Pulmonary Test 2016

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1.

A 55-year-old woman is evaluated for persistent hyperkalemia. She is asymptomatic. Medical history is significant for type 2 diabetes mellitus complicated by nephropathy and peripheral neuropathy; she also has hypertension. Medications are insulin, rosuvastatin, amlodipine, amitriptyline, and aspirin.

On physical examination, temperature is 36.3 °C (97.4 °F), blood pressure is 130/72 mm Hg, pulse rate is 64/min, and respiration rate is 18/min. BMI is 32. Estimated central venous pressure is 6.0 cm H_2O. There is hyperesthesia of the feet bilaterally but no edema. The remainder of the examination is unremarkable.

Laboratory studies:	
Creatinine	1.9 mg/dL (168 µmol/L)
Electrolytes:	
Sodium	138 mEq/L (138 mmol/L)
Potassium	5.1 mEq/L (5.1 mmol/L)
Chloride	112 mEq/L (112 mmol/L)
Bicarbonate	18 mEq/L (18 mmol/L)
Glucose	142 mg/dL (7.9 mmol/L)
Phosphorus	4.5 mg/dL (1.5 mmol/L)
Estimated glomerular filtration rate	27 mL/min/1.73 m^2
Urinalysis	pH 5.0

Which of the following is the most likely cause of this patient's metabolic findings?

A. Kidney failure
B. Type 1 (hypokalemic distal) renal tubular acidosis
C. Type 2 (proximal) renal tubular acidosis
D. Type 4 (hyperkalemic distal) renal tubular acidosis

WHAT I NEED TO KNOW:

- What is a Renal Tubular Acidosis?
- What is the difference between the types of RTAs in terms of who gets them and how to diagnose them? Type 1, 2, and 4?
- Metabolic acidosis from renal failure; how to distinguish from RTA

Renal Tubular Acidosis

	Type 1 RTA (distal)	Type 2 RTA (proximal)	Type 4 RTA (distal)
Chloride	↑	↑	↑
Bicarbonate	↓	↓	↓
Potassium	↓	**NL**	↑
Urine pH	**High (> 5.5)**	**Low (<5.5)** except with bicarb load	**Low (<5.5)**
Etiologies	**C**hronic hepatitis ***A**mphotericin B* **T**oluene **L**ithium **S**jogren's; **S**LE	**M**ultiple Myeloma **M**etal poisoning *Acetazolamide*	**D**iabetes mellitus **S**ickle cell *Spironolactone*
Associations	**Nephrolithiasis** due to hypercalcuria		

A 43-year-old man is evaluated in the emergency department for abdominal pain. He has a history of alcohol abuse, with repeated episodes of acute intoxication requiring medical therapy. He also has a history of several episodes of acute pancreatitis, but no history of seizure disorder. He takes no medications.

On physical examination, temperature is 37.4 °C (99.3 °F), blood pressure is 112/66 mm Hg, and pulse rate is 76/min. BMI is 20. There is no evidence of trauma or head injury. There is no evidence of ascites. The abdomen is tender to palpation. Neurologic examination reveals normal pupillary and corneal reflexes, normal muscle tone, and a downgoing plantar reflex.

Laboratory studies:	
Blood urea nitrogen	28 mg/dL (10 mmol/L)
Calcium	8.6 mg/dL (2.2 mmol/L)
Creatinine	1.2 mg/dL (106.1 µmol/L) (baseline, 0.8 mg/dL [70.7 µmol/L])
Electrolytes:	
Sodium	135 mEq/L (135 mmol/L)
Potassium	4.9 mEq/L (4.9 mmol/L)
Chloride	96 mEq/L (96 mmol/L)
Bicarbonate	12 mEq/L (12 mmol/L)
Ethanol	62 mg/dL (0.062 g/dL)
Glucose	72 mg/dL (4 mmol/L)
Lactate	0.8 mEq/L (0.8 mmol/L)
Plasma osmolality	293 mOsm/kg H_2O
Phosphorus	3.7 mg/dL (1.2 mmol/L)
Urinalysis	pH 5.5; specific gravity 1.020; no blood, ketones, or cells

Which of the following is the most likely cause of this patient's acidosis?

(A) Acute kidney injury
(B) Alcoholic ketoacidosis
(C) D-Lactic acidosis
(D) Rhabdomyolysis

2.

WHAT I NEED TO KNOW:

- Recognize a metabolic acidosis
- Calculate an anion gap and know normal/ abnormal
- Know the differential diagnosis of an anion gap acidosis
- Understand when to measure and calculate serum osmolality and how to check for osmolal gap
- Know how alcoholic ketoacidosis presents
- Know what a D-Lactic acidosis is
- Know who gets a D-Lactic acidosis

A 61-year-old woman is evaluated for a 4-month history of progressive dyspnea and fatigue without chest pain. Eighteen months ago, she was diagnosed with liver cirrhosis due to nonalcoholic steatohepatitis (NASH). Medical history is also significant for obesity. Medications are propranolol, spironolactone, and lactulose.

