Author: Bo Burns, DO Reviewer: Sarah Farris, MD

Case Title: Sepsis complicated by Adrenal Failure

# Target Audience: Emergency Medicine Residents

Primary Learning Objectives:

1. Recognize the key presenting signs of adrenal insufficiency.

2. Diagnose and treat severe sepsis.

3. Understand the causes/triggers of adrenal insufficiency.

Secondary Learning Objectives

1. Understand appropriate antibiotic choices for ICU patients.

2. Initiate treatment of adrenal insufficiency without laboratory confirmation.

Critical actions checklist

1. Treat Hypotension (PM)
2. Obtain Chest xray (DA)
3. Diagnose Pneumonia (PS)
4. Administer Antibiotics (PM)
5. Recognize and treat Adrenal Failure
6. Admit to ICU (PM)

## Environment (if using as a simulation case)

1. Room Set Up – ED, trauma bay, decon room, in sim lab or in situ
   1. (if used) Manikin Set Up – type of simulator, moulage, lines needed, drugs needed
   2. Props – ECGs needed, X-rays, CT scans, EMS equip, decon equipment, airway equipment, code blue cart
2. Distractors – list here any environmental or background distractors

## Actors (optional)

1. Roles – paramedic, nurse, consultant
2. Who may play them – other residents, other students, actors
3. Action Role – what role do they serve in the scenario?

**For Examiner Only**

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Case Title: Sepsis Complicated by Adrenal Failure

**CASE SUMMARY**

**CORE CONTENT AREA**

Infectious Disease and Endocrine/Metabolic Emergencies

**SYNOPSIS OF CASE**

This case involves a 72 year-old male who presents with a 3 day history of progressive cough, shortness of breath, generalized malaise, and vomiting. The patient has a history of steroid dependent COPD and was discharged a week ago from the hospital after a prolonged stay (CVA with some residual left side weakness). In the transfer from the hospital to the rehabilitation facility, his daily dose of Prednisone (30mg) was omitted on his medication list. The patient is in septic shock from pneumonia which is complicated by adrenal failure.

The candidate must treat the hypotension aggressively with fluids, diagnose the pneumonia, initiate empiric antibiotics (consider nosocomial with recent hospitalization), recognize and treat the adrenal failure, and admit the patient to the ICU.

The candidate may either inquire from the patient that he has missed his prednisone for the past week (Patient: “They aren’t giving me my prednisone.”) or they may compare the last discharge summary with the rehabilitation facility medication list.

**SYNOPSIS OF HISTORY**

The patient’s chief complaint is cough, “not feeling well” and vomiting associated with generalized weakness. The nursing staff at the rehabilitation facility noticed that he “wasn’t looking good” today and notified EMS for transport to the ED.

**SYNOPSIS OF PHYSICAL**

The patient looks ill on general appearance. He is having mild-moderate dyspnea and is in septic shock with the following VS (BP=72/46, HR=140, RR=32, T=103.2 rectally). Exam reveals bilateral rhonchi in the lower lobes.

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**CRITICAL ACTIONS**

**SCENARIO BRANCH POINTS / PLAY OF CASE GUIDELINES**

Vital signs do not improve until at least two liters of crystalloids are infused and steroids given.

a. Vital signs do not improve with vasopressors unless steroids given.

1. **Obtain Chest X-ray (DA)**

This critical action is met by the candidate obtaining a chest x-ray.

Cueing Guideline: Cue the candidate: Nursing staff “The patient is coughing up horrible looking sputum.”

**2. Diagnose Pneumonia (PS**)

This critical action is met by the candidate verbalizing the finding of a RLL and LLL pneumonia, infiltrates, or consolidations on the x-ray.

Cueing Guideline:  Cue the candidate, “Please interpret the x-ray,” if needed

1. **Administer Antibiotics (PM)**

This critical action is met by the candidate administering the appropriate empiric antibiotics for nosocomial pneumonia.

