Registrar Education Series

Pulmonology

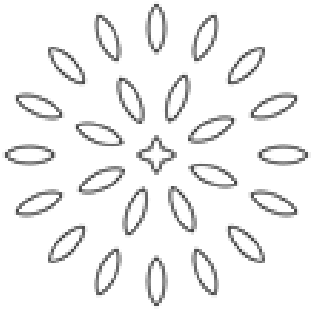
Continuing education for personal growth and quality improvement

[DynaMed]
[GINA Guidelines]
[Gold Guidelines]

How to...

- What is the differential based on the chief complaint?
- What additional information do you want?
- How does the history narrow down the differential?
- What labs/imaging would be most helpful?
- What is the diagnosis?
- What is the assessment?
- What is the treatment/plan?



PULMONOLOGY CASES

challenging the status quo

Seed Global Health

Pulmonology Case 1

Chief Concern | Histories | PE | Assessment | Plan

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Chief Concern

Sylvia is a 28yoF with no significant PMH who presents for a cough.

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Histories

HPI: The cough has been present for over two months. Worse first thing in the morning and when she lays down at night. Occasionally will bring up sputum. Has associated nasal congestion and is consistently clearing her throat. Denies fever, weight loss, hemoptysis, hoarseness, excessive dyspnea, recurrent pneumonia, smoking and wheezing. Has a history of asthma as a child but has not needed an inhaler in years.

PMH: Asthma, eczema

PSH: None

FH: None

Social: Originally from Lusaka. Lives with 3 friends. Has 2 indoor dogs. Works at a cell phone store. Enjoys shopping and dancing. Denies heavy alcohol, tobacco and drugs.

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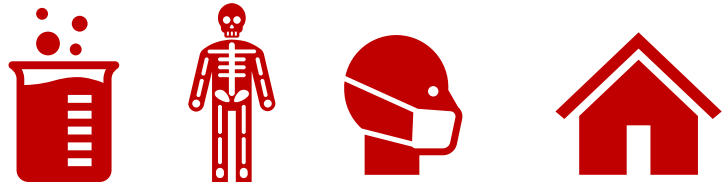
Physical Exam

VITALS: T 37.1, BP 112/64, P 82, R 16, O2 98%

GEN: female appearing stated age in no acute distress.

HEENT: hyperpigmentation under each eye. Clear rhinorrhea with enlarged pale boggy nasal mucosa/turbinates. Streaking down the posterior pharynx with b/l clear TM effusions.
CV: S1, S2 normal, regular rate and rhythm, no murmur or rub.
RESP: Clear to auscultation bilaterally, no wheezes, rhonchi or crackles. Able to speak in full sentences.
ABD: soft, non-tender, non-distended, bowel sounds present
MSK: No lower extremity pitting edema, strength 5/5 b/l
Neuro: CN II-XII intact



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Labs:

*FBC	
WBC	7.5
Hgb	13
Hct	36
Plt	220

*RFTs/LFTs	
Na	138
K	4.6
Bicarb	25
Cl	101
BUN	11
Cr	82
Glucose	5.1
Ca	9.5
T bili	7
AST	35
ALT	32
Alk Phos	125

