

International guidelines for management of sepsis and septic shock 2021

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ONLINE SPECIAL ARTICLE

Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock 2021

Evans, Laura¹; Rhodes, Andrew²; Alhazzani, Waleed³; Antonelli, Massimo⁴; Coopersmith, Craig M.⁵; French, Craig⁶; Machado, Flávia R.⁷; Mcintyre, Lauralyn⁸; Ostermann, Marlies⁹; Prescott, Hallie C.¹⁰; Schorr, Christa¹¹; Simpson, Steven¹²; Wiersinga, W. Joost¹³; Alshamsi, Fayez¹⁴; Angus, Derek C.¹⁵; Arabi, Yaseen¹⁶; Azevedo, Luciano¹⁷; Beale, Richard¹⁸; Beilman, Gregory¹⁹; Bellef-Cote, Emilie²⁰; Burry, Lisa²¹; Cecconi, Maurizio²²; Centofanti, John²³; Coz Yataco, Angel²⁴; De Waele, Jan²⁵; Dellinger, R. Phillip²⁶; Doi, Kent²⁷; Du, Bin²⁸; Estenssoro, Elisa²⁹; Ferrer, Ricard³⁰; Gomersall, Charles³¹; Hodgson, Carol³²; Hylander Møller, Morten³³; Iwashyna, Theodore³⁴; Jacob, Shevin³⁵; Kleinpell, Ruth³⁶; Klompas, Michael³⁷; Koh, Younsuck³⁸; Kumar, Anand³⁹; Kwizera, Arthur⁴⁰; Lobo, Suzana⁴¹; Masur, Henry⁴²; McGloughlin, Steven⁴³; Mehta, Sangeeta⁴⁴; Mehta, Yatin⁴⁵; Mer, Mervyn⁴⁶; Nunnally, Mark⁴⁷; Oczkowski, Simon⁴⁸; Osborn, Tiffany⁴⁹; Papathanassoglou, Elizabeth⁵⁰; Perner, Anders⁵¹; Puskarich, Michael⁵²; Roberts, Jason⁵³; Schweickert, William⁵⁴; Seckel, Maureen⁵⁵; Sevransky, Jonathan⁵⁶; Sprung, Charles L.⁵⁷; Welte, Tobias⁵⁸; Zimmerman, Janice⁵⁹; Levy, Mitchell⁶⁰

Author Information

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1. For hospitals and health systems, we recommend using a performance improvement program for sepsis, including sepsis screening for acutely ill, high-risk patients and standard operating procedures for treatment.
2. We recommend against using qSOFA compared with SIRS, NEWS, or MEWS as a single-screening tool for sepsis or septic shock.
3. For adults suspected of having sepsis, we suggest measuring blood lactate.

INITIAL RESUSCITATION

4. Sepsis and septic shock are medical emergencies, and we recommend that treatment and resuscitation begin immediately.
5. For patients with sepsis induced hypoperfusion or septic shock we suggest that at least 30 mL/kg of IV crystalloid fluid should be given within the first 3 hr of resuscitation.
6. For adults with sepsis or septic shock, we suggest using dynamic measures to guide fluid resuscitation, over physical examination, or static parameters alone

INITIAL RESUSCITATION

7. For adults with sepsis or septic shock, we suggest guiding resuscitation to decrease serum lactate in patients with elevated lactate level, over not using serum lactate.
8. For adults with septic shock, we suggest using capillary refill time to guide resuscitation as an adjunct to other measures of perfusion.

MEAN ARTERIAL PRESSURE

9. For adults with septic shock on vasopressors, we recommend an initial target mean arterial pressure (MAP) of 65 mm Hg over higher MAP targets.

ADMISSION TO INTENSIVE CARE

10. For adults with sepsis or septic shock who require ICU admission, we suggest admitting the patients to the ICU within 6 hr.

