Early Identification and Diagnosis of Chronic Respiratory Diseases: The ‘Primary’ Role in Improving Patient Outcomes in Asthma, COPD, and IPF

Learning Objectives

- Detect the early warning signs of common respiratory diseases and apply appropriate diagnostic tests to make timely and accurate diagnoses of asthma, Chronic Obstructive Pulmonary Disease (COPD), and Idiopathic Pulmonary Fibrosis (IPF) in the primary care setting
- Provide guideline-driven care for patients with asthma, COPD, and IPF, including specialist referrals when necessary
- Describe strategies to facilitate patient self-management and a multidisciplinary care approach for chronic respiratory conditions by engaging patients and monitoring for response and progression

MISSED OPPORTUNITIES in primary care for earlier diagnoses and timely initiations of appropriate therapies for asthma, COPD, and IPF

- More than 60% of asthma patients do not reach appropriate levels of control, resulting in 14 million physician office visits, 2 million emergency room visits, and 500,000 hospitalizations per year
- 85% of patients with COPD visited their primary care doctor or a clinic at least once with respiratory symptoms in the 5 years before diagnosis
- More than 50% of IPF patients are initially misdiagnosed with other forms of respiratory illness

Burden of COPD and Asthma

- COPD is a leading cause of morbidity and mortality worldwide
- COPD is often not diagnosed until symptoms have increased in severity and significant (irreversible) lung damage has occurred
- 35.5 million North Americans have asthma resulting in a prevalence of 11.2%, among the highest in the world
- Every day in America 40,000 people miss school or work due to asthma
- There are more than 4,000 deaths due to asthma each year, many of which are avoidable with proper treatment and care

Five-year Survival of IPF (and severe COPD) is Worse than Most Cancers

What is the “primary role” in improving outcomes?

- Early diagnosis
- Guideline-driven management
- Multidisciplinary care that fosters patient self-management
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Early Diagnosis = Better Outcomes

- Patients often attribute their shortness of breath and decreased ability to perform usual activities to the normal aging process and only seek treatment in urgent-care settings for acute exacerbations.

Primary Care Physicians Can Recognize Early Warning Signs of Chronic Respiratory Disease

Monday morning...

- I come into the office, and the first three patients present with cough and breathlessness:
  - Betsy
  - Carl
  - Alice

Betsy: 52-year-old Woman with Cough and Breathlessness

- History of Present Illness
  - Cough x 5 days, yellow sputum
  - Past Medical History
    - Hypertension
    - Similar ‘bronchitis’ episode earlier this year
  - Social History
    - 2 ppd for 30 years
  - ROS
    - Progressive exertional dyspnea x 2 years
    - Physical Examination
      - Atebrile, RR 22, mild distress
      - Mild forced expiratory wheezing

Global Strategy for Diagnosis, Management, and Prevention of COPD

Mechanisms Underlying Airflow Limitation in COPD

- Small Airways Disease
  - Airway inflammation
  - Airway fibrosis, luminal plugs
  - Increased airway resistance

- Parenchymal Destruction
  - Loss of alveolar attachments
  - Decrease of elastic recoil

Aging Populations

Global Strategy for Diagnosis, Management, and Prevention of COPD

Risk Factors for COPD

- Cigarette smoke
- Occupational dust and chemicals
- Environmental tobacco smoke (ETS)
- Indoor and outdoor air pollution

Genes
Infections
Socio-economic status

Global Strategy for Diagnosis, Management, and Prevention of COPD

Diagnosis of COPD

- SYMPTOMS
  - shortness of breath
  - chronic cough
- EXPOSURE TO RISK FACTORS
  - tobacco
  - occupation
  - indoor/outdoor pollution

