

NR603 - Week 3 iHuman (Joseph camella 66 years, Dyspnea)

Good Questions:

1. How can I help you today
 - I'm having trouble breathing. My wife made me come in. She's worried about me.
2. Do you have any other symptoms or concerns we should discuss
 - An allergic cough and runny nose. I get the cough every year during this season.
3. Do you wheeze?
 - Normally just when my allergies act up. Lately I've sort of noticed wheezing at night. That's fairly new I guess.
4. Are you short of breath when lying down?
 - I'm always SOB
5. Do you sleep with pillows to help you breathe?
 - Just 1 pillow
6. Does anything make your cough better or worse?
 - My coughing is worse when the trees shed pollen
7. Are you taking any prescription medications?
 - Yes indeed. I brought my list with me here. Lisinopril 10mg daily, HCTZ 25mg daily, glipizide 5mg daily. Also use a CPAP machine, though it's not really a medicine.
8. Are you taking any OTC or herbal medications?
 - Aleve for shoulder pain and Allegra for the allergies
9. Do you have any allergies?
 - Sulfa drugs, I am pretty sure I'm allergic to tree and grass pollen and ragweed
10. Do you now or have you ever smoked or chewed tobacco?
 - I was a big time smoker in the past. Started when I was 16. A pack a day, but I stopped 10 years ago. That was hard to do.
11. Do you have a problem with fatigue/tiredness?
 - I sure do. I get tired when I exert. I think I'm really out of shape, but I also don't sleep great due to sleep apnea, and this makes me tired during the day too
12. Have you been having fevers?
 - no
13. Is there any swelling in your ankles?
 - Sometimes. Not bad though
14. Do you have a problem with generalized weakness?
 - Weakness? No, I don't think I'd call it that really
15. Do you have a cough?
 - Not normally, but I have been coughing for the last couple of months

16. Are you coughing up any sputum?
- Occasionally, like now. I get a cold, then bronchitis with coughing up stuff, then it goes away. Sometimes clear. Sometimes not. Its been worse the past 2 months - coughing up this gooey white stuff in the morning. Maybe like a few teaspoons worth. Disgusting.
17. When did your difficulty breathing start?
- About 10 years ago. Past 5 years its affected me more and more
18. Does anything make your difficulty breathing better or worse?
- Sitting still is the best for my breathing. Also it helps if i purse my lips when i breathe out
19. Do you become short of breath with exertion?
- Yes definitely. I can walk slowly to the postbox or from room to room ok, but im out of breath going upstairs to the bedroom or just lifting stuff
20. Are you short of breath at rest?
- Yes just these past couple months
21. Do you have any pain or other symptoms associated with your difficulty breathing?
- Symptoms? Like cough with runny nose. What else do you mean?
22. Has there been any change in your difficulty breathing over time?
- Big time! I used to be able too walk, work, and run with the best of them. But not now
23. Do you have unusual heartbeats / palpitations?
- No.
24. Do you have any pain in your chest?
- No.
25. Can you tell me about any current or past medical problems?
- High blood pressure, sleep apnea, and type 2 DM. Ive had the blood pressure thing for maybe 25 years now. The DM was maybe 5 years ago. But all these are under control. I guess thats all i can think of thats important.
26. Any recent acute or chronic infections?
- No.
27. Any previous medical, surgical, or dental procedures?
- I had my gall bladder removed 20 years ago. I had an accident 30 years back and i had a surgery to fix my shoulder and for the wound in my leg. I guess thats the big stuff
28. Have you ever been hospitalized?
- Just when i had to have some surgery
29. Do you have a family history of heart disease?
- My father died of a heart attack when he was 52. He had HTN and DM and was a smoker. My brother had HTN and heart disease too but passed from cancer
30. Do you drink alcohol?

