Misdiagnosis of Asthma

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Educational Objectives

By completing this educational activity, the participant should be better able to:

1. Evaluate patients diagnosed with asthma to confirm an appropriate diagnosis.
2. Appropriately assess patients' respiratory symptoms to avoid a misdiagnosis.
3. Confirm variable airflow limitation at the time of diagnosis or if possible clinical remission.
4. Discuss other conditions that could cause a misdiagnosis of asthma including allergic rhinitis, GERD, or vocal cord dysfunction.
5. Discuss solutions to prevent the under and over diagnosis of asthma.

Speaker Disclosure

Dr. Hawkins disclosed that he has no financial relationships with any ineligible organizations or commercial interests.

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2022 Texas Family Medicine Symposium
La Cantera Hill Country Resort, San Antonio TX
Clare Hawkins, MD, FAAFP
CMO, Main Street Health Texas

1

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2

Objectives

1. Evaluate patients diagnosed with asthma to confirm an appropriate **diagnosis**.
2. Appropriately assess patients' respiratory symptoms to **avoid a misdiagnosis**.
3. **Confirm variable airflow limitation** at the time of diagnosis or if possible clinical remission.
4. Discuss **other conditions** that could cause a misdiagnosis of asthma including allergic rhinitis, GERD, or vocal cord dysfunction.
5. Discuss solutions to **prevent the under and over diagnosis of asthma**.

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Case # 1: Rachel

- Previous visits for acute bronchitis – treated with antibiotics
- Half a pack/day for 20 years
- Grew up in family of smokers
- Worsening x 3 months
- Complains of SOB when walking up stairs
- Wheezing waking her at night and productive cough

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Audience Polling Question #1

Does Rachel have…

1. COPD
2. Asthma
3. I don't know

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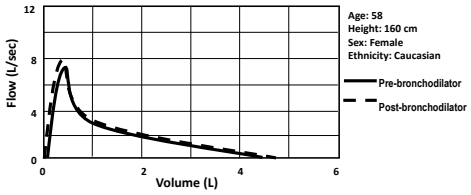
Case #1: Rachel Spirometry Results



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Case #1: Rachel Spirometry Results

	Pre-Bronchodilator			Post-Bronchodilator	
	Predicted	Measured	% Predicted	Measured	% Change
FVC	4.37 L	4.65 L	106%	4.65 L	0%
FEV_1	3.78 L	2.98 L	79%	3.19 L	7%
FEV 1/ FVC (%)	86%	64%		69%	

Office Staff eager to leave at end of day and only waited 5 minutes before tests

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Case #3: Rachel Spirometry Results – 2

	Pre-Bronchodilator			Post-Bronchodilator	
	Predicted	Measured	% Predicted	Measured	% Change
FVC	4.37 L	4.65 L	106%	4.65 L	0%
FEV_1	3.78 L	2.98 L	79%	3.50 L	17.5%
FEV 1/ FVC (%)	86%	64%		75%	

After waiting the full 20 minutes

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Audience Polling Question #2

Rachel's diagnosis now is

1. Mild Intermittent Asthma
2. Reversible Airways Disease
3. Moderate Persistent Asthma
4. Mild COPD

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Maximal Forced Expiratory Maneuver

Public Health Image Library, (PHIL), #20950, Veronica Burkel, M.P.H., 2013, http://phil.cdc.gov/phil/details.asp Accessed 8/11/2016, public domain

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Coaching "Blow, Blow, Blow!"

Public Health Image Library, (PHIL), # 19298, Daniel A. Singer, MD, MPH, Medical Officer 2014 http://phil.cdc.gov/phil/details.asp Accessed 8/11/2016, public domain

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Spirometry Technique

Forced expiratory maneuver

- Coach patient to get a maximal effort
- Six seconds of effort required though most of air pushed out in the first second
- Pace of expired air is most important variable; therefore, it should be released with explosive force
- 4 MDI of 100 ug Albuterol preferably with a spacer
- Wait 20 minutes for full effect

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Choose Wisely!

BEST PRACTICES IN PULMONOLOGY

Recommendations from the Choosing Wisely Campaign

RECOMMENDATION	*SPONSORING ORGANIZATION*
Do not diagnose or manage asthma without spirometry.	American Academy of Allergy, Asthma and Immunology

Source: For more information on the Choosing Wisely Campaign, see https://www.choosingwisely.org. For supporting citations and to search Choosing Wisely recommendations relevant to primary care, see https://www.aafp.org/afp/recommendations/search.htm.

