SIMULATION

Severe Sepsis Manifesting as A-Fib with Rapid Ventricular Rate

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ABSTRACT:

Audience: This simulation is designed to educate emergency medicine residents and medical students on the diagnosis and management of an adult patient with sepsis due to a decubitus ulcer manifesting as acute-onset atrial fibrillation (A-fib) with rapid ventricular response (RVR).

Introduction: Adult patients frequently present critically ill from sepsis. Proper diagnosis and management require a focused but thorough history and physical exam, as well as an appropriate diagnostic workup. Management includes aggressive care with antibiotics and intravenous fluids, and may require vasoactive agents.

Objectives: By the end of this simulation session, the learner will be able to: 1) Recognize severe sepsis (please note – Centers for Medicare and Medicaid Services (CMS) Sepsis-I and II definitions are used throughout the case, as Sepsis-III has not been adopted by any emergency medicine organizations), 2) recognize atrial fibrillation, 3) review the importance of a thorough history and physical exam, 4) discuss the sepsis spectrum, 5) discuss the acute management of severe sepsis, 6) discuss common and uncommon sources of sepsis, 7) discuss appropriate empiric antibiotic options, 8) discuss common causes of newly-diagnosed atrial fibrillation, 9) review the different emergency medicine-based treatment modalities for uncomplicated atrial fibrillation, specifically atrial fibrillation with rapid ventricular rate.

Method: This session was conducted using high-fidelity simulation, followed by a debriefing session.

Topics: Severe sepsis, atrial fibrillation, atrial fibrillation with rapid ventricular response, medical simulation.

USER GUIDE

List of Resources:

Learner Audience:
Medical students, interns, junior residents, senior residents

Time Required for Implementation:
Instructor Preparation: 30 minutes
Time for case: 20 minutes
Time for debriefing: 45 mintues

Recommended Number of Learners per Instructor:
3-4

Topics:
Severe sepsis, atrial fibrillation, atrial fibrillation with rapid ventricular response, medical simulation.

Objectives:
By the end of this simulation session, the learner will be able to:

1. Recognize severe sepsis (please note – Centers for Medicare and Medicaid Services (CMS) Sepsis-I and II definitions are used throughout the case, as Sepsis-III has not been adopted by any emergency medicine organizations)
2. Recognize atrial fibrillation.
3. Review the importance of a thorough history and physical exam.
4. Discuss the sepsis spectrum.
5. Discuss the acute management of severe sepsis.
6. Discuss common and uncommon sources of sepsis.
7. Discuss appropriate empiric antibiotic options.
8. Discuss common causes of newly-diagnosed atrial fibrillation.
9. Review the different emergency medicine-based treatment modalities for uncomplicated atrial fibrillation, specifically atrial fibrillation with rapid ventricular rate.

Linked objectives and methods:
Sepsis is a potentially life threatening dysregulated response to overwhelming infection.[1] The concept of ideal management of sepsis and septic shock has evolved overtime, however, the cornerstones of management remain, including aggressive fluid resuscitation, broad-spectrum antibiotics, and hemodynamic support when clinically indicated.[2] Sepsis can present on a spectrum of severity, and failure to recognize sepsis may lead to increased morbidity and mortality. In this simulation, we challenge participants to recognize sepsis in an unusual presentation, which is new-onset atrial fibrillation with rapid ventricular response (A-fib with RVR). Asking participants to simultaneously manage sepsis in light of A-fib with RVR tests their understanding of two complex medical entities, and clinicians should assess for an underlying cause of their tachycardia. Examples of conditions that may induce A-fib with RVR include anything that would cause physiologic stress, including (but not limited to) hyperthyroidism, infection, decompensated heart failure, and pulmonary embolism. In hemodynamically stable patients, therapy should first be directed at treating the precipitating cause, which may cause the patient to spontaneously revert to sinus rhythm.[3] Mismanagement of A-fib with RVR in the setting of sepsis is potentially harmful, as the increased cardiac output may be appropriate if the heart has adequate filling time. This simulation scenario allows learners to review and learn safe and effective concomitant management of both severe sepsis and A-fib with RVR.

Recommended pre-reading for instructor:

- We recommend that instructors review literature on sepsis management, including the latest Surviving Sepsis campaign. Suggested reading includes the materials listed below under "References/suggestions for further reading."

Results and tips for successful implementation:
This simulation was written to be performed as a high-fidelity simulation scenario, but may also be used as a mock oral board case. If participants fail to identify the decubitus ulcer, the confederate nurse will tell participants that they do not feel the patient may provide a clean-catch urine specimen without catheterization. Nursing should initiate the catheter procedure, and then tell participants that the patient has a decubitus ulcer.