* 1. Candidate may consult with pharmacist or other resources for choice of antibiotics.
  2. In general, the following antibiotics are acceptable choices:
     1. 4th generation Cephalosporin
     2. Carbapenem
     3. Anti-pseudomonal penicillin + beta lactamase inhibitor
     4. Respiratory fluoroquinolone
     5. Aminoglycoside (amikacin)

Cueing Guideline: “The patient recently was discharged from the hospital after a prolonged stay”

**4. Administer Steroids**

This critical action is met by the candidate administering glucocorticoid replacement

1. In general, the following glucocorticoids are acceptable choices:
   * 1. Hydrocortisone
     2. Decadron
     3. Prednisone/Prelone
     4. Fludrocortisone

Cueing Guideline: Pt states “They won’t give me my Prednisone since I left the Hospital!”

**5. Admit to ICU (PM)**

This critical action is met by the candidate admitting the patient to the intensive care unit (ICU).

Cueing Guideline:  Nursing: “The patient’s blood pressure is still pretty low.”

**SCORING GUIDELINES**

(Critical Action No.)

1. Score down if candidate starts vasopressors without giving at least 2 liters of crystalloid.
2. Score down if candidate does not administer the crystalloids as boluses (CA1)
3. Score down if candidate doesn’t place the patient on supplemental oxygen
4. Score down if candidate does not administer steroids
5. Score up if the candidate mentions the need for “Early Goal Directed Therapy for Sepsis” to the ICU physician. (CA5)
6. Score up if the candidate mentions/asks the ICU attending about cosyntropin stim test (not necessary since pt on long term prednisone therapy)
7. Score up if the candidate reconciles the medication omission.

**HISTORY**

**Onset of Symptoms:** The patient presents today complaining of a productive cough, generalized weakness and vomiting. The patient developed a productive cough of yellow-green sputum one week ago with progressive shortness of breath. He denies chest pain but does have mild to moderate dyspnea. He has had chills and sweats and a fever over the last 24 hours. The last few days he has felt worse and is lightheaded with standing. He denies abdominal pain and notes normal non-bloody bowel movements. He was discharged one week ago from this hospital after a prolonged stay secondary to a CVA and is currently in a rehabilitation facility for physical therapy.

**Background Info:** He was discharged one week ago from this hospital after a prolonged stay secondary to a CVA and is currently in a rehabilitation facility for physical therapy.

**Chief Complaint:** Cough, general weakness and vomiting

**Past Medical Hx:** Allergies:  None

Medical: COPD; CAD, CVA, HTN

Surgical:  Cholecystectomy, 1982.

Last Meal:  \_\_\_\_\_\_\_\_?

Meds: Albuterol, Atrovent, Aspirin, Norvasc

**Past Surgical Hx:** \_\_\_\_\_\_\_\_\_\_\_\_None?

**Habits:** Smoking: Quit 20 years ago. Used to smoke 1 pack per day for 20 years.

ETOH: Occasional beer

Drugs: None

**Family Medical Hx:** Father: Died, age 67 of heart attack

Mother: Died, age 72 of stroke

**Social Hx:** Marital Status: Married (wife with dementia in a nursing home)

Children: 3 children in good health

Education: College graduate, bachelor’s degree in Electrical Engineering

Employment: Retired

**ROS:** List pertinent positives and negatives: \_\_\_\_\_\_\_\_\_?

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**PHYSICAL EXAM**

**Patient Name: Age & Sex: 72 yo male**

**General Appearance:**  Ill appearing 72 year old man, who looks dehydrated and is in mild respiratory distress. There is no family present.

