Respiratory Crisis Patient’s with Case Study
Objectives

• Review Respiratory System
• Review ETCO$_2$
• Review Asthma and COPD
• Review Assembly of CPAP
• Review Patient Presentations
Basic Definitions

**Apnea** - absence of breathing

**Dyspnea** - abnormality of breathing rate, pattern or effort

**Orthopnea** - difficulty breathing while lying supine

**Tachypnea** - rapid respirations

**Bradypnea** - slow respirations

**Hypercarbia** - excessive levels of carbon dioxide in the blood
Basic Definitions

**Acidosis** - excess of acid in the body – PH < 7.35

**Alkalosis** - excess of base in the body PH > 7.45

**Ventilation** - mechanical process of moving air into and out of the lungs

**Perfusion** - supply of oxygen and nutrients to the body’s tissue as a result of constant passage of blood through the capillaries

**Respiration** - exchange of gases between a living organism and it’s environment
Basic Anatomy

Upper Airway
- Nasal cavity
- Nostril
- Oral cavity
- Larynx
- Right primary bronchus
- Right lung

Lower Airway
- Site of carina
- Left primary bronchus
- Left lung
- Diaphragm
Basic Anatomy

- Air
- Alveolar duct
- Pulmonary venule
- Pulmonary alveolus
- Pulmonary capillaries
- \( O_2/CO_2 \) exchange
- Pulmonary arteriole
Basic Physiology

**Inspiration**
Active process
Chest cavity expands
Intrathoracic pressure falls
Air flows in until pressure equalizes
Expiration
Passive process
Chest cavity size decreases
Intrathoracic pressure rises
Air flows out until pressure equalizes
Autonomic Function (Why do we breathe)

**Primary drive:** increase in arterial CO$_2$
   - (Hypercarbia) – need to get rid of excess CO$_2$

**Secondary drive:** decrease in arterial O$_2$
   - (Hypoxia) – need to get more O$_2$

**Hering – Breuer reflex:** a reflex triggered to prevent over-inflation of the lungs
   - Pulmonary stretch receptors present in the smooth muscle of the airways respond to excessive stretching of the lung during large inspirations
Respiratory Cycle

• **Respiration** - process of oxygen taken into body and distributed to the cells for energy
  – Carbon dioxide is returned to the lungs by the circulatory system and exhaled.
Respiratory Cycle (cont.)

Metabolism - Process by which an organism obtains energy by reacting $O_2$ with glucose to obtain energy.

Glucose (sugar) + Oxygen $\rightarrow$ Carbon dioxide + Water + Energy (as ATP)
Respiratory Cycle (cont.)

- **Ventilation** - Rate that gases enter and leave the lungs
  - **Minute Ventilation** - Total volume of gas entering lungs per minute
  - **Alveolar Ventilation** - Volume of gas that reaches the alveoli
  - **Dead Space Ventilation** - Volume of gas that does not reach the respiratory portions (150 ml)
Interpretation of ETCO₂

- Excellent correlation between ETCO₂ and cardiac output when cardiac output is low.
- When cardiac output is near normal, then ETCO₂ correlates with minute volume.
- Only need to ventilate as often as a “load” of CO₂ molecules are delivered to the lungs and exchanged for O₂ molecules.
How is ETCO$_2$ Measured?

- **Capnometry** - Analysis only of the presence of gases
  - no waveforms

- **Capnography** - Continuous analysis and recording of Carbon Dioxide concentrations in respiratory gases
  - waveforms and numeric values
Semi-Quantitative Capnometry

- Relies on pH changes
- Paper changes color
  - Purple to Brown to Yellow

Can Only Identify Good or Bad Ventilations
Waveform Capnography

- Adds continuous waveform display to the ETCO$_2$ value.
- Additional information in waveform shape can provide clues about causes of poor ventilations.
Capnography Waveform

- A-B – respiratory baseline
- B-C - expiratory upslope
- C-D - expiratory plateau
- D-E – inspiratory downslope