References/suggestions for further reading:

1. Rhodes A, Evans LE, Alhazzani W, et al. Surviving Sepsis Campaign: international guidelines for management of sepsis and septic shock. *Intensive Care Med*. 2017;43(3): 304-377. doi: 10.1007/s00134-017-4683-6
2. Naccarelli G, Ganz L, Manning W. Atrial fibrillation: Cardioversion to sinus rhythm. In: Saperia GM, ed. *UpToDate.* Waltham, MA: UpToDate Inc. https://www.uptodate.com/contents/atrial-fibrillation-cardioversion-to-sinus-rhythm. Updated December 2017. Accessed January 3, 2018.
3. Phang R, Olshansky B. Management of new onset atrial fibrillation. In: Saperia GM, ed. *UpToDate.* Waltham, MA:

UpToDate Inc. https://www.uptodate.com/contents/management-of-new-onset-atrial-fibrillation. Updated Aug 2, 2016. Accessed October 20, 2017.

4. January CT, Wann LS, Alpert JS, Calkins H, Cigarroa JE, Cleveland JC Jr, et al. 2014 AHA/ACC/HRS guideline for the management of patients with atrial fibrillation: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the Heart Rhythm Society. *Circulation*. 2014;130(23): 2071-2104. doi: 10.1161/CIR.0000000000000041.
5. Ganz L. Control of ventricular rate in atrial fibrillation: pharmacologic therapy. In: Saperia GM. UpToDate. Waltham, MA: UpToDate Inc. https://www.uptodate.com/contents/control-of-ventricular-rate-in-atrial-fibrillation-pharmacologic-therapy. Updated Dec 14, 2017. Accessed December 3, 2018.
6. Singer M, Deutschman CS, Seymour CW, Shankar-Hari M, Annane D, Bauer M, et al. The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3). *JAMA*. 2016;315(8):801-810. doi: 10.1001/jama.2016.0287
7. Specifications Manual for National Hospital Inpatient Quality Measures. The Joint Commission. https://www.jointcommission.org/specifications_manual_for_national_hospital_inpatient_quality_measures.aspx. Updated November 2, 2017. Accessed January 3, 2018.

INSTRUCTOR MATERIALS

Case Title: Severe Sepsis Manifesting as A-Fib with RVR

Case Description & Diagnosis (short synopsis): A 78-year-old female presents with one day of "dizziness" upon awakening this morning. Her description of her dizziness is non-specific, but denies vertigo, presyncope, and disequilibrium. She also reports mild dyspnea and palpitations. The goal of the case is early recognition of severe sepsis secondary to an infected decubitus ulcer, with intravenous fluids and antibiotics administered prior to admission.

Equipment or Props Needed:
High fidelity adult simulation mannequin
Moulage material for mannequin for decubitus ulcer and cellulitis
    Commercial moulage kits are available, as well as special effects/makeup artist materials to create the ulcer. Cream-based cosmetic blush may also be used.
Oxygen (O_2) = Nasal cannula, face mask, non-rebreather mask
Cardiac monitor
Cardioverter/Defibrillator
Pulse oximetry
Bag-valve mask
Intravenous (IV) pole
Foley catheter
Normal saline (1L, 500mL, 250mL)
Medications = IV vancomycin, IV linezolid, IV metronidazole, IV aztreonam

Confederates needed:
Primary Nurse

Stimulus Inventory:
#1 Complete blood count (CBC)
#2 Basic metabolic panel (BMP)
#3 Liver function tests (LFTs)
#4 Lactate
#5 Coagulation studies
#6 Troponin
#7 Urinalysis
#8 Chest X-ray
#9 Electrocardiogram (ECG) #3– atrial fibrillation with RVR

INSTRUCTOR MATERIALS

#10 ECG #2– sinus tachycardia
#11 ECG #3– atrial fibrillation, rate controlled
#12 Decubitus ulcer image

Background and brief information: Patient is transferred to the emergency department (ED) by emergency medical services (EMS) from her extended care facility.

Initial presentation: 78-year-old woman presents by EMS from her extended care facility for "dizziness."

- If asked: The patient describes her symptoms non-specifically as "fogginess" and that she "just doesn't feel right."
- If asked, she has mild shortness of breath and feels as though her heart is fluttering. She lives in an extended care facility because of her severe rheumatoid arthritis and non-ambulatory status. She is full code. She denies chest pain, fevers, chills, cough, abdominal pain, hemoptysis, dysuria, history of cardiac dysrhythmias, history of thromboembolism, recent travel or surgery in the past three months, active cancer, or estrogen use.
- Assessment: No acute distress, lying in bed supine. Dry mucous membranes. Tachycardic with irregularly irregular rhythm, no murmurs, gallops or rubs. Brisk capillary refill. Tachypneic, but lungs are clear to auscultation bilaterally. Abdomen soft, non-distended, non-tender without guarding or rebound. Sacral decubitus ulcer with surrounding erythema and warmth. Alert, oriented to person and place, but believes it is 1997. Normally alert and oriented x4 at baseline. No focal motor/sensory deficits.

