



Fundamental Critical Care Support Skill Station
Integrated Sepsis A Scenario
Participant Guide

Estimated completion time: 40-60 minutes

This skill station represents the practical application of the concepts presented in the textbook chapter, Life-Threatening Infections: Diagnosis and Antimicrobial Therapy Selection chapter. The case scenario is presented to create a framework for using the ***DIRECT*** mnemonic (**D**etection, **I**ntervention, **R**eassessment, **E**ffective **C**ommunication, and **T**eamwork) for the early identification and management of the patient with sepsis. The case presented here is intended to represent common problems encountered when caring for critically ill patients.

Station Goal

The goal of this station is to:

- Gain the knowledge necessary to recognize and stabilize the patient presenting with sepsis.

Participant Objectives

After completing this skill station, the student should be able to:

- Recognize early sepsis.
- Describe the steps needed to manage an acutely ill patient.
- Describe the steps needed to stabilize the septic patient.
- Order laboratory studies and interpret the results in septic patients.
- Manage a septic patient with organ dysfunction.
- Provide initial mechanical ventilation support for a septic patient.
- Manage hemodynamic instability in a septic patient.
- Manage basic ventilator support in a septic patient.
- Identify appropriate fluid management for a septic patient.

Case Scenario	Critical Elements Checklist
<p>A 74-year-old woman on the general surgical floor is noted to be confused and tachypneic on postoperative day 4 following cholecystectomy. The patient is 5'2", 170 lb.</p>	
<p>Assessment and findings: primary survey</p> <ul style="list-style-type: none"> ● Confused elderly woman moaning, with no specific complaints ● Dry mucous membranes; right lung rales and rhonchi ● Abdomen soft; bowel sounds sluggish ● Wound clean <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Vital signs</p> <ul style="list-style-type: none"> ● Blood pressure (BP) 100/40 mm Hg ● Mean arterial pressure (MAP) 60 mm Hg ● Heart rate (HR) 120 beats/min ● Respiratory rate (RR) 33 breaths/min ● Temperature 39.4°C (102.9°F) ● O₂ saturation 88% on room air </div>	<p>Detection</p>
<p>Q. What needs to be done?</p>	<p>Intervention</p>

Assessment and findings: 30 min later

Patient is more confused and still on the general surgical floor.

Vital signs	Lab studies	ABG
<ul style="list-style-type: none"> ● BP 100/50 mm Hg ● MAP 60 mm Hg ● HR 120 beats/min ● RR 33 breaths/min ● Temperature 39.4°C (102.9°F) ● O₂ saturations 90% on 4 L via nasal cannula 	<ul style="list-style-type: none"> ● Na 149 mmol/L ● K 4 mmol/L ● Cl 96 mmol/L ● HCO₃ 18 mmol/L ● Blood urea nitrogen 40 mg/dL ● Creatinine 2 mg/dL (baseline 0.5) ● White blood cell count 16,000 x 10⁹/L with 8% bands ● Hemoglobin 13 g/dL ● Hematocrit 41% ● Bilirubin 2.5 mg/dL (baseline 1) ● Platelets 135 x 10⁹/L (baseline 220) 	<ul style="list-style-type: none"> ● pH 7.30 ● PCO₂ 33 mm Hg ● HCO₃ 19 mmol/L ● PO₂ 60 mm Hg ● O₂ saturation 88% on room air ● Lactate 4.2 mg/dL

Chest radiograph:



Q. What is your diagnosis?

Reassessment

<p>Q. How do you define sepsis and septic shock?</p>	<p>Detection and Reassessment</p>

<p>The patient is still confused.</p> <div data-bbox="94 641 598 901" style="border: 1px solid black; padding: 5px;"> <p>Vital signs</p> <ul style="list-style-type: none"> ● BP 90/50 mm Hg ● MAP 58 mm Hg ● HR 120 beats/min ● RR 33 breaths/min ● O₂ saturation 90% on 4 L via nasal cannula ● Temperature 39.4°C (102.9°F) </div>	
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<p>Q. What needs to be done next in the management of this patient?</p>	<p>Intervention, Reassessment, Effective Communication, and Teamwork</p>

