Recognizing and Managing Adult Sepsis

Contact Hours: 1.0

First published: 10/28/ 2014
Revised: 10/5/2017
Course expires: 10/31/2020

Conflict of Interest

RN.com strives to present content in a fair and unbiased manner at all times, and has a full and fair disclosure policy that requires course faculty to declare any real or apparent commercial affiliation related to the content of this presentation. Note: Conflict of Interest is defined by ANCC as a situation in which an individual has an opportunity to affect educational content about products or services of a commercial interest with which he/she has a financial relationship.

The author of this course does not have any conflict of interest to declare.

The planners of the educational activity have no conflicts of interest to disclose.

There is no commercial support being used for this course.

Acknowledgements

RN.com acknowledges the valuable contributions of….
…. Suzan R. Miller-Hoover DNP, RN, CCNS, CCRN-K

Purpose and Objectives

The purpose of this course is to inform the healthcare provider of the updated guidelines regarding early identification, diagnosis, and goal directed therapy through evidenced based research from the international Surviving Sepsis Campaign. This Campaign is an international initiative to improve patient outcomes.

After successful completion of this course, you will be able to:

1. Define infection, bacteremia, sepsis, and septic shock
2. Discuss the best practice statements found in the 2016 sepsis guidelines
3. Delineate differences between the 2012 and 2016 guidelines
4. Describe the 2016 sepsis bundles
5. Delineate treatment modalities for patients with sepsis and septic shock
6. Differentiate compensated and uncompensated shock as it applies to distributive shock

Introduction

Sepsis is a serious, often fatal syndrome stemming from an existing infectious process resulting in multiorgan dysfunction (Novosad, Sapiano, Grigg, Lake, Robyn, Dumyati…Epstein, 2016).

To understand the reasoning behind the treatment strategies delineated by the Surviving Sepsis Campaign, 2016 guidelines, one must understand the pathophysiology of sepsis and septic shock. A review of shock categories, decompensated, and compensated shock will initiate this module.

This course reviews the identification and management of sepsis utilizing the most current international guidelines for the management of sepsis and septic shock published in 2016.

Statistics

An evaluation by the Centers for Disease Control (CDC) found:

- More than 1.5 million people get sepsis annually in the United States
- About 250,000 Americans die from sepsis each year
- One in three patients who die in a hospital have sepsis
- Seven out of ten patients with sepsis had been hospitalized or had chronic diseases that required frequent medical care
- Sepsis costs 23.7 billion dollars annually
- The most common pathogens are:
    - Escherichia coli adults aged ≥18 years
    - Klebsiella spp. in children aged ≥1 year
    - Enterococcus spp. in infants aged <1 year
    - 33% patients had no pathogen isolated
- 25% of patients with sepsis or septic shock die
- The most common risk factors are:
    - Lung infection such as pneumonia (35%)
    - Kidney or urinary tract infection (25%)
    - Gut, stomach, or intestine infection (11%)
    - Skin infection (11%)

(Novosad, et al., 2016 &Centers for Disease Control (CDC), 2017)

Definitions

Infection: An inflammatory response to the presence of microorganisms or the invasion of normally sterile host tissue by these organisms
Bacteremia: The presence of viable bacteria in the blood
(Neviere, 2014)

The Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock, 2016 developed new definitions for sepsis and septic shock with clinical criteria to operationalize the new definitions.

Sepsis: Life-threatening organ dysfunction caused by a dysregulated host response to infection
Septic shock: A subset of sepsis with circulatory and cellular/metabolic dysfunction associated with a higher risk of mortality
(Rhodes, Evans, Alhazzani, Levy, Antonelli, Ferrer…Dellinger, 2017)

Shock

Pathophysiology

Shock is a state of organ hypoperfusion resulting in cellular dysfunction and death. The following is a brief general overview of shock.

Causal factors may include:

- Decreased circulating volume
- Decreased cardiac output
- Vasodilation, with or without shunting of blood to bypass capillary exchange beds

Symptoms:

- Altered mental status
- Tachycardia
- Hypotension
- Oliguria

Diagnosis:

- Clinical assessment
- Hypotension
- Increased blood lactate
- Acidosis

Treatment:

- Fluid resuscitation
- Correction of underlying disorder
- Possible vasopressor use

When tissue perfusion declines, oxygen delivery at the cellular level is inadequate to support cellular metabolism. Aerobic metabolism becomes anaerobic resulting in increased carbon dioxide levels and the accumulation of lactic acid. Unchecked, cellular function declines and irreversible cell damage or death occurs.

