

Emergency Department Sepsis Guidelines

The provincial Sepsis Clinical Expert Group developed the BC Emergency Department Sepsis Guidelines, taking into account the most up-to-date literature (references below) and expert opinion.

For more information about the guidelines, and to join the BC Sepsis Network, visit www.BCsepsis.ca.

GUIDELINES

All patients with two out of four SIRS (HR > 90, RR > 20, temperature $\geq 38^{\circ}$ C or $< 36^{\circ}$ C, altered mental state) and suspected infection and one of the following risk factors should be considered at risk of sepsis:

- Looks unwell
- Age > 65 years
- Recent surgery
- Immunocompromised (AIDS, Chemotherapy, neutropenia, asplenia, transplant, chronic steroids)
- Chronic illness (diabetes, renal failure, hepatic failure, cancer, alcoholism, IV drug use)

All patients with two out of four SIRS and suspected infection (with above risk factor):

- ABG venous lactate measurement within 30 minutes of presentation to triage should be taken with initial blood draw. *This will require access to an ABG machine (or other rapid lactate testing device) with rapid turn around time (approximately 30 minutes)*
- If initial lactate is elevated have a repeat venous lactate measurement drawn in next 2-4 hours

If at presentation systolic blood pressure is < 90 mmHg or patient presents with two out of three qSOFA (altered mental state, respiratory rate > 20/min, systolic blood pressure < 100 mmHg):

- Broad spectrum IV antibiotics within 1 hour
- Blood culture before IV antibiotics
- Complete crystalloid fluid bolus (30 cc/kg) within first 3 hours (balanced crystalloid preferred)

If initial lactate result is ≥ 4 mmol/L:

- Broad spectrum IV antibiotics within 1 hour of measurement of elevated lactate
- Blood culture before IV antibiotics
- Complete crystalloid fluid bolus (30 cc/kg) within first 3 hours (balanced crystalloid preferred)

If systolic blood pressure > 90 mmHg at presentation and initial lactate is < 4 mmol/L but patient is admitted to the hospital and received IV antibiotics:

- Broad spectrum IV antibiotics within 3 hours
- Blood culture before IV antibiotics

Emergency Department Sepsis Guidelines

ADDITIONAL RECOMMENDATIONS

- Early investigations to determine infectious source (radiologic, surgical, other cultures i.e. CSF, joint aspiration) and early source control within 6-12 hours through appropriate consultation and using the least invasive technique.
- Consult ICU early (either locally or through the BC Patient Transfer Network) if you have early knowledge that patient will need higher level of care.
- Encourage a 'culture of lactate' where any nurse or physician is empowered to check a lactate if concerned. Check early and check often (if lactate elevated or patient unwell).
- We suggest guiding resuscitation to normalize lactate in patients with elevated lactate as a marker of tissue hypoperfusion.

If hypotensive despite fluid bolus (30 cc/kg) or lactate fails to improve 10% after 2nd reading (at least two hours after initial measurement) we suggest:

- Placing central venous catheter and arterial catheter, continue fluid resuscitation while assessing for fluid responsiveness and initiate norepinephrine or epinephrine (+/- vasopressin 0.03 units/minute as vasopressor sparing agent) to maintain mean arterial pressure of > 65 mmHg.
- Using further hemodynamic assessment (such as assessing cardiac function) to determine the type of shock if the physical exam does not lead to a clear diagnosis.
- Using dobutamine as needed if evidence of sepsis induced myocardial suppression (determined by ECHO, low ScvO₂ or physical exam). Continue to assess response.
- Using albumin in addition to crystalloids for initial resuscitation and subsequent intravascular volume replacement in patients with sepsis and septic shock when patients require substantial amounts of crystalloids.
- If you are unable to restore hemodynamic stability with fluid resuscitation and vasopressors we suggest adding IV hydrocortisone at a dose of 50 mg IV q6h.
- Consultation with critical care services or transfer to ICU (either locally or through BC Patient Transfer Network).

GUIDELINE REFERENCES

1. Arnold RC, Shapiro NI, Jones AE, et al. Multi-center study of early lactate clearance as a determinant of survival in patients with presumed sepsis. *Shock*. 2009;32(1):35-39.
2. Gacoulin A, Tulzo Y, Lavoue S, et al. Severe pneumonia due to *Legionella pneumophila*: Prognostic factors, impact on delayed appropriate antimicrobial therapy. *Intensive Care Med*. 2002; 28:686-691.
3. Gaieski DF, Mikkelsen ME, Band RA, et al. Impact of time to antibiotics on survival in patients with severe sepsis or septic shock in whom early goal-directed therapy was initiated in the emergency department. *Crit Care Med*. 2010; 38(4):1045-1053.
4. Kumar A, Roberts D, Wood KE, et al. Duration of hypotension before initiation of effective antimicrobial therapy is the critical determinant of survival in human septic shock. *Crit Care Med*. 2006; 34:1589 – 1596.
5. Micek ST, Roubinian N, Heuring T, et al. Before-after study of a standardized hospital order set for the management of septic shock. *Crit Care Med*. 2006; 34:2707–2713.
6. Mikkelsen ME, Gaieski DF, Goyal M, et al. Factors associated with nonadherence with early goal-directed therapy in the ED. *Chest*. 2010; 138(3): 551-558.
7. Morrell M, Fraser VJ, Kollef MH. Delaying the empiric treatment of candida bloodstream infection until positive blood culture results are obtained: a potential risk factor for hospital mortality. *Antimicrob Agents Chemother*. 2005; 49:3640–3645.
8. Nguyen H, Rivers E, Knoblich B, et al. Early lactate clearance is associated with improved outcome in severe sepsis and septic shock. *Crit Care Med*. 2004; 32(8):1637-1642.
9. Rhodes A, Evans L, Alhazzani W, et al. Surviving Sepsis Campaign: International guidelines for management of severe sepsis and septic shock: 2016. *Crit Care Med* 2017; 45(3).
10. Rivers E, Nguyen B, Havstad S, et al. Early goal-directed therapy in the treatment of severe sepsis and septic shock. *N Engl J Med* 2001; 345:1368-1377.
11. Singer M, et al. The third international consensus definitions for sepsis and septic shock (Sepsis-3). *JAMA*. 2016; 315(8): 801-810.