<p>Assessment and findings: 2 h later Patient received 1500 mL crystalloid, IV antibiotics. Patient is still confused and becoming lethargic with labored breathing. She states that she “feels like she is dying.”</p> <div data-bbox="100 781 688 1130" style="border: 1px solid black; padding: 5px;"> <p>Vital signs and lab values</p> <ul style="list-style-type: none"> ● BP 85/40 mm Hg ● MAP 55 mm Hg ● HR 123 beats/min, sinus tachycardia ● RR 45 breaths/min ● O₂ saturation 91% on 6 L nasal cannula ● Temperature 39.9°C (103.8°F) [peripheral] ● Central venous O₂ saturation (ScvO₂) 46% ● CVP 2 mm Hg ● ECG: sinus tachycardia ● Lactate: 4.2 mg/dL </div>	<p>Reassessment</p>
<p>Q. What is your diagnosis?</p>	

<p>Q. What is your management for the respiratory failure?</p>	<p>Intervention, Effective Communication, and Teamwork</p>
<p>Q. What are the essential intubation equipment and medications?</p>	
<p>Q. What are the initial settings for the mechanical ventilation? What follow-up steps are needed?</p>	
<p>The patient is placed on AC ventilation, VT 500 mL, PEEP 5 cm H₂O, FI_O₂ 1.0, RR 14 breaths/min</p> <p><u>Assessment and findings: 10 min later</u></p> <div style="border: 1px solid black; padding: 5px;"> <p>Vital signs</p> <ul style="list-style-type: none"> ● RR 21 breaths/min ● BP 80/40 mm Hg ● MAP 54 mm Hg ● HR 123 beats/min, sinus tachycardia ● O₂ saturation 98% ● CVP 2 mm Hg ● ScvO₂ 53% </div>	<p>Reassessment</p>

<p>Q. What needs to be done at this time?</p>	<p>Intervention</p>
<p>A cardiac output monitoring device is placed.</p> <div data-bbox="94 349 703 665" style="border: 1px solid black; padding: 5px;"> <p>Vital signs</p> <ul style="list-style-type: none"> ● BP 78/42 mm Hg ● MAP 52 mm Hg ● CVP 4 mm Hg ● HR 120 beats/min ● RR 16 breaths/min ● Temperature 39.9°C (103.8°F) ● ScvO₂ 57% ● O₂ saturation on pulse oximetry 98% (SpO₂) ● Cardiac index (CI) 1.7 mL/min/m² </div>	
<p>Q. Is the patient in shock? What should be done next for hemodynamic support?</p>	<p>Reassessment</p>

<p>Q. What if the patient continues to be hypotensive?</p>	
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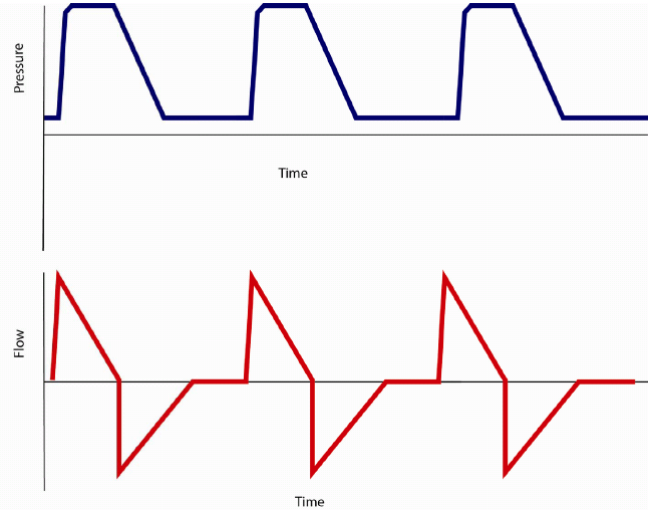
<p>Q. What vasopressor?</p>	
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Patient continues to receive fluid and norepinephrine, 5 µg/min, initiated.

<p>Vital signs</p> <ul style="list-style-type: none"> • BP 82/48 mm Hg • MAP 58 mm Hg • CVP 4 mm Hg • HR 107 beats/min • RR 18 breaths/min • Temperature 39.9°C (103.8°F) • ScvO₂ 59% • SpO₂ 98% • CI 1.9 mL/min/m² 	<p>ABG</p> <ul style="list-style-type: none"> • pH 7.37 • Pco₂ 40 mm Hg • HCO₃ 18 mmol/L • PO₂ 150 mm Hg • O₂ saturation 96% • Lactate 3.9 mg/dL
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<p>Q. What is your next step?</p>	<p>Intervention</p>
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Q. Are the flow and pressure waves satisfactory?