SPIROMETRY: Required to establish diagnosis
**Perform Spirometry**

- Essential if chronic airways disease is suspected
- Confirms chronic airflow limitation
- More limited value in distinguishing between asthma with fixed airflow limitation and COPD
- Measure at the initial visit or subsequent visit
- If possible measure before and after a trial of treatment
- Medications taken before testing may influence results
- Peak expiratory flow (PEF)
  - Not a substitute for spirometry
  - Normal PEF does not rule out asthma or COPD
  - Repeated measurement may confirm excessive variability, found in asthma

**Spirometry: Obstructive Disease**

- In patients with $\text{FEV}_1/\text{FVC}<0.70$:
  - All symptomatic patients with obstruction should be tested for AAT deficiency with an AAT serum level

**Spirometry Normal Trace Showing FEV1 and FVC**

- $\text{FEV}_1 = 4L$
- $\text{FVC} = 5L$
- $\text{FEV}_1/\text{FVC} = 0.8$

**Assessment of COPD - Determine COPD Category**

<table>
<thead>
<tr>
<th>Classification</th>
<th>Severity</th>
<th>FEV$_1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOLD 1</td>
<td>Mild</td>
<td>≥80% predicted</td>
</tr>
<tr>
<td>GOLD 2</td>
<td>Moderate</td>
<td>50%≤FEV$_1$&lt;80%</td>
</tr>
<tr>
<td>GOLD 3</td>
<td>Severe</td>
<td>30%≤FEV$_1$&lt;50%</td>
</tr>
<tr>
<td>GOLD 4</td>
<td>Very Severe</td>
<td>FEV$_1$&lt;30% predicted</td>
</tr>
</tbody>
</table>

**Diagnostic Confusion Between COPD and Asthma is Common**

**Pathology of Asthma**

- Asthma involves inflammation of the airways

*Source: "What You and Your Family Can Do About Asthma" by the Global Initiative For Asthma Created and funded by NIH/NHLBI, 1995*
Distinguishing between COPD and Asthma

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>COPD</th>
<th>Asthma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Patient typically over 40</td>
<td>Typically begins at an early age</td>
</tr>
<tr>
<td>Smoking</td>
<td>Smokers and ex-smokers at highest risk</td>
<td>No direct relationship between smoking and asthma</td>
</tr>
<tr>
<td>Dyspnea</td>
<td>Shortness of breath especially with exercise; progressing to dyspnea at rest</td>
<td>Episodic attacks after exposure to allergens, irritant, or exercise</td>
</tr>
<tr>
<td>Cough</td>
<td>Present intermittently at every day; generally productive</td>
<td>Sustained; sporadic in nature</td>
</tr>
<tr>
<td>Disease course</td>
<td>Steadily worsens; with exacerbations</td>
<td>Intermittent symptoms; tapers to asymptomatic function between exacerbations in most patients</td>
</tr>
</tbody>
</table>

Obstruction

<table>
<thead>
<tr>
<th>Spirometry</th>
<th>Asthma</th>
<th>COPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal FEV&lt;sub&gt;P,VC&lt;/sub&gt;</td>
<td>Compatible</td>
<td>Not compatible</td>
</tr>
<tr>
<td>Post-SE &lt;0.7</td>
<td>Compatible</td>
<td>Required for GOLD criteria</td>
</tr>
<tr>
<td>FEV&lt;sub&gt;1&lt;/sub&gt; ≥80%</td>
<td>Compatible</td>
<td>Compatible with A or B COPD</td>
</tr>
<tr>
<td>FEV&lt;sub&gt;1&lt;/sub&gt; &lt;80%</td>
<td>Risk factor for exacerbation</td>
<td>Risk factor for exacerbation and death</td>
</tr>
<tr>
<td>Post-SE increase in FEV&lt;sub&gt;1&lt;/sub&gt; ≥12–15% and &gt;250–420 mL from baseline</td>
<td>High probability of asthma</td>
<td>Unusual in COPD; consider Asthma-COPD Overlap Syndrome (ACOS)</td>
</tr>
</tbody>
</table>

