ACEP Ultrasound Simulation Case Template

SIMULATION CASE TITLE: COPD Exacerbation
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PATIENT NAME: Fannie Mae Brown
PATIENT AGE: 55 years old
CHIEF COMPLAINT: Shortness of breath

Brief narrative description of case *Include the presenting patient chief complaint and overall learner goals for this case*	CC: Shortness of breath, cough This is a 55 year old female with a history of CHF and COPD who presents with cough and shortness of breath for 3 days. She is found to have a COPD exacerbation. Her bedside ultrasound shows normal cardiac function and no pulmonary edema, so she is treated with nebs and steroids. Learners should be able to distinguish between a CHF exacerbation and COPD exacerbation using ultrasound and manage the COPD exacerbation effectively.
Primary Learning Objectives *What should the learners gain in terms of knowledge and skill from this case? Use action verbs and utilize Bloom's Taxonomy as a conceptual guide*	1. Recognize respiratory distress 2. Distinguish between COPD and CHF exacerbations using bedside ultrasound 3. Manage COPD exacerbation
Critical Actions *List which steps the participants should take to successfully manage the simulated patient. These should be listed as concrete actions that are distinct from the overall learning objectives of the case.*	1. Get vital signs, place patient on monitor 2. Recognize abnormal vital signs and address them – start patient on oxygen 3. HPI, physical exam 4. Perform and interpret bedside cardiac and lung ultrasounds 5. Manage COPD exacerbation 6. Reassess 7. Dispo – if improving, admit to floor; if decompensating, admit to ICU
Learner Preparation *What information should the learners be given prior to initiation of the case?*	This scenario takes place in an ED. The nurse assigned to this patient is also caring for 3 other patients. You have a tech assigned to your pod. You have respiratory therapy, pharmacy, lab services available in the hospital. You currently have available beds on the floor as well as in the ICU.

Required Equipment *What equipment is necessary for the case?*	ED room set up with cardiac monitor with BP cuff/pulse ox/temp probe, peripheral IV, IV fluids and medications, nebulizer mask and medications, EKG, CXR image, ultrasound machine and images, stethoscope If patient decompensates: BiPAP, ETT, ventilator, laryngoscope, RSI medications, BVM.

INITIAL PRESENTATION	
Initial vital signs	HR: 90/min BP: 150 / 90 RR: 30 /min O$_2$SAT: 86% T: 37°F
Overall Appearance *What do learners see when they first enter the room?*	Patient is a middle-aged woman sitting upright on a gurney. She appears uncomfortable with increased respiratory effort.
Actors and roles in the room at case start *Who is present at the beginning and what is their role? Who may play them?*	Patient, RN, tech, physician(s)
HPI *Please specify what info here and below must be asked vs what is volunteered by patient or other participants*	Volunteered: Nurse reports the new patient is a 55yo F who has SOB, cough for the last 3 days. Must be asked: Course of illness – has gotten progressively worse x 3 days, no relief with her medications at home. No change in dyspnea with exertion or position. Has a chronic cough, more frequent and now productive of yellow phlegm x 3 days. No lower extremity swelling, chest pain, fevers. Had similar symptoms ~ 1 year ago – was admitted to the hospital but does not remember her diagnosis at that time. Thinks she has been on BiPAP before, but no intubations. Not on home oxygen. No h/o DVT/PE.
ROS	Volunteered: No headache, weakness, numbness, dysuria, hematuria, back pain, syncope, abdominal pain, visual changes, vomiting, diarrhea, constipation, rash, back pain, syncope. Must be asked: Denies CP, fevers, back, LE swelling/pain.
Past Medical History	Congestive heart failure, COPD, hypertension, diabetes mellitus, hyperlipidemia Social: +tobacco abuse, occasional alcohol use, denies illicits
Past Surgical History	cholecystectomy
Family History	Diabetes, hypertension

Medications	Lisinopril, metoprolol, Lasix, metformin, albuterol, Spiriva, aspirin
Allergies	No known drug allergies
PHYSICAL EXAMINATION	
General	Mild distress, appears tired and uncomfortable
HEENT	NC/AT, mucus membranes moist, extraocular movements intact, pupils equal round and reactive to light
Neck	Neck supple, trachea midline, no JVD
Respiratory	Tachypneic, diminished breath sounds bilaterally with wheezing bilaterally, able to talk in short sentences
Cardiovascular	Regular rate and rhythm, no murmurs, no peripheral edema
Abdomen	Soft, nontender, nondistended, normal bowel sounds
Neurological	AAO x 3, CN II-XII intact, motor intact, sensation intact, speech intact
Skin	Warm, dry
GU	Deferred
Extremities	Moves all extremities equally, 2+ distal pulses x 4, no peripheral edema
Psychiatric	Cooperative

SCENARIO STATES, MODIFIERS AND TRIGGERS
This section should be a list with detailed description of each step than may happen during the case. If medications are given, what is the response? Do changes occur at certain time points? Should the nurse or other participant prompt the learners at given points? Should new actors or participants enter, and when? Are there specific things the patient will say or do at given times?