*Urine	
LE	Negative
Blood	Negative
Nit	Negative
Bili	Negative

*Other	
A1c	5.1
Chol	4.8
LDL	3.4
HDL	1.1
Trigs	2.1
TSH	3.1

*indicates the test was likely not indicated with this clinical presentation

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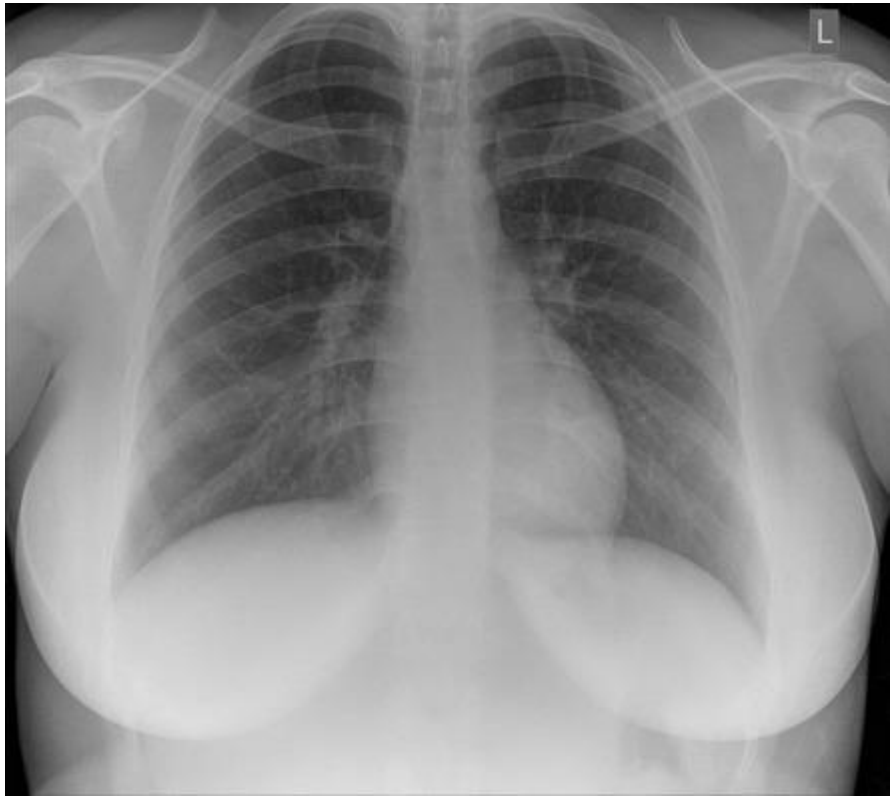
Imaging



*Chest x-ray

*indicates the test was likely not indicated with this clinical presentation

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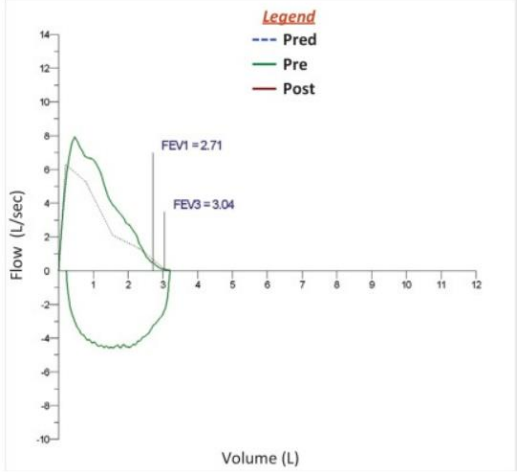
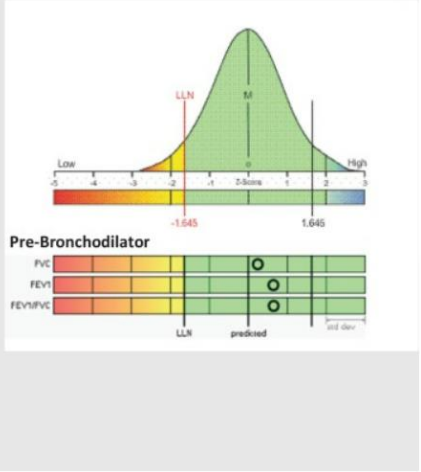
Procedures

Spirometry (BTPS)		Pre Bronchodilator Actual	Range		Predicted	% Pred	Z-score
StartTime		17:03	----	----	----	----	----
FVC	L	3.20	2.42	3.80	3.10	103	0.25
FEV_1	L	2.71	1.95	3.03	2.50	108	0.66
FEV_1 / FVC	%	85	70	90	81	105	0.67





*Spirometry

*indicates the test was likely not indicated with this clinical presentation

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Assessment

- Sylvia is a 28yoF with a PMH of remote asthma and eczema who presents for a chronic cough suggestive of upper airway cough syndrome, aka postnasal drip. Other common causes of chronic cough that have to be considered if she does not respond are asthma, GERD, ACE-inhibitor, tobacco related, COPD.