12. Surviving Sepsis Campaign. Surviving Sepsis Campaign: Updated Bundles in Response to New Evidence. www.survivingsepsis.org/bundles. Accessed 9 Feb. 2017.
13. Wang HE, Shapiro NI, Angus DC, et al. National estimates of severe sepsis in United States emergency departments. *Crit Care Med*. 2007; 35:1928 –1936.
14. Weinstein MP, Reller LP, Murphy JR, et al. The clinical significance of positive blood cultures: A comprehensive analysis of 500 episodes of bacteremia and fungemia in adults. I. Laboratory and epidemiologic observations. *Rev Infect Dis*. 1983; 5:35–53.
15. Freund Y, Lemachatti N, Krastinova E, et al. Prognostic accuracy of Sepsis-3 criteria for in-hospital mortality among patients with suspected infection presenting to the emergency department. *JAMA*. 2017; 317(3):301-308.

ADDITIONAL REFERENCES:

1. Bozza F, Carnevale R, Japiassu M, et al. Early Fluid Resuscitation in Sepsis: Evidence and Perspectives. *Shock*. 2010; 34: Supplement 1: 40-43.
2. El Sohl A, Akinnusi M, Alsawalha L, et al. Outcomes of Septic Shock in Older Adults After Implementation of the Sepsis “Bundle”. *J Am Ger Soc*. 2008; 56:272-278.
3. Funk D. & Kumar A. Antimicrobial Therapy for Life-threatening Infections: Speed is Life. *Crit Care Clin*. 2011; 27: 53–76.
4. Jones A, Shapiro N, & Roshon M. Implementing Early Goal Directed Therapy in the Emergency Setting: The Challenges and Experiences of Translating Research Innovations into Clinical Reality in Academic and Community Settings. *Acad Emerg Med*. 2007; 14(11):1072-1078.
5. Jones A, Shapiro N, Trzeciak S, et al. Lactate Clearance Vs. Central Venous Oxygen Saturation as Goals for Early Sepsis Therapy: A randomized clinical trial. *JAMA*. 2010; 303(8):739-746.
6. Kumar A, Zarychanski R, Light B, et al. Early combination antibiotic therapy yields improved survival compared with monotherapy in septic shock: A propensity-matched analysis. *Crit Care Med*. 2010; 38(9): 1773-1785.

Emergency Department Sepsis Guidelines

7. Levy M, Dellinger R, Townsend S, et al. The Surviving Sepsis Campaign: Results of an international guidelinebased performance improvement program targeting severe sepsis. *Crit Care Med.* 2010; 38 (2):1-8.
 8. Nee P. Critical Care in the Emergency Department: Severe Sepsis and Septic Shock. *J Emerg Med.* 2006; 23: 713-717.
 9. Nguyen B, Oh J, Otero R, et al. Standardization of Severe Sepsis Management: A Survey of Methodologies in Academic and Community Settings. *J Emerg Med.* 2010; 38(2):122–132.
 10. Otero R, Nguyen B, Huang D, et al. Early Goal Directed Therapy in Severe Sepsis and Septic Shock Revisited: Concepts, Controversies and Contemporary Findings. *Chest.* 2006; 130:1579-1595.
 11. Rivers E. Point: Adherence to Early Goal Directed Therapy: Does it Really Matter? Yes. After a Decade, the Scientific Proof Speaks for Itself. *Chest.* 2010; 138:476-480
 12. Rivers E. & Ahrens T. Improving Outcomes for Severe Sepsis and Septic Shock: Tools for Early Identification of At-Risk Patients and Treatment Protocol Implementation. *Crit Care Clin.* 2008; 23:S1–S47.
 13. Shapiro N, Howell M, Talmor D, et al. Lactate as a Predictor of Mortality in Emergency Department Patients With Infection. *Anls Emerg Med.* 2005; 45(5): 524-528.
 14. Sweet D, Jaswal D, Fu W, et al. Effect of an emergency department sepsis protocol on the care of septic patients admitted to the intensive care unit. *CJEM.* 2010; 12(5): 414-420.
-