INFECTION

11. For adults with suspected sepsis or septic shock but unconfirmed infection, we recommend continuously re-evaluating and searching for alternative diagnoses and discontinuing empiric antimicrobials if an alternative cause of illness is demonstrated or strongly suspected.
12. For adults with possible septic shock or a high likelihood for sepsis, we recommend administering antimicrobials immediately, ideally within 1 hr of recognition.
13. For adults with possible sepsis without shock, we recommend rapid assessment of the likelihood of infectious versus noninfectious causes of acute illness.
14. For adults with possible sepsis without shock, we suggest a time-limited course of rapid investigation and if concern for infection persists, the administration of antimicrobials within 3 hr from the time when sepsis was first recognized.

INFECTION

15. For adults with a low likelihood of infection and without shock, we suggest deferring antimicrobials while continuing to closely monitor the patient.
16. For adults with suspected sepsis or septic shock, we suggest against using procalcitonin plus clinical evaluation to decide when to start antimicrobials, as compared to clinical evaluation alone.
17. For adults with sepsis or septic shock at high risk of MRSA, we recommend using empiric antimicrobials with MRSA coverage over using antimicrobials without MRSA coverage.
18. For adults with sepsis or septic shock at low risk of MRSA, we suggest against using empiric antimicrobials with MRSA coverage, as compared with using antimicrobials without MRSA coverage.

INFECTION

19. For adults with sepsis or septic shock and high risk for multidrug resistant (MDR) organisms, we suggest using two antimicrobials with gram-negative coverage for empiric treatment over one gram-negative agent.
20. For adults with sepsis or septic shock and low risk for multidrug resistant (MDR) organisms, we suggest against using two gram-negative agents for empiric treatment, as compared to one gram-negative agent.
21. For adults with sepsis or septic shock, we suggest against using double gram-negative coverage once the causative pathogen and the susceptibilities are known.
22. For adults with sepsis or septic shock at high risk of fungal infection, we suggest using empiric antifungal therapy over no antifungal therapy.

INFECTION

23. For adults with sepsis or septic shock at low risk of fungal infection, we suggest against empiric use of antifungal therapy.
24. We make no recommendation on the use of antiviral agents.
25. For adults with sepsis or septic shock, we suggest using prolonged infusion of beta-lactams for maintenance (after an initial bolus) over conventional bolus infusion.
26. For adults with sepsis or septic shock, we recommend optimising dosing strategies of antimicrobials based on accepted pharmacokinetic/pharmacodynamic (PK/PD) principles and specific drug properties.

INFECTION

27. For adults with sepsis or septic shock, we recommend rapidly identifying or excluding a specific anatomical diagnosis of infection that requires emergent source control and implementing any required source control intervention as soon as medically and logistically practical.
28. For adults with sepsis or septic shock, we recommend prompt removal of intravascular access devices that are a possible source of sepsis or septic shock after other vascular access has been established.
29. For adults with sepsis or septic shock, we suggest daily assessment for de-escalation of antimicrobials over using fixed durations of therapy without daily reassessment for de-escalation.

INFECTION

30. For adults with an initial diagnosis of sepsis or septic shock and adequate source control, we suggest using shorter over longer duration of antimicrobial therapy.
31. For adults with an initial diagnosis of sepsis or septic shock and adequate source control where optimal duration of therapy is unclear, we suggest using procalcitonin AND clinical evaluation to decide when to discontinue antimicrobials over clinical evaluation alone.

HEMODYNAMIC MANAGEMENT

32. For adults with sepsis or septic shock, we recommend using crystalloids as first-line fluid for resuscitation.
33. For adults with sepsis or septic shock, we suggest using balanced crystalloids instead of normal saline for resuscitation.
34. For adults with sepsis or septic shock, we suggest using albumin in patients who received large volumes of crystalloids.
35. For adults with sepsis or septic shock, we recommend against using starches for resuscitation.

HEMODYNAMIC MANAGEMENT

36. For adults with sepsis and septic shock, we suggest against using gelatin for resuscitation.
37. For adults with septic shock, we recommend using norepinephrine as the first-line agent over other vasopressors.
38. For adults with septic shock on norepinephrine with inadequate mean arterial pressure levels, we suggest adding vasopressin instead of escalating the dose of norepinephrine.
39. For adults with septic shock and inadequate mean arterial pressure levels despite norepinephrine and vasopressin, we suggest adding epinephrine.