- Other causes to consider if empiric treatment fails are OSA, postinfectious bronchospasm, malignancy, TB, psychogenic cough, sarcoidosis, interstitial lung disease, pertussis, CCF

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Plan

- No labs or imaging are indicated at this time as this is a clinical diagnosis and empiric treatment is based on the most likely cause
- Start with intranasal corticosteroids either continuous or as needed
- If needed can consider escalating therapy by adding an intranasal antihistamine or second generation oral antihistamine
- Unless absolutely needed avoid oral and intranasal decongestants due to adverse effects.
- Skin allergy testing and immunotherapy would only be considered if all other measures fail and other common causes of chronic cough have been excluded
- If needed can empirically treat other common causes of chronic cough, i.e. GERD, with lifestyle and pharmacologic interventions based on current evidence-based practices.

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Chronic Cough Summary

Chronic cough is defined as a cough for >8 weeks duration

- Common causes: upper airway cough syndrome, asthma, GERD, ACE-inh, tobacco related, COPD

Labs and imaging are not indicated if there is high suspicion for a typical cause in the absence of red flag signs in an immunocompetent otherwise healthy individual

- Red flags: fever, weight loss, hemoptysis, hoarseness, excessive dyspnea or sputum production, recurrent pneumonia, smoking history of 20 pack-years, or smoker older than 45 years

Upper airway cough syndrome

- First line is intranasal corticosteroids

GERD

- Counsel on lifestyle modification, weight loss, smoking cessation, elevate head of bed, avoid meals before bed
- Prescribe a PPI for 4-8 weeks

ACE-Inhibitor

- Stop the ACE-inhibitor

Tobacco

- Counsel on cessation using the 5As, refer to a smoker's hotline, prescribe NRT, bupropion and/or varenicline

Asthma/COPD

- Escalate therapy to gain better control

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Pulmonology Case 2

Chief Concern | Histories | PE | Assessment | Plan

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Chief Concern

Johnathon is a 56yo male with a PMH of smoking and hypertension who presents for cough and shortness of breath.

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Histories

HPI: This episode started 4 days ago with a runny nose and has escalated to feeling like he cannot catch a full breath when resting. He admits to having persistent SOB for the last year, worse with exertion affecting his activities at home and a chronic cough during that time that has been productive intermittently. There has been no change in the cough or sputum with this episode. He denies lower extremity edema, fevers, PND. He has a low level of chronic chest tightness, poor sleep and low energy.

PMH: Hypertension and smoking

FH: No early heart disease or cancers

Social: Lives with his wife and 3 children. Works at a desk with the Ministry of transportation. Enjoys going out to eat. Does not exercise. Currently smokes ½ pack per day, has a total history of 50 pack-years. Drinks socially, denies drugs.

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Physical Exam

Vitals: T 37.1, BP 146/93, P 85, R 19, O2 93%

GEN: male appearing stated age in mild respiratory distress.
CV: S1, S2 normal, regular rate and rhythm, no murmur or rub.
RESP: Decreased air movement in all fields with a prolong expiratory phase. Coarse bilateral rhonchi without wheezing or crepitations. Able to speak comfortably but not in long sentences.
ABD: soft, non-tender, non-distended, bowel sounds present
MSK: No lower extremity pitting edema, strength 5/5 b/l
Neuro: CN II-XII intact




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Labs

FBC	
WBC	11.1
Hgb	17
Hct	52
Plt	220
Eos	<100

*RFTs/LFTs	
Na	138
K	4.6
Bicarb	25
Cl	101
BUN	11
Cr	96
Glucose	5.2
Ca	9.5
T bili	7
AST	35
ALT	32
Alk Phos	125

