**EM Basic- Shortness of Breath (SOB)**

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**Vitals-** special attention to respiratory rate and pulse ox

**PEARL-** A respiratory rate of 16, 18, or 20 in an adult probably means that it wasn’t counted accurately- it says “I think the respiratory rate is normal”- think of anything over 20 as tachypenic

**Rapid assessment**- look at the patient’s work of breathing and make a decision as to whether they have increased work of breathing

**PEARL-** The decision to intubate is based on clinical situation- not numbers- a severe COPD patient may live at a pCO2 of 70 and a pulse ox of 92- if they are talking without distress they probably don’t need a tube. Its about mental status and work of breathing- not numbers

**History-** ask standard OPQRST questions about when the SOB started

**Important associated symptoms-** Chest pain (PE or MI), fever (pneumonia), lower extremity edema (CHF), increased sputum (COPD)

**Aggravating factors-** dyspnea on exertion or orthopnea (SOB with rest)

**PEARL-** bad bronchitis or COPD can cause some blood tinged sputum- clarify the amount- blood tinged or dime sized is not as worrisome- “nothing but blood” is worrisome

**Medical history-**  focus on asthma, COPD, cardiovascular history. Ask about hx of MI, strokes, CABG, catherizations. Ever intubated for COPD or asthma?

**Medications**- recently on antibiotics or steroids? Recent med changes?

**Social history-** most important is tobacco use

**Exam**

**Work of breathing**- may have to take down the patient’s gown. Look for accessory muscle use (clavicles) or retractions (usually).

Retractions- paradoxical contraction of muscles with inspiration

**HEENT-** assess the upper airway for foreign bodies and for predictors of difficult intubation (poor mouth opening, visibility of soft palate, etc.)

**Heart-** Listen to it first before lungs (better exam that way), listen for valve disorders (aortic stenosis most common in older patients)

**Lungs-** Assess both sides all of the way up, full lung sounds vs. quiet chest?, listen for crackles, rhonchi, and wheezing

**PEARL-** In young children- count out respiratory rate while you listen to lung sounds- easier than counting by watching- do it for a full minute!

**Abdomen-** assess for tenderness- don’t miss a perotinitis

**Extremities-** lower extremity edema, calf tenderness (DVT?)

**Differential Diagnosis**

**Tubes-** upper airways- airway obstruction or burns, dental or neck abscess, foreign body, croup, epiglottitis

Lower airways- bronchitis, asthma, COPD, bronchiolitis (kids <2 y.o.)

**Lungs-** Pneumonia

**Pipes-** Pulmonary embolism

**Pump-** Congestive heart failure, valve disorders

**Outside the lungs-** pneumo/hemothorax, pleural effusion, abdominal process

**Dental or neck abscess**- most worrisome is Ludwig’s angina- deep space neck infection- classically in diabetics with poor dentition, look toxic, have brawny edema of floor of the mouth, drooling- need broad spectrum antibiotics and OR emergently with ENT to drain infection and secure airway

**Foreign Body-** most common in kids- sudden onset of stridor without a cough and no other viral symptoms

**Croup-** Viral infection in kids caused by parainfluenza, causes upper airway swelling and “barking seal” cough, worse at night, stridor at rest is more severe (see below)

**Epiglottitis/tracheatitis-** upper airway infections, usually in children but today is more seen in adults (waning vaccine immunity), toxic appearing, drooling, hoarse voice. Don’t agitate- get immediately to the OR

**Lower airway**

**Asthma-** usually a younger patient with wheezing and shortness of breath, on outpatient inhalers

**COPD-** usually an older patient with a history of smoking, wheezing, and on outpatient inhalers

**Bronchiolitis-** viral syndrome, wheezing, respiratory difficulty, bilateral runny nose in a child <2 years old

**Lungs**

**Pneumonia**- cough, fever, SOB, +/- hypoxia, chest x-ray with an infiltrate

**Pipes (blood vessels)**

**Pulmonary embolism**- sudden onset of pleuritic chest pain, shortness of breath, risk factors include OCPs, immobilization, recent surgery, etc.