How the scenario unfolds: Patient should be given intravenous fluid bolus. Learners should obtain laboratory work, a chest X-ray, an ECG, and blood and urine cultures. Antibiotic therapy targeting her infected decubitus ulcer should be initiated, and she should be admitted to an intermediate or intensive care unit.

- If patient does not receive 30mL/kg of normal saline, she will remain hypotensive and tachycardic.
- If the patient is rate-controlled with medications, she will become more hypotensive and her altered mental status will worsen.
- If the patient is cardioverted, she will initially cardiovert to sinus tachycardia before reverting back to atrial fibrillation.
- If the patient is not thoroughly examined, the nurse will attempt to put in a foley catheter and then verbalize that she has a decubitus ulcer.

INSTRUCTOR MATERIALS

Critical Actions:

1. Obtain 2 points of intravenous (IV) access
2. Obtain a blood glucose level
3. Place the patient on continuous cardiac monitoring
4. Administer 30 mL/kg normal saline bolus
5. Order labs, lactate, chest X-ray (CXR), electrocardiogram (ECG), and blood and urine cultures
6. Diagnose severe sepsis with a soft tissue source
7. Diagnose atrial fibrillation with rapid ventricular response
8. Start broad spectrum antibiotics
9. Reassessment of the patient's clinical status and vital signs
10. Admit to stepdown or intensive care unit

INSTRUCTOR MATERIALS

Case Title: Severe Sepsis Manifesting as A-Fib with RVR

Chief Complaint: 78-year-old female who presents with one day of "dizziness," disorientation, shortness of breath and palpitations.

Vitals: *Heart Rate (HR)* 130s *Blood Pressure (BP)* 98/46 *Respiratory Rate (RR)* 24 *Temperature (Temp)* 37.7C *Oxygen Saturation (O_2Sat)* 93% on room air

General Appearance: lying supine in bed

Primary Survey:

- **Airway:** intact
- **Breathing:** mildly tachypneic at rest. Clear to auscultation bilaterally
- **Circulation:** tachycardic. 2+ irregular, symmetric pulses. Brisk capillary refill

History:

- **History of present illness:** 78-year-old female with one day of "dizziness."
- If asked, she has mild shortness of breath and feels as though her heart is fluttering. She lives in her extended care facility because of her severe rheumatoid arthritis and non-ambulatory status. She is full code. She denies chest pain, fevers, chills, cough, abdominal pain, hemoptysis, dysuria, history of cardiac dysrhythmias, history of thromboembolism, recent travel or surgery in the past three months, active cancer, or estrogen use.
- **Past medical history:** Rheumatoid arthritis, diabetes mellitus type II, hypertension, hyperlipidemia, COPD without home oxygen use.
- **Past surgical history:** Remote appendectomy.
- **Patient's medications:** aspirin, amlodipine, metformin, methotrexate, prednisone, rosuvastatin, tiotropium.
- **Allergies:** penicillin – unknown reaction – occurred in the remote past.
- **Social history:** 40 pack-year smoking history; denies drugs or alcohol use.
- **Family history:** non-contributory.
- **Weight:** 54.5 kg

Secondary Survey/Physical Examination:

- **General appearance:** Lying supine in bed.
- **HEENT:**

  - **Head:** within normal limits.
  - **Eyes:** within normal limits.
  - **Ears:** within normal limits.
  - **Nose:** within normal limits.
  - **Throat:** within normal limits.
- **Neck:** within normal limits.
- **Heart:** tachycardic, irregularly irregular. No murmurs, gallops, or rubs.
- **Lungs:** mild tachypnea, no accessory muscle use. No wheezes, rales, or rhonchi.
- **Abdominal/GI:** within normal limits.
- **Genitourinary:** normal external genitalia.
- **Rectal:** sacral decubitus ulcer noted with surrounding erythema, induration, and warmth. No associated fluctuance or crepitation. Intact rectal tone. Soft brown stool without gross blood.
- **Extremities:** swan neck deformities to hands bilaterally. Otherwise normal
- **Back:** sacral decubitus ulcer noted with surrounding erythema, induration, and warmth. No associated fluctuance or crepitation. C-T-L spine otherwise within normal limits.
- **Neuro:** GSC 14. Oriented to person, place. Thinks it 1997. No focal deficits.
- **Skin:** Sacral decubitus ulcer with purulent drainage with surrounding erythema and induration.
- **Lymph:** within normal limits.
- **Psych:** within normal limits.