HEMODYNAMIC MANAGEMENT

40. For adults with septic shock, we suggest against using terlipressin.
41. For adults with septic shock and cardiac dysfunction with persistent hypoperfusion despite adequate volume status and arterial blood pressure, we suggest either adding dobutamine to norepinephrine or using epinephrine alone.
42. For adults with septic shock and cardiac dysfunction with persistent hypoperfusion despite adequate volume status and arterial blood pressure, we suggest against using levosimendan.
43. For adults with septic shock, we suggest invasive monitoring of arterial blood pressure over noninvasive monitoring, as soon as practical and if resources are available.

HEMODYNAMIC MANAGEMENT

44. For adults with septic shock, we suggest starting vasopressors peripherally to restore mean arterial pressure rather than delaying initiation until a central venous access is secured.
45. There is insufficient evidence to make a recommendation on the use of restrictive versus liberal fluid strategies in the first 24 hr of resuscitation in patients with sepsis and septic shock who still have signs of hypoperfusion and volume depletion after the initial resuscitation.

VENTILATION

46. There is insufficient evidence to make a recommendation on the use of conservative oxygen targets in adults with sepsis-induced hypoxemic respiratory failure.
47. For adults with sepsis-induced hypoxemic respiratory failure, we suggest the use of high flow nasal oxygen over noninvasive ventilation.
48. There is insufficient evidence to make a recommendation on the use of noninvasive ventilation in comparison to invasive ventilation for adults with sepsis-induced hypoxemic respiratory failure.
49. For adults with sepsis-induced ARDS, we recommend using a low tidal volume ventilation strategy (6 mL/kg), over a high tidal volume strategy (> 10 mL/kg).

VENTILATION

50. For adults with sepsis-induced severe ARDS, we recommend using an upper limit goal for plateau pressures of 30 cm H₂O, over higher plateau pressures.
51. For adults with moderate to severe sepsis-induced ARDS, we suggest using higher PEEP over lower PEEP.
52. For adults with sepsis-induced respiratory failure (without ARDS), we suggest using low tidal volume as compared with high tidal volume ventilation.
53. For adults with sepsis-induced moderate-severe ARDS, we suggest using traditional recruitment maneuvers.

VENTILATION

54. When using recruitment maneuvers, we recommend against using incremental PEEP titration/strategy.
55. For adults with sepsis-induced moderate-severe ARDS, we recommend using prone ventilation for greater than 12 hr daily.
56. For adults with sepsis induced moderate-severe ARDS, we suggest using intermittent NMBA boluses, over NMBA continuous infusion.
57. For adults with sepsis-induced severe ARDS, we suggest using Venovenous (VV) ECMO when conventional mechanical ventilation fails in experienced centers with the infrastructure in place to support its use.

ADDITIONAL THERAPIES

58. For adults with septic shock and an ongoing requirement for vasopressor therapy we suggest using IV corticosteroids.
59. For adults with sepsis or septic shock we suggest against using polymyxin B hemoperfusion.
60. There is insufficient evidence to make a recommendation on the use of other blood purification techniques.
61. For adults with sepsis or septic shock we recommend using a restrictive (over liberal) transfusion strategy.
62. For adults with sepsis or septic shock we suggest against using IV immunoglobulins.

ADDITIONAL THERAPIES

63. For adults with sepsis or septic shock, and who have risk factors for gastrointestinal (GI) bleeding, we suggest using stress ulcer prophylaxis.
64. For adults with sepsis or septic shock, we recommend using pharmacologic venous thromboembolism (VTE) prophylaxis unless a contraindication to such therapy exists.
65. For adults with sepsis or septic shock, we recommend using low molecular weight heparin over unfractionated heparin for VTE prophylaxis
66. For adults with sepsis or septic shock, we suggest against using mechanical VTE prophylaxis, in addition to pharmacological prophylaxis, over pharmacologic prophylaxis alone.