On physical examination, temperature is 36.4 °C (97.5 °F), blood pressure is 112/64 mm Hg, pulse rate is 60/min, and respiration rate is 16/min; BMI is 36. Mild scleral icterus is noted. Cardiac examination reveals a prominent S_2. The lungs are clear. Dilated veins are visible on the trunk and abdomen, and there is no appreciable ascites. Trace symmetric ankle edema is noted.

Chest radiograph shows cardiomegaly and clear lung fields. Pulmonary function tests show normal spirometry but reduced diffusing capacity (42% of predicted). A resting echocardiogram shows a left ventricular ejection fraction of 70% and an estimated right ventricular systolic pressure of 58 mm Hg. No shunt is seen with contrast enhancement. A dobutamine stress echocardiogram is negative for ischemia. A ventilation-perfusion scan shows a low probability of pulmonary embolism. Right heart catheterization reveals a mean pulmonary artery pressure of 48 mm Hg and a pulmonary capillary wedge pressure of 12 mm Hg.

Which of the following is the most likely diagnosis?

A Chronic thromboembolic pulmonary hypertension

B Hepatopulmonary syndrome

C Portopulmonary hypertension

D Pulmonary veno-occlusive disease

3.

WHAT I NEED TO KNOW:

- What causes a prominent S2?
- What causes normal pulmonary function tests with a reduced diffusion capacity? (DLCO?)
- What is the definition of pulmonary hypertension on ECHO?
- What are the categories of pulmonary hypertension?
- How do I interpret the results of a right heart catheterization in the evaluation of pulmonary hypertension?
- What is hepatopulmonary syndrome?
- What is portopulmonary hypertension?
- What is pulmonary veno-occlusive disease and who gets it?

A 53-year-old woman is evaluated for a 3-month history of progressively worsening exertional dyspnea and chest pressure. She has not had fever, cough, sputum production, or weight loss. Four months ago she underwent left shoulder arthroplasty. Eighteen months ago she had a right lower extremity deep venous thrombosis attributed to hormone replacement therapy. Hormones were discontinued, and she completed a 6-month course of warfarin. She takes no medications at this time.

On physical examination, temperature is 36.0 °C (96.8 °F), blood pressure is 130/74 mm Hg, pulse rate is 90/min, and respiration rate is 18/min; BMI is 26. Oxygen saturation is 89% breathing ambient air. Pulmonary examination reveals clear lung fields. Cardiac examination reveals a single loud S_2. There is no peripheral edema.

Laboratory studies, including a complete blood count and electrolyte measurement, are normal.

Chest radiograph shows no cardiopulmonary abnormalities. Transthoracic echocardiogram shows normal left ventricular and right ventricular function, normal valves, and a right ventricular systolic pressure of 52 mm Hg. Pulmonary function testing reveals an isolated reduction in diffusing capacity. Bilateral lower extremity venous ultrasound shows no evidence of recurrent deep venous thrombosis.

Which of the following is the most appropriate diagnostic test to perform next?

A. CT angiography of the chest
B. Polysomnography
C. Pulmonary angiography
D. Ventilation-perfusion scan

4.

<u>WHAT I NEED TO KNOW:</u>

- What causes a loud S2?
- What is an abnormal right ventricular systolic pressure on ECHO?
- What causes an isolated reduction in diffusion capacity on pulmonary function testing?
- What are the 5 categories of pulmonary hypertension?
- What is the best test for diagnosis of pulmonary hypertension due to chronic PEs?

A 65-year-old man is evaluated for a 14-month history of progressively worsening cough and shortness of breath, most notable with exertion. His cough is nonproductive and is not associated with fever, chills, or sweats. He has no other symptoms. He is a retired carpenter. He has a 20-pack-year history of smoking but quit 15 years ago. He takes no medications.

On physical examination, respiration rate is 22/min; other vital signs are normal. Oxygen saturation is 95% breathing ambient air. BMI is 27. Pulmonary examination reveals inspiratory dry crackles at the bases bilaterally. Cardiac examination is normal. Mild clubbing is present. There is no lower extremity edema.

Pulmonary function tests reveal an FVC of 60% of predicted, an FEV_1 of 63% of predicted, an FEV_1/FVC ratio of 85%, and a DLCO of 50% of predicted. High-resolution CT shows bilateral peripheral- and basal-predominant septal line thickening with evidence of honeycomb change at the bases. No ground-glass opacities are noted, and there is no mediastinal or hilar lymphadenopathy.

Which of the following is the most likely diagnosis?

A **COPD**

B **Hypersensitivity pneumonitis**

C **Idiopathic pulmonary fibrosis**

D **Respiratory bronchiolitis–associated interstitial lung disease**

5.