*Infections	
TB	Neg
Cocci	Neg
HIV	Neg
Parasites	Neg
Fungal	Neg
COVID	Neg

*Urine	
LE	Negative
Blood	Negative
Nit	Negative
Bili	Negative
UPT	Negative

*Other	
A1c	5.1
Chol	4.8
LDL	3.4
HDL	1.1
Trigs	2.1
D-dimer	0.3



*indicates the test was likely not indicated with this clinical presentation

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Imaging

Normal chest x-ray

*indicates the test was likely not indicated with this clinical presentation

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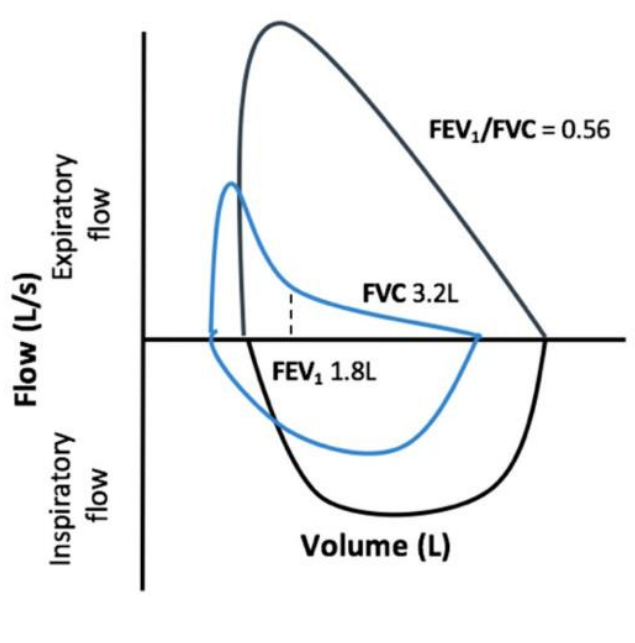
Procedures



Spirometry (Blue line is patient curve)

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Assessment

- Jonathon is a 56yoM with a PMH of smoking and HTN who presents for acute on chronic dyspnea with a chronic cough and intermittent sputum production over the past year making COPD the most likely diagnosis with an acute exacerbation due to a viral URI.
- *COPD CAT* score of >10 and spirometry with an FEV1/FVC < 0.7 and a FEV1 at 60% of predicted value.
- This makes his airflow limitation GOLD 2: moderate and puts him in Group B for initial management options.

- Differential includes: : asthma, CCF, TB, interstitial lung disease, lung cancer, GERD, chronic allergic rhinitis, upper airway cough syndrome, medication induced cough

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Plan

- During the exacerbation will give a SABA and prednisone
- Given that there was no change in sputum purulence or volume will hold off on antibiotics
- Based on being diagnosed in Group B he can take either a LAMA or a LABA once stable as a maintenance medication
- Given his eosinophils were <100 there is no indication to add an ICS in the future
- Will counsel on inhaler technique and adherence as well as tobacco cessation
- Refer for pulmonary rehab and a structed COPD self-management program
- No need for oxygen at this point
- Order low dose CT for lung cancer screening based on USPSTF recommendations, PCV20, influenza and COVID vaccines
- If cor pulmonale or CCF is suspected in the future can get ECG and echo
- Follow up on exacerbation within a week and after 3 months of maintenance therapy to decide on escalation or de-escalation of therapy

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COPD Summary

COPD: is a chronic progressive disease characterized by persistent respiratory symptoms and airflow limitation

- Suspect COPD in a patient with dyspnea, chronic cough or sputum production, a history of recurrent lower respiratory tract infections and/or a history of exposure to risk factors

Risk factors: male, >40yo, significant exposure to tobacco smoke (i.e. >40pack-years), HIV, TB

Diagnosis is based on high suspicion in a person with risk factors, signs and symptoms and spirometry

- Confirm with spirometry of FEV1/FVC < 0.7 after bronchodilator

Additional testing is not necessary for diagnosis but can identify co-morbidities

- Pulse oximetry, *CBC (eosinophil count), CXR/CT, ECG/echo, AAT deficiency, diffusing capacity of the lung for carbon monoxide*

Initial Management: based on severity and health status

- *CAT* and spirometry
- Treatment is based on Group A-D. B-D should have a long-acting bronchodilator (LABA or LAMA)

Nonpharmacologic management consists of inhaler technique, pulmonary rehab, self-management, oxygen, palliative care, end of life care, surgical interventions

Follow up management is based on dyspnea and exacerbations

- Combining medications is based on baseline therapy and other factors and include LAMA|LABA +/- ICS +/- roflumilast+/- azithromycin

Exacerbations: treat with SABA then LABD when stable +/- steroids, +/- antibiotics

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Pulmonary Case 3

Chief Concern | Histories | PE | Assessment | Plan

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Chief Concern

Jasmine is a 56yo female with a PMH of smoking who presents for a cough.