INSTRUCTOR MATERIALS

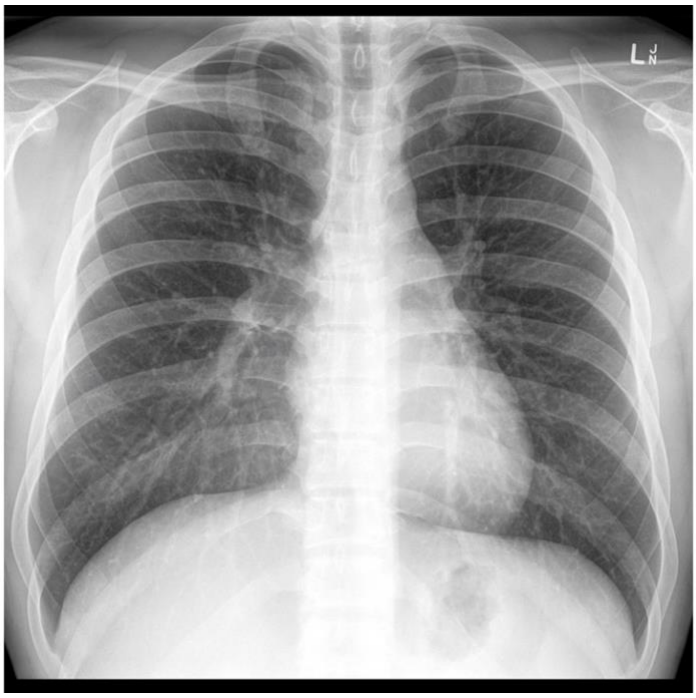
Results:

Complete blood count (CBC)	
White blood count (WBC)	14.0 x1000/mm^3(H)
Hemoglobin (Hgb)	10.5 g/dL
Hematocrit (HCT)	30.0 %
Platelet (Plt)	170 x1000/mm^3
Segs	79%
Bands	10%
Basic metabolic panel (CMP)	
Sodium	133 mEq/L
Chloride	99 mEq/L
Potassium	4.2 mEq/L
Bicarbonate (HCO_3)	18 mEq/L (L)
Blood Urea Nitrogen (BUN)	60 mg/dL (H)
Creatine (Cr)	2.2 mg/dL (H)
Glucose	85 mg/dL
Calcium	8.0 mg/dL
Liver Function Test (LFT)	
Total bilirubin	0.8 mg/dL
Direct bilirubin	0.2 mg/dL
Albumin	3.0 g/dL
Alkaline Phosphate	100 U/L
Total Protein	7.0 g/dL
Aspartate Aminotransferase (AST)	30 u/L
Alanine Aminotransferase (ALT)	40 u/L
Lactate	2.2 mEq/L
Cardiac Enzymes	
Troponin-I	< 0.015 ng/mL
Urinalysis	
Color	dark yellow
Spec gravity	1.015

INSTRUCTOR MATERIALS

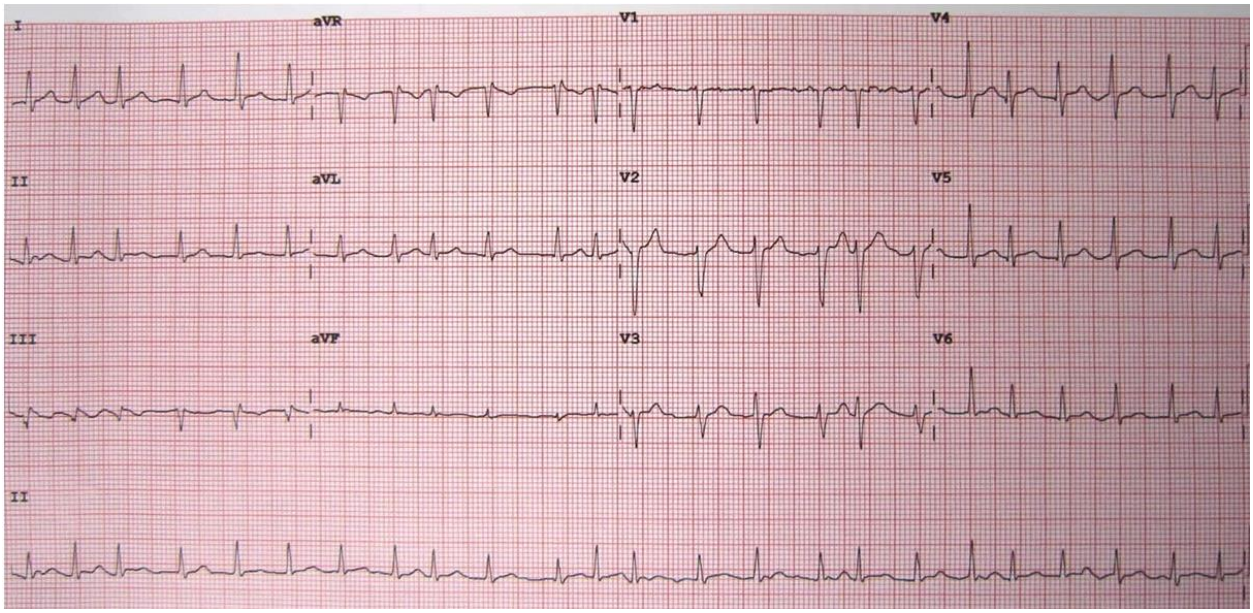
Glucose	negative
Ketones	negative
Hemoglobin	negative
Leukocyte esterase	negative
Nitrite	negative
Red blood cells (RBC)	0-5 /HPF
White blood cells (WBC)	0-5 /HPF
Bacteria	none
Squamous epithelial	0-5 /HPF