WHAT I NEED TO KNOW:

- Differential diagnosis for progressive shortness of breath over months
- Is there a lung disease associated with being a carpenter?
- Differential for bilateral inspiratory “dry”crackles in a patient with clubbing
- Interpretation of pulmonary function tests including DLCO
- Differential of septal thickening and honeycomb changes at the bases on high resolution CT scan
- How to diagnosis COPD
- How to diagnose hypersensitivity pneumonitis
- How to diagnose idiopathic pulmonary fibrosis
- How to diagnose (what is?) respiratory bronchiolitis-associated interstitial lung disease.

A 34-year-old woman is evaluated during a follow-up visit for polymyositis. She was diagnosed 1 year ago and has responded well to therapy. She reports no weakness, chest pain, or shortness of breath on exertion. Current medications are prednisone and azathioprine.

On physical examination, temperature is normal, blood pressure is 106/72 mm Hg, pulse rate is 84/min, and respiration rate is 26/min. BMI is 23. Oxygen saturation is 98% on ambient air. Cardiac and pulmonary examinations are normal. Strength is normal in proximal and distal muscles. Slight hyperkeratosis and cracking of the palmar surface of the hands are present. There are no other rashes, skin thickening, or digital ulcers.

Laboratory studies are notable for a serum creatine kinase level of 100 U/L, an antinuclear antibody titer of 1:1280, and anti–Jo-1 antibody positivity.

Electrocardiogram is normal.

Which of the following is the most appropriate diagnostic test to perform next?

A. 6-Minute walk test

B. Cardiac MRI

C. Chest radiography

D. Exercise stress testing

E. No additional testing

6.

WHAT I NEED TO KNOW:

- Other findings other than muscle disease associated with polymyositis
- Hyperkeratosis, cracking of the palms of both hands in patient with polymyositis
- Antibody tests associated with polymyositis
- Jo-1 antibody positivity means what and how would I diagnose it?

A 38-year-old woman is evaluated for a 2-week history of fever, right-sided chest pain, cough, and occasional night sweats. Her chest discomfort is sharp and stabbing, and the cough is not productive. Medical history is significant for tuberculosis treated with 6 months of antimicrobial therapy 10 years ago when she lived in Africa; she immigrated to the United States 6 years ago. Medical history is otherwise unremarkable and she takes no medications.

On physical examination, temperature is 36.5 °C (97.7 °F), blood pressure is 132/83 mm Hg, pulse rate is 80/min, and respiration rate is 20/min; BMI is 30. Dullness to percussion and decreased breath sounds are noted over the lower third of the right hemithorax. A pleural rub is noted over the midlateral right lung field.

Chest radiograph shows a moderate right-sided pleural effusion with no infiltrate.

Thoracentesis is performed, and 500 mL of straw-colored fluid is removed.

Laboratory studies:	
Serum lactate dehydrogenase	90 U/L
Serum total protein	7.2 g/dL (72 g/L)
Pleural fluid lactate dehydrogenase	600 U/L
Pleural fluid pH	7.30
Pleural fluid total protein	5.6 g/dL (56 g/L)
Pleural fluid total nucleated cell count	5700/μL (5.7×10^9/L), with 15% neutrophils, 71% lymphocytes, 12% monocytes, and 2% eosinophils

7.

Which of the following tests is most likely to lead to a diagnosis?

A. Induced sputum culture and stain for acid-fast bacilli
B. Pleural fluid adenosine deaminase measurement
C. Pleural fluid culture for acid-fast bacilli
D. Pleural fluid stain for acid-fast bacilli

WHAT I NEED TO KNOW:

- What is the incidence of tuberculosis recurrence after treatment for pulmonary TB?
- What are the characteristics of a pleural effusion due to tuberculosis in terms of LDH, protein, pH, and cell counts?
- What is the most sensitive test to use to evaluate for a pleural effusion due to tuberculosis?

A 57-year-old man is evaluated in follow-up for a right-sided pleural effusion. He initially presented with increasing dyspnea and a constant dull ache on his right side. He also has lost 9.1 kg (20.0 lb) over the last 6 months. Medical history is otherwise unremarkable, and he takes no medications. He has never smoked and is employed as an auto mechanic.

Initial chest radiograph showed a moderate-sized, free-flowing pleural effusion on the right; the left lung field was unremarkable. Thoracentesis showed 3500/μL (3.5×10^9/L) nucleated cells with 45% lymphocytes and an exudative profile with negative Gram stain, culture, and cytology. Chest CT following thoracentesis showed no parenchymal lesions but several areas of pleural thickening. A repeat thoracentesis performed 2 weeks later showed similar results, also with negative cultures and cytology.