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Histories

HPI: She started coughing 3 days ago and since then the cough has become productive of sputum, she has had fevers, chills and shortness of breath. She denies nasal congestion, recent travel, unilateral lower extremity edema. She has sharp chest pains on the left when she coughs or takes a deep breath. Denies taking steroids or antibiotics recently.

PMH: Smoking

PSH: None

FH: No early heart disease or cancers

Social: From Northern Province. Lives her sister and 2 children. Started working as a laborer cleaning the streets of Lusaka 4 months ago. Enjoys cooking and sewing. Smokes ½ ppd and has a 25 pack-year history of smoking. Denies alcohol and drugs.

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Physical Exam

VITALS: T 39.6, BP 132/84, P 110, R 22, O2 94%

GEN: female appearing older than stated age ill but not toxic appearing.

CV: S1, S2 normal, mild tachycardia with a regular rhythm. No murmur or rub.
RESP: Asymmetric breath sounds. Good clear air movement on the right. Crepitations present on the left side with increased tactile fremitus and dullness to percussion near the base.
ABD: soft, non-tender, non-distended, bowel sounds present
MSK: No lower extremity pitting edema, strength 5/5 b/l
Neuro: CN II-XII intact



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Labs

*FBC	
WBC	15.2
Hgb	13
Hct	36
Plt	470

*RFTs/LFTs	
Na	138
K	4.6
Bicarb	25
Cl	101
BUN	35
Cr	80
Glucose	3.7
Ca	9.5
T bili	10
AST	35
ALT	32
Alk Phos	97

*Urine	
LE	Negative
Blood	Negative
Nit	Negative
Bili	Negative

*Infections	
TB	Neg
Cocci	Neg
HIV	Neg
Parasites	Neg
Fungal	Neg
COVID	Neg

*indicates the test was likely not indicated with this clinical presentation

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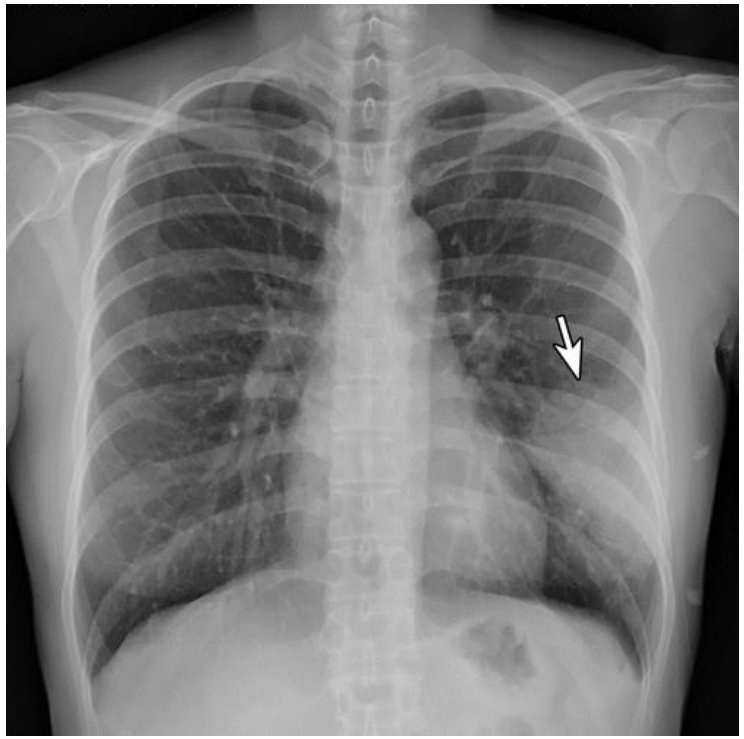
Imaging



*Chest x-ray

*indicates the test was likely not indicated with this clinical presentation

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Assessment

- Jasmine is a 56yoF with a PMH of smoking who presents with progressive symptoms of cough, fever, dyspnea and sputum production which points towards a community acquired pneumonia. PSI could not be calculated , CURB-65 score is 0. She does not meet the criteria for severe pneumonia and can be treated in the outpatient setting.