Chest X-ray: Normal (author's own image)

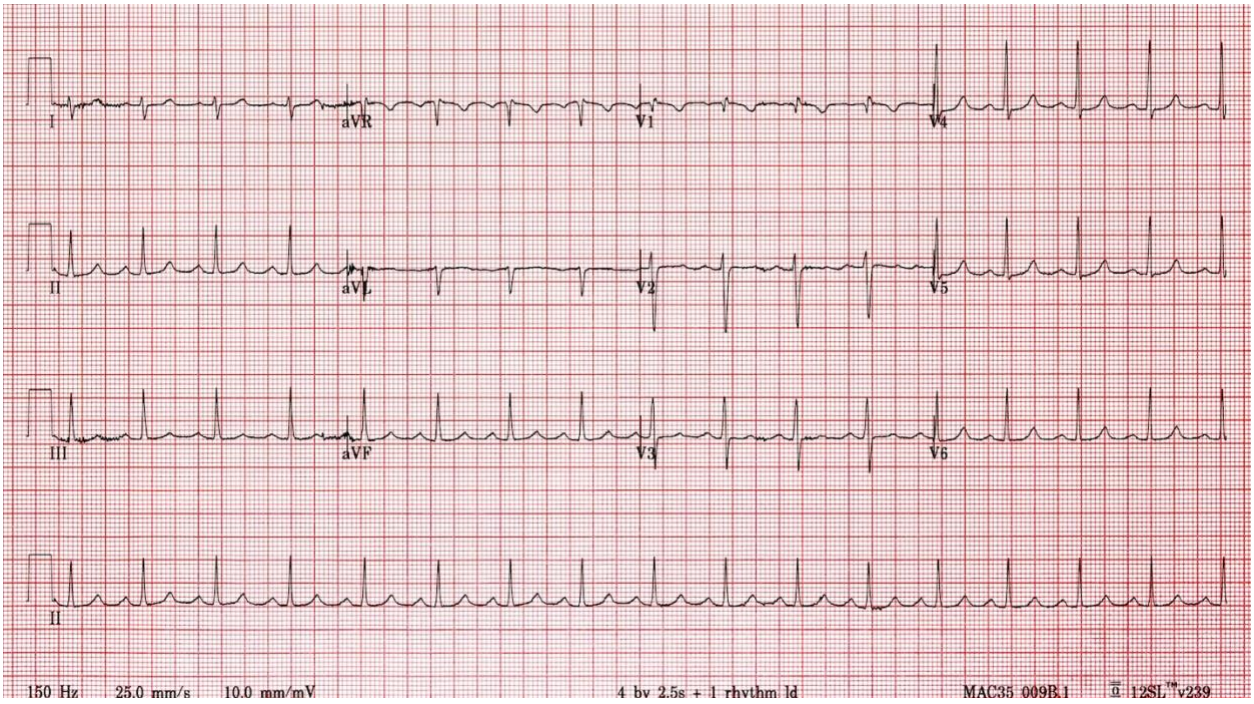


INSTRUCTOR MATERIALS

ECG #1: atrial fibrillation with RVR (author's own image)