During shock, inflammatory and clotting cascades may be triggered in the areas of hypoperfusion resulting in the production of cytokines and nitric oxide (potent vasodilator).
(de Moya, 2013)

Shock Categories
The etiology of the shock often determines the classification.

- Hypovolemic: A critical decrease in intravascular volume
    - Decreased preload
    - Decreased ventricular filling
    - Decreased stroke volume
    - Decreased cardiac output unless the heart rate increases
- Cardiogenic: Reduction in cardiac output due to a primary cardiac lesion
- Obstructive: Mechanical failures which interfere with the filling or emptying or the ventricles or great vessels
- Distributive: Inadequacy of intravascular volume caused by arterial or venous vasodilation; while, the circulating blood volume remains normal

The body attempts to compensate for the discrepancy in volume by increasing heart rate to maintain cardiac output and blood pressure.

- Compensated: Also known as warm shock. Peripheral perfusion may be decreased but the blood pressure remains within the normal range
- Decompensated: Also known as cold shock. Peripheral perfusion is decreased, pulses are weak, and the blood pressure is not within the normal range
  (de Moya, 2013)

Distributive Shock (Septic Shock)
In this module, distributive shock is the most important classification to understand. In distributive shock, the inflammatory cascade may be more pronounced than in any other shock due to the actions of the bacterial toxins, especially endotoxins.

There is too little blood to fill the intravascular space due to the potent vasodilator action of the nitric oxide produced during the hypoperfusion state and the effects of endotoxins.
(de Moya, 2013)

Surviving Sepsis Campaign

In 2002 the Surviving Sepsis Campaign was begun with the original goal:

> To reduce mortality from sepsis by 25% in 5 years (that translates to 2009 from the date of publication of the first set of guidelines) via a 7-point agenda including:
>
> - Building awareness of sepsis
> - Improving diagnosis
> - Increasing the use of appropriate treatment
> - Educating healthcare professionals
> - Improving post-ICU care
> - Developing guidelines of care
> - Implementing a performance improvement program

Over the past 15 years, the guidelines have been revised three times. The first set of guidelines was published in 2004, revised in 2008 and 2012, with the most current version published in 2017. The current guidelines, based on research evidence review, have removed specific diagnostic recommendations. Included in the new guidelines are 93 statements on early management and resuscitation of sepsis and septic shock. Of these 93 statements:

- 18 are Best Practice Statements
- 32 are Strong Recommendations
  39 are Weak Recommendations

(Rhodes et al, 2017)

To read the Surviving Sepsis Campaign: International Guidelines for Management of Severe Sepsis and Septic Shock: 2016 in its entirety with rationales, go to: http://www.survivingsepsis.org/Guidelines/Pages/default.aspx

Changes in the Guidelines

	2012	2016
Definitions	Sepsis: A systemic manifestation of infection (i.e. Systemic Inflammatory Response Syndrome [SIRS] criteria) + suspected infection Severe sepsis was defined as sepsis + end organ damage Septic shock was defined as severe sepsis + hypotension not reversed with fluid resuscitation	Sepsis: life-threatening organ dysfunction caused by a dysregulated host response to infection." End organ damage is identified as an acute change in total Sequential [Sepsis-related] Organ Failure Assessment score (SOFA) ≥2. Septic shock: A subset of sepsis "in which circulatory, cellular, and metabolic abnormalities are associated with a greater risk of mortality than with sepsis alone. These patients can be clinically identified by a vasopressor requirement to maintain a MAP ≥ 65mmHg and serum lactate >2mmol/L in the absence of hypovolemia" "Severe sepsis" category was deemed to be superfluous and is no longer recommended for clinical use
Systemic inflammatory response syndrome (SIRS) Criteria	An intense host response characterized by generalized inflammation in organs remote from initial insult. SIRS causes massive inflammatory dysfunction involving activation of leukocytes and endothelial cells and the release of inflammatory mediators and toxic oxygen free radicals of	**No longer considered** in defining sepsis and septic shock Instead, adult patients outside of the ICU with suspected infection are identified as being at heightened risk of mortality if they have quickSOFA (qSOFA) score meeting ≥2 of the following criteria: respiratory

	intracellular and extracellular origin	rate of 22/min or greater, altered mentation, or systolic blood pressure of 100mmHg or less
Fluid Status Measurements CVP, SVO_2	Guiding principles	**No longer recommended** as lone guiding principles as they carry limited value for measuring fluid responsiveness Recommend the use of dynamic variables over static variables to predict fluid responsiveness (i.e. passive leg raise, pulse pressure variation, stroke volume variation)