D – end of exhalation
  – point of measurement
ETCO$_2$ Values

- **Normal** 35 – 45 mmHg
- **Hypoventilation** > 45 mmHg
  - $\downarrow$ RR = $\uparrow$ CO$_2$
- **Hyperventilation** < 35 mmHg
  - $\uparrow$ RR = $\downarrow$ CO$_2$
Capnography Waveforms

• Hypoventilation
  – CO₂ is retained so values increase

• Hyperventilation
  – CO₂ is eliminated so values decrease
Capnography Waveforms

• Asthma or COPD
  – Difficulty exhaling evidenced by slow, gradual upslope
Capnography Waveforms

- Apnea or loss of advanced airway - flat line

Sudden increase in EtCO₂

- Return of spontaneous circulation (ROSC)
Pulse Oximetry

- Shows Oxygen Saturation (SpO₂)
- Reflects Oxygenation
- Slow to change when patient is hypoventilating or apneic

ETCO₂

- Shows Carbon Dioxide being exhaled
- Reflects Ventilation
- Hypoventilation/Apnea detected immediately

They should be used in conjunction with each other
Now what does all this mean to EMS?

- ETCO$_2$ is a great tool to help monitor the patient’s breath-to-breath status.
- Can help recognize airway obstructions before the patient has signs of a problem.
- Helps you control the ETCO$_2$ of head injuries.
- Can help to identify ROSC in cardiac arrest.
As you’re leaning over to check responsiveness, look at the monitor...........

Capnography provides an immediate picture of patient condition

Capnography will give an early indication that the patient status has changed
All that wheezes is not asthma....
Comparison of Asthma and COPD

- **Chronic obstructive pulmonary disease (COPD)**
  - general term that describes progressive respiratory diseases like *emphysema* and *chronic bronchitis*
  - Progressively worsening condition

- **Asthma**
  - Chronic condition that only affects the patient when a trigger activates it
Symptoms of Asthma/COPD:

- Wheezing
- Chest Tightness
- Shortness of Breath
- Cough

Both can be exacerbated by:

- viral infections
- exposure to tobacco/smoke
- pollutants (indoor and outdoor)
- occupational exposures
What is Asthma?

Asthma is a disease in which the airways become inflamed and irritable in response to an allergen.

The body limits the exposure by:
- inflammation of the lower airways
- release of a sticky mucous

Usually diagnosed in childhood/adolescence
- Adult onset is rare
Asthma
What is Chronic Obstructive Pulmonary Disease (COPD)?

- In **COPD**, the lungs become damaged following exposure to certain irritants
  - most common irritant - chronic smoking
  - chronic exposure causes damage
    - leads to airway obstruction & hyperinflation
      - commonly due to bacteria growth
- Usually diagnosed in Adulthood
  - Symptoms get progressively worse
COPD

A Normal Lungs
- Trachea (windpipe)
- Airways
- Left lung
- Right lung
- Bronchioles (tiny airways)

B Lungs with COPD
- Bronchioles lose their shape and become clogged with mucus
- Walls of alveoli are destroyed, forming fewer larger alveoli

Change to Alveoli structure
Treatment Philosophy:

- **Asthma**
  - attempt to lower or suppress inflammation

- **COPD**
  - reduce symptoms
MECHANICAL INTERVENTIONS
CPAP: Just a reminder on how it works

- Maintains constant pressure within the airway and throughout the respiratory cycle
  - Keeps alveoli open and expanded
- Also decreases venous return to the heart thereby lessening its work load
- In CHF, forces excess fluid out of alveoli & interstitial space back into the vasculature
- Can avert the need for advanced airway and mechanical ventilation if applied early enough
THIS IS HOW CPAP FEELS TO THE PATIENT!!
Indications

- Heart Failure - acute
- Asthma/COPD - severe
- Drowning – near/conscious
- Flail chest (w/o pneumothorax)
Contraindications

Airway
- Unable to obtain adequate seal
- Facial anomalies/injury

Breathing
- Inadequate resp rate/effort
- Pneumothorax
- Penetrating chest trauma