PATIENT STATUS	LEARNER ACTIONS, MODIFIERS & TRIGGERS TO MOVE TO THE NEXT STATE	
1. Baseline Rhythm: NSR HR: 90/min BP: 150/90 RR: 30/min O$_2$SAT: 86% T: 37ºF	Learner Actions: • Place patient on monitor and get VS • Recognize abnormal VS • Start oxygen • Take HPI, PE • Start IV and draw labs	Modifiers: *Changes to patient condition based on learner action* • If no oxygen placed, SpO2 drops to 80% Triggers: *For progression to next state* • Learner recognizes abnormal vital signs and addresses hypoxia by placing patient on oxygen. • SpO2 improves to 94% on 2L NC

2. Rhythm: NSR HR: 90/min BP: 150/90 RR: 26/min O$_2$SAT: 94% on 2L NC T: 37°F	Learner Actions: • Order labs, CXR, EKG • Radiology CXR response: "it will be a while until we can get there". • Bedside ultrasound to assess heart and lungs	Modifiers: • If CHF meds given, patient will become hypotensive and confused • If started on BiPAP, duonebs, steroids, will start to symptomatically improve Triggers: • Learner performs and correctly interprets cardiac and lung ultrasounds – no pulmonary edema, normal cardiac ejection fraction. • Learner diagnoses patient with COPD exacerbation
3. Rhythm: NSR HR: 90/min BP: 145/85 RR: 26/min O$_2$SAT: 94% on 2L NC T: 37°F	Learner Actions: • If not given yet, start duonebs, steroids • Consider antibiotics	Modifiers: • If no meds given, patient will decompensate and require BiPAP for worsening hypoxia and increased respiratory effort Triggers: • Learner correctly manages COPD exacerbation
4. Rhythm: NSR HR: 70/min BP: 140/80 RR: 20/min O$_2$SAT: 96% on 2L NC T: 37°F Lung exam: moderate air flow, inspiratory and expiratory wheezing bilaterally	Learner Actions: • Reassess, assure patient is improving and admit to the floor	Modifiers: • If no disposition made, patient should prompt learner by asking "Can I go home?" If learner says "yes", patient should ask "what about this oxygen?" When taken off oxygen, SpO2 86% again. Triggers: • Case completed when admission call placed to hospitalists.
5. Rhythm: HR: /min BP: / RR: /min O$_2$SAT: % T: ^{o}F	Learner Actions: •	Modifiers: • Triggers: •

SUPPORTING DOCUMENTS, LAB RESULTS AND MULTIMEDIA	
Lab Results	Troponin 0.00 CBC – WBC: 5.5, Hgb: 12, Hct: 36%, Platelets: 175k BMP: Na: 138, Cl: 103, K: 3.3, CO2: 28, BUN: 25, Cr: 1.2, Ca: 9, Glucose: 110 BNP: 150 D-dimer: negative ABG: pH: 7.30, pCO2: 50, pO2: 70, HCO3: 26, FiO2: 0.21
EKG	Normal sinus rhythm, no ST depression or elevation, normal intervals
CXR CT imaging	CXR shows hyperinflated lungs, negative for acute findings Chest CT PE negative for PE, PNA
Ultrasound Video Files	Lung fields – A lines, no pulmonary edema or pleural effusions Echo – normal EF, no pericardial effusion, full IVC, no RV dilation

SAMPLE QUESTIONS FOR DEBRIEFING

1) What was your differential at the beginning of the case before any diagnostics were performed?

2) How does ultrasound help you distinguish between a CHF and COPD exacerbation?

3) What are contraindications to using positive pressure ventilation?

Ideal Scenario Flow
Provide a detailed narrative description of the way this case should flow if participants perform in the ideal fashion.

> *The learners enter the room to find a patient in mild respiratory distress. They immediately place the patient on bedside monitors and recognize that the patient is hypoxic. Supplemental oxygen is provided while an IV is placed. Oxygen by nasal cannula will improve the patient's SpO2 and respiratory effort. The learners should get a history and perform a physical exam. They should order diagnostics to address their differential, including EKG, CXR, and lab work. The radiology tech should tell them that the CXR will "take a while" because they are currently with a sick patient. The learners should then use ultrasound to perform a bedside cardiac and lung ultrasound. They should be able to correctly interpret the images to diagnose a COPD exacerbation and start the patient on nebulizer meds and steroids as well as consider an antibiotic. If they try to use an MDI, patient will not be able to use it correctly. If the patient is treated for CHF, she will decompensate and become hypotensive and altered. If no medications are given, patient will become progressively more hypoxic with worsening respiratory distress and require BiPAP. Learners should reassess the patient after treatments to ensure patient is improving and admit her to the floor for persistent new oxygen requirement and COPD exacerbation; if patient has decompensated, will require ICU admission.*

Anticipated Management Mistakes
Provide a list of management errors or difficulties that are commonly encountered when using this simulation case.

1. *Failure to recognize abnormal vital signs*
2. *Failure to use ultrasound for bedside diagnosis and waiting on CXR – this should lead to the patient decompensating*
3. *Treating the patient for CHF exacerbation instead of COPD exacerbation*