Adapted from B. Wang, 2017, Surviving Sepsis 2017 Guidelines Overview

2016 Guidelines Overview
Best Practice Statements

1. Sepsis and septic shock are medical emergencies; treatment and resuscitation should begin immediately
2. Hospitals and hospital systems have a performance improvement program for sepsis including sepsis screening for acutely ill, high-risk patients
3. Hemodynamic assessment should be done to determine the type of shock if the clinical examination does not lead to a clear diagnosis
4. A specific anatomic diagnosis of infection requiring emergent source control be identified or excluded as rapidly as possible
5. Prompt removal of intravascular access devices that are a possible source of sepsis or septic shock after other vascular access has been established should be performed
6. Appropriate routine microbiologic cultures (including blood) be obtained before starting antimicrobial therapy in patients with suspected sepsis and septic shock if doing so results in no substantial delay in the start of antimicrobials
7. Empiric antimicrobial therapy be narrowed once pathogen identification and sensitivities are established and/or adequate clinical improvement is noted
8. Sustained systemic antimicrobial prophylaxis should not be done in patients with severe inflammatory states of non-infectious origin (severe pancreatitis, burn injury, etc
9. Dosing strategies of antimicrobials be optimized based on accepted pharmacokinetic/pharmacodynamic principles and specific drug properties in patients with sepsis or septic shock
10. If combination therapy is initially used for septic shock, we recommend de-escalation with discontinuation of combination therapy within the first few days in response to clinical improvement and/or evidence of infection resolution. This applies to both targeted (for culture-positive infections) and empiric (for culture-negative infections) combination therapy
11. Daily assessment for de-escalation of antimicrobial therapy in patients with sepsis and septic shock
12. A fluid challenge technique be applied where fluid administration is continued if hemodynamic factors continue to improve
13. Following initial fluid resuscitation, additional fluids be guided by frequent reassessment of

hemodynamic status
14. Continuous or Intermittent sedation be minimized in mechanically ventilated sepsis patients, targeting specific titration end points
15. Blood glucose values be monitored every 1 to 2 hours until glucose values and insulin infusion rates are stable, then every 4 hours thereafter in patients receiving insulin infusions
16. Glucose levels obtained with point-of-care testing of capillary blood be interpreted with caution, as such measurements may not accurately estimate arterial blood or plasma glucose values
17. Goals of care and prognosis be discussed with patients and families
18. Stress ulcer prophylaxis should not be administered in patients without risk factors for GI bleeding
(Rhodes et al, 2017)

2016 Sepsis and Septic Shock Bundles

"Time of presentation" is defined as the time of triage in the emergency department or, if presenting from another care venue, from the earliest chart annotation consistent with all elements of sepsis or septic shock ascertained through chart review. Of note, the 6-hour bundle has been updated; the 3-hour bundle has not changed.

To be completed within 3 hours:

1. Measure lactate level
2. Obtain blood cultures prior to administration of antibiotics
3. Administer broad spectrum antibiotics
4. Administer 30 ml/kg crystalloid fluid for hypotension or lactate ≥4mmol/L

To be completed within 6 hours:

5. Apply vasopressors (for hypotension that does not respond to initial fluid resuscitation) to maintain a mean arterial pressure (MAP) ≥65 mm Hg
6. In the event of persistent hypotension after initial fluid administration (MAP < 65 mm Hg) or if initial lactate was ≥4 mmol/L, re-assess volume status and tissue perfusion and document findings according to Table 1
7. Re-measure lactate if initial lactate elevated

TABLE 1

Document reassessment of volume status and tissue perfusion with:

- Repeat focused exam (after initial fluid resuscitation) including vital signs, cardiopulmonary, capillary refill, pulse, and skin findings

Or two of the following:

- Measure CVP
- Measure SVO_2
- Bedside cardiovascular ultrasound
- Dynamic assessment of fluid responsiveness with passive leg raise or fluid challenge
(Rhodes et al, 2017)

Treatment

The goals of treatment are to reverse the pathophysiologic responses, control the infection, improvement and preservation of tissue perfusion, and promote metabolic support. This approach includes supporting the cardiovascular system and enhancing tissue perfusion, identifying and

treating the infection, restoring metabolic balance, and initiating nutritional therapy.