Circulation
- SBP <90 mmHg / DBP <60

Disability - Consciousness
- Decreased LOC
- Unable to follow commands

GI
- Aspiration risk
- Gastric distention
- Vomiting

Pregnant
CPAP Tidbits

• Be prepared to coach the patient through first few minutes of CPAP use
• Explain to them what you are doing
  – Patient is already frightened
  – Patient may feel suffocated with the mask on
  – Exhaling against the resistance is tough at first
• Monitor B/P
  – B/P can drop with CPAP use
FLOW SAFE ® CPAP

- CPAP Valve
- Pop off Valve
- 02 Tubing
- PEEP Manometer
- Quick Release Clip
- Forehead adjustment
- Head adjustment straps
• Yellow label displays PEEP settings
Flow-Safe® CPAP Device

PEEP depends on
- $O_2$ flow rate
- Face mask seal (leak)

Oxygen concentration depends on
- $O_2$ flow rate
- Respiratory rate
- Tidal volume
TITRATE PEEP TO PATIENT’S WORK OF BREATHING

– Start at 15 L which equals 3-4 cm H$_2$O PEEP

– Titrate up to patient response (decreased work of breathing)

– Maximum PEEP 8.5 - 10 cm at 25 L O$_2$
O₂ Flow

- Attach CPAP O₂ tubing to regulator/flow-meter
- Begin O₂ flow @ 15 L
- If needed, slowly increase O₂ to desired O₂ sat/PEEP (do not exceed 25 LPM)
UNDO 1 OR 2 OF THE QUICK RELEASE CLIP(S)
OPEN PACKAGE

- SECURELY CONNECT MASK TO VALVE/TUBING
Hold, or have pt. hold, mask snuggly to face...
Good face-mask seal is critical
Tighten head straps using Velcro tabs
Adjust forehead pad flat on forehead

- Squeeze together and raise or lower to adjust
- Adjusted
USE QUICK RELEASE TO ADMINISTER NITRO PER SOP

SOP: If systolic B/P is 90 or above, give nitro every 3-5 minutes: unlimited
Capnography can be used under CPAP

CPAP with MWLCEMS Neb
The patient will need a neb treatment

CONNECT NEBULIZER BETWEEN CPAP VALVE & MASK
Adaptors

- Some nebulizers may require an adaptor (same adapter used for in-line nebs)
- You will need this for Good Shepherd nebulizers
No-Adaptor

- This will also work:

- Make sure the Nebulizer stays upright
Documentation

- Document the oxygen flow rate
- Document the PEEP reading on the manometer
- This can be done in your narrative
- Remember to use the manometer reading when patient exhales
### Differential for SOB