Q. What is the next step for hemodynamic management?

Reassessment

Assessment and findings: 30 min later

The patient is receiving norepinephrine 30 µg/min, and vasopressin at 0.04 U/h.

Vital signs

- BP 82/48 mm Hg
- MAP 58 mm Hg
- HR 107 beats/min
- RR 18 breaths/min
- SpO₂ 99%
- Temperature 39.5°C (103.1°F)
- CVP 4 mm Hg
- CI 2 mL/min/m²
- ScvO₂ 59%

Q. What is your next step?

Intervention

<p>Assessment and findings: 2 h later</p> <p>The patient is receiving mechanical ventilation with VT 500 mL, RR 14 breaths/min, FIO₂ 50%, PEEP 5 cm H₂O. She is still receiving norepinephrine 7 µg/min.</p> <table border="1" data-bbox="96 224 884 448"> <tr> <td data-bbox="96 224 401 448"> <p>Readings</p> <ul style="list-style-type: none"> • CVP 6 mm Hg • CI 2.4 mL/min/m² • ScvO₂ 63% </td> <td data-bbox="401 224 884 448"> <p>Vital signs</p> <ul style="list-style-type: none"> • BP 95/58 mm Hg • MAP 67 mm Hg • HR 101 beats/min • RR 16 breaths/min • SpO₂ 99% • Temperature 38.5°C (101.3°F) </td> </tr> </table>	<p>Readings</p> <ul style="list-style-type: none"> • CVP 6 mm Hg • CI 2.4 mL/min/m² • ScvO₂ 63% 	<p>Vital signs</p> <ul style="list-style-type: none"> • BP 95/58 mm Hg • MAP 67 mm Hg • HR 101 beats/min • RR 16 breaths/min • SpO₂ 99% • Temperature 38.5°C (101.3°F) 	<p>Reassessment</p>
<p>Readings</p> <ul style="list-style-type: none"> • CVP 6 mm Hg • CI 2.4 mL/min/m² • ScvO₂ 63% 	<p>Vital signs</p> <ul style="list-style-type: none"> • BP 95/58 mm Hg • MAP 67 mm Hg • HR 101 beats/min • RR 16 breaths/min • SpO₂ 99% • Temperature 38.5°C (101.3°F) 		
<p>Q. What is the hemodynamic management?</p>			

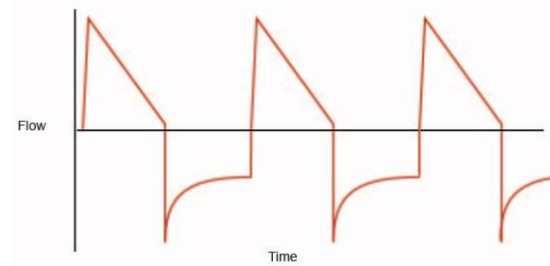
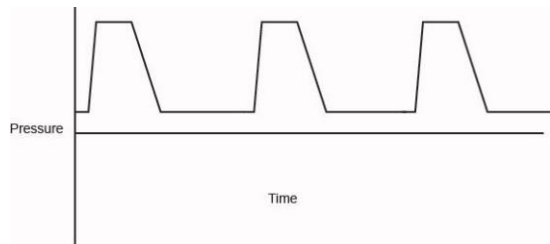
<p>Assessment and findings: 5 h later</p> <p>The patient is receiving mechanical ventilation with VT 500 mL, RR 14 breaths/min, FIO₂ 50%, PEEP 5 cm H₂O. Norepinephrine is administered at 2 µg/min.</p> <table border="1" data-bbox="96 837 884 1062"> <tr> <td data-bbox="96 837 401 1062"> <p>PAC readings</p> <ul style="list-style-type: none"> • CVP 7 mm Hg • CI 2 mL/min/m² • ScvO₂ 63% </td> <td data-bbox="401 837 884 1062"> <p>Vital signs</p> <ul style="list-style-type: none"> • BP 95/58 mm Hg • MAP 67 mm Hg • HR 110 beats/min • RR 24 breaths/min • SpO₂ 99% • Temperature 38.5°C (101.3°F) </td> </tr> </table> <p>You are asked to manage the high pressure alarms on the ventilator.</p>	<p>PAC readings</p> <ul style="list-style-type: none"> • CVP 7 mm Hg • CI 2 mL/min/m² • ScvO₂ 63% 	<p>Vital signs</p> <ul style="list-style-type: none"> • BP 95/58 mm Hg • MAP 67 mm Hg • HR 110 beats/min • RR 24 breaths/min • SpO₂ 99% • Temperature 38.5°C (101.3°F) 	<p>Reassessment</p>
<p>PAC readings</p> <ul style="list-style-type: none"> • CVP 7 mm Hg • CI 2 mL/min/m² • ScvO₂ 63% 	<p>Vital signs</p> <ul style="list-style-type: none"> • BP 95/58 mm Hg • MAP 67 mm Hg • HR 110 beats/min • RR 24 breaths/min • SpO₂ 99% • Temperature 38.5°C (101.3°F) 		
<p>Q. What do you look for?</p>			
<p>Q. How do you measure plateau pressure?</p>			
<p>Peak pressure is 48 cm H₂O, and plateau pressure is 25 cm H₂O.</p> <p>Q. What should you do with the airway pressures?</p>	<p>Intervention</p>		