ADDITIONAL THERAPIES

67. In adults with sepsis or septic shock and AKI, we suggest using either continuous or intermittent renal replacement therapy.
68. In adults with sepsis or septic shock and AKI, with no definitive indications for renal replacement therapy, we suggest against using renal replacement therapy.
69. For adults with sepsis or septic shock, we recommend initiating insulin therapy at a glucose level of $\geq 180\text{mg/dL}$ (10 mmol/L).
70. For adults with sepsis or septic shock we suggest against using IV vitamin C.

ADDITIONAL THERAPIES

71. For adults with septic shock and hypoperfusion-induced lactic acidemia, we suggest against using sodium bicarbonate therapy to improve hemodynamics or to reduce vasopressor requirements.
72. For adults with septic shock and severe metabolic acidemia (pH \leq 7.2) and acute kidney injury (AKIN score 2 or 3), we suggest using sodium bicarbonate therapy
73. For adult patients with sepsis or septic shock who can be fed enterally, we suggest early (within 72 hr) initiation of enteral nutrition.

LONG-TERM OUTCOMES AND GOALS OF CARE

74. For adults with sepsis or septic shock, we recommend discussing goals of care and prognosis with patients and families over no such discussion.
75. For adults with sepsis or septic shock, we suggest addressing goals of care early (within 72 hr) over late (72 hr or later).
76. For adults with sepsis or septic shock, there is insufficient evidence to make a recommendation on any specific standardized criterion to trigger goals of care discussion.
77. For adults with sepsis or septic shock, we recommend that the principles of palliative care (which may include palliative care consultation based on clinician judgement) be integrated into the treatment plan, when appropriate, to address patient and family symptoms and suffering.

LONG-TERM OUTCOMES AND GOALS OF CARE

78. For adults with sepsis or septic shock, we suggest against routine formal palliative care consultation for all patients over palliative care consultation based on clinician judgement.
79. For adult survivors of sepsis or septic shock and their families, we suggest referral to peer support groups over no such referral.
80. For adults with sepsis or septic shock, we suggest using a handoff process of critically important information at transitions of care over no such handoff process.
81. For adults with sepsis or septic shock, there is insufficient evidence to make a recommendation on the use of any specific structured handoff tool over usual handoff processes.

LONG-TERM OUTCOMES AND GOALS OF CARE

82. For adults with sepsis or septic shock and their families, we recommend screening for economic and social support (including housing, nutritional, financial, and spiritual support), and make referrals where available to meet these needs.
83. For adults with sepsis or septic shock and their families, we suggest offering written and verbal sepsis education (diagnosis, treatment, and post-ICU/post-sepsis syndrome) prior to hospital discharge and in the follow-up setting.
84. For adults with sepsis or septic shock and their families, we recommend the clinical team provide the opportunity to participate in shared decision making in post-ICU and hospital discharge planning to ensure discharge plans are acceptable and feasible.

LONG-TERM OUTCOMES AND GOALS OF CARE

85. For adults with sepsis and septic shock and their families, we suggest using a critical care transition program, compared with usual care, upon transfer to the floor.
86. For adults with sepsis and septic shock, we recommend reconciling medications at both ICU and hospital discharge.
87. For adult survivors of sepsis and septic shock and their families, we recommend including information about the ICU stay, sepsis and related diagnoses, treatments, and common impairments after sepsis in the written and verbal hospital discharge summary.
88. For adults with sepsis or septic shock who developed new impairments, we recommend hospital discharge plans include follow-up with clinicians able to support and manage new and long-term sequelae.

LONG-TERM OUTCOMES AND GOALS OF CARE

89. For adults with sepsis or septic shock and their families, there is insufficient evidence to make a recommendation on early post-hospital discharge follow-up compared with routine post-hospital discharge follow-up.
90. For adults with sepsis or septic shock, there is insufficient evidence to make a recommendation for or against early cognitive therapy.
91. For adult survivors of sepsis or septic shock, we recommend assessment and follow-up for physical, cognitive, and emotional problems after hospital discharge.
92. For adult survivors of sepsis or septic shock, we suggest referral to a post-critical illness follow-up program if available.
93. For adult survivors of sepsis or septic shock receiving mechanical ventilation for > 48hr or an ICU stay of > 72 hr, we suggest referral to a post-hospital rehabilitation program.

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