<table>
<thead>
<tr>
<th>S&amp;S</th>
<th>HF/FE</th>
<th>AMI</th>
<th>COPD</th>
<th>Pneumonia</th>
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<tbody>
<tr>
<td>SOB</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cough</td>
<td>-/+</td>
<td>-</td>
<td>+/ early am</td>
<td>-</td>
</tr>
<tr>
<td>Sputum</td>
<td>Frothy (pink)</td>
<td>-</td>
<td>Clear</td>
<td>Yellow/green</td>
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<td>Fever</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>Sweats</td>
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<td>+ Cold/dammy</td>
<td>-</td>
<td>+/ Hot</td>
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<tr>
<td>Chest pain</td>
<td>-</td>
<td>+/</td>
<td>-</td>
<td>+/</td>
</tr>
<tr>
<td>Chest pain nature</td>
<td>-</td>
<td>Heavy, tight</td>
<td>-</td>
<td>Sharp, pleuritic</td>
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<tr>
<td>Chest pain duration</td>
<td>-</td>
<td>Varies: usually &gt; 20 min</td>
<td>-</td>
<td>Gradually worsening, then constant</td>
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<tr>
<td>Smoking Hx</td>
<td>Risk</td>
<td>Risk</td>
<td>Almost always</td>
<td>+/</td>
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<tr>
<td>Hypertension</td>
<td>+ Risk</td>
<td>+ Risk</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cyanosis</td>
<td>+/-</td>
<td>+/</td>
<td>-</td>
<td>+/</td>
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<tr>
<td>Air entry to lungs</td>
<td>Good upper/worse at bases</td>
<td>Good</td>
<td>Poor</td>
<td>Patchy</td>
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<tr>
<td>Wheezing</td>
<td>+/-</td>
<td>+/-</td>
<td>Must have or entry to wheeze</td>
<td>+/-; patchy</td>
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<tr>
<td>Crackles</td>
<td>+/-</td>
<td>+ with HF/otherwise clear</td>
<td>-</td>
<td>+ patchy, isolated to infected lobes</td>
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<td>BP</td>
<td>Usually unaffected; ↓ if severe S&amp;S</td>
<td>Usually unaffected; ↓ if severe S&amp;S</td>
<td>Usually unaffected</td>
<td>-</td>
</tr>
<tr>
<td>Tachycardia</td>
<td>+/-</td>
<td>+/-</td>
<td>+</td>
<td>-</td>
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### Heart Failure
- **PMH meds:** CVD, CAD, MI, HF, HTN, cardiomyopathy, high cholesterol, ICD, liver, failing DM, renal failure, smoking, alcoholism
- **Meds:** See list on HF SOP p. 21
- Paroxysmal nocturnal dyspnea
- Orthopnea (multiple pillows to sleep)
- Dyspnea on exertion
- Cough: (non-productive or productive; frothy, clear, white, pink)
- Wt gain (tight shoes, belt, watch, rings)
- Fatigue
- Crackles or wheezes
- **Capnograph:** square waveform
- **12 L abnormal:** (acute MI, AF, LVH, ischemia, BBB, 'age-undetermined infarct')
- S3 (7th heart sound, after lub-dub, best heard at apex)
- JVD, pedal edema (RHF)

### COPD / Asthma
- **PMH meds:** for asthma, COPD: chronic bronchitis, emphysema, smoking (steroids, bronchodilators, anticholinergics)
- Cough: productive – yellow/green
- S/S respiratory infection: fever, chills, rhinorrhea, sore throat
- Exposure to known allergen
- Capnograph: “sharkfin” waveform
- Wheezes (initially expiratory)

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**CPAP**

**Indications:** Alert, intact airway/intent drive: acute pulmonary edema; fail chest; COPD/asthma w/ severe distress; submersion, palliative care

**Contraindications**
- AMS: aspiration risk; inability to clear secretions; questionable ability to protect airway
- Need for immediate intubation and/or BVM ventilations, facial burns
- Consider intubation if imminent arrest, ↓ level of consciousness, severe hypotension, near-apnea, and/or copious frothy sputum
- Unstable respiratory drive: ventilatory failure
- Severe hemodynamic or ECG instability (BP ≥ 90 & DBP ≤ 60 mmHg or MAP < 55)
- Gastric distention; impaired swallowing, persistent vomiting, active upper GI bleed; possible esophageal rupture
- Compromise of thoracic organs (penetrating thoracic trauma); pneumothorax
- Facial anomalies that would complicate CPAP mask seal, epistaxis
- Uncooperative pt or those unable to tolerate mask due to extreme anxiety, claustrophobia, or pain
- Pregnant

**On-going care monitoring**
- Reassess RR/deep & lung sounds, SpO₂, capnography q. 3-5 min after CPAP applied
- Reassess VS q. 3-5 min; if BP starts to drop, gradually titrate PEEP from 10 down to 5. If SBP < 90 (MAP < 65) remove CPAP.
- Continuously monitor for signs indicating need to D/C CPAP &/or Intubate

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Region IX FINAL 2014
ASTHMA/COPD with Respiratory Distress