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Grading Severity

- Four grades split at 80%, 50% and 30% of predicted value
- Does airway function predict disease trajectory (prognosis)?
- Combine with Dyspnea & Exacerbation Frequency to choose treatment regimen

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Three Numbers

- **FVC**: Forced Vital Capacity
- **FEV1**: Amount breathed out in 1 second
- **FEV1/FVC**: How much of your lung's air can be exhaled in the first second
  - Measure of caliber or function of airway
  - NOT A COMPARISON TO REFERENCE VALUES
- More accurate than Peak Flow

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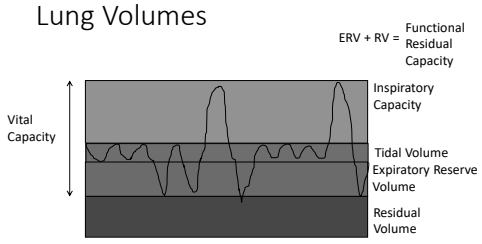
Lung Volumes



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Severity of Obstruction	
FEV1	% of predicted
Mild	>80
Moderate	50 to 79
Severe	30 to 49
Very severe	<30 *
Severity of Restriction	
FVC	% of predicted
Mild	>65 to 80
Moderate	>50 to 64
Severe	<50

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FEV 1 Thresholds

- Grade 1: Mild FEV1 > 80%
- Grade 2: Moderate 50% < FEV1 < 80%
- Grade 3: Severe 30% < FEV1 < 50%
- Grade 4: Very Severe FEV1 < 30%

- Compared with predicted values in patients with post-bronchodilator FEV1/FVC < 70

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Caveat

- FEV1/FVC 70
  - Overestimates COPD diagnosis in Elderly
  - Underestimates COPD diagnosis in those under age 45

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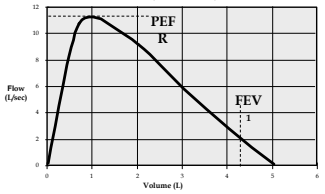
Normal Flow Volume Curve (Expiratory)



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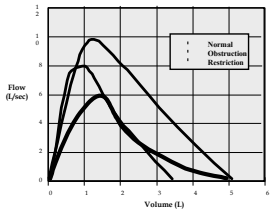
Normal, Obstructed, & Restrictive Curves



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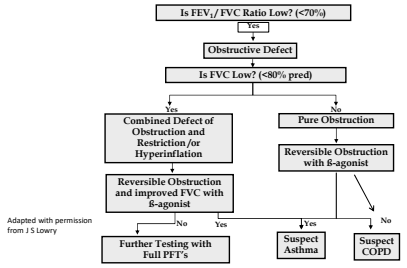

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Common Obstructive Disorders

Diffuse Airway Disease

- Asthma
- COPD
- Bronchiectasis
- Cystic Fibrosis

Upper Airway Obstruction

- Foreign Body
- Neoplasm
- Tracheal Stenosis
- Tracheomalacia
- Vocal Cord Paralysis

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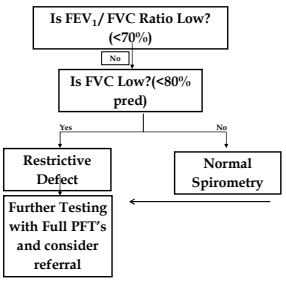
Diagnostic Flow Diagram, Restriction



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Common Restrictive Disorders

Parenchymal
- Interstitial Lung Diseases
  - Fibrosis
  - Granulomatosis (TB)
  - Pneumoconiosis
  - Pneumonitis (lupus)
- Loss of Functioning Tissue
  - Atelectasis
  - Large Neoplasm
  - Resection

Pleural
- Effusion
- Fibrosis

Chest Wall
- Kyphoscoliosis
- Neuromuscular Disease
- Trauma

Extrathoracic
- Abdominal Distension
- Obesity

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Asthma or COPD?

