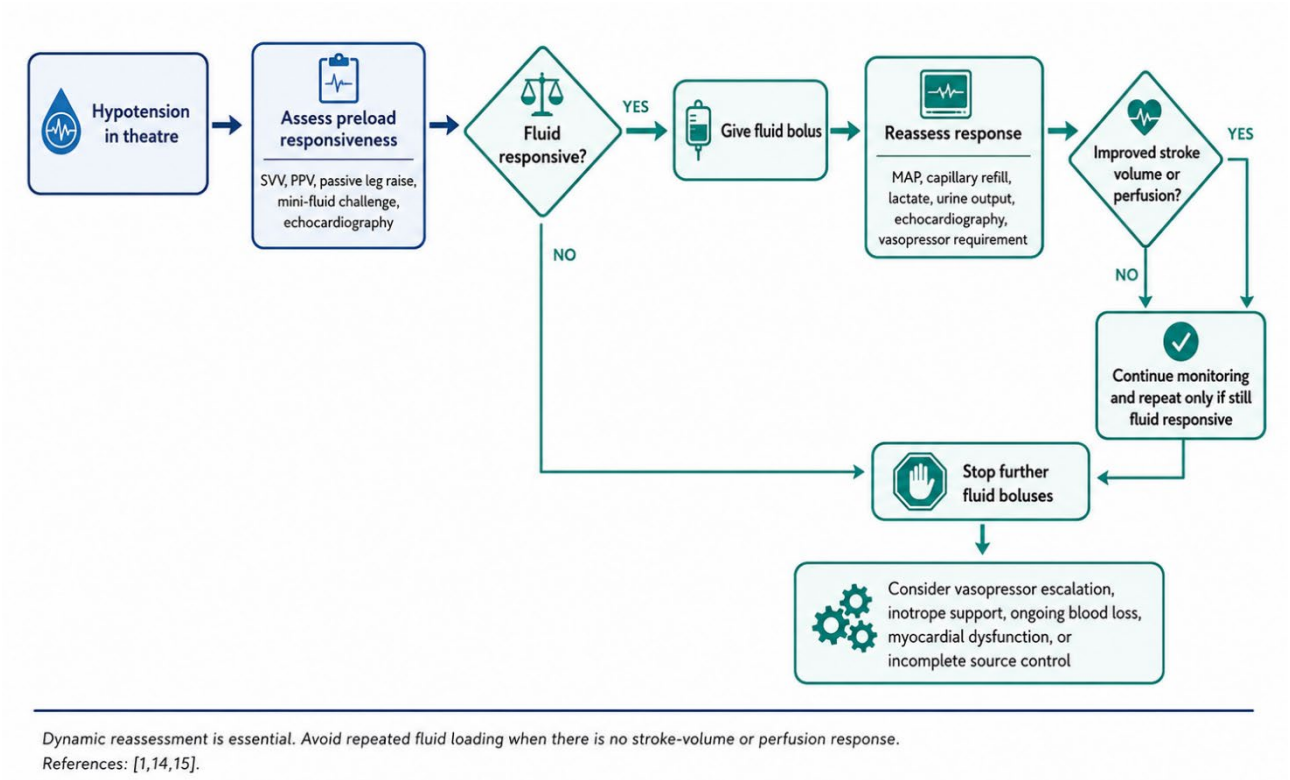
For the anaesthetist sepsis should be seen as a perioperative resuscitation problem, not only as an ICU diagnosis. The anaesthetist must recognise suspected infection with evolving organ dysfunction, while remembering that theatre conditions may mask or mimic sepsis physiology [1,4,5]. The anaesthetist should therefore interpret sepsis dynamically using the clinical history, suspected source, lactate trend, perfusion, urine output, haemodynamic response and surgical findings rather than relying on a single score or isolated blood-pressure value [1,4,5].

“Time zero”, should be described as an operational trigger for action, not as a new guideline definition [1]. In a known septic patient, it may be the moment of arrival in theatre for source-control surgery; in an unexpected case, it may be the moment pus, perforation, necrosis, bowel ischaemia or contamination is identified and communicated by the surgeon [1,5,13]. Once this point is reached, the anaesthetist should escalate, confirm cultures where feasible, ensure therapeutic antibiotics, measure lactate, prepare invasive monitoring, start or escalate vasopressors and communicate with ICU [1,5].

Table 6. Final take-home points

Examination point	Senior anaesthetic interpretation
Recognition	Sepsis is infection with organ dysfunction; theatre confounders require dynamic interpretation [1,4,5].
Time zero	Use it as a practical trigger for antibiotics, lactate, escalation, vasopressors and documentation [1,5].
Antibiotics	Treat sepsis therapeutically, not as routine prophylaxis; document time, drug and cultures [1,12].
Source control	Resuscitation and source control should proceed concurrently where urgent surgery is required [1,13].
Induction	Anticipate post-induction collapse and prepare monitoring, access and vasopressors before induction [5,6].
Haemodynamics	Norepinephrine is usual first-line vasopressor; perfusion is more important than monitor appearance [1,14].
Fluids	Give early fluid when indicated, but continue only when reassessment shows benefit [1,15].
ICU transfer	Handover physiology, treatment, source-control status, unresolved risks and escalation plans [1,18].

Figure 3. Dynamic fluid assessment in theatre



Source: Author's diagram, adapted from guideline recommendations on haemodynamic reassessment and fluid responsiveness in septic shock [1,14,15].

CONCLUSION

The updated sepsis guidance reinforces principles that are directly relevant to anaesthetic practice: early recognition, prompt antimicrobial treatment, haemodynamic support, timely source control and continuity into ICU care [1]. The anaesthetist's role is not passive. In emergency source-control surgery, the anaesthetist bridges emergency medicine, surgery, critical care and microbiology, while maintaining oxygen delivery, perfusion, ventilation, temperature control and safe transfer [1,5]. Good practice is not memorising a checklist, but applying guideline priorities to a physiologically unstable patient whose condition may change rapidly during induction, incision, contamination control and transfer [1,5,6].

As anaesthetists, we should recognise uncertainty, prepare for cardiovascular collapse, avoid unnecessary delay to source control, use vasopressors early when indicated, individualise fluids, and communicate clearly when source control is incomplete or ongoing organ support is required [1,5,13]. In this sense, the anaesthetist is a perioperative resuscitation specialist: maintaining physiology while surgical and antimicrobial treatment begins to control the disease process [1,5].

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