1. IMC special considerations:
   - Evaluate ventilation/oxygenation, WOB, accessory muscle use, degree of airway obstruction/resistance, speech, cough (productive or non-productive - yellow/green), cerebral function, fatigue, hypoxia, CO2 narcosis, and cardiac status
   - Obtain Hx of current meds: time and amount of last dose; duration of this attack
   - If wheezing without Hx of COPD/Asthma: consider FD aspiration, pulmonary embolus, vessel or vascular, HF/ pulmonary edema. See appendix for differential. If probable cardiac cause (PMH: CVD): Rx per Cardiac SOPs
   - Assess for pneumonia, atelectasis, pulmonary edema or tension pneumothorax. If tension pneumothorax (- BP, unilaterally absent breath sounds). Needle decompress affected side
   - Airway/Oxygen: If assisted: ventilate at 6-8 BPM (slower rate, smaller tidal volume (5-8 mL/kg), shorter inspiratory time & longer expiratory time to allow complete exhalation) Target SpO2 92% (COPO)
     - If cardiogenic shock occurs, brief disconnection from EBM may be considered & compression of the chest wall to relieve air-trapping can be effective (Class III)
   - Monitor ECG: Bradycardia signifies deterioration of patient status

MILD to MODERATE distress with wheezing and/or cough variant asthma

2. ALBUTEROL 2.5 mg & IPRATROPIUM 0.5 mg via HHN or mask
   - Supplement w/O2 6 LVM if patient is hypoxic (asthma: SpO2 < 94%, COPD: SpO2 < 92%) & using a HHN
   - Begin transport as soon as neb is started. Do not wait for a response
   - Continue nebulizer therapy enroute. May repeat ALBUTEROL 2.5 mg HHN.

SEVERE distress: Severe SOB, orthopnea, use of accessory muscles, speaks in syllables, tachypnea, breath sounds diminished or absent; exhausted: HR & BP may be dropping

2. IMC special considerations:
   - Prepare resuscitation equipment: anticipate rapid patient deterioration. If immediate intubation not needed
     - O2 10-15 cm FEEP, use 15 L/min if CPAP unavailable or contraindicated
     - If SBP falls < 90, MAP < 65: Titrate PEEP values downward to 5 cm, remove C-PAP if hypoxemia persists.

History of ASTHMA

3. EPINEPHRINE (1:1000) 0.3 mg (IM) EMR may give
   - Caution: HR > 100, CVD/HTN; on beta blockers, digoxin, or MAO inhibitors; pregnant, or significant side effects to albuterol
   - Begin transport as soon as Epi is given
   - Do not wait for a response
   - May repeat Epi X 1 in 10 min if minimal response

4. ALBUTEROL 2.5 mg & IPRATROPIUM 0.5 mg via HHN, mask or BVM; continue neb therapy enroute
   - May repeat ALBUTEROL 2.5 mg HHN

5. Severe distress persists: MAGNESIUM (50%) 2 Gm mixed with 16 mL NS slow IV over 5 min, or 2 Gm
   - Premix in 50 mL IVFS over 10 min.

History of COPD

3. ALBUTEROL 2.5 mg & IPRATROPIUM 0.5 mg via HHN, mask or BVM
   - Begin transport as soon as neb is started
   - Do not wait for a response
   - Continue nebulizer therapy enroute
   - May repeat ALBUTEROL 2.5 mg HHN
HEART FAILURE / PULMONARY EDEMA

- Assess for hypoperfusion and cardiorespiratory compromise. Ensure recently obtained and transmitted 12L ECG: differentiate HF from COPD/asthma by Hx, meds, S & S, capnography if available. (See Appendix)
- Consider cause: rate, rhythm, volume, or pump problem. Treat per appropriate SOP based on etiology.
- Auscultate: Breath sounds all lobes, front & back. Report timing/location of wheezes/sibilants

MILD to MODERATE cardiorespiratory compromise:
Alert, normotensive or hyperactive (SBP > 90 and DBP > 60) (MAP > 65)

1. IMC special considerations:
   - Position patient sitting upright at 90° (if tolerated); elbrig dangling legs over sides of stretcher.
   - If severe respiratory distress: Assess need for DAI
   - O₂: CPAP mask to deliver 5-10 cm PEEP; give 15 L/min if CPAP unavailable or contraindicated
   - If SBP falls < 90 (MAP < 65) Titrate PEEP down to 5 cm; remove CPAP if hypotension persists.
2. ASPIRIN 324 mg (4 tabs 81 mg) PO per ACS SOP unless contraindicated
3. NITROGLYCERIN 0.8 mg SL if SBP remains > 90 (MAP > 65). Repeat NTG 0.4 mg every 3-5 min – no dose limit.
   - NTG may be given if HR > 100 in pulmonary edema
4. Severe anxiety if SBP > 20 (MAP > 65): MIDAZOLAM standard dosing per ACS SOP