- Underlying immune mechanism of chronic inflammation different
- Age of onset
  - Earlier in life with asthma
  - Usually > age 40 in COPD
- Symptoms in asthma vary; COPD slowly progressive
- Smoking associated with COPD
- Asthma with reversible airflow limitation; irreversible airflow limitation in COPD

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ACOS History

- Lumpers & Splitters
  - Oslerian tendency to find a single diagnosis
  - But COPD experience is proportional to comorbidity
- Dutch Hypothesis
  - Pathophysiology of scarred airways from untreated airways causing "minimally reversible air
- Overdiagnosis of Asthma (Socially acceptable)
- Importance of Inhaled Steroids in Asthma
  - GINA guideline update now replacing SABA!
- Risk of Inhaled Steroids in COPD
  - ISOLDE study

Nakawah MO, Hawkins C, Barbandi F. **Asthma, chronic obstructive pulmonary disease (COPD), and the overlap syndrome.** *J Am Board Fam Med*. 2013 Jul-Aug;26(4):470-7. PMID: 23833163

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Asthma

- A **heterogenous disease**, usually characterized by chronic airway inflammation. It is defined by the history of respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary over time and in intensity, together with **variable expiratory airflow limitation**.

GINA 2015

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COPD

- Is a common preventable and treatable disease, characterized by **persistent airflow limitation** that is usually progressive and associated with enhanced chronic inflammatory responses in the airways and the lungs to noxious particles or gases. Exacerbations and comorbidities contribute to the overall severity in the individual patients.

GOLD 2015

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ACOS:…
A Description for Clinical Use

- Is characterized by **persistent** airflow limitation with several features usually associated with asthma and several features usually associated with COPD.
- ACOS is therefore identified in clinical practice by the **features that it shares with both asthma and COPD**

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Features	ASTHMA	COPD
Age of onset	○ Before 20	○ After 40
Pattern of Sx	○ Variation over minutes hours or days ○ Worse during night or early AM ○ Triggered by exercise, emotions, dust or allergens	○ Persistent despite treatment ○ Good and bad days but always daily sx and exertional dyspnea ○ Chronic cough & sputum preceded onset of dyspnea, unrelated to triggers
Lung Function	○ Record of variable airflow limitation (spirometry or peak flow)	○ Persistent airflow limitation (FEV1/FVC < 0.7 post BD)
Between Sx	○ Normal Spirometry	○ Abnormal Spirometry
PHx / FHx	○ Doctor dx of Asthma ○ FHX asthma or allergy	○ Doctor dx COPD ○ Heavy RF exposure i.e., smoke
Time Course	○ No worsening of sx over time ○ Seasonal variation	○ Sx slowly worsening ○ Rapid Bronchodilator provides only limited relief
CXR	○ Normal	○ Severe hyperinflation

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Counting Boxes

- Assemble the features that favor a dx of asthma or COPD
- Compare the # of features favoring either
- Consider the level of certainty around the diagnoses
- Spirometry

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Differentiating with Spirometry

Spirometry	Asthma	COPD	ACOS
Normal FEV1/FVC	Asthma- yes	Not COPD	Not overlap
Post-BD <0.7	Airflow limitation	Required for dx	Usually present
FEV1 > 80% pred	Good control	Mild COPD (A, B)	Mild ACOS
FEV1 < 80%	RF for exac	Severity indicator Poorer prognosis & exacerbation risk	Severity indicator Poorer prognosis & exacerbation risk
Post-BD FEV1 >12% and **200** ml	Usual at some time in asthma but not when well controlled	Common More likely when FEV1 is low	Common More likely when FEV1 is low
Post-BD FEV1 >12% and **400** ml	High probability of Asthma	Unusual in COPD Consider ACOS	Possible ACOS

Adapted from box 5-3 ACOS/ GINA-GOLD 2015

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OTHER TESTING	Asthma	COPD
Lung Function Test DLCO	N or slight high	Often reduced
LFT: ABG	Normal between exac.	May be chronically abn
LFT: (AHR) Airway Hyperresponsiveness	Not useful on its own But…. Favors Asthma	no
Imaging: HRCT	Normal though air trapping and bronchial thickening may be seen	Air trapping or Bullae. Bronchial Thickening & Pulm HTN
Atopy: IgE or skin test	Not essential but may be suggestive	Conforms to background prevalence (does not r/o COPD)
FENO	>50 ppb in nonsmoker supports Asthma dx	Usually normal, low in current smokers
Blood Eosinophils	Supports Asthma	May be present during exacerbation
Sputum analysis for inflammatory cells	Not well established	Not well established

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Screening Spirometry?