- Differential includes: asthma or chronic obstructive pulmonary disease exacerbation, bronchitis, congestive heart failure, gastroesophageal reflux disease, lung cancer and pulmonary embolism

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Plan

- Given there is clinical suspicion for pneumonia and the diagnosis is not in doubt she can be treated with 5-7 days of oral antibiotics without imaging or labs.
- Doxycycline 100mg PO bid.
- If she had co-morbid conditions including DM, COPD, asthma, renal/heart/liver disease, alcoholism, malignancy, asplenia or recent antibiotic use would recommend a 3rd gen cephalosporin plus a macrolide.
- Steroids are not indicated for community acquired pneumonia
- No follow up imaging is necessary if she improves within 5-7 days as chest x-ray abnormalities may take weeks to months to resolve despite clinical resolution
- Update all vaccines including PCV20 (or 15 followed by 23 one year later), influenza and COVID.
- Follow up in 1 week to check clinical improvement

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CAP Summary

Lower respiratory tract infections are among the top 4 causes of death worldwide

Risk factors include smoking, DM, COPD, asthma, renal/heart/liver disease, PPIs, opioid use, high alcohol consumption and orodental/periodontal disease

Typical signs and symptoms are cough, subjective fever, sputum production and dyspnea

- Diagnostic odds: clinical impression 11.5, egophony 6.5, any abnormal vital sign 6.0, any abnormal lung finding 3.2, tachypnea 3.1, fever 3.3
- Unlikely to have CAP if vital signs and pulmonary exam are normal, negative likelihood ratio of 0.1

Diagnosis is made with a combination of history, physical exam +/- lung imaging

- CXR accuracy is limited with a PPV of 26.9% and NPV of 96.5%
- Ultrasound is more accurate than CXR for diagnosing CAP
- Diagnostic cultures and antigen testing should only be ordered in patients with severe CAP

Treatment for outpatient without comorbidities is amoxicillin 1g tid, doxycycline 100mg bid or azithromycin

- Outpatients with comorbidities and inpatients with non-severe pneumonia should be treated with Augmentin bid OR 3rd gen cephalosporin plus a macrolide or doxycycline OR levofloxacin 750mg daily
- Steroids are indicated for comorbid asthma, COPD, autoimmune disease or CAP septic shock refractory to fluids and vasopressors

Oseltamivir should be initiated if influenza virus is isolated regardless of the duration of the illness

Vaccines: Influenza, COVID. If ≥65 or 19-64 with underlying conditions give PCV20 or PCV15 followed by PPSV23 1 year later

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Pulmonary Case 4

Chief Concern | Histories | PE | Assessment | Plan

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Chief Concern

Michael is an 18yoM who presents to the outpatient clinic with a cough.

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Histories

HPI: He noticed chest tightness about a week ago and started coughing and wheezing a few days ago. This happens frequently and can be brought on by colds, cold weather, allergy season, exercise, strong chemicals and laughing. Denies fever, sputum production, dizziness, GERD, rhinorrhea, lower extremity swelling.

PMH: Allergic rhinitis, eczema

PSH: None

FH: Seasonal allergies, asthma

Social: Eastern Province. Lives with friends. Does not have any children. In school full time studying graphic design. Enjoys playing and watching football. Drinks on the weekends. Denies smoking tobacco and drugs.

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Physical Exam

VITALS: T 36.8, BP 117/74, P 72, R 18, O2 97%

GEN: 18yoM appearing stated age in no acute distress.

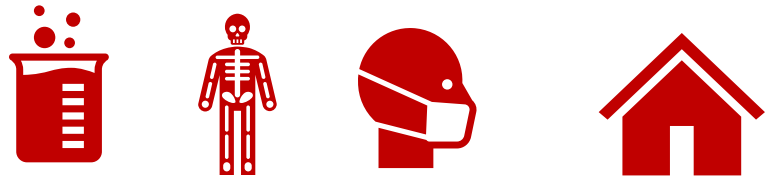
CV: S1, S2 normal, regular rate and rhythm. No murmur or rub.

RESP: Good air movement with b/l diffuse end expiratory wheezing. No crepitations or rhonchi. Able to speak in full sentences, deep breathing induces cough.