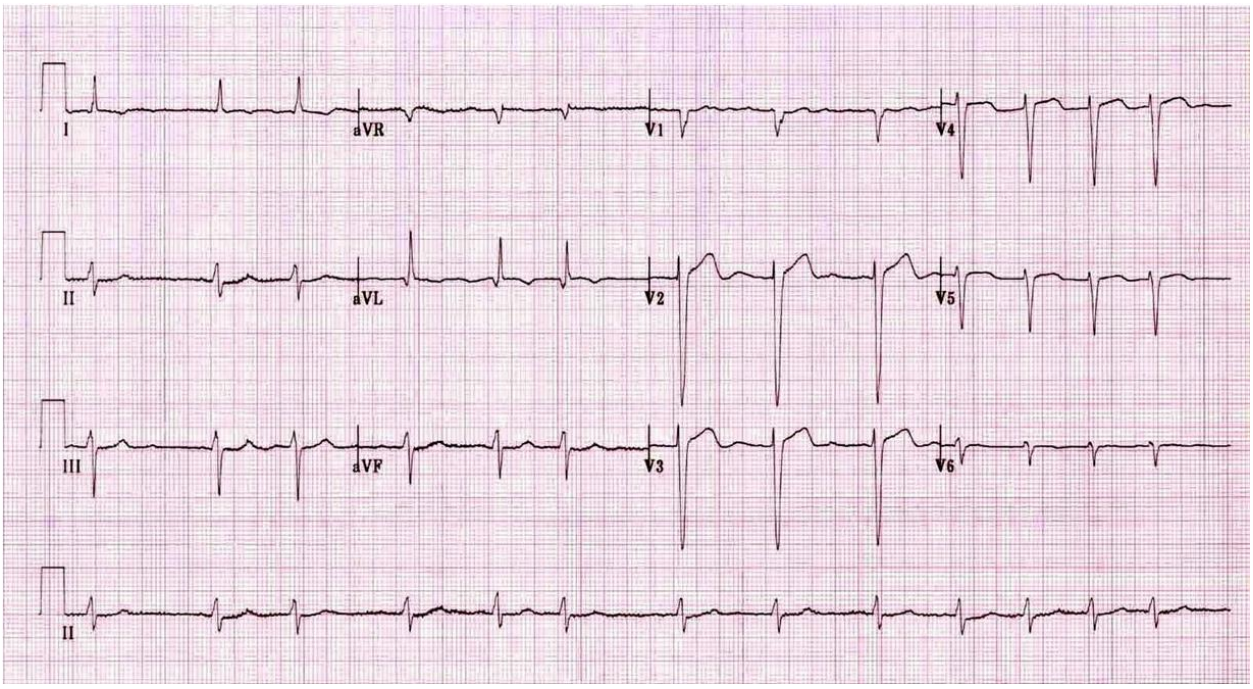


ECG #2: sinus tachycardia (author's own image)



INSTRUCTOR MATERIALS

ECG #3: atrial fibrillation, rate controlled (author's own image)



Decubitus ulcer image

Afro Brazilian. Decubitus of left hip region. In: Wikimedia Commons [free media repository]. https://commons.wikimedia.org/wiki/File:Decubitus_02.JPG. The Wikimedia Foundation; 2016.

OPERATOR MATERIALS

SIMULATION EVENTS TABLE:

Minute (state)	Participant action/ trigger	Patient status (simulator response) & operator prompts	Monitor display (vital signs)
0:00 (Baseline)	Patient placed into bed in ED. Participants obtain history.	Patient in gurney, complaining of dizziness.	T 37.7 C HR 135 BP 98/46 RR 22 O_2sat 93% RA
1:00	IV placed, labs ordered.	If patient is given fluid bolus only or fluid bolus with rate control, go to state A. If rate control performed without IV fluids, go to state B. If cardioversion performed, go to state C	T 37.7 C HR 135 BP 98/46 RR 22 O_2sat 93% RA
3:00 A	IV placed, IVF given.	If patient is given 30mL/kg fluid bolus correctly without concurrent rate controlling medications, tachycardia and hypotension will improve. If not performed correctly, ie, <30 mL/kg ordered and administered with rate control, or only 1L NS ordered, patient will become hypotensive to 70/palp, tachycardic to 150, and will require intubation (GCS 8, E2V2M4).	T 37.7 C HR 116 BP 108/54 RR 22 O_2sat 93% RA
3:00 B	Rate control medications given.	Patient will deteriorate clinically, mental status will worsen to a GCS of 12 (E3V3M6), and patient will become hypotensive. If 30 mL/kg intravenous fluids are then given, go to vitals A. If <30 mL/kg intravenous fluids are given, vitals remain unchanged until 30mL/kg fluids are given or patient is started on vasopressors.	T 37.7 C HR 100 BP 66/- RR 24 O_2sat 90% RA

OPERATOR MATERIALS

Minute (state)	Participant action/ trigger	Patient status (simulator response) & operator prompts	Monitor display (vital signs)
3:00 C	Synchronized cardioversion.	If synchronized cardioversion is correctly performed, patient will convert to sinus tachycardia. Patient will then spontaneously revert back to atrial fibrillation after 1 minute with baseline vitals. If 30 mL/kg intravenous fluids are then given, vitals will improve, go to State A. If <30 mL/kg intravenous fluids are given, vitals remain unchanged from baseline, go to State B.	T 37.7 C HR 140 sinus tach BP 90/50 RR 22 O_2sat 93% RA
5:00	IV antibiotics ordered.	Blood work results, imaging results. If source of infection is not discovered, nursing will attempt to place foley and notice decubitus ulcer.	T 37.6 C HR 108 BP 98/62 RR 28 O_2sat 94% RA
(Case Completion)	IV fluid bolus and antibiotics are given. Participants call for ICU admission.		T 37.6 C HR 108 BP 98/62 RR 28 O_2sat 94% RA

Diagnosis:
Severe sepsis with a soft tissue source, atrial fibrillation with rapid ventricular response.

Disposition:
Admission to ICU or stepdown unit

DEBRIEFING AND EVALUATION PEARLS

Sepsis and Atrial Fibrillation with RVR

Sepsis can have a subtle initial presentation; however, physicians should have a high suspicion for this diagnosis, as mismanagement is associated with significant morbidity and mortality.