- A beer with my supper sometimes a couple more when im watching a game
31. Tell me about your work
- Construction... master carpenter, then rose to foreman. I retired at 59. Too tough to continue
32. Does your chest feel tight or heavy?
- No.
33. How severe is your difficulty breathing?
- It seems pretty bad to me. I mean, its affecting my life too much
34. Does anyone in your family have difficulty breathing?
- Not that ive noticed
35. Are you coughing up blood?
- No thank god
36. Do you have a history of lung disease?
- Never evaluated for it, though probably should be. I was exposed to asbestos years ago - and we now know thats bad stuff. Of course there were the usual fumes from stuff around you on the job site, like welding and stuff like that
37. Do you now or have you ever had cancer?
- No thank god
38. Have you had TB?
- Not that ive been told
39. Do you have asthma?
- Not been diagnosed but im starting to think maybe thats whats wrong with me now.
40. Do you have a family history of blood clots in your legs or lungs?
- no
41. Do you have a history of deep vein thrombosis or pulmonary embolism?
- I do have ugly varicose veins. Is that the same thing?
42. Do you have heart disease and/or have you ever had a heart attack?
- Never had a heart attack, but sometimes i worry about it a bit
43. Is there any swelling in your legs?
- Havent noticed that at all
44. Have you ever been diagnosed with thyroid problems?
- no
45. Do you awaken at night short of breath?
- Not so far
46. Do you recently travelDo
- no
47. Is there any swelling in your feet?
- Yeah, and my shoes dont fit
48. Have you ever been told that you have a heart murmur or valve problem?
- Yes a murmur. Ive had it all my life but they said not to worry about it
49. Do you have a history of heart failure?

- No one has ever told me that. Is that different than a heart attack
50. Do you have high cholesterol?
- I dont think so. No one has ever told me that one
51. Do you have chills?
- no
52. Do you have a history of cystic fibrosis?
- no
53. Do you have a history of valvular heart disease?
- no
54. Have you been diagnosed with a bleeding disorder?
- No
55. Have you had chicken pox, measles mumps or rheumatic fever?
- Not that I recall
56. Are you eating alot of salty food? Not really
57. Do you have muscle pain or cramping?
- No
58. Do you have a sensation of a pounding heart in your chest?
- No
59. Do you have difficulty chewing?
- no
60. Do you have a problem with movement?
- nope
61. Did you ever have involuntary strange dance like movements?
- No i have not
62. Did you have strep throat as a child?
- Not that I remember
63. Have you recently had surgery?
- no
64. Have you eaten anything out of the ordinary lately?
- No nothing out of the ordinary
65. Do you have arthritis?
- no
66. Do you feel faint or like you might faint?
- Nope, never have passed out
67. Have you noticed any trouble with your speech?
- nope
68. Do you have a problem swallowing?
- nope

Physical exam:

1. **Auscultate lungs- expiratory wheeze bilaterally, possible crackles heard but only able to choose one answer**
2. **Inspect mouth and pharynx**
3. **Look up nostrils**
4. **Visual inspection anterior/posterior chest (did palpate and percuss also)**
5. Auscultation heart sounds- mitral valve regurgitation
6. **Visual inspection of extremities**
7. **Palpate extremities**
8. **Capillary refill ?**
9. **BP - 144/92, normal pulse pressure, hypertensive (the video at the end has his vitals as follows : BP- 145/90 RR20 HR 96 saO2 95%) Ed**
10. **Eyelid ice pack test**
11. **Inspect-????**
12. **Fundoscopy exam**

KEY FINDINGS:

1. Dyspnea MSAP
2. Cough
3. BLE Edema +2
4. Bilateral Expiratory Wheezing
5. White sputum production
6. Cobblestoning oropharynx
7. Asbestos exposure
8. Smoking history 40 years one pack a day
9. Sleep apnea
10. Fatigue
11. Elevated BP
12. Use of accessory muscles
13. Hx of HTN and DM controlled

Lead diagnosis: COPD

Differential Diagnoses:

1. Emphysema
2. Chronic Bronchitis
3. Anemia
4. Pneumonia - community acquired

5. Heart failure
6. Asbestosis
7. Lung cancer
8. Mitral regurgitation?(I would not put that one, I can not find any resources that states it as a differential)
9. Bronchiectasis? (I agree)
10. Pulmonary embolism?
11. Asthma ? (i agree)
12. Tuberculosis
13. Pulmonary HTN
14. Myasthenia gravis
15. Lou Gehrig disease?