**Vital Signs: After 2L of IVF**

BP = 72/46 90/55

P = 140/min 110/min

R = 32/min

T = 103.2 (F, rectally)

**Head:**Normocephalic, atraumatic

**Eyes:** PERRL, EOMs intact

**Ears:**Normal

**Mouth:**Normal

**Neck:**No JVD, thyromegaly, or masses

**Skin:**  Warm and slightly diaphoretic; no rashes

**Chest:**No external signs of trauma

**Lungs:** Bilateral rhonchi in the lower lobes. Increased respiratory rate with few faint scattered wheezes.

**Heart:**  Tachycardic, no murmur

**Back:**Normal

**Abdomen:**  Soft, non-distended, non-tender, no masses

**Extremities:**No clubbing, cyanosis, or edema; Normal pulses

**Rectal:**Normal tone, prostate enlarged but non-tender, stool negative for occult blood

**Pelvic:** Circumcised male, no ecchymosis.

**Neurological:** CN intact. Mild (3-4/5 strength L side, pt reports is unchanged after recent CVA)

**Mental Status:**Intact. Good historian.

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**STIMULUS INVENTORY**

#1 Emergency Admitting Form

#2 CBC

#3 BMP

#4 U/A

#5 ABG

#6 Cardiac Rhythm Strip

#7 EKG

#8 CXR

**For Examiner Only**

**Lab Data Panel**

|  |  |
| --- | --- |
| Stimulus #2 **Complete Blood Count (CBC)**  WBC 22,400/mm3  Hgb 14.1 g/dL  Hct 41.9 %  Platelets 320,000/mm3  Differential  Segs 82 %  Bands 10 %  Lymphs 5 %  Monos 2 %  Eos 1 % Stimulus #3Basic Metabolic Profile (BMP) Na+ 129 mEq/L  K+ 5.6 mEq/L  CO2 16 mEq/L  Cl- 108 mEq/L  BUN 24 mg/dL  Cr 1.2 mg/dL  Glucose 60 mg/dL Stimulus #4Urinalysis (U/A) Color Yellow  Sp Gravity 1.020  Glucose Negative  Protein Negative  Ketone Negative  Leuk Est Negative  Nitrite Negative  WBC 0-2/HPF  RBC 0-2/HPF | **Stimulus #5**  **Arterial Blood Gas (room air)**  pH 7.32  pCO2 38 mm Hg  pO2 68 mm Hg  O2 sat 89%    **Stimulus #6**  **Cardiac Rhythm Strip**  Sinus tachycardia  **Stimulus #7**  **ECG**  Sinus tachycardia, otherwise normal ECG  **Stimulus #8**  **CXR**  LLL & RLL infiltrates VERBAL REPORTS   Oxygen Sat (room air) 89%  Oxygen Sat (on oxygen) 98%  Lactate 7  Liver Function Tests Normal  PT/Ptt, INR Normal |
|  |  |

**Learner Stimulus #1**

**ABEM General Hospital**

**Emergency Admitting Form**

**Name**: Steve Brown

**Age**: 72

**Sex:** Male

**Method of Transportation**: EMS

**Person giving information**: Patient and EMS

**Presenting complaint: “I’m sick”**

**Background:** EMS was contacted by the Nursing Home secondary to pt’s fever, cough, vomiting, general malaise and overall poor condition.

**Vital Signs**

BP: 72/46

P: 140/min

R: 32/min

T: 103.2OF (rectally)

## Stimulus #2

## Complete Blood Count (CBC)

WBC 22,400/mm3

Hgb 14.1 g/dL

Hct 41.9 %

Platelets 320,000/mm3

Differential

Segs 82 %

Bands 10 %

Lymphs 5 %

Monos 2 %

Eos 1 %

## Learner Stimulus #3

## Basic Metabolic Profile (BMP)

Na+ 142 mEq/L

K+ 4.2 mEq/L

CO2 16 mEq/L

Cl- 108 mEq/L

BUN 24 mg/dL

Cr 1.2 mg/dL

Glucose 106 mg/dL

This is the BMP given in the stimulus summary, which one preferred?

## Basic Metabolic Profile (BMP)

Na+ 129 mEq/L

K+ 5.6 mEq/L

CO2 16 mEq/L

Cl- 108 mEq/L

BUN 24 mg/dL

Cr 1.2 mg/dL

Glucose 60 mg/dL

**Learner Stimulus #4**

**Urinalysis (U/A)**

Color Yellow

Sp Gravity 1.020

Glucose Negative

Protein Negative

Ketone Negative

Leuk Est Negative

Nitrite Negative

WBC 0-2/HPF

RBC 0-2/HPF

## Learner Stimulus #5

## Arterial Blood Gas (ABG - room air)

pH 7.42

pCO2 31 mm Hg

pO2 68 mm Hg

O2 sat 89%

This is the ABG given in the stimulus summary, which one preferred?