CARDIOGNIZATION SHOCK: Pump failure due to MI, dysrhythmia (tachyarrhythmias, pulmonary embolus) with SBP < 90, MAP < 60; 5 & S hypoperfusion

1. IMC special considerations:
   - Assess need for DAI to assist work of breathing, protect airway, or ventilate patient
   - Assess carefully for signs of hypoperfusion/hypothermia
2. DOPAMINE 4-10 mg/250 ml or 800-1000 ml NS or D₂W IVPR
   - Start at 5-10 mcg/min, titrate up to 20 mcg/min (MAP > 65).
3. If hypoperfusion or dehydrated and certain that lungs are clear and respirations are not labored:
   - NS IVF challenges in 200 mL increments until SBP > 90 (MAP > 65). Frequently reassess breath sounds.
4. If alert with dry reflex: ASPIRIN 324 mg (4 tabs 81 mg) PO per ACS SOP

Sampling of drugs prescribed for patients with CV disease/Heart Failure

ACE Inhibitors (ACEI): Benazepril (Lotensin), captopril (Capoten), enalapril (Vasotec), fosinopril, monopril, lisinopril (Prinivil/Zestil), moexipril (Univasc), perindopril (Aceona), quinapril, enalapril, Ramipril (Altace), trandolapril (Mavik)

Angiotensin Receptor Blockers (ARB): irbesartan (Avapro), losartan (Cozaar), valsartan (Trental), losartan (Alopia), losartan (Cozaar), losartan (Trental), losartan (Micardis), valsartan (Diovan)

Anticoagulants: aspirin (Risplurin), epidrug (Aspirin), corned drug (Fenistil), dabigatran (Pradaxa), dabigatran (Pradaxa), dabigatran (Pradaxa), dabigatran (Pradaxa), dabigatran (Pradaxa), dabigatran (Pradaxa), dabigatran (Pradaxa), dabigatran (Pradaxa)

Beta Blockers: a beta-blocker (Sectral), atenolol (Tenormin), metoprolol (Toprol XL), bisoprolol (Zebeta), carvedilol (Coreg), esmolol (Brevibloc), labetolol (Normodyne), metoprolol (Toprol XL), nadolol (Corgard), pindolol (B心得), pindolol (Inderal), propranolol (Imodil), timolol (Blocadren), timolol (Timolol), atenolol (Tenormin)

Calcium channel blockers: amiodipine (Norvasc), telodipine, diltiazem (Cardizem), nicardipine (Cardene), nifedipine (Procardia, Adalat), verapamil (Calan, Isoptin)

Diuretics: midamol (Midmol), bumetanide (Bumex), chlorothiazide (Diuril), thiazide (Hdydroturi), indapamide (Lozol), metolazone (Zaroxyl), Polythiazide, spironolactone (Aldactone), torsemide, triamterene (Dyrenium)

Digoxin (Lanoxin)

Vasodilators: hydralazine (Apresoline), isosorbide (Isordil), minoxidil (Loniten), nesiritide (Natrecor), Nitrates/NTG

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Case Scenario #1

- The patient is a conscious, restless, and anxious 68 year-old male with respiratory distress that has progressively worsened during the past 2 days.
- The patient has cyanosis of the lips and nail beds.
- B/P 138/70; P - 116 & irregular; R - 26; SpO₂ 82%
- Rhonchi and Rales are auscultated in the lower right lung field; patient feels warm to the touch.
- The patient has had a cold for 1 week with a productive cough of yellow-green sputum.
- Hx: emphysema, angina, osteoarthritis.
Case Scenario #1

What is this patient’s rhythm?
What influence would this rhythm have on this patient’s health history & current condition?
Do you need to intervene?