There are varying sepsis definitions and screening criteria, which are occasionally conflicting with each other. CMS core measures and Sepsis-III are described below.

- CMS core measure: The Severe Sepsis/Septic Shock Early Management Bundle (SEP-1)
    - Severe sepsis definition: a suspected source of infection, 2 SIRS criteria, and evidence of end-organ dysfunction.
        - Lactate and blood cultures must be drawn and broad-spectrum antibiotics must be started within three hours of presentation.
        - If the first lactate was 2 or greater, a repeat lactate must be drawn within 6 hours of the first lactate.
    - Septic shock definition: an initial lactate greater than or equal to 4, OR evidence of hypotension documented an hour after completion of a 30 mL/kg IVF bolus.
        - A 30 mL/kg bolus must be started within three hours.
        - Pressors should be started within 6 hours, as well as an assessment of volume status and tissue perfusion.

- Sepsis-III (created by ESICM and SCCM from January 2014-January 2015)
    - Sepsis: *"life-threatening organ dysfunction due to a dysregulated host response to infection";* however, the definition of sepsis is still subjective, defined in part by suspected infection causing organ dysfunction.
    - Septic Shock
        - Persisting hypotension requiring vasopressors to maintain MAP ≥65 mm Hg.
        - Blood lactate >2 mmol/L despite adequate volume resuscitation.
- Sepsis-III does not include “severe sepsis” terminology.
- Sepsis-III has not been endorsed by ACCP, IDSA, any emergency medicine society, or hospital medicine society.

A "quick SOFA" (qSOFA) consists of three domains:

- Hypotension: SBP < 100 mmHg
- Altered mental status: any GCS less than 15
- Tachypnea: respiratory rate > 22

DEBRIEFING AND EVALUATION PEARLS

The qSOFA is an illness-severity score to predict a prolonged ICU stay or in-hospital mortality, but it is not a sepsis screening tool or a sepsis definition.
A thorough history and physical examination is important to identify potential sources of infection.

Management of sepsis includes fluid resuscitation, broad-spectrum antibiotics, and clinical reassessment for need for hemodynamic support with vasopressors, particularly if patient has a MAP below 65 mmHg despite completion of a 30 mL/kg bolus.

Code status discussions should be held with chronically ill and elderly patients, including desire for intubation, chest compressions, and vasopressor support.

Patients with atrial fibrillation with RVR that meet hemodynamically unstable criteria should immediately undergo synchronized cardioversion, but hemodynamically stable patients should undergo a thorough history and physical exam. Hemodynamic instability is present if patients have acute altered mental status, signs of decompensated heart failure, ischemic chest pain, or hypotension.

It is important to search for an underlying cause of new atrial fibrillation and to carefully consider the risks and benefits of treating rapid ventricular response. Acute causes of atrial fibrillation include a hyperthyroid state, electrolyte disturbances such as hypomagnesemia or hypokalemia, post-operative states, and alcohol use. Chronic conditions may also contribute, such as rheumatic heart disease, chronic hypertensive heart disease, coronary artery disease, and heart failure. Certain subsets of patients, such as those in a shock state, are reliant on increased cardiac output to maintain adequate perfusion to vital organs.

Other debriefing points:
Closed-loop communication amongst team: was it used? Why or why not? Were there any implications of this during case execution?

SIMULATION ASSESSMENT

Severe Sepsis Manifesting as A-Fib with RVR

Learner: _____

Assessment Timeline

This timeline is to help observers assess their learners. It allows observer to make notes on when learners performed various tasks, which can help guide debriefing discussion.

Critical Actions	
1. Obtain 2 points of IV access	0:00
2. Obtain a blood glucose level	
3. Place the patient on continuous cardiac monitoring	
4. Administer 30 mL/kg normal saline bolus	
5. Order labs, lactate, CXR, ECG, and blood and urine cultures	
6. Diagnose severe sepsis with a soft tissue infection as the source	
7. Diagnose atrial fibrillation with rapid ventricular response	
8. Start broad spectrum antibiotics	
9. Reassessment of the patient's clinical status and vital signs	
10. Admit to intensive care unit or stepdown service	

SIMULATION ASSESSMENT

Severe Sepsis Manifesting as A-Fib with RVR

Learner: _____

Critical Actions:

- ☐ Obtain 2 points of IV access
- ☐ Obtain a blood glucose
- ☐ Place the patient on continuous cardiac monitoring
- ☐ Administer 30 mL/kg NS bolus
- ☐ Order labs, lactate, CXR, ECG, blood and urine cultures
- ☐ Diagnose severe sepsis with a soft tissue infection as the source
- ☐ Diagnose A-fib with RVR
- ☐ Start broad spectrum antibiotics
- ☐ Reassessment of the patient's clinical status and vital signs
- ☐ Admit to intensive care unit or stepdown service