On physical examination, temperature is 36.7 °C (98.1 °F), blood pressure is 128/72 mm Hg, pulse rate is 81/min, and respiration rate is 18/min; BMI is 23. There is no jugular venous distention. Heart sounds are normal with no murmurs. Dullness to percussion and decreased breath sounds are noted over the lower third of the right hemithorax. The left lung is clear to auscultation. No lower extremity edema is noted.

Repeat chest radiograph shows reaccumulation of the right pleural effusion.

Which of the following is the most appropriate diagnostic test to perform next?

A Bronchoscopy

B Large-volume pleural fluid cytology

C PET/CT scanning

D Thoracoscopy

8.

WHAT I NEED TO KNOW:

- What is the differential diagnosis for an exudative effusion with diagnostic uncertainty?
- Is there a pleural disease associated with being an auto mechanic?
- What is the significance of pleural thickening?
- What is the significance of lymphocyte predominant cells in a pleural effusion?
- What is the diagnostic yield for bronchoscopy, 3rd pleural fluid cytology, PET/CT scan and thorascopy in the setting of an exudative effusion with diagnostic uncertainty?

A 24-year-old man is evaluated for shortness of breath with occasional wheeze that occurs several times per week. He develops significant shortness of breath when playing tennis or soccer outdoors, particularly during cool weather. He notes that it takes several minutes to recover his breath when this occurs. He also notes coughing during exercise as well as episodes of cough in the evenings and nighttime, even when not exerting himself. Medical history is significant only for seasonal allergies as a child, although he now rarely experiences allergy symptoms. He takes no medications.

On physical examination, vital signs are normal. Mild nasal congestion is noted. Lung examination reveals normal air movement and no wheezes. Heart examination is unremarkable, and the remainder of the examination is normal.

A chest radiograph is normal. Spirometry findings are within normal parameters.

Which of the following is the most appropriate next step in management?

A **Methacholine challenge test**

B **Nasal glucocorticoid**

C **Short-acting β_2-agonist inhaler as needed**

D **Clinical observation**

9.

WHAT I NEED TO KNOW:

- Different types of asthma
- How to diagnosis asthma
- Spirometry findings in asthma
- What to do when spirometry is negative and there is a very high pre-test probability of asthma

10.

An 18-year-old man is evaluated for a 6-month history of significant chest and throat tightness and acute episodes of a barking cough and a prolonged wheeze that occur during his college basketball practice and games. He also notices episodes of these symptoms occasionally when he is not exerting himself. He has a history of moderate persistent asthma, which had been well controlled. He takes an as-needed short-acting β_2-agonist inhaler at the time his symptoms occur, but this does not relieve his symptoms. He otherwise feels well. Medical history is otherwise unremarkable. In addition to his short-acting β_2-agonist, medications are a low-dose inhaled glucocorticoid and a long-acting inhaled β_2-agonist.

On physical examination, vital signs are normal. There is no jugular venous distention. The lungs are clear without wheezing. Cardiac examination shows no murmur. The remainder of the examination is unremarkable.

Chest radiograph is normal. Spirometry shows no evidence of obstruction.

Which of the following is the most appropriate next step in management?

A **Allergen immunotherapy**

B **Echocardiography**

C **Otolaryngology evaluation**

D **Switch to a medium-dose inhaled glucocorticoid**

<u>WHAT I NEED TO KNOW:</u>

- What do intermittent symptoms of throat tightness, barking cough, and prolonged wheeze in an asthmatic patient indicate?
- What are other respiratory problems associated with asthma?
- When is allergen immunotherapy indicated in asthmatic patients?
- When is otolaryngologic therapy indicated in asthmatic patients?
- When is it appropriate to increase steroids (step up therapy) in asthmatic patients?

A 58-year-old man is evaluated for chronic cough, occasional wheezing, and shortness of breath associated with frequent stops to catch his breath when walking one to two blocks on level ground. His medical history is notable for an episode of bronchitis, for which he underwent outpatient treatment 6 months ago. He is a current smoker with a 30-pack-year smoking history.

On physical examination, vital signs are normal. Examination of the lungs shows mildly decreased breath sounds throughout both lung fields and occasional scattered expiratory wheezes. The remainder of the physical examination is normal. Spirometry shows an FEV_1 of 70% of predicted and a postbronchodilator FEV_1/FVC ratio of 62%. His modified Medical Research Council (mMRC) symptom score is 2.

In addition to smoking cessation, which of the following is the most appropriate treatment?