Reversibility

Carl: 52-year-old Man with Cough and Breathlessness

- History of Present Illness
- Cough x 6 months, yellow sputum x 5 days
- Increasing breathlessness
- Past Medical History
- Hypertension
- Social History
- Non-smoker
- ROS
- Intermittent exertional wheezes
- Physical Examination
- Afebrile, RR 18, no distress
- Bibasilar rales

Identification of “Velcro” crackles is a key component of early diagnosis of IPF

- If you suspect IPF, refer to a pulmonologist

Disease Progression in IPF Is Variable and Often Unpredictable

Interstitial Lung Disease

- While IPF is the most common ILD, there are many “look alike” diseases
- History, symptoms, physical exam, imaging and sometimes histology are required to make the IPF diagnosis
- IPF is a diagnosis of exclusion

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Interstitial Lung Diseases

- There are over two hundred recognized types of diffuse parenchymal lung diseases
- They are a heterogeneous group of disorders classified together because of similar clinical, radiographic, physiologic, or pathologic manifestations
- The term “interstitial” refers to pathologic appearance that the abnormality begins in the interstitium

When to Suspect ILD

- Common first symptoms: dyspnea on exertion, cough
- Symptoms may be present years before diagnosis
- Age >50
- Male predominance
- Risk factors associated with IPF: history of smoking, environmental exposure, GERD
- Clubbing of fingertips
- Velcro-like crackles on auscultation

Distinguishing between COPD and IPF

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<tr>
<th>Characteristics</th>
<th>COPD</th>
<th>IPF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Patient typically over 40(^1)</td>
<td>Patient typically over 45</td>
</tr>
<tr>
<td>Smoking</td>
<td>Smokers and ex-smokers at highest risk(^1),(^2)</td>
<td>No direct relationship with smoking</td>
</tr>
<tr>
<td>Dyspnea</td>
<td>Shortness of breath, especially with exertion, progressing to dyspnea at rest (^1)</td>
<td>Gradual onset of exertional dyspnea</td>
</tr>
<tr>
<td>Cough</td>
<td>Present intermittently or every day (generally productive)(^1)</td>
<td>Nonproductive</td>
</tr>
<tr>
<td>Disease course</td>
<td>Steady worsening, with exacerbations(^2)</td>
<td>Unpredictable with slowly waning symptoms, frequent exacerbations</td>
</tr>
<tr>
<td>Chest X-Ray</td>
<td>Hyperinflation, bullous changes (^6)</td>
<td>Predominantly basal interstitial markings; hallmark on CT scan: honeycombing</td>
</tr>
<tr>
<td>Physical exam</td>
<td>Rhonchi, wheezing, clubbing, cyanosis</td>
<td>Velcro rales, clubbing, cyanosis</td>
</tr>
</tbody>
</table>

Guideline-driven Management

- Guidelines
- New agents/combinations
- When to refer

Benefits of Guideline-based Treatment

- Improved lung function\(^1\),\(^2\)
- Improved symptoms\(^1\),\(^2\)
- Improved exercise tolerance\(^1\),\(^2\)
- Improved QoL\(^1\),\(^2\)
- Prolonged life and better QoL with smoking cessation\(^1\),\(^2\)
- Delayed time to first exacerbation\(^1\),\(^2\)
- Fewer exacerbations\(^1\),\(^2\)
- Fewer hospitalizations\(^1\),\(^2\)
- Cost savings\(^3\)

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**Goals of COPD and Asthma Management**

The long-term goals of asthma management are:

1. **Symptom control**: to achieve good control of symptoms and maintain normal activity levels
2. **Risk reduction**: to minimize future risk of exacerbations, fixed airflow limitation, and medication side-effects

**Determine Initial Treatment**

- Initial pharmacotherapy choices are based on both efficacy and safety
- If syndromic assessment suggests asthma as single diagnosis:
  - Start with low-dose ICS
  - Add LABA and/or LAMA if needed for poor control despite good adherence and correct technique
  - Do not give LABA alone without ICS
- If syndromic assessment suggests COPD as single diagnosis:
  - Start with bronchodilators or combination therapy
  - ICS alone may not be efficacious in modifying disease; combination with LABA and/or LAMA is better
- If differential diagnosis is equally balanced between asthma and COPD, i.e. ACOS:
  - Refer to specialist