You are called because the patient is uncomfortable, laboring in inspiratory effort.

Vital signs

- BP 90/55 mm Hg
- MAP 66 mm Hg
- HR 110 beats/min
- RR 32 breaths/min
- SpO₂ 99%
- Temperature 37.6°C (99.6°F)

The following are the ventilator graphics.



Q. What is your diagnosis? And how do you measure?

The auto-PEEP is 15 cm H₂O.

What needs to be done? Discuss the mechanisms and treatment of auto-PEEP.

Reassessment

<p><u>Assessment and findings: 30 min later</u></p> <p>The patient is on AC ventilation, VT 300 mL, RR 14 breaths/min, PEEP 5 cm H₂O, FIO₂ 0.5%.</p> <div data-bbox="96 224 653 444" style="border: 1px solid black; padding: 5px;"> <p>ABG</p> <ul style="list-style-type: none"> ● pH 7.27 ● PCO₂ 65 mm Hg ● HCO₃ 20 mmol/L ● PO₂ 100 mm Hg ● O₂ saturation 96% </div> <p>Q. What to do next?</p>	Reassessment
<p><u>Assessment and findings: few hours later</u></p> <div data-bbox="96 732 667 954" style="border: 1px solid black; padding: 5px;"> <p>ABG</p> <ul style="list-style-type: none"> ● pH 7.35 ● PCO₂ 46 mm Hg ● HCO₃ 20 mmol/L ● PO₂ 65 mm Hg ● O₂ saturation 91% </div> <p>Peak pressure is 39 cm H₂O.</p> <p>Q. What do you do next?</p>	
<p>Plateau pressure is 37 cm H₂O.</p> <p>Q. What is your next step?</p>	Intervention

A chest radiograph is obtained (below).

Q. What is your diagnosis?



Reassessment

The patient stabilized, sedated, and receiving mechanical ventilation: AC, VT 300 mL, RR 12 breaths/min, PEEP 5 cm H₂O, FIO₂ 70%. Norepinephrine is discontinued. IV fluid rate is 150 mL/h.

Vital signs

- BP 110/60 mm Hg
- MAP 72 mm Hg
- HR 98 beats/min
- RR 14 breaths/min
- SpO₂ 99%
- ScvO₂ 77%
- Temperature 37.2°C (98.9°F)

