

## K02: Sepsis

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### Introduction

Sepsis is a syndrome of life-threatening organ dysfunction resulting from a dysregulated host response to an infection. In Canada, 1 in 18 deaths are directly related to or complicated by sepsis, with the condition having prolonged psychosocial effects on survivors. Sepsis disproportionately affects the very young (below 1 year of age) and older adults (above 50). Paramedics and EMRs/FRs must recognize the potential for sepsis and be prepared to provide care to protect a patient's airway, ensure adequate oxygenation and ventilation, and maintain end-organ perfusion.

### Essentials

- The National Early Warning Score-2 (NEWS2) is a screening tool designed to identify patients at high risk for deterioration from all causes, including sepsis. Paramedics and EMRs should routinely obtain a NEWS2 score on all patients and use these findings to help guide management, including conveyance methods, pre-arrival notification, and in-hospital advocacy.
- Use appropriate personal protective equipment. For patients with suspected respiratory infections, paramedics and EMRs/FRs should use airborne droplet precautions.
- Patients with chronic fluid-retention (e.g., congestive heart failure or chronic renal failure) may also be fluid depleted and require fluid resuscitation. Assess for signs of volume overload continually throughout patient contact and stop infusion if edema becomes apparent.

### Additional Treatment Information

- Sepsis can cause increased capillary permeability. All patients receiving fluid must be continually monitored for signs of volume overload, such as the development of pulmonary edema.
- Administration of vasopressors through peripheral IV lines carries a risk of significant extravasation injury. If vasopressors are used, they must be given through a 20G or larger IV catheter placed above the wrist. Paramedics must continually monitor for signs of extravasation; if swelling or pain around the IV site are present, the receiving facility must be notified immediately.
- Capillary blood glucose levels should be assessed in all patients with suspected sepsis. A measurement  $> 7.7$  mmol/L, in the absence of diabetes, is suggestive of an underlying hypermetabolic state, which may be a sign of sepsis.
- Notify receiving facilities early for immunocompromised patients who are suspected of having sepsis. These patients often require isolation on arrival.

### General Information

- NEWS2 relies on several physiological parameters already measured by paramedics and EMRs in their practice:
  - Respiratory rate
  - Oxygen saturation scale 1 (for patients without COPD)
  - Oxygen saturation scale 2 (for patients with COPD)
  - Systolic blood pressure
  - Pulse rate
  - Level of consciousness or new-onset confusion
  - Temperature
- Primary risk factors for sepsis include:
  - Age  $> 65$
  - Immunosuppression
  - Diabetes

- Obesity
- Current diagnosis of cancer
- Hospitalization within the preceding 90 days
- In isolation, malodorous urine is not associated with a urinary tract infection.
- Elderly individuals with sepsis frequently do not present with a fever. Patients should be asked about antipyretic medications as these may mask a fever. In all patients, the absence of fever does not exclude sepsis. Hypothermia, where it is present, is an ominous sign in sepsis.
- Paramedics and EMRs should consider the possibility of meningococcal septicemia and invasive group A streptococcus (necrotizing fasciitis).

#### National Early Warning Score-2

BC Emergency Health Services advocates the use of the National Early Warning Score (NEWS2) to identify patients at risk of sudden deterioration. NEWS2 scores should be obtained on all patients, and used to guide clinical decision-making, particularly in the areas of conveyance, clinical pathway selection, pre-arrival notification, ongoing monitoring, and emergency department advocacy. Note: SpO<sub>2</sub> Scale 1 is for patients not diagnosed with COPD; SpO<sub>2</sub> Scale 2 is for patients diagnosed with COPD.