The “best practice statements” and “bundles” were identified and discussed above, the remaining 75 recommendations will be discussed in the remainder of this module. The following treatments for sepsis will be reviewed based on the 2016 recommendations:

- Source control
- Infection prevention
- Hemodynamic support and adjunctive therapy
    - Fluid therapy

  -Vasopressors
    - Administration of blood products
- Supportive therapy for sepsis and septic shock
    - Mechanical ventilation in patients with sepsis-induced respiratory distress syndrome
    - Sedation, analgesia, and neuromuscular blockade
    - Glucose control
    - Renal replacement therapy
    - Prophylaxis of deep vein thrombosis
    - Stress ulcer prophylaxis
    - Nutrition
    - Goals of care

Source Control

Priority is to identify or eliminate the source of the infection.

- During the assessment, pay careful attention to areas of redness and inflammation
- Look for abscess during skin assessment
- Drainage at the insertion site of a vascular access for a potential catheter-associated bloodstream infection
- Assess for need to discontinue unnecessary catheters (vascular or urinary)

Antimicrobial Therapy

Antimicrobial therapy should be specific to the infectious organism whenever possible. However, antibiotic administration should not be delayed waiting for culture results. Broad spectrum antibiotics should be administered and should cover most anticipated causative organisms.

- Blood cultures (2 sets of aerobic and anaerobic cultures) should be obtained before antimicrobial therapy is administered whenever possible
- IV antibiotics should be given within 1 hour of identifying sepsis or septic shock
    - This is an ideal goal
    - The authors of the guidelines note that this goal is hard to attain given the dynamics of care within the emergency department and intensive care unit; however, antibiotics should be given as soon as humanly possible

Infection Prevention

The following are recommendations for infection control:

- Hand hygiene
- Universal precautions
- Catheter care (central line or urinary catheters should be removed at the earliest possible opportunity)
- Head of bed elevation (35-45 degrees)
- Comprehensive oral care with subglottic suctioning

- Oral chlorhexidine gluconate mouth care to reduce ventilator-associated pneumonia (VAP)

For more information regarding infection prevention, review the RN.com course: Infection Prevention for Healthcare Professionals and/or New York State Infection Control for Healthcare Professionals.

Fluid Therapy
For hemodynamic support:
- Fluid therapy should be initiated within 3 hours
- Crystalloids are the initial fluid of choice in the resuscitation of sepsis and septic shock
- With sepsis-induced tissue hypoperfusion, hypovolemia, and/or a lactate level of ≥4 mmol/L, administer a minimum of 30 mL/kg of crystalloids
- Albumin may be added in the fluid resuscitation of sepsis and septic shock when patients are not responding to the crystalloid infusion

Test Yourself
A patient admitted to the ICU with possible septic shock has a blood pressure of 70/40. What should the nurse do first?

A. Start Levophed
B. Crystalloids
C. Hydrocortisone
D. Hespan

Rationale: Crystalloids are the initial fluid of choice in the resuscitation of sepsis and septic shock.