ABD: soft, non-tender, non-distended, bowel sounds present

MSK: No lower extremity pitting edema, strength 5/5 b/l

Neuro: CN II-XII intact



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Labs

*FBC	
WBC	7
Hgb	14
Hct	43
Plt	195

*RFTs/LFTs	
Na	138
K	4.6
Bicarb	25
Cl	110
BUN	13
Cr	90
Glucose	5.1
Ca	9.5
T bili	10
AST	35
ALT	32
Alk Phos	97

*Infections	
TB	Neg
Cocci	Neg
HIV	Neg
Parasites	Neg
Fungal	Neg
COVID	Neg

*indicates the test was likely not indicated with this clinical presentation

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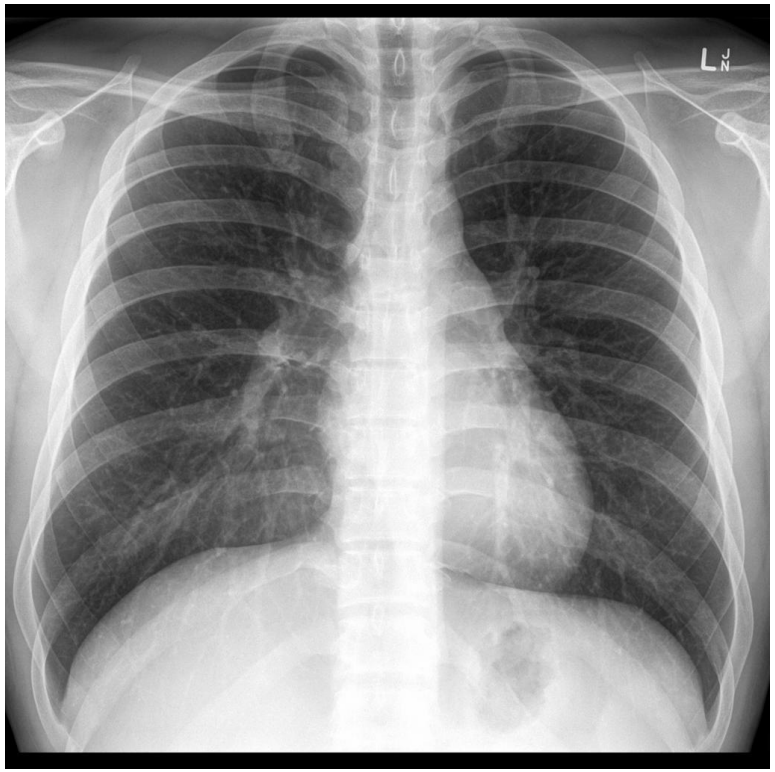
Imaging



*Chest x-ray

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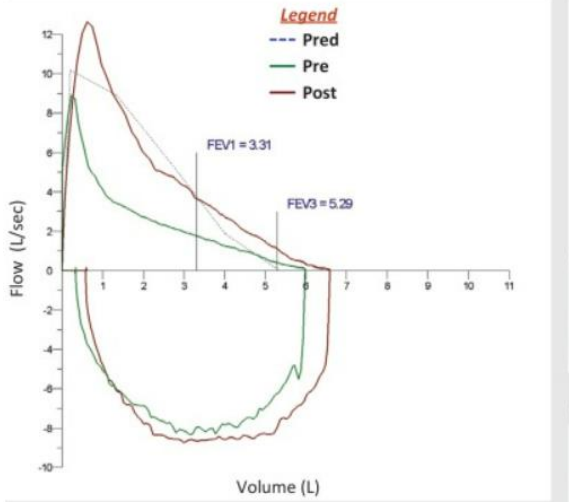
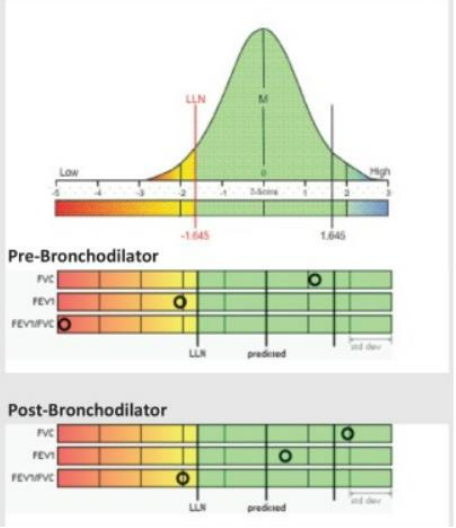
Procedures