Chart 1: The NEWS scoring system

Physiological parameter	3	2	1	Score 0	1	2	3
Respiration rate (per minute)	≤8		9–11	12–20		21–24	≥25
SpO <sub>2</sub> Scale 1 (%)	≤91	92–93	94–95	≥96			
SpO <sub>2</sub> 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	

Score	Clinical Risk	Practitioner Response
Aggregate score 0 - 4	Low	<ul style="list-style-type: none"> <li>• Routine monitoring</li> <li>• Routine transport or referral pathway as required</li> </ul>
Score of 3 in any individual parameter	Low - Medium	<ul style="list-style-type: none"> <li>• Monitor carefully</li> <li>• Routine transport as required</li> </ul>
Aggregate score 5 - 6	Medium	<ul style="list-style-type: none"> <li>• Monitor carefully</li> <li>• Attempt to optimize oxygenation, ventilation, and perfusion</li> <li>• Consider advanced care intercept where available</li> <li>• Consider emergency transport to hospital</li> <li>• Consider pre-arrival notification</li> <li>• Consider CliniCall consultation</li> </ul>
Aggregate score ≥7	High	<ul style="list-style-type: none"> <li>• Monitor continuously</li> <li>• Maximize oxygenation, ventilation, and perfusion</li> <li>• Seek advanced care intercept, but do not delay transport in doing so</li> <li>• Emergent transport to hospital</li> <li>• Pre-arrival notification</li> </ul>

NEWS2 is not intended to replace sound clinical judgment. Its purpose is to alert practitioners to the risk of sudden deterioration and to help identify those patients who require more aggressive monitoring, treatment, and advocacy. NEWS2 is particularly valuable in the context of infectious diseases and suspected sepsis.

## Interventions

### First Responder

- Position supine to improve blood pressure if not in respiratory distress
- Do not walk the patient
- Supplemental oxygen as required
  - → [A07: Oxygen Administration](#)

### Emergency Medical Responder – All FR interventions, plus:

- Obtain and document [NEWS2 score](#)
- Provide supplemental oxygen to maintain  $\text{SpO}_2 \geq 94\%$ 
  - → [A07: Oxygen Administration](#)
- Perform full-body assessment to examine for presence of mottling or non-blanching rash; consider meningococcal septicemia

### Primary Care Paramedic – All FR and EMR interventions, plus:

- Obtain vascular access and correct hypotension or hypoperfusion
  - → [D03: Vascular Access](#)
- Consider [CPAP](#) if necessary to support oxygenation in cases of respiratory infection

### Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Concurrent use of vasopressors and fluid resuscitation is patient specific
  - [OnCall consultation recommended](#) to discuss care planning options.
- [KetAMINE](#) is the preferred induction agent if advanced airway management is required to maintain airway patency, oxygenation, or ventilation
  - → [PR18: Anesthesia Induction](#)

### Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Hemodynamic support (maintain MAP > 65)
- Consider [radial arterial line](#) placement
- Consider [femoral arterial line](#) placement
  - Consider [norepinephrine](#)
  - Consider [Vasopressin](#)
  - Consider [Phenylephrine](#)
  - Consider [Epinephrine](#)
  - Consider [Dobutamine](#) ( $\text{ScVO}_2 \geq 65$ )
- Ultrasound and IVCDI to determine fluid responsiveness
  - Passive leg raise test
  - Use a balanced crystalloid rather than saline
  - goal of urine output of 50 ml/hr or 0.5ml/kg/hr
- Consider blood products (pRBC)
  - [Call ETP prior to blood products](#)
  - Hgb > 70
- Consider adrenal insufficiency
- Respiratory support
  - Consider NIPPV
  - Consider IPPV
    - Consider a [recruitment maneuver](#)
    - Consider [prone ventilation](#)

- ARDSnet protocol
  - Consider ABG/VBG analysis to guide therapy.
- Consider appropriate antimicrobial coverage
  - **Call ETP prior to antimicrobial coverage**
  - Gram positive
  - Gram negative
  - Atypical coverage
  - Antiviral
  - Antifungal

## Evidence Based Practice

### Septic Shock

#### Supportive

- [Liberal fluid management](#)
- [Pressors](#)
- [Titrated fluid management](#)
- [Balanced crystalloids](#)

#### Neutral

- [Colloid Infusion](#)
- [Trendelenburg](#)
- [Crystalloid Infusion](#)

#### Against

### Sepsis Syndrome

#### Supportive

- [Identification tools \(other\)](#)
- [Identification tools- qSOFA](#)
- [Identification tools-SIRS](#)
- [Oxygen-titrated](#)
- [Point of Care Lactate](#)
- [Prenotification](#)
- [Temperature Monitoring](#)

#### Neutral

- [Early Goal Directed Therapy](#)
- [Prehospital Antibiotics](#)

#### Against

- [Oxygen-high flow](#)

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