I put the ones below and got 67%

Your DDx

- chronic obstructive pulmonary disease (COPD)
- emphysema
- asthma
- bronchitis, chronic
- bronchiectasis
- lung cancer
- pneumoconiosis, asbestosis
- heart failure/congestive heart failure (HF/CHF)
- pneumonia, community-acquired
- anemia
- hypertension, pulmonary
- myasthenia gravis
- amyotrophic lateral sclerosis (ALS/Lou Gehrig's disease)
- pulmonary embolism
- tuberculosis
- mitral valve stenosis (MS)
- mitral regurgitation (MR)

(I got 80% by taking out MG, Pneumo Asbestosis, lung cancer, and TB, i think they were ruled out w/ testing)

Must Not Miss

1. Emphysema
2. Lung cancer u
3. Heart failure

More?

4. Tuberculosis

5. Pulmonary Embolism

ALT diagnosis

Asthma?

Bronchiectasis ?

More?

Diagnostic tests:

1. **CXR PA and lateral \$114-\$140**
2. **CBC: \$14-\$25**
3. **PFT's \$379-\$520**
4. **12 lead ECG \$118-\$188**
5. **ABG \$213**
6. **BNP \$59-\$102**
7. **D-dimer \$17-\$31**
8. **Ct chest \$350-\$450**
9. **Echocardiogram, transthoracic \$1,200-\$2,500**
10. **Alpha 1 antitrypsin \$500**
11. **CTA (not recommended at this time) \$1200**
12. **Troponin I \$18-\$31**
13. **Pulmonary ventilation/perfusion scan \$487-\$1702**
15. **Stress echocardiogram \$1200**
16. **Cardiac stress test \$540**

1. CXR PA and lateral
2. CBC
3. PFT's
4. 12 lead ECG
5. ABG
6. BNP
7. D-dimer
8. Ct chest
9. Echocardiogram, transthoracic
10. Alpha 1 antitrypsin
11. CTA (not recommended at this time)
12. Troponin T
13. Pulmonary ventilation/perfusion scan
14. PPD(statesIt is in not needed at this time)

15. Stress echocardiogram
16. Cardiac stress test
17. Troponin I
18. Acetylcholine receptor antigen

More?

I did these tests below and got 89% - i didn't get any that said they were not necessary — idk if maybe they don't give that feedback anymore?

12-Lead ECG

- Normal rhythm and axis
- Mild LVH
- No ischemic changes

Alpha 1 antitrypsin, blood

- Normal
- 1.6 (1.5-3.5)

ABGs

- Arterial pH 7.40 (7.35-7.45)
- PaCO₂ 42 (35-48)
- Pao₂ 53 (83-108) LOW
- Bicarbonate 26 (22-26)
- Carbon dioxide 23 (17-20)
- Oxygen saturation 87% (95-99) LOW
- Base Excess -2.4 (-2.4-+2.3)

Brain natriuretic peptide

- 3.3
- Barely above the upper limit of normal

Cardiac stress test

- Normal

Chest CT

- Severe upper lobe and mid lung zone centrilobular emphysema, sparing the lung bases
- No interstitial infiltrates or pleural plaques

d-Dimer, blood

- 44 (0-300)
- Normal

Echocardiogram, TTE

- LVH
- e/e ratio suggests mildly impaired diastolic relaxation
- mild left atrial enlargement
- mild aortic stenosis
- mildly elevated pulmonary artery systolic pressure at rest (35mmHg) but normal RV size and function

Pulmonary Function Test

- FEV1 = 1.1 liters (30% predicted)
- FVC – 2.5 liters (50% predicted)
- FEV1/FVC = .44 (61% predicted)
- Diffusing capacity of the lungs for carbon monoxide (corrected for Hgb) = 8.0 ml/min/mmHg (40% predicted)
- After albuterol FEV1 increases to 1.25 liters (an increase of 14%) and FVC increases to 3.0 liters (an increase of 20%) with FEV1/FVC decreasing to .44 (58% predicted)
- Lung volumes prior to albuterol show total lung capacity TLC = 5.5 liters (92% predicted)
- Residual volume = 3 liters (200% predicted)
- Functional residual capacity = 3.5 liters (100% predicted)
- Exertional oximetry shows SaO₂ dropping to 86% on room air with walking 200 feet with patient complaining of moderate dyspnea

