

**I. CHF Exacerbation**

**II. Target Audience: EM1 Residents**

**III. Learning Objectives or Assessment Objectives**

A. Primary -

1. Approach of the dyspneic patient
2. Medical treatment of patients with CHF
3. Skills assessment of endotracheal intubation

B. Secondary -

1. Clinical differentiation of dyspnea
  - COPD/Asthma
  - CHF
  - PE
2. Pathophysiology and clinical manifestations of diastolic vs. systolic failure
3. Work up of new-onset CHF vs. exacerbation

C. Critical Actions Checklist (see eval form for details)

1. Identifies and treats hypoxia
2. Focused H&P to determine cause of dyspnea
3. Identifies clinical signs of CHF
4. BP control with nitrates
5. Identifies impending respiratory failure and manages airway

**IV. Environment**

B. Lab Set Up

- Sim lab

C. Manikin Set Up

- METI ECS
  - a. Bubble wrap over "lungs" for better rales
  - b. Skin-colored playdoh in saran wrap over legs for pitting edema

D. Equipment

- bag valve mask
- Non rebreather
- Nasal cannula
- nasal and oral airways
- Straight and curved blades of various sizes
- ET tubes of various sizes
- Stylet

E. Distractors

- None

## **V. Actors**

### F. Roles – Patient

- Faculty to act as patient
- Sim Jockey to advance scenario as directed by Faculty

## **VI. Case Narrative (describes what the learner will experience)**

### G. Scenario Background Given to Participants (see Stimuli)

- CC: Shortness of breath
- HPI: 1 week history of gradually worsening SOB.
- PMH: HTN
- Meds: No BP meds. Has been taking ibuprofen 800mg 4-5 times a day for knee pain
- Family History: HTN
- Social History: Occasional EtOH, no tobacco or illicit

### H. Scenario Conditions Initially

- Patient initial exam:
  - ✓ Tachypneic
  - ✓ Patient able to speak in short sentences
  - ✓ RR upper 30s
  - ✓ SaO<sub>2</sub> 90-92% on room air.
  - ✓ Hypertensive
  - ✓ S3 gallop
  - ✓ Peripheral pitting edema
- Patient pathophysiology
  - ✓ Uncontrolled hypertension (not taking meds)
  - ✓ NSAID use → fluid retention
  - ✓ Decreased cardiac output due to increased afterload → pulmonary edema

### I. Scenario Branch Points

- See Scenario Setup

## **VII. Instructor Notes**

### J. Tips to keep scenario flowing:

- Pt initially hypoxic – may prompt for supplemental O<sub>2</sub> if not provided
- Manual transitions to worsening pulmonary edema as indicated by trainee's progress. Part of the skills

assessment is intubation, so regardless of intervention, the pt will deteriorate.

B. Tips for actors:

- Speak in short phrases initially to demonstrate dyspnea

C. Scenario Programming

- ECS - "Standard Man"
  1. see Scenario Setup
- Stimuli available:
  1. CXR - pulmonary edema
  2. CXR - post intubation
  3. EKG - LVH, strain
  4. Lab work: mild renal insufficiency, elevated BNP, nl CIEs, slight bump in transaminases due to liver congestion

## VIII. Debriefing Plan

K. Method for debriefing

- Videotape of case for later review with preceptor
- Group debriefing of critical actions, play of the case (ideal vs. actual)

L. Actual debriefing materials:

- Resident checklist - review with individual and group
- Review article

M. Rules for the debriefing:

- Debriefing after clinical conclusion of case
- Ask participant for self-evaluation first
- Solicit group assessment
- Video provided to participant later for review with preceptor
- Facilitated discussion of clinical case (see questions)

D. Questions to facilitate the debriefing

- CHF is often called a symptom rather than a diagnosis. Why is that?
- Describe the pathophysiology of CHF due to diastolic vs. systolic dysfunction. (Note that this is an echo determined difference - clinically we can't tell)
- What causes the hypoxia of CHF? (V/Q mismatch due to shunt)
- Why does nitroglycerin help CHF? How long does it take to work?
- Why does lasix help CHF? How long does it take to work?
- How does BiPAP work? What does it stand for? How is it different from CPAP?

- For what patients would CPAP not work? (COPD patients have hypercapnea, so need bipap or intubation)
- What are the indications for intubation?
- Discuss the utility of BNP in the diagnosis of CHF.
- What other conditions present with pulmonary edema?

Etiologies of pulmonary edema may be placed in the following 6 categories:

1. **Altered capillary permeability**—includes acute respiratory deficiency syndrome (ARDS), infectious causes, inhaled toxins, circulating exogenous toxins, vasoactive substances, disseminated intravascular coagulopathy (DIC), immunologic processes reactions, uremia, near drowning, and other aspirations.
2. **Increased pulmonary capillary pressure** —comprises cardiac causes and noncardiac causes, including pulmonary venous thrombosis, stenosis or veno-occlusive disease, and volume overload.
3. **Decreased oncotic pressure** (hypoalbuminemia )
4. **Lymphatic insufficiency**
5. **Large negative pleural pressure** with increased end expiratory volume
6. **Mixed or unknown mechanisms** including high altitude pulmonary edema (HAPE), neurogenic pulmonary edema, heroin or other overdoses, pulmonary embolism, eclampsia, postcardioversion, postanesthetic, postextubation, and post-cardiopulmonary bypass

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## **IX. Pilot Testing and Revisions**

- A. Numbers of participants: 2 (1 primary, 1 support)
- B. Evaluation forms - for and by participants

## **X. Authors and their affiliations**

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## **XI. Resources and References**

- A. Aurigemma GP, Gaasch WH. Diastolic Heart Failure NEJM 2004;351:1097-1105
- B. Gimbel, R. "CHF CPAP Airway Management" Simulation Interest Group Case Library [www.saem.org](http://www.saem.org)