Summative and formative comments:

Milestones assessment:

	Milestone	Did not achieve level 1	Level 1	Level 2	Level 3
1	**Emergency Stabilization (PC1)**	☐ Did not achieve Level 1	☐ Recognizes abnormal vital signs	☐ Recognizes an unstable patient, requiring intervention Performs primary assessment Discerns data to formulate a diagnostic impression/plan	☐ Manages and prioritizes critical actions in a critically ill patient Reassesses after implementing a stabilizing intervention

Standardized assessment form for simulation cases. JETem © Developed by: Megan Osborn, MD, MHPE; Shannon Toohey, MD; Alisa Wray, MD
Nicholson P, et al. Severe Sepsis Manifesting as A-Fib with RVR. JETem 2018. 3(1):S1-21.
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SIMULATION ASSESSMENT

Severe Sepsis Manifesting as A-Fib with RVR

Learner: _____

	Milestone	Did not achieve level 1	Level 1	Level 2	Level 3
2	**Performance of focused history and physical (PC2)**	☐ Did not achieve Level 1	☐ Performs a reliable, comprehensive history and physical exam	☐ Performs and communicates a focused history and physical exam based on chief complaint and urgent issues	☐ Prioritizes essential components of history and physical exam given dynamic circumstances
3	**Diagnostic studies (PC3)**	☐ Did not achieve Level 1	☐ Determines the necessity of diagnostic studies	☐ Orders appropriate diagnostic studies. Performs appropriate bedside diagnostic studies/procedures	☐ Prioritizes essential testing Interprets results of diagnostic studies Reviews risks, benefits, contraindications, and alternatives to a diagnostic study or procedure
4	**Diagnosis (PC4)**	☐ Did not achieve Level 1	☐ Considers a list of potential diagnoses	☐ Considers an appropriate list of potential diagnosis May or may not make correct diagnosis	☐ Makes the appropriate diagnosis Considers other potential diagnoses, avoiding premature closure
5	**Pharmacotherapy (PC5)**	☐ Did not achieve Level 1	☐ Asks patient for drug allergies	☐ Selects an medication for therapeutic intervention, consider potential adverse effects	☐ Selects the most appropriate medication and understands mechanism of action, effect, and potential side effects Considers and recognizes drug-drug interactions

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Learner: _____

	Milestone	Did not achieve level 1	Level 1	Level 2	Level 3
6	**Observation and reassessment (PC6)**	☐ Did not achieve Level 1	☐ Reevaluates patient at least one time during case	☐ Reevaluates patient after most therapeutic interventions	☐ Consistently evaluates the effectiveness of therapies at appropriate intervals
7	**Disposition (PC7)**	☐ Did not achieve Level 1	☐ Appropriately selects whether to admit or discharge the patient	☐ Appropriately selects whether to admit or discharge Involves the expertise of some of the appropriate specialists	☐ Educates the patient appropriately about their disposition Assigns patient to an appropriate level of care (ICU/Tele/Floor) Involves expertise of all appropriate specialists
9	**General Approach to Procedures (PC9)**	☐ Did not achieve Level 1	☐ Identifies pertinent anatomy and physiology for a procedure Uses appropriate Universal Precautions	☐ Obtains informed consent Knows indications, contraindications, anatomic landmarks, equipment, anesthetic and procedural technique, and potential complications for common ED procedures	☐ Determines a back-up strategy if initial attempts are unsuccessful Correctly interprets results of diagnostic procedure
20	**Professional Values (PROF1)**	☐ Did not achieve Level 1	☐ Demonstrates caring, honest behavior	☐ Exhibits compassion, respect, sensitivity and responsiveness	☐ Develops alternative care plans when patients' personal beliefs and decisions preclude standard care

Standardized assessment form for simulation cases. JETem © Developed by: Megan Osborn, MD, MHPE; Shannon Toohey, MD; Alisa Wray, MD
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SIMULATION ASSESSMENT

Severe Sepsis Manifesting as A-Fib with RVR

Learner: _____

	Milestone	Did not achieve level 1	Level 1	Level 2	Level 3
22	**Patient centered communication (ICS1)**	☐ Did not achieve level 1	☐ Establishes rapport and demonstrates empathy to patient (and family) Listens effectively	☐ Elicits patient's reason for seeking health care	☐ Manages patient expectations in a manner that minimizes potential for stress, conflict, and misunderstanding. Effectively communicates with vulnerable populations, (at risk patients and families)
23	**Team management (ICS2)**	☐ Did not achieve level 1	☐ Recognizes other members of the patient care team during case (nurse, techs)	☐ Communicates pertinent information to other healthcare colleagues	☐ Communicates a clear, succinct, and appropriate handoff with specialists and other colleagues Communicates effectively with ancillary staff

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Nicholson P, et al. Severe Sepsis Manifesting as A-Fib with RVR. JETem 2018. 3(1):S1-21.
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