**Arterial Blood Gas (room air)**

pH 7.32

pCO2 38 mm Hg

pO2 68 mm Hg

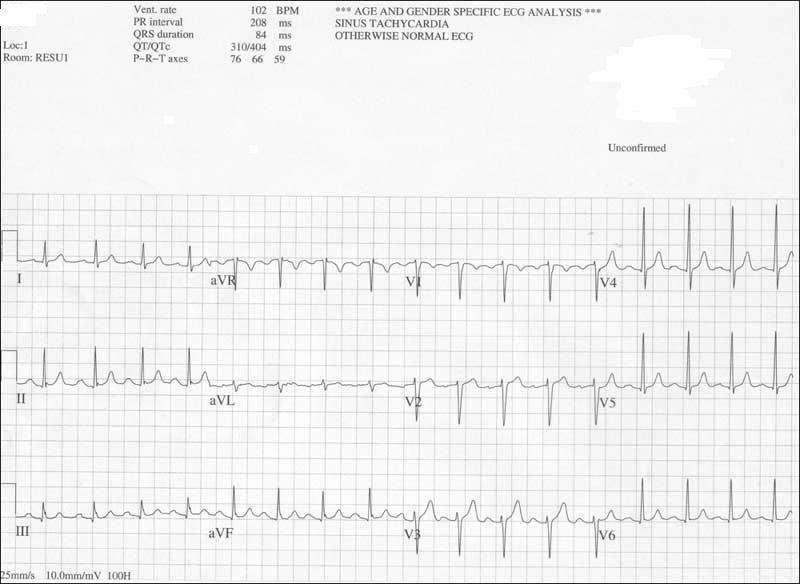
O2 sat 89%

Learner Stimulus #6

Cardiac Rhythm Strip

Sinus tachycardia

Learner Stimulus #7



Learner Stimulus #8

CXR



Mock Oral Feedback Form – ABEM model

**Date: Examiner: Examinee:**

**Data acquisition**

Worst 1 2 3 4 5 6 7 8 Best

NOTES

**Problem solving**

Worst 1 2 3 4 5 6 7 8 Best

NOTES

**Patient management**

Worst 1 2 3 4 5 6 7 8 Best

NOTES

**Resource utilization**

Worst 1 2 3 4 5 6 7 8 Best

NOTES

**Health care provided**

Worst 1 2 3 4 5 6 7 8 Best

NOTES

**Patient Interpersonal relations**

Worst 1 2 3 4 5 6 7 8 Best

NOTES

**Comprehension of path physiology**

Worst 1 2 3 4 5 6 7 8 Best

NOTES

**Clinical competence (overall)**

Worst 1 2 3 4 5 6 7 8 Best

NOTES

|  |  |  |
| --- | --- | --- |
| **Critical Actions** |  | **Dangerous actions and omissions**  **1**. Score down if candidate starts vaso-pressors without giving at least 2 liters of crystalloid. (CA1)  **2.** Score down if candidate does not administer the crystalloids as boluses. (CA1)  **3.** Score down if candidate doesn’t place the patient on supplemental oxygen.  **4**. Score up if the candidate mentions the need for “Early Goal Directed Therapy for Sepsis” to the ICU physician. (CA5) |
| 1 Obtain Chest X-ray | 🞎 |
| 2. Diagnose Pneumonia | 🞎 |
| 3. Administer Antibiotics | 🞎 |
| 4. Diagnose Adrenal Failure | 🞎 |
| 5. Administer Steroids | 🞎 |
| 6. Admit to ICU | 🞎 |
| 7. | 🞎 |

**Debriefing Materials:**

See attached powerpoint lecture.

**Keywords for future searching functions:**

Adrenal Failure, Sepsis, SIRS, Pneumonia

**References: Attached**

**Has this work been previously published?** No