AUDIENCE AND PARTICIPANTS

Target Learning Group

☒ PGY-1
☒ PGY-2
☐ All groups

LEARNING OBJECTIVES

Educational Goal

- Recognize and appropriately treat septic shock secondary to pneumosepsis

Crisis Resource Management (CRM) Objectives:

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Medical Objectives:

- Demonstrate the steps involved in the initial stabilization and resuscitation of a patient with sepsis

CASE SUMMARY:

An 80-year-old female presents with septic shock secondary to pneumonia and ultimately requires intubation.

PHYSICAL PROPS / EQUIPMENT

Mannequin:

- High fidelity patient simulator
- No moulage required

Monitors:

- Telemetry

Personnel:

- RN or observer to play RN
- RT or observer to assist with airway
- ICU attending available for phone consultation

Other:

- Basic airway equipment e.g. nasal cannula, non-rebreather (NRB), bag-valve mask (BVM)
- Intubation equipment e.g.
- Code blue cart
- Central venous access kit

ROOM

Set-Up:

- Any stretcher or hospital bed

Medications & Fluids:

- Normal Saline (NS) IV
- Acetaminophen
- Broad spectrum antibiotics
- Vasopressors
- Intubation medications (e.g. paralytic, induction agents)

Diagnostics:

- ECG (sinus tachycardia)
- CXR (pneumonia)
- Laboratory investigations

Documentation Forms:

- Typical RN documentation form

Scenario

Patient Identification: 80 year old female with generalized weakness.

Chief Complaint / History: Chest pain

Sylvia is an 80-year-old female who was brought in to the hospital by ambulance due to increasing weakness. She has been feeling tired for the last 3 days. She has not been eating or drinking well. Today she was unable to get out of bed unassisted and her nursing home called the ambulance. Paramedics state she was febrile and tachycardic on their arrival to the facility.

Past Medical History:

1. Hypertension
2. High cholesterol
3. Type II Diabetes
4. Congestive heart failure (CHF)
5. Chronic kidney disease (CKD)

Medications:

1. Metoprolol
2. Ramipril
3. ASA
4. Atorvastatin
5. Metformin
6. Lasix

Allergies: NKDA

Family History: Non-contributory

Social History:

- Nursing home resident.
- Non-smoker, no alcohol, no illicit drugs.

Key Management Interventions:

Stage 1: Initial recognition and management of sepsis

Elderly female, drowsy, confused, only minimally able to answer questions.

Vitals:

HR: 125
BP: 89/45
Temp: 39°C
O_2 Sat: 90% RA
RR: 25

Physical Exam Findings:

- **CNS:** GCS = E3V4M6 = 13. Lethargic, confused.
- **CVS:** Cool to peripheries. Palpable peripheral pulses X 4. Tachycardic, normal S1S2, no murmurs.
- **RESP:** Tachypneic, crackles on right. Decreased air entry to right.
- **GI:** Abdomen soft, non-distended, non-tender.
- **GU:** Non-contributory
- **MSK:** Non-contributory
- **SKIN:** Non-contributory

Review of Systems (ROS)

Positive ROS:

Cough productive of yellow-green sputum for 2 days. Mild shortness of breath. Lightheaded. Fever and chills today.

Negative ROS:

No nausea or vomiting. No lower urinary tract symptoms. No abdominal pain. No chest pain. No headache, unilateral weakness.

Interventions

☐ Obtains IV access
☐ Oxygen via facemask or NRB
☐ Cardiopulmonary monitoring
☐ Orders appropriate investigations (labs, ECG, CXR)
☐ IV NS bolus

- ☐ Starts broad spectrum antibiotics
- ☐ Acetaminophen 1g PO
- ☐ Checks glucose (12.4)

Successful Intervention:

- If antibiotics, fluid and oxygen given then learner may progress to stage 2.
- Respiratory decompensation will occur despite any treatment.
- Even if normal saline and antibiotics are given then the blood pressure and heart rate will continue to deteriorate

Unsuccessful Intervention:

- If no chest x-ray is ordered then a confederate / RN will prompt learner.

Stage 2: Respiratory decompensation and intubation

Brief description of Stage.

Vitals:

HR: 134   BP: 83/40   Temp: 39 O_2 Sat: 92% on NRB   RR: 26

Physical Exam Findings:

- **CNS:** GCS = E2V2M5. Drowsy, groans and opens eyes to painful stimuli only.
- **CVS:** Cool to peripheries, mottled.
- **RESP:** Low saturations, increasingly tachypneic.

Interventions

- ☐ Addition of vasopressors
  - ☐ Push dose phenylephrine or epinephrine
  - ☐ Peripheral levophed
  - ☐ Titrate MAP to > 65
- ☐ Intubation
  - ☐ Fluid
  - ☐ Appropriate choice of induction agent e.g. ketamine, etomidate; paralytic ~~e.g.~~ (rocuronium or succinylcholine)
- ☐ Consultation with an intensivist

Successful Intervention:

- If the patient is resuscitated and vasopressors are used then they will be intubated successfully and case can end

Unsuccessful Intervention:

- If an innapropriate induction agent is used (e.g. propofol, midazolam) the patient will suffer a peri-intubation arrest
- If no vasopressors are used prior to intubation then the patient will deteriorate post-intubation (BP to 60/30). If no pressors are started immediately the patient will suffer a PEA arrest.