- USPSTF recommends against screening
- In patients with symptoms or risk factors only
- Occupational Medicine
- No clear threshold for smoking exposure
- Annual spirometry not necessary for COPD

https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/chronic-obstructive-pulmonary-disease-screening accessed 5/20/22

Martinez FJ, Raczek AE, Seifer FD, Conoscenti CS, Curtice TG, D'Eletto T, Cote C, Hawkins C, Phillips AL; COPD-PS Clinician Working Group. **Development and initial validation of a self-scored COPD Population Screener Questionnaire** (COPD-PS). *COPD*. 2008 Apr;5(2):85-95. PMID: 18415807

Siu AL, Bibbins-Domingo K, Grossman DC, et al. Screening for chronic obstructive pulmonary disease: US Preventive Services Task Force recommendation statement. *JAMA*. 2016;315(13):1372–1377.

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Case 2: William

- 30 yo M with "congestion" which upon further questioning involves inspiratory and expiratory "wheezes" but mostly in upper airway and nose.
- It is spring and happens annually for three months.
- Asking for antibiotics or "inhaler"
- COVID-19 test negative and never smoker

Adobe Stock license #13698514

Gladu RH, Hawkins CA. **Combatting the cough that won't quit**. *J Fam Pract*. 2012 Feb;61(2):88-93. PMID: 22312613

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Audience Polling Question #3

What is his diagnosis?

1. The “crud”
2. Asthma
3. Allergic Rhinitis
4. COPD

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Case 3: Gerald

- Gerald got a new job 6 months ago and enjoyed it until 3 months ago developed a cough and shortness of breath. It got better on weekends and holidays and varied a bit with his assignment.
- He has never smoked or had asthma and no family history. Spirometry was normal.
- You give him a peak flow meter and he keeps a record during day and presents you a variable pattern with low readings at work.

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Audience Polling Question #4

Gerald’s diagnosis is

1. Malingering
2. Anxiety
3. COPD
4. Occupational Asthma

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Asthma Phenotypes

- Allergic Asthma: Early onset, responds well to ics
- Non-Allergic Asthma: Neutrophilic sputum, less bronchodilator response
- Adult Onset: Including occupational asthma. Higher doses of ics required
- Asthma with persistent airflow limitation: Airway remodeling (ACOS)
- Asthma with obesity: Little eosinophilic inflammation

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Case 4: Sidney

- Sidney had a motor vehicle accident three months ago with an extended hospitalization.
- She was intubated for 11 days in ICU and before a tracheostomy could be performed, she was extubated.
- Recovery has been slow and is now associated with breathing difficulty and wheezing.
- Spirometry was performed.

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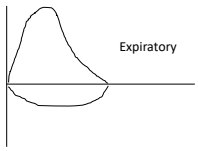
Inspiratory Volume Loop



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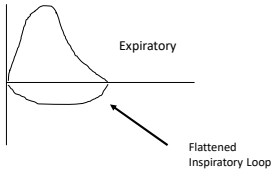
Inspiratory Volume Loop



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Case 4: Vocal Cord Dysfunction

- **Inspiratory Obstruction**
  - Symptom: Inspiratory Wheeze, Stridor
  - Tracheal stenosis
- Unilateral or bilateral **vocal cord paralysis**
  - Also includes possible dysphonia or hoarseness
- **Newborn**
  - Tracheal Ring
  - Tracheal Malacia

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Guidelines

- GINA Guidelines
- NHLBI
- Emphasis on dangers of bronchodilator without anti-inflammatory
- No longer using Albuterol as first line

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Evidence-Based Recommendations

- In patients 12 years and older with mild, persistent asthma, intermittent low-dose ICS and as-needed inhaled SABAs should be used as rescue therapy instead of daily controller therapy.
- In patients four years and older with moderate to severe asthma, ICS/formoterol therapy should be considered as a daily controller and rescue therapy, a SMART strategy.
- Adding an inhaled LABA to an ICS in uncontrolled asthma is preferred over adding a LAMA because of increased hospitalizations associated with LAMA therapy.
- Subcutaneous immunotherapy can reduce the severity of mild or moderate asthma over time in patients with proven allergies.

Raymond TJ. Asthma Mgmt NHLBI AFP *Volume 104, 5 November 2021*

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Notes