Atrial fibrillation diminishes the efficiency of the pumping of the heart which can further compromise the cardiac output.
Case Scenario #1

- Impression & intervention?
- The patient has COPD most likely complicated by pneumonia
  - a “cold” over the last week
  - productive cough of yellow-green sputum
  - warm to the touch (temperature 100.6°F)
  - rhonchi & rales in the right lung field base
- Routine medical care
  - supplemental oxygen
  - ↑ heart rate most likely due to pneumonia and does not need specific treatment
Case Scenario #2

- A 68 year-old female calls 911 due to severe respiratory distress which suddenly woke her up from sleep. She is unable to speak in complete sentences and is using accessory muscles to breathe. Lips and nail beds are cyanotic; ankles are swollen.
- B/P 186/100; P - 124; R - 34; SpO₂ - 88%
- Crackles are auscultated in the lower half of the lung fields.
Case Scenario #2

- History: angina and hypertension; smokes 1 pack per day for the past 30 years
- Meds: Cardizem, nitroglycerin PRN; 1 baby aspirin daily; furosemide, Atrovent inhaler as needed
- Rhythm:
Case Scenario #2

- What is your impression?
- What intervention(s) are appropriate following Region IX SOP’s?
- What is the rationale for these interventions?
- What is this patient’s rhythm and do you need to administer any medications for the rhythm?
Case Scenario #2

• Impression: congestive heart failure with pulmonary edema
  – paroxysmal nocturnal dyspnea (sudden shortness of breath at night)
  – bilateral crackles in the lungs
  – peripheral edema
  – cardiac history - hypertension and angina

• Rhythm - sinus tachycardia
  – determine and treat the underlying cause
Case Scenario #2

- Interventions
  - Sit the patient upright, have their feet dangle off the sides of the cart
    - This encourages the patient to sit in a better, upright position
  - CPAP
  - Prepare to assist breathing via BVM
    - have BVM out on the counter and ready for use
  - IV-O2-monitor
  - Meds: ASA, NTG, Midazolam for anxiety
Case Scenario #3

- 7 year-old with history of asthma has sudden onset of difficulty breathing and wheezing while playing outside
- Patient has an increased respiratory rate and is using accessory muscles
- B/P - 108/70; P - 90; R - 24; SpO$_2$ - 97%
- Upon auscultation, left lung is clear and wheezing is present on the right side
- Impression and intervention?
Case Scenario #3

• Sounds like asthma, looks like asthma, has a history of asthma but why should you **not** suspect asthma?
  – Asthma is not a selective disease - the patient will have widespread, not localized, bronchoconstriction and have bilateral wheezing, not unilateral

• Dig into the history more - what was the patient doing prior to the development of symptoms?
Case Scenario #3

- This patient was playing with friends, running around while eating food
- Possibly aspirated a foreign body
  - sudden onset of unilateral wheezing
- Albuterol would not be indicated in this situation
- Supplemental oxygen if indicated, position of comfort, reassessment watching for increase in airway obstruction
WRAP UP ............
Normal Wave Form
CPR

- ETCO$_2$ 10-15 mm Hg (possibly higher) with adequate CPR
- Management: Change Compressor if ETCO$_2$ falls below 10 mm Hg
Obstructive Airway

• Can be seen before actual attack
• Indicative of Bronchospasm
(Asthma, COPD, Allergic Reaction)
ROSC (Return of Spontaneous Circulation)

- During CPR sudden increase of ETCO$_2$ above 10-15 mm Hg
- Management: Check for pulse
Hypoventilation

- ETCO\textsubscript{2} $>$ 45 mm Hg
- Management: Assist ventilations or advanced airway as needed
Hyperventilation

- ETCO2 < 35 mm Hg
- Management: If conscious gives biofeedback
  - If ventilating, slow ventilations
Quick Field Guidelines.....

- If you are thinking about giving O$_2$, *then give it!*

- If you can’t tell whether a patient is breathing adequately, *then they aren’t!*

- If you’re thinking about assisting a patient’s breathing, *you probably should be!*

- When a patient quits fighting it does not mean that they are getting better!
Questions?
Be Safe!