A. Combination inhaled glucocorticoid and a long-acting bronchodilator

B. Phosphodiesterase-4 inhibitor and combination inhaled glucocorticoid and long-acting bronchodilator

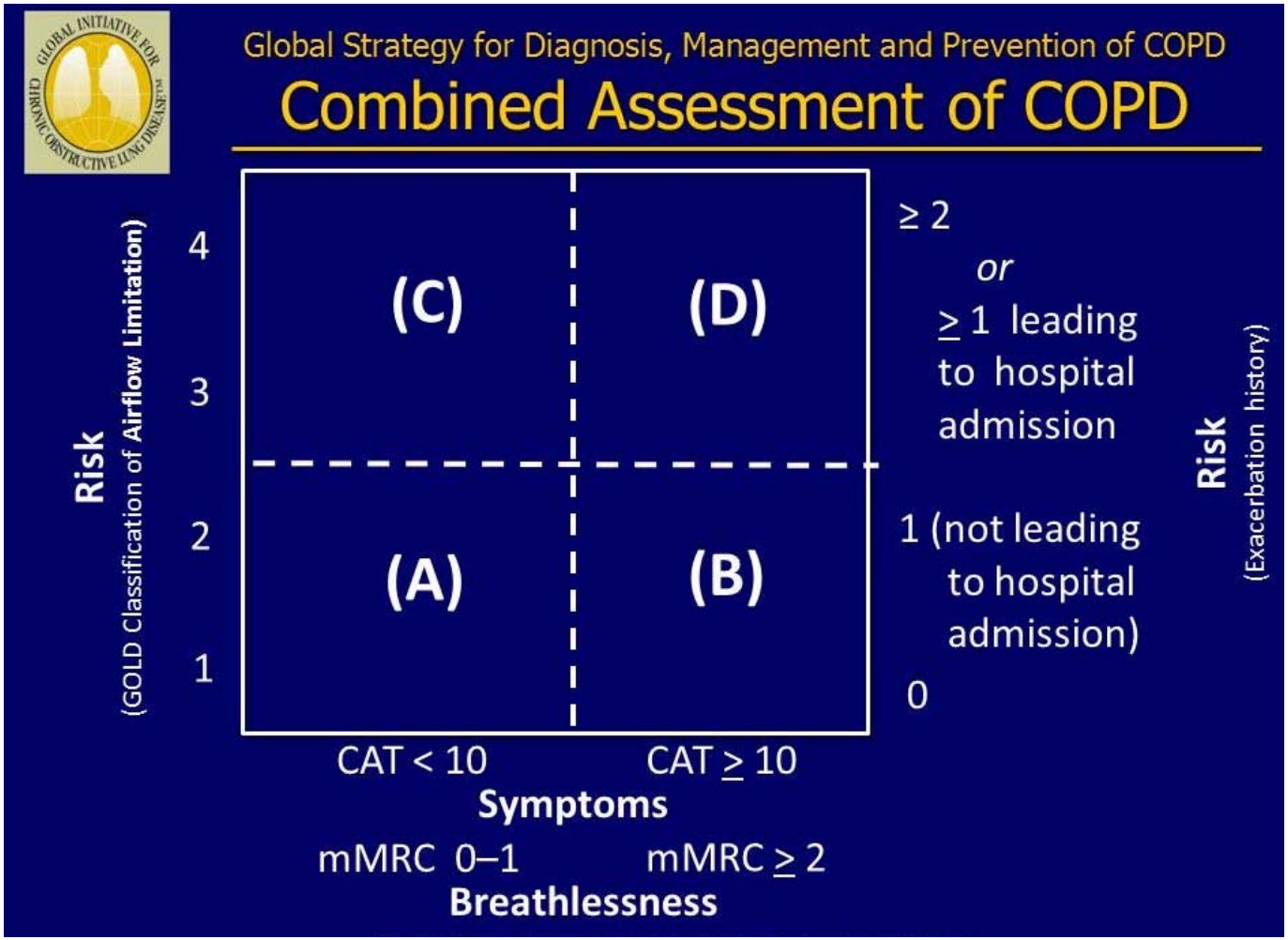
C. Short-acting bronchodilator as needed, a long-acting bronchodilator, and pulmonary rehabilitation

D. Short-acting bronchodilator as needed and an inhaled glucocorticoid

11.