**Pump (heart)**

**Congestive heart failure-** dyspnea on exertion with lower extremity edema, orthopnea, crackles on lung exam, “wet” chest x-ray

**MI-** chest pain, diaphoresis, nausea, EKG changes

**Outside the lung** (space occupying)

**Pneumothorax-** spontaneous (thin tall young patient or bad COPD/asthma) or traumatic, air in chest cavity on CXR

**Hemothorax-** traumatic- seen as a white out on the CXR

**Pleural effusion-** layering fluid at bases on CXR

**Abdominal process-** perotinitis, free air under diaphragm

**Workup- EKG and Imaging**

**EKG-** low threshold especially on older patients and in anyone with CHF or MI as a consideration (most patients over 40 should get one)

**Chest x-ray-** Low threshold but can withhold it if it seems like an obvious asthma exacerbation or clear cut bronchiolitis

**PEARL-** If patient is in distress or has chest pain, get a 1 view portable CXR at the bedside, otherwise send for a 2 view PA and lateral, 2 view is better, can’t tell cardiomegaly from 1 view

**CT Pulmonary Angiogram-** if considering PE

**Workup- Labs**

**In general-** if you are going to send the patient home, don’t get labs (or at least don’t order them and send them), if you admit, get labs

**Venous blood gas**- can be helpful in cases of severe SOB but don’t base airway interventions on those numbers alone

**CBC/Chem 10-** in COPD and pneumonia patients that you are going to admit

**Blood cultures x2-** Only in pneumonia patients, ? quality measure but this seems to change everyday, don’t order them unless you are admitting the patient to avoid culture callbacks. Can tell your nurse/tech to draw and hold if you are unsure whether the patient will be admitted

**CBC, chem 10, coags-** PE workup patients (check creatinine for IV contrast, platelets and coags for possible anticoagulation)

**Cardiac Enzymes**- Cardiac workup- CK, CK-MB, Troponin, +/- myoglobin

**BNP-** secreted by the heart in response to increased ventricular stretch, <100- probably not CHF, >400- probably CHF 100-400 indeterminate

**Treatment**

**Non-invasive Ventilation (CPAP and BiPAP)-** can use to avoid intubation and reduce work of breathing, start at 10/5 and titrate upwards

**Asthma and COPD**

**Beta Agonists-** albuterol- 2.5 mg unit dose or 5mg continuous (child) or 10mg continuous (adult)

**Anticholinergic**- ipatroprium (atrovent)- 1 dose during ED stay (1 dose lasts 4-6 hours, no benefit from higher dosing)

**Steroids-** for both asthma and COPD

**Prednisone-** 50mg PO for adults (5 day total course)

**Orapred (oral prednisolone)-** 1 mg/kg PO BID for kids (5 day course)

**Solumedrol (IV prednisolone)-**125 mg IV or 2mg/kg for kids

**PEARL-** Bioavailability is the same PO vs. IV- only reason to give IV is if the patient is too tachypenic to take PO

**COPD flares-** add antibiotics (anti-inflammatory effects)

**Outpatient-** Azithromycin (Z-pack)- 500mg on day 1, 250 for days 2-5

**Inpatient-** Azithromycin or Levaqiun (levofloxacin)- 500mg IV

**Bronchiolitis treatment-** mostly supportive

**Treatment-** nasal suctioning and oxygen as needed

**PEARL-** Beta agonists don’t help bronchiolitis

**PEARL-** High risk bronchiolitis patients (need admission for apnea monitoring)- 12 bed PICU- **<12** weeks old, **P**remature, **I**mmunodeficient, **C**ardiac anomaly (congenital)

**Croup-** mostly supportive

**Decadron (**dexamethasone)- 0.6 mg/kg PO, max 10mg

**Racemic Epi neb-** only for kids with stridor at rest (i.e. when NOT agitated or crying)- requires 4 hour observation period after neb

**The lungs**

**Pneumonia-** most common cause is strep pneumonia

**Treatment-** antibiotics, oxygen as needed

**Adults- Community Acquired- outpatient-** Azithromycin (Z-pack)

**Adults- Community Acquired- inpatient-** ceftriaxone 1 gram IV and Azithromycin 500mg initial dose in ED

**Children- Community Acquired- outpatient-** amoxicillin 45 mg/kg BID

**PEARL-** Amoxicillin 400mg/5ml= 1 teaspoon for every 10 kg (like children’s acetiminophen/ibuprofen)

**Children- Community Acquired- inpatient-** Ceftriaxone 50 mg/kg IV and azithromycin 10 mg/kg

**Hospital Acquired-** see sepsis podcast

**The Pipes (blood vessels)**

**Pulmonary embolism-** heparin/enoxaparin - see chest pain podcast

**The Pump (heart)**

**Congestive Heart Failure (CHF)-** nitrates, Lasix

**Nitroglycerin-** start with sublinguals (0.4 mg q 5 minutes= 80 mcg per minute), can do IV drip for more severe cases

**Lasix-** loop diuretic- takes 4-6 hours for diuresis but is a weak venodilator (nitro much better)- 20mg IV or usual outpatient PO dose given IV.

**Outside the lungs**

**Pneumo/hemothorax-** drain using a chest tube

**Pleural effusion-** consider draining but most will resolve if you treat the underlying condition

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