Stage 3: PEA Arrest

If not appropriately resuscitated peri-intubation the patient~~eitn~~ will suffer a PEA arrest.

Vitals:

HR: 30   BP: undetectable   Temp: 36.0°C O_2 Sat: undetectable   RR: apneic

Physical Exam Findings:

- **CNS:** Pale, unconscious.

- **CVS:** No palpable pulse.
- **RESP:** Apneic.

Interventions

- ☐ Follow standard ACLS protocols
    - ☐ Epinephrine 1 mg IV immediately
    - ☐ Begins CPR with rotation of compressors every two minutes
    - ☐ Applies 100% FiO_2
    - ☐ Pulse / rhythm checks every two minutes.
    - ☐ Administers epinephrine 1 mg IV every 3-5 minutes
- ☐ Fluid bolus
- ☐ Epinephrine infusion once ROSC occurs

Successful Intervention:

- If Epinephrine administered then ROSC will occur at the first pulse check.

Unsuccessful Intervention:

- If no epinephrine given during PEA arrest RN / confederate will prompt learner.

NOTES

Possible Debriefing Points:

- Define systemic inflammatory response syndrome (SIRS), sepsis, organ dysfunction, and septic shock as per the new Sepsis-3 guidelines (see reference 1) [1]
- Key components of the 2016 surviving sepsis guidelines (see Reference 2) [2]
  - Broad spectrum antibiotics within 1 hour
  - 30 cc/kg of crystalloid within 3 hours
  - Vasopressors to target a MAP $\geq$ 65 (norepinephrine is the recommended first choice)
- Severity scores for predicting mortality in community-acquired pneumonia (see tables 1 and 2 in Reference 3) [3]
  - CURB-65 (Table 2)
  - Pneumonia Severity Index (PSI) or Port Score (Table 1)

Debriefer Notes:

REFERENCES, RESOURCES, PROTOCOLS, ALGORITHMS, OR EVIDENCE INFORMED PRACTICE GUIDELINES:

References:

[1] M. Singer, C. S. Deutschman, C. W. Seymour, M. Shankar-Hari, D. Annane, M. Bauer, R. Bellomo, G. R. Bernard, J.-D. Chiche, C. M. Coopersmith, R. S. Hotchkiss, M. M. Levy, J. C. Marshall, G. S. Martin, S. M. Opal, G. D. Rubenfeld, T. van der Poll, J. Vincent, and D. C. Angus, “The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3).,” *Jama*, vol. 315, no. 8, pp. 801–10, 2016.

[2] A. Rhodes, L. E. Evans, W. Alhazzani, M. M. Levy, M. Antonelli, R. Ferrer, A. Kumar, J. E. Sevransky, C. L. Sprung, M. E. Nunnally, B. Rochwerg, G. D. Rubenfeld, D. C. Angus, D. Annane, R. J. Beale, G. J. Bellinghan, G. R. Bernard, J.-D. Chiche, C. Coopersmith, D. P. De Backer, C. J. French, S. Fujishima, H. Gerlach, J. L. Hidalgo, S. M. Hollenberg, A. E. Jones, D. R. Karnad, R. M. Kleinpell, Y. Koh, T. C. Lisboa, F. R. Machado, J. J. Marini, J. C. Marshall, J. E. Mazuski, L. A. McIntyre, A. S. McLean, S. Mehta, R. P. Moreno, J. Myburgh, P. Navalesi, O. Nishida, T. M. Osborn, A. Perner, C. M. Plunkett, M. Ranieri, C. A. Schorr, M. A. Seckel, C. W. Seymour, L. Shieh, K. A. Shukri, S. Q. Simpson, M. Singer, B. T. Thompson, S. R. Townsend, T. Van der Poll, J.-L. Vincent, W. J. Wiersinga, J. L. Zimmerman, and R. P. Dellinger, *Surviving Sepsis Campaign*. 2017.

[3] B. A. Shah, W. Ahmed, G. N. Dhobi, N. N. Shah, S. Q. Khursheed, and I. Haq, “Validity of Pneumonia Severity Index and CURB-65 Severity Scoring Systems in Community Acquired Pneumonia in an Indian Setting,” *Indian J Chest Dis Allied Sci*, vol. 52, no. 1, pp. 9–17, 2010.

Adjuncts

1. ECG Image: Life in the Fast Lane (https://lifeinthefastlane.com/wp-content/uploads/2011/12/sinus-tachycardia.jpg).
2. CXR: Case courtesy of A.Prof Frank Gaillard, Radiopaedia.org, rID: 11009 (https://radiopaedia.org/cases/pneumonia-streptococcus-1).

Authors / Contributors:

Case drafted by Kelsey Innes with contributions from Shannon Chestnut, Afshin Khazei and Karen Schafer.
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