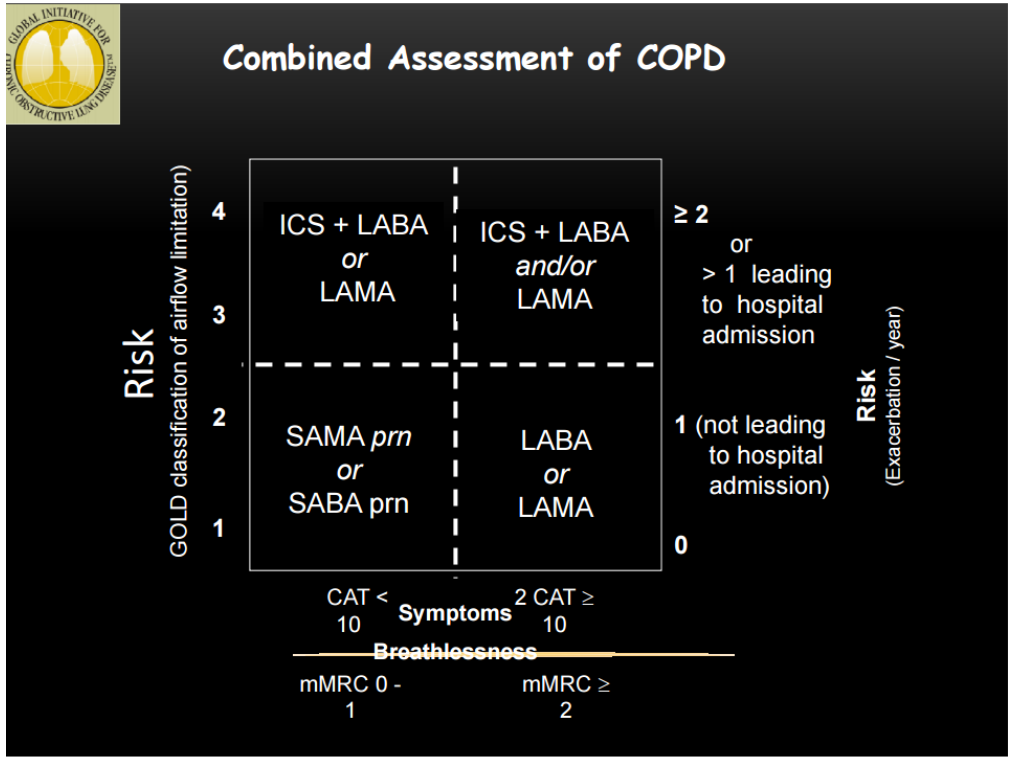
<u>WHAT I NEED TO KNOW:</u>

- When should I suspect a diagnosis of COPD?
- What is the sensitivity of physical exam for the diagnosis of COPD?
- What percentage of smokers develop COPD?
- How do I interpret PFTs?
- What is the mMRC symptom score and what does a score of 2 mean?
- What are the appropriate treatments for patients with COPD based on their stage?



FEV1 Severity of Obstruction:

Patient category C High risk few symptoms GOLD Exacerbations CAT score mMRC	 3–4 ≥2/year or ≥ 1 admission <10 0–1
Patient category D High risk many symptoms GOLD Exacerbations CAT score mMRC	 3–4 ≥2/year or ≥1 admission ≥10 ≥2
Patient category A Low risk few symptoms GOLD Exacerbations CAT score mMRC	 1–2 ≤1/year <10 0–1
Patient category B Low risk many symptoms GOLD Exacerbations CAT score mMRC	 1–2 ≤1/year ≥10 ≥2



A 55-year-old man is evaluated in follow-up for severe COPD, which was diagnosed 2 years ago. He has had two exacerbations in the past year requiring hospitalization, and his baseline exercise tolerance is low. He completed pulmonary rehabilitation 3 months ago without much improvement in exercise capacity. He quit smoking 1 year ago. His medications are tiotropium, fluticasone/salmeterol, daily roflumilast, and albuterol as needed.

On physical examination, vital signs are normal; BMI is 22. Oxygen saturation is 92% breathing ambient air. Scattered wheezing is noted bilaterally.

Chest radiograph and CT scan both show emphysematous changes in the upper lobes. Spirometry shows an FEV_1 of 40% of predicted and a DLCO of 25% of predicted. His 6-minute walking distance is 240 meters (787 feet), consistent with decreased exercise tolerance.

Which of the following is most likely to benefit this patient?

A **Change fluticasone/salmeterol to fluticasone/vilanterol**

B **Daily prednisone**

C **Lung transplantation**

D **Lung volume reduction surgery**

12.

<u>WHAT I NEED TO KNOW:</u>

- What is the recommended treatment for severe COPD?
- Is daily prednisone of benefit to patients with COPD?
- When is lung transplant indicated in the management of patients with severe COPD?
- When is lung volume reduction surgery indicated in the management of COPD?

A 42-year-old man is evaluated in follow-up after being diagnosed with obstructive sleep apnea (OSA) 6 weeks ago. Polysomnography showed moderate-severity OSA that was adequately controlled with continuous positive airway pressure (CPAP) at 8 cm H_2O. He has noticed improved daytime alertness since starting CPAP, but he finds that the apparatus is very cumbersome to transport on his frequent business trips. Medical history is otherwise unremarkable, and he takes no medications. He works as a national sales representative.

On physical examination, temperature is 37.0 °C (98.6 °F), blood pressure is 132/82 mm Hg, pulse rate is 82/min, and respiration rate is 14/min; BMI is 27. The neck circumference is 43 cm (17 in). Oropharyngeal examination reveals patent nasal airways, a low-lying soft palate, and a slight dental overjet. Cardiopulmonary examination is normal.

Weight loss is recommended.

Which of the following is the most appropriate alternative treatment to continuous positive airway pressure?