Vasopressor Therapy
Whenever possible, an arterial catheter should be placed for patients requiring vasoactive medication support. The initial mean arterial pressure goal with vasopressor therapy should be 65 mmHg (Rhodes et al, 2017).
- Norepinephrine – First line of defense for sepsis mediated hypoperfusion and hypotension
  - Peripheral vasoconstrictor
  - Inotropic stimulator
  - Coronary artery dilator
  - Decreased effect on HR and SV compared to other vasopressors
  - Contraindications: hypotension from blood volume deficits
  - Dose: 0.02-1 mcg/kg/min IV; Start: 0.1-0.5 mcg/kg/min IV, then titrate to effect; patients with septic shock may require higher doses
- Vasopressin - Use of this medication in addition to Norepinephrine may reduce the amount of Norepinephrine needed to maintain mean arterial pressure
  - Antidiuretic hormone
  - Increases systemic vascular resistance and mean arterial pressure
  - Contraindications: hypersensitivity to vasopressin
  - Dose: 0.03 units per minute; Start: 0.01 units per minute IV, then titrate to effect; titrate up by 0.005 units per minute at 10- to 15-minute intervals. Maximum dose: 0.07 units per minute
- Epinephrine – Use of this medication, in addition to Norepinephrine, may help maintain mean arterial pressure
  - Peripheral vasoconstrictor
  - Contraindications: no absolute contraindications
  - Dose: Initial: 0.05 to 2 mcg/kg/minute; titrate to desired mean arterial pressure; adjust

dose every 10 to 15 minutes by 0.05 to 0.2 mcg/kg/minute to achieve desired blood pressure

Vasoconstrictor agents are used to increase afterload by increasing the systemic vascular resistance (SVR) and improving the patient's blood pressure level.

For more information regarding hemodynamic management and medication administration, review the RN.com module: Principles of Invasive Hemodynamics and Medication Safety: Protecting Patients from Avoidable Harm.

Test Yourself

A nursing home patient presents to emergency room with fever, cloudy urine, and chest pain. Vital signs: temperature: 104.7 degrees F, HR: 150, BP 70/40. Which of the following is ***contraindicated***?

A. Give fluids
B. Draw cultures and start antibiotics
C. Place a central line
D. Give nitroglycerin for chest pain

Rationale: Given that the patient is febrile, hypotensive and tachycardic; the chest pain may be from the hypotension. Nitroglycerine is a vasodilator and may further exacerbate the hypotension issue. Additionally, the treatment for sepsis is vasoconstriction to counteract the vasodilation caused by the effects of sepsis.

Corticosteroids

The 2016 guidelines state that corticosteriods should NOT be used to treat septic shock when fluid resuscitation and vasopressor therapy restore hemodynamic stability.

- Hydrocortisone 200mg/day may be used if fluid and vasopressors are ineffective

Administration of Blood Products

An adequate cardiac output and hemoglobin level are crucial to oxygen transport.

- Blood administration should be considered to augment oxygen transport if the patient's hemoglobin level is less than 7.0 g/dL unless there are extenuating circumstances such as:
  - Myocardial ischemia
  - Sever hypovolemia
  - Acute hemorrhage
- Erythropoietin should NOT be used for anemia
- Fresh frozen plasma should NOT be used in the absence of bleeding or planned invasive procedures
- Prophylactic platelet transfusion should be considered:
  - When counts are less than 10,000/mm3 (10 × 109/L) in the absence of apparent bleeding
  - When counts are < 20,000/mm3 (20 × 109/L) if a significant risk of bleeding exist
  - Higher platelet counts (≥ 50,000/mm3 [50 × 109/L]) are advised for active bleeding, surgery, or invasive procedures

Mechanical Ventilation

Supplemental oxygen should be provided to all patients with sepsis and oxygenation should be monitored continuously with pulse oximetry (Schmidt & Mandel, 2014). Adequate pulmonary gas exchange is critical to oxygen transport.

The following are guidelines from the Surviving Sepsis Campaign 2016. Mechanical ventilation in patients with sepsis-induced respiratory distress syndrome should have the following:

- Low tidal volume – 6 mL/kg
- Upper limit goal for plateau pressures: 30 cm H_2O
- High peep
- Prone position
- PaO_2/FIO_2 ration greater than 150
- DO NOT use high frequency oscillatory ventilation
- DO NOT use beta-2 agonists without bronchospasm

For more information regarding mechanical ventilation, review the RN.com module: An Overview of Adult Mechanical Ventilation

Analgesia, and Neuromuscular Blockade in Patients with Sepsis

When using sedation, analgesia, and neuromuscular blockades in septic patients, it is important for hospitals to have protocols for sedation and weaning of sedation.

