I. Title: PEA Arrest (Tension PTX)

II. Target Audience: EM1 Residents

III. Learning Objectives or Assessment Objectives

A. Primary
   1. Perform cardiac resuscitation of PEA arrest according to 2010 ACLS guidelines
   2. Identify clinical picture of tension pneumothorax (deviated trachea, unilateral breaths sounds, hypotension)
   3. Perform needle thoracentesis with correct placement

B. Secondary
   1. List the possible causes of a PEA arrest (6H6T)
   2. Explain the difference in epidemiology and pathophysiology between spontaneous and secondary pneumothoraces

C. Critical actions checklist (see attached form for details):
   1. IV, O2, monitor
   2. Elicits history from EMS personnel
   3. Checks for tracheal deviation
   4. Performs needle decompression
   5. Performs tube thoracostomy
   6. Admits to ICU

1. Environment

A. Lab Set Up – ED room
B. Manikin Set Up – Laerdal 3G Street Clothes
C. Props – none
D. Stimuli –
   1. H&P
   2. UDS (positive cocaine)
   3. Post-resuscitation ECG
E. Distractors – none

2. Actors

A. Roles –
   1. EMS – provides initial history
   2. Friend who arrives later can provide history of crack use

3. Case Narrative

A. Scenario Background Given to Participants (all freely provided)
   1. CC: Unresponsive at party
   2. PMH: None
   3. Meds: None

4. Allergies: None
5. Family history: None
6. Social history: (+) tobacco, (+) marijuana

B. Scenario conditions initially
   1. Patient found unresponsive in corner at a party
   2. Patient's initial exam:
      - PEA Arrest
      - Unilateral BS with BVM
      - Tracheal deviation
   3. Patients physiology
      - Tension pneumothorax

C. Scenario branch points
   1. Pt will remain in PEA arrest until needle decompression

IV. Instructors Notes

A. Pt is tall and thin (not Marfanoid), and smokes tobacco and crack on a regular basis. Had a spontaneous pneumothorax, worsened to tension.

2. Actors:
1. EMS: Provides HPI per report on-scene.

C. Scenario programming
   1. Optimal management path (see evaluation checklist)
   2. Potential errors path(s)
      - Not recognizing clinical picture of tension pneumothorax
      - Not doing toxicology workup
   3. Program debugging
      a. Activate needle decompression

2. Debriefing Plan

A. Method for debriefing
   - Videotape of case for later review with preceptor
   - Group debriefing of critical actions, play of the case (ideal vs. actual)
   - Replay critical sections as needed to reinforce correct actions

B. Actual debriefing materials:
   - Resident checklist – review with individual and group
   - ACLS PEA flowsheet

C. 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

D. Facilitated discussion of clinical case (see questions below):

1. What are the causes of PEA Arrest?
   - 6 "H"s
     1. Hypovolemia
     2. Hypoxia
     3. Hydrogen ion (acidosis)
     4. Hypo/Hyperkalemia
     5. Hypoglycemia
     6. Hypothermia
   - 6 "T"s
     1. Toxins
     2. Tamponade
     3. Thrombosis – MI
     4. Thrombosis – PE
     5. Tension PTX
     6. Trauma – increased ICP
2. Define primary vs. secondary pneumothorax
   - Primary: Spontaneous due to intrinsic lung anatomy (apical bleb)
   - Secondary: Spontaneous due to concomitmant condition such as smoking, infection
3. List the etiologies and epidemiology of primary and secondary pneumothorax
   - Primary: M:F 6:1, 20-40 yoa (peaks in 20s), 28% recurrence rate
   - Secondary: M:F 3:1, 60-65 yoa, 43% recurrence rate
4. What conditions are risk factors for spontaneous PTX?
   - Smoking
   - AIDS/PCP pneumonia
   - Cystic Fibrosis
   - Tuberculosis
   - Necrotizing pneumonia
   - Intersitial lung disease
5. What percentage of spontaneous PTX progress to tension?
   - Only 1-2%.
6. How reliable is tracheal deviation in tension ptx?
   - Relatively late finding, as is hypotension. Suggests arrest is imminent…

3. Pilot Testing and Revisions

A. Numbers of participants: 2-3 (1 primary, 2 support)
B. Evaluation forms - for and by participants

X. Authors and their affiliations

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XI. Resources and References

A. Part 7.2: Management of Cardiac Arrest *Circulation* 2005;112:IV-58-IV-66
B. Bowman JG. Pneumothorax, Tension and Traumatic www.eMedicine.com Aug 28, 2006.