A **Oral mandibular advancement appliance**

B **Supplemental oxygen**

C **Surgical maxillomandibular advancement**

D **Uvulopalatopharyngoplasty**

13.

WHAT I NEED TO KNOW:

- What are other alternative treatments to CPAP for moderate to severe OSA?
- Which one of these treatments is the most appropriate alternative to CPAP treatment with the least risk to the patient?

14.

A 42-year-old man is evaluated for a lifelong history of insomnia. He reports always having had trouble sleeping, but sleep initiation and maintenance have become more difficult over the past few years. He experiences daytime sleepiness but does not have the opportunity to nap. He reports no depressed mood or anhedonia. His wife has not noticed excessive snoring or abnormal or absent breathing during sleep. He drinks one cup of coffee in the morning and drinks one alcoholic beverage 3 to 4 nights per week. Medical history is otherwise unremarkable. He takes no medications.

On physical examination, the patient is afebrile, blood pressure is 142/82 mm Hg, pulse rate is 78/min, and respiration rate is 14/min. BMI is 27. The remainder of the physical examination is normal.

Which of the following is the most appropriate next step in management?

A. Alcohol cessation counseling

B. Sleep hygiene counseling

C. Trazodone

D. Zolpidem

WHAT I NEED TO KNOW:

- What is the difference between sleep initiation and sleep maintenance in the evaluation or treatment of insomnia?
- How does coffee and alcohol intake affect insomnia?
- What is sleep hygiene counselling and when is it recommended?
- What drugs are appropriate for treatment of insomnia?

15.

A 29-year-old man is being discharged from the hospital following treatment of pneumonia. His medical history is notable for myotonic dystrophy with progressive muscle wasting and increasing dyspnea over the last 12 months. He sleeps in a seated to semirecumbent position and has difficulty breathing on his own when lying flat. He is being treated with cough assistance maneuvers and has not had difficulty in handling his secretions. He has no known underlying lung disease and responded well to antibiotic therapy.

On physical examination, temperature is 37.2 °C (99.0 °F), blood pressure is 128/78 mm Hg, pulse rate is 88/min, and respiration rate is 16/min. Chest examination is significant for mild crackles heard over the right lower lung field. The remainder of the examination is normal except for diffuse wasting of all major muscle groups.

Chest radiograph shows hypoinflation and an improving infiltrate in the upper portion of the right lower lobe. Forced vital capacity is 40% of predicted. Daytime arterial blood gas studies breathing ambient air show a pH of 7.35, a P_{CO_2} of 55 mm Hg (7.3 kPa), and a P_{O_2} of 86 mm Hg (11.4 kPa).

Which of the following is the most appropriate respiratory management for this patient?

A. Continuous positive airway pressure

B. Nocturnal noninvasive positive pressure ventilation

C. Nocturnal supplemental oxygen by nasal cannula

D. Tracheostomy and continuous mechanical ventilation

WHAT I NEED TO KNOW:

- What are clinical findings associated with neuromuscular weakness and impending respiratory failure?
- How do I determine if neuromuscular weakness is significant enough to cause respiratory failure based on PFTs and blood gas analysis?
- What is the appropriate management of respiratory failure due to neuromuscular weakness?

A 62-year-old man is evaluated for 2-year history of increasing shortness of breath. His symptoms are worse when he walks up steps or lifts heavy objects. He also has an occasional nonproductive cough. His medical history is significant for hypertension, and his only medication is chlorthalidone. He is an active smoker with a 56-pack-year smoking history. He is a former construction worker and worked in a steel mill when he was in high school.

On physical examination, the patient is afebrile, blood pressure is 125/78 mm Hg, pulse rate is 90/min, and respiration rate is 18/min; BMI is 31. Oxygen saturation at rest breathing ambient air is 94%. Pulmonary examination reveals a mildly prolonged expiratory phase but is otherwise normal; no wheezes or crackles are noted. The remainder of the examination is unremarkable.

Chest radiograph shows mildly increased lung markings but no focal findings.

Spirometry shows an FEV_1/FVC ratio of 65%, an FEV_1 of 52% of predicted, and an FVC of 80% of predicted. Lung volumes show a total lung capacity of 120% of predicted, a residual volume of 125% of predicted, and a DLCO of 65% of predicted.

Based on this patient's clinical findings, which of the following is the most likely diagnosis?

A **Bronchiectasis**

B **COPD**

C **Idiopathic pulmonary fibrosis**

D **Obesity hypoventilation syndrome**

16.

WHAT I NEED TO KNOW:

- What is the likely cause of chronic worsening shortness of breath with exertion and cough in a patient with 56 pack-year history of smoking who continues to smoke?
- Is there a lung disease associated with working in a steel mill?
- What does the prolonged expiratory phase indicate on physical examination?
- How do I interpret PFTs?
- How do patients with bronchiectasis present?
- How do patients with COPD present?
- How do patients with pulmonary fibrosis present?
- How do patients with obesity hypoventilation syndrome present?