Spirometry (BTPS)		Pre Bronchodilator Actual	Range		Predicted	% Pred	Z-score	Post Bronchodilator Actual	% Pred	% Change	Z-score
StartTime		10:12	----	----	----	----	----	10:39	----	--	----
FVC	L	6.09	4.30	6.39	5.35	114	1.16	6.59	123	8	1.94
FEV_1	L	3.31	3.52	5.30	4.41	75	−2.02	4.65	105	40	0.46
FEV_1 / FVC	%	54	72	94	83	65	−3.61	71	86	31	−1.76





Spirometry

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Assessment

- Michael is an 18yoM with a PMH of allergic rhinitis and eczema who presents for a week of cough, chest tightness and wheeze with a history of recurrent episodes based on typical asthma triggers making an acute worsening of asthma due to seasonal allergies the most likely diagnosis. He is uncontrolled based on an asthma symptom score of 3 with 2 known risk factors for future exacerbations (uncontrolled symptoms and not being prescribed an inhaled corticosteroid).

- Differential includes: chronic upper airway cough syndrome, medication induced, GERD, chronic sinusitis, inducible laryngeal obstruction, COPD, pneumonia, hyperventilation, dysfunctional breathing, cardiac failure, parenchymal lung disease, bronchiectasis, PE, TB

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Plan

- Need to confirm diagnosis with an FEV1/FVC <0.75-0.8 and excessive variability in the absence of infection.
- Start with lung function tests now, 3-6 months after starting treatment then every 1-2 years once controlled.
- Based on his baseline he would be at Step 1 or 2, will Step up to Step 3 with ICS-formoterol as a controller and reliever based on current exacerbation for 2 weeks then attempt to Step down to as needed ICS-formoterol once symptoms are controlled.
- No need for oral corticosteroids, oxygen therapy or acute care facility
- Will provide asthma self management with teaching asthma basics, inhaler technique, discuss adherence, guided self management with self-monitoring of symptoms, provide a written asthma action plan and ensure there is regular communication with a health care professional.
- Discuss modifiable risk factors like remediating moist/mold in household, baits for roaches and rodents. There is no clinical benefit to replacing carpets, removing cats and dogs.
- Follow up in 1-2 weeks

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Asthma Summary

Asthma is over diagnosed and overtreated in the United States and the opposite is true for LMIC

- Suspect if there is >1 symptom which varies over time and intensity: wheeze, SOB, chest tightness, cough
- Triggers include exercise, allergen/irritant exposure, change in weather, viral respiratory illness, laughter

Diagnosis is based on a history of characteristic symptom patterns and evidence of excessive expiratory airflow variability in the absence of infection

- Confirmed by FEV1/FVC < 0.75/0.8 in adults and < 0.9 in children

Assess control with 4 symptom questions over the last 4 weeks: Daytime >2x/week, night awakening, SABA reliever > 2x/week, activity limitation

- 0: well controlled, 1-2 partly controlled, 3-4 uncontrolled

Treatment is Step based and depends on symptoms: as needed SABA alone is not recommended due to risk of severe exacerbations and mortality

- Low dose ICS-formoterol combo is preferred in adults and adolescents
- Low dose ICS and a SABA is preferred in children 6-11

Office visit checklist should include

- Symptom review, risk for exacerbations, lung function measurement, document current Step, watching *inhaler technique*, assess adherence and side effects, written *asthma action plan*, patient attitudes/goals and assess comorbidities, *vaccines* (flu, PCV20, COVID)

Asthma self management reduces asthma morbidity, asthma-related hospitalizations, emergency department visits, unscheduled visits, missed work/school days, nocturnal wakening

- Inhaler skills training, asthma information, training in guided self management with self monitoring of symptoms, written action plan, regular communication with a health professional

Treatment of exacerbations depends on severity and typically includes repeated SABA by pMDI with spacer, controlled oxygen and oral corticosteroids (prednisolone 40-50mg daily for 5-7 days).

- Do not routinely order a chest x-ray or prescribe antibiotics