Stress echocardiogram

- Normal

Troponin I

- Normal

Troponin T

- Normal

Ventilation/perfusion scan

- Normal

Chest PA/Lateral

- Normal lung volumes
- Decreased lung markings in upper lobes
- Diaphragms flat
- No interstitial or alveolar infiltrates
- Heart size upper limits of normal
- No effusions
- No nodules or masses
- No obvious adenopathy

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Possible management plan:

Final DX: COPD

Admit to the hospital

Meds:

In-office: Duoneb (ipratropium bromide/albuterol nebulizer) 0.5mg/2.5mg per 3mL inhaled q20 min x3 if needed

Rx: Albuterol HFA (90mcg/at)

Sig: 1-2 puffs q4 hours prn for SOB/wheezing

Disp: 1 inhaler

Refill: 2

Rx: Umeclidinium-vilanterol 62.5mcg/25mcg per inhalation

Sig: 1 inhalation QD

Disp: 1 inhaler

Refill:0

Rx: Prednisone 40mg tablet

Sig: 1 tablet QD x 5 days with food

Disp: 5 tablets

Refill: 0

Rx: Amoxicillin-clavulanate 875mg

tablet Sig4: take 1 tablet PO BID x5

days Disp: 10 tablets

Refill: 0

Referrals: Pulmonology and pulmonary rehab, allergist, cardiology, nutritionist (?)

Education: Encourage weight loss, diet/exercise, proper use and routine cleaning of CPAP machine to avoid PNA. Assess inhaler technique for initiation and every visit after.

home oxygen needed

Encourage medication compliance. Encourage a diet high in protein, high fiber, cut back on carbohydrates, monitor blood sugars and check weight same time daily, keep log for provider evaluation. Seek emergency care if patient develops severe chest pain and/or SOB that is unrelieved with rescue medications. Keep log of BPs for one week for reassessment of BP medication control (take BP morning and evening).

Follow-up: Follow up in 48 hours for reevaluation.

Any related CPG's or articles found:

Global Initiative for Asthma. (2021). *2021 gina main report - global initiative for asthma - gina*. Global Initiative for Asthma - GINA. <https://ginasthma.org/gina-reports/>

Celli, B., & Wedzicha, J.(2019). Update on clinical aspects of chronic obstructive pulmonary disease. The New England journal of medicine. <https://pubmed.ncbi.nlm.nih.gov/31553837/>

Bollmeier, S. G., Hartmann, A. P. (2020). Management of chronic obstructive pulmonary disease: A review focusing on exacerbations. *American journal of health-system pharmacy*.
<https://doi.org/10.1093/ajhp/zxz306>

AAFP. (2021, April). *COPD exacerbation management*.
<https://www.aafp.org/family-physician/patient-care/clinical-recommendations/all-clinical-recommendations/copd-exacerbation-management.html>

Exercises: 88%

1 c

2 d

3 a

4 d

5 acd

6 bd

7d

8 ac



Case Summary



Our patient is a 66 year-old former 40 pack-yr retired construction worker with 10 years of gradually increasing dyspnea. In the past 2 mos his dyspnea has significantly worsened, accompanied by cough & white sputum, but without chest pain or orthopnea. He has nocturnal wheezing, but no paroxysmal nocturnal dyspnea.

His other medical conditions include obesity, type 2 DM, sleep apnea, seasonal upper respiratory allergies, & hypertension. His past exposures include welding fumes and asbestos. His family history is significant for CAD.

His vital signs show: BP 145/90, RR=14, HR=96, T=98.6, SaO₂=95% on r.a. though he is dyspneic at rest and is using accessory respiratory muscles.



Narrowing The Still Broad Differential...



- Based on the H&P & CXR the patient is felt to be at risk of several cardiopulmonary diseases. The following additional data are obtained:
 - PFTs: FEV1/FVC=44%; FEV1=30% predicted and improves 14% after albuterol; FVC=50% predicted; TLC=92% predicted; RV=200% predicted; DLCO=40% predicted; SaO₂ drops from 95% to 86% on r.a. upon walking 200ft.
 - EKG: it shows LVH, but no arrhythmia and no evidence of old MI or active ischemia
 - Cardiac echo: it shows mild pulmonary HTN, mild aortic stenosis, and mild LVH
 - ABGs: PO₂ 66, PCO₂ 44, pH 7.39
 - D-Dimer: negative
 - BNP: minimally elevated
- How does one now use the all the clinical data assembled to sort through these various disorders that can present with dyspnea and a clear CXR?