17.

A 68-year-old man is evaluated in follow-up for a 6-mm solitary pulmonary nodule, which was incidentally discovered on imaging for abdominal pain 3 years ago. The nodule was located at the right lung base and had no associated ground-glass opacification. Follow-up chest CT was obtained at 1- and 2-year intervals, and the pulmonary nodule appears unchanged. He feels well and does not have any respiratory or constitutional symptoms. He has a 23-pack-year smoking history, but he quit smoking 20 years ago.

On physical examination, vital signs and cardiopulmonary examination findings are normal.

Which of the following is the most appropriate management?

A. Obtain PET/CT now
B. Perform chest radiograph in 1 year
C. Repeat chest CT in 1 year
D. Repeat chest CT in 2 years
E. No further imaging is necessary

<u>WHAT I NEED TO KNOW:</u>

- What is the definition of a solitary pulmonary nodule?
- What does associated ground-glass opacificaton indicate when associated with a SPN?
- What does the stability of a pulmonary nodule at 1 and 2 years indicate?
- When does the risk of lung cancer reach non-smoker level (if ever) after quitting smoking?

A 62-year-old woman is evaluated in follow-up after a 3-mm pulmonary nodule was discovered on chest imaging obtained 1 year ago. She feels well and has not had shortness of breath, cough, hemoptysis, weight loss, or chest pain. She has a 60-pack-year smoking history and is a current smoker.

On physical examination, vital signs are normal. No cervical or supraclavicular lymphadenopathy is noted. The lungs are clear to auscultation bilaterally. There is no evidence of clubbing.

Her repeat chest CT shows that the nodule has increased in size and now measures 8 mm in diameter. There is no evidence of mediastinal or hilar lymphadenopathy.

Which of the following is the most appropriate management?

A **Perform bronchoscopy**

B **Perform transthoracic needle aspiration**

C **Refer for thoracic surgery**

D **Repeat chest CT imaging in 3 months**

18.

<u>WHAT I NEED TO KNOW:</u>

- How do I determine a patient's pre-test probability for lung cancer?
- What are the concerning characteristics of a pulmonary nodule?
- What amount of growth of a nodule is concerning?
- What is the most appropriate management of a patient with risk factors for lung cancer and a nodule that increases in size with repeat imaging?

A 63-year-old man is evaluated in the emergency department for significant shortness of breath and pleuritic anterior chest pain of 48 hours' duration. Three days ago, he completed a 12-hour flight from Asia to the United States. Medical history is otherwise unremarkable and he takes no medications.

On physical examination, he is in mild respiratory distress. He is afebrile, blood pressure is 135/87 mm Hg, pulse rate is 108/min, and respiration rate is 18/min. Oxygen saturation breathing ambient air is 94%. The remainder of the physical examination is unremarkable.

Electrocardiography shows nonspecific ST- and T-wave changes. Echocardiography shows normal right ventricular function. CT angiography of the chest demonstrates multiple pulmonary artery filling defects in the distal branches of the right pulmonary artery consistent with pulmonary embolism.

Which of the following is the most appropriate next step in management?

A **Catheter-directed thrombolysis**

B **Inpatient anticoagulation**

C **Outpatient anticoagulation**

D **Systemic thrombolysis**

19.

<u>WHAT I NEED TO KNOW:</u>

- What hemodynamics are concerning for instability in a patient with a pulmonary embolism?
- What is the appropriate management for a patient who presents with multiple pulmonary emboli on imaging who is hemodynamically stable/hemodynamically unstable?
- What is the appropriate setting in which to treat a patient with multiple pulmonary emboli who is hemodynamically stable?

20.

A 25-year-old woman is evaluated for a 3-hour history of pleuritic chest pain and mild shortness of breath. She is pregnant at 16 weeks' gestation. Her symptoms began acutely; she reports no other symptoms or previous problems during the pregnancy. Medical and family history is unremarkable. Her only medication is a prenatal vitamin.

On physical examination, she is afebrile, blood pressure is 125/88 mm Hg, heart rate is 80/min, and respiration rate is 15/min. Oxygen saturation is 97% breathing ambient air. Lungs are clear, and cardiac examination is normal. She has a distended, pregnant abdomen. Trace bipedal edema is noted, and the left midcalf circumference is 1.5 cm larger than the right. The remainder of the physical examination is unremarkable.

A chest radiograph is normal.

Which of the following is the most appropriate diagnostic test to perform next?

A. CT pulmonary angiography

B. D-dimer test

C. Lower extremity venous duplex ultrasonography

D. Ventilation-perfusion lung scan

<u>WHAT I NEED TO KNOW</u>:

- What are the physical exam findings that are most predictive of VTE?
- What is the safest test to order in the evaluation of a pregnant patient for the diagnosis of PE?