- Neuromuscular blocking agents are used:
  - Less than or equal to 48 hours
  - For patients with sepsis-induced ARDS and a $PaO_2/FIO_2 < 150$ mm Hg

For more information regarding sedation management, review the RN.com module: Sedation Considerations for Adult Patients

Glucose Control

A protocolized glucose management should be used when treating sepsis patients. Insulin should be used when two consecutive blood glucose levels are greater than 180 mg/dL.

- Evidence suggests that the target blood glucose level should be 180 mg/dL
- Point of care glucose testing may not be accurate in sepsis patients due to decreased peripheral perfusion, use of arterial blood is preferred if an arterial line is present

Renal Replacement Therapy

To facilitate the management of fluid balance in hemodynamically unstable septic patients, with acute kidney injury, use of continuous renal replacement therapy (CRRT) or intermittent hemodialysis should be considered.

Renal replacement therapy should not be used in the absences of definitive indications for dialysis

Bicarbonate Therapy

There is no evidence to support the use of sodium bicarbonate therapy in the treatment of hypoperfusion-induced lactic acidemia associated with sepsis.

Prophylaxis of Deep Vein Thrombosis

Patients with sepsis should receive prophylaxis for deep vein thrombosis.

- Low-molecular weight heparin (WMWH)
- Mechanical prophylaxis
- Dual therapy (LMWH and mechanical)

For more information regarding deep vein thrombosis prevention, review the RN.com module: DVT: A Life-Threatening Condition

Stress Ulcer Prophylaxis
Stress ulcer prophylaxis should not be used in patients without risk factors for GI bleeding. When indicated, histamine-2 receptor antagonists (H2RA) or a proton pump inhibitor (PPI) should be administered.

Nutrition
- Parental nutrition should not be administered if the patient can tolerate enteral feedings
- Enteral feedings should be initiated and increased over the first seven days
- IV glucose should be initiated along with enteral feedings if full enteral feedings are not tolerated
- Trophic enteral feedings should be started instead of a complete fast or IV glucose only
- Omega-3 fatty acids should not be used as immune support
- Gastric residual volumes should not be monitored unless the patient has a feeding intolerance or at high risk for aspiration
- Post-pyloric feeding tubes should be used with feeding intolerances and aspiration risk
- Selenium, arginine, and glutamine should not be sued to treat sepsis

Goals of Care
Families and patients should be updated with goals of care and the prognosis should be discussed within the first 72 hours of admission or diagnosis of sepsis.

Test Yourself
Goals of care are not important in the septic shock patient because sepsis is very common in the ICU setting and most families are aware of the risks.

A. True
B. False

Rationale: Families and patients should be updated with goals of care and prognosis should be discussed within the first 72 hours of admission or diagnosis of sepsis.

Nursing Management of Shock
The nursing management of a patient in shock is a complex and challenging responsibility. It requires an in-depth understanding of the pathophysiology of the disease and the anticipated effects of each intervention, as well as a solid understanding of the nursing process.

- Prevention of sepsis and septic shock is one of the primary responsibilities of the nurse in the critical care area. These measures include:
    - Infection prevention
    - Identification of at-risk patients
    - Risk factors reduction
- Nursing interventions include:
    - Early identification of sepsis syndrome
    - Administering prescribed fluids, medications, and nutrition
    - Providing comfort and emotional support to the patient and family
    - Advocating for the patient and family

Case Study
An 85-year-old male presents to the Emergency Department from home with the following 2-day

history:

- Cough
- Temp 103.2F
- BP 85/40 (55)
- HR 80
- RR 28

Past Medical History: Hypertension (HTN), coronary artery disease (CAD)

Home meds: Lopressor 25mg po bid, Aspirin 81mg po daily, Lisinopril 10mg po daily

Clinical presentation:

- Neuro – restless and confused
- CV – warm and flushed
- Resp – dyspnea, bilateral crackles
- GU – Urinary catheter placed with <10ml urine in the first hour

What are your concerns?

- Did you ask yourself why the patient's HR is low in the presence of a temperature and hypertension?
    - Good! He is on Lopressor, a beta blocker which reduces the heart rate
- Were you concerned about the low urine output?
    - Great! He has a fever and hypotension, he may be dehydrated
- What about his confusion?
    - There is no history of confusion, is it from his fever and vital signs?

What do you anticipate his diagnosis might be?

- You are correct if you thought about sepsis!

What do you anticipate will be the next steps?