Differential Diagnosis



- Against the dx of bronchiectasis is his lack of chronic cough and sputum. There is nothing in his history to suggest chronic recurrent lower airway infection or any other disorder (like dysmotile cilia or immunoglobulin deficiency) that might cause bronchiectasis.
- HFpEF is a possible contributor to his dyspnea, with his multiple risks for it, his pedal edema, and bibasilar crackles, and LVH on EKG and TTE. His normal CXR and near normal BNP suggest HFpEF is not playing the major role, however.
- Restrictive neuromuscular disorders (e.g., myasthenia gravis) are not suggested by the physical exam (his strength is normal). Furthermore his PFTs do not show restriction. Restrictive disorders, however, when superposed on obstructive diseases can occasionally give normal lung volumes on PFTs. Though not technically a neuromuscular disorder, his obesity is probably contributing to increased work of breathing & hence dyspnea, and it could also contribute, as above, to his lung volumes being normal.

Differential Diagnosis

- Pulmonary hypertension is present on echo, and could be due to left heart disease or the pulmonary process that has lowered his DLCO. Mild pulmonary hypertension can also be seen in a minority of patients with OSA. Whatever its cause, his pulmonary hypertension is too mild to be playing a significant role in his dyspnea.
- Aortic stenosis is also only mild by echo. Mild AS does not cause dyspnea and rarely does it contribute to it. However his AS, even though mild, can be contributing to increased afterload and HFpEF
- Asthma is supported by his history of allergies, nocturnal wheezing, cough, white sputum, by wheezing on exam, and by his PFTs which show obstructive lung disease with reversibility. Asthma, however, does not explain his low DLCO, and it doesn't explain the 10 year course of his progressive dyspnea in the absence of any asthma exacerbations to this point.

COPD – The Likely Diagnosis

- The dx of COPD nicely fits with his long smoking hx and slow progressive dyspnea.
- The low DLCO suggests an emphysematous process but the reaction to albuterol in the lab suggests there is also a component of reactive airways (e.g. asthma).
- The severe reductions in both FEV1 (30% pred.) & DLCO (40% pred.) indicate his COPD is severe
- His ABGs are reassuring that he's not retaining CO₂ presently, despite the severity of his underlying disease and dyspnea.
- Emphysema would normally cause increased lung volumes on exam and chest imaging, but his obesity can mask those. His elevated RV (200% pred.) shows how significant his air trapping is from his COPD

COPD & Our Patient

- COPD is common -- the 3rd leading cause of death in the U.S. and an increasing threat in the developing world
- His smoking for 40 pk-yrs is associated with a LR of +12 for COPD
- His diminished breath sounds over the upper lobes are compatible with smoking related emphysema, which is usually upper lobe predominant
- Any patient with a DLCO < 55% predicted has enough of a gas exchange abnormality that he or she should be evaluated for exertional hypoxemia, even if SaO₂ at rest is preserved. This patient, not unexpectedly, desaturated with mild exertion, and is a candidate for exertional home oxygen

Case Synthesis

- Thus the most likely dx in our case is COPD, chiefly emphysema in type, with an underlying asthmatic component ("asthmatic bronchitis").
- One explanation for his story is that his underlying COPD has been worsening over 10 years due to normal yearly decline in lung function. His previously quiescent asthma has been flaring for 2 months, likely due to untreated environmental allergies.
- This likely accounts for his subacute on chronic dyspnea
- HFpEF is potentially playing a contributing role in his dyspnea, as is obesity

Disposition



- The patient was admitted to the hospital, given round the clock bronchodilators and parenteral steroids, and he improved dramatically, both symptomatically and on physical exam
- He was placed as an outpatient on beta agonists, inhaled steroids, and inhaled anticholinergic Rx
- He decided to “turn over a new leaf” in life. He enrolled in a pulmonary rehabilitation program that also helped him lose weight
- When last contacted his ability to exert comfortably was at a level he had not experienced in 8 years.