Q. Should anything be changed in management at the present time?

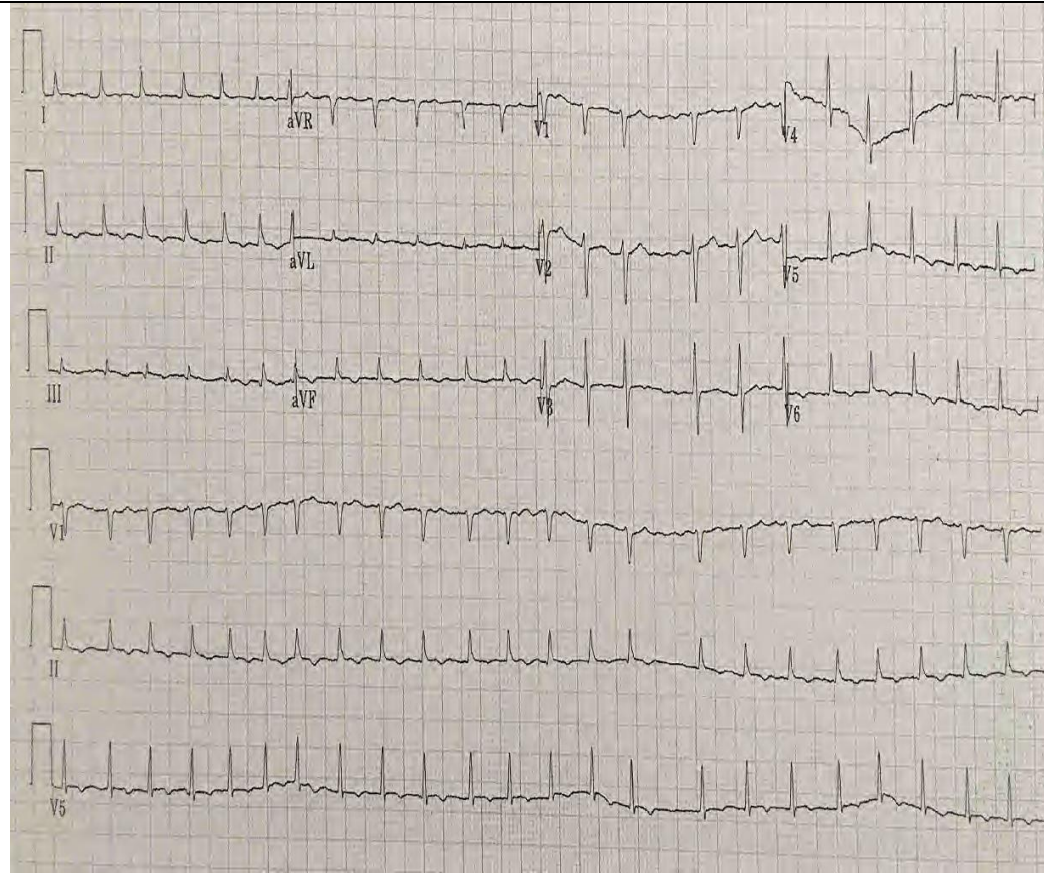
At 3 AM, you are called because the patient develops tachycardia and the rhythm shown below.

Vital signs

- BP 70/35 mm Hg
- MAP 45 mm Hg
- HR 180 beats/min
- SpO₂ 95%
- Temperature 38.5°C (101.3°F)

Q. What is the diagnosis? What should be done now?

Reassessment



Q. Does the patient have a history of atrial fibrillation?

If the patient was stable with a history of atrial fibrillation, what should be done differently?

<p>The patient is stable after cardioversion, and amiodarone is initiated on continuous drip. Mechanical ventilation continues.</p> <div data-bbox="96 191 621 412" style="border: 1px solid black; padding: 5px;"> <p>Vital signs</p> <ul style="list-style-type: none"> ● BP 120/80 mm Hg ● MAP 70 mm Hg ● RR 14 breaths/min ● HR 89 beats/min ● SpO₂ 100% ● Temperature 37.2°C (98.9°F) </div>	
<p>The ICU nurse detects these vital signs:</p> <div data-bbox="96 574 621 829" style="border: 1px solid black; padding: 5px;"> <p>Vital signs</p> <ul style="list-style-type: none"> ● BP 50/30 mm Hg ● MAP 40 mm Hg ● RR 18 breaths/min ● HR 20 beats/min (2nd degree type 2) ● SpO₂ 82% ● Temperature 37.2°C (98.9°F) </div> <p>The patient is sedated with midazolam and fentanyl, and mechanical ventilation continues. A high-pressure alarm sounds with peak pressure of 50 cm H₂O and plateau pressure of 29 cm H₂O.</p> <p>Q. What is your next step in management?</p>	<div style="background-color: #0056b3; color: white; padding: 2px;">Intervention</div>
<p>Q. The hypoxemia is corrected, and the patient still has hypotension and bradycardia. What is the next step?</p>	
<p>Q. If there is no sensing or capture, what should be done?</p>	