- Fluid resuscitation? Absolutely!
    - How much? 30 mL/kg
    - Which type of fluid? Crystalloid
    - When? Within the first three hours from sepsis identification
- Cultures? Of course! But which ones?
    - Sputum because of the cough and dyspnea
    - Blood because of the temperature
    - Urine because of the low output

Now what?

- Do you wait for the results of the cultures to come back? It might be a while, even though a gram stain could be done for an initial result.
    - No, the provider should order broad-spectrum antibiotics initially then change the medication to a specific antibiotic when the culture results are back
- Should you wait for the patient to be transferred up to the ICU before administering the antibiotic so that the ICU nurses can get him on a schedule of their choosing?
    - No, whenever possible, you know to start the antibiotics as soon as possible, ideally within one hour of diagnosis

Conclusion
Sepsis is a serious worldwide healthcare condition that is associated with high mortality ratios despite improvements in the ability to manage infection. Early recognition and treatment is essential to decrease the devastating monetary and human costs from this disease process. It is important that research into sepsis and septic shock continue to reduce mortality and morbidity.

References

Centers for Disease Control, (2017). Sepsis: Data and reports. Retrieved from https://www.cdc.gov/sepsis/datareports/index.html

de Moya, M. (2013). Shock. Retrieved from: http://www.merckmanuals.com/professional/critical-care-medicine/shock-and-fluid-resuscitation/shock

Neviere, R. (2014). Sepsis and the systemic inflammatory response syndrome: Epidemiology, definitions, clinical presentation, diagnosis, and prognosis. Retrieved from: https://www.uptodate.com/contents/sepsis-syndromes-in-adults-epidemiology-definitions-clinical-presentation-diagnosis-and-prognosis

Novosad, S., Sapiano, M., Grigg, C., Lake, J., Robyn, M., Dumyati, G….Epstein, L. (2016). Morbidity and Mortality Weekly Report (MMRW): Vital signs: Epidemiology of sepsis: Prevalence of health care factors and opportunities for prevention. Retrieved from: https://www.cdc.gov/mmwr/volumes/65/wr/mm6533e1.htm

Rhodes, A., Evans, L., Alhazzani, W., Levy, M., Antonelli, M., Ferrer, R…Dellinger, R. (2017). Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock 2016. Retrieved from: http://journals.lww.com/ccmjournal/Fulltext/2017/03000/Surviving_Sepsis_Campaign___International.15.aspx#

Schmidt, G.A. & Mandel, J. (2014). Evaluation and management of severe sepsis and septic shock in adults. Retrieved from www.uptodate.com.

Wang, B. (2017). Surviving Sepsis 2017 Guidelines Overview. Retrieved from: https://coreem.net/core/surviving-sepsis-2017/

Disclaimer

This publication is intended solely for the educational use of healthcare professionals taking this course, for credit, from RN.com, in accordance with RN.com terms of use. It is designed to assist healthcare professionals, including nurses, in addressing many issues associated with healthcare. The guidance provided in this publication is general in nature, and is not designed to address any specific situation. As always, in assessing and responding to specific patient care situations, healthcare professionals must use their judgment, as well as follow the policies of their organization and any applicable law. This publication in no way absolves facilities of their responsibility for the appropriate orientation of healthcare professionals. Healthcare organizations using this publication as

a part of their own orientation processes should review the contents of this publication to ensure accuracy and compliance before using this publication. Healthcare providers, hospitals and facilities that use this publication agree to defend and indemnify, and shall hold RN.com, including its parent(s), subsidiaries, affiliates, officers/directors, and employees from liability resulting from the use of this publication. The contents of this publication may not be reproduced without written permission from RN.com.

Participants are advised that the accredited status of RN.com does not imply endorsement by the provider or ANCC of any products/therapeutics mentioned in this course. The information in the course is for educational purposes only. There is no “off label” usage of drugs or products discussed in this course.
You may find that both generic and trade names are used in courses produced by RN.com. The use of trade names does not indicate any preference of one trade named agent or company over another. Trade names are provided to enhance recognition of agents described in the course.
Note: All dosages given are for adults unless otherwise stated. The information on medications contained in this course is not meant to be prescriptive or all-encompassing. You are encouraged to consult with physicians and pharmacists about all medication issues for your patients.