**Manage Stable COPD: Goals of Therapy**

- Asses and relieve symptoms
- Improve exercise tolerance
- Pulmonary rehab
- Improve health status
- Prevent disease progression
- Exposure to smoking, occupational
- Prevent and treat exacerbations: reduce mortality

**Management of Stable COPD**

- Essential
- Smoking cessation
- Can include pharmacologic treatment
- Recommended: physical activity
- Depending on local guidelines
- Flu vaccination
- Pneumococcal vaccination

**How to Determine Appropriate Therapy of Stable COPD**

The image shows a table with categories for increasing risk and increasing symptoms, along with treatment options such as short-acting bronchodilators (prn), LABA or LAMA, ICS/LABA, and a PDE-4 inhibitor. The table also includes a decision tree for determining appropriate therapy based on GOLD classification.
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COPD: Pharmacologic Options

- **Bronchodilators**
  - Short-acting
  - Long-acting

- **Anti-inflammatory**
  - ICS + LABA

- **Anti-cholinergic**
  - SAMA + SABA:
    - Metaproterenol
    - Levalbuterol
    - Ipratropium
    - Pirbuterol
    - Albuterol

- **Leukotriene receptor antagonists (LTRA)**

- **PDE-4 inhibitors**

- **Anticholinergic**
  - ICS + LABA: Indacaterol
  - Theophylline

- **SAMA + SABA**: Umeclidinium

- **LAMA + LABA**:
  - Arformoterol
  - Formoterol
  - Tiotropium

When to Refer to a Specialist

- Persistent symptoms and/or exacerbations despite treatment
- Diagnostic uncertainty (e.g., suspected pulmonary hypertension, cardiovascular diseases, and other causes of respiratory symptoms)
- Suspected asthma or COPD with atypical or additional symptoms or signs (e.g., haemoptysis, weight loss, night sweats, fever, signs of bronchiectasis or other structural lung disease)
- Few features of either asthma or COPD
- Comorbidities present
- Reasons for referral for either diagnosis as outlined in the GINA and GOLD strategy reports

Alice: 25-year-old Woman with Cough and Breathlessness

- History of Present Illness
  - Cough x 5 days, chest tightness, breathlessness
- Past Medical History
  - **Seasonal rhinitis**
  - **Family History**
  - **Maternal history of asthma**
  - Social History
  - Non-smoker
  - Physical Examination
  - Afebrile, RR 22, mild distress
  - Mild forced expiratory wheezing

Step 1 – as-needed inhaled short-acting beta₂-agonist (SABA)

Step 2 – low-dose controller + as-needed inhaled SABA

Step 3 – one or two controllers + as-needed inhaled reliever

Step 4 – refer for further care

Step 5 – refer for further care

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**Goals of COPD and Asthma Management**

- The long-term goals of asthma management are
  1. **Symptom control:** to achieve good control of symptoms and maintain normal activity levels
  2. **Risk reduction:** to minimize future risk of exacerbations, fixed airflow limitation, and medication side-effects
- Achieving these goals requires a partnership between patient and his/her health care providers
  - Ask the patient about his/her own goals regarding their disease
  - Good communication strategies are essential
  - Consider the health care system, medication availability, cultural and personal preferences, and health literacy

**What is the “primary role” in improving outcomes?**

- Early diagnosis
- Guideline-driven management
- Multidisciplinary care that fosters patient self-management
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Multidisciplinary Care
- Nurses, allergists, specialists, pharmacists
- Provide disease education
- Inhaler technique
- Adherence
- Patient self-management
- Monitoring for response and progression

‘Guided self-management education’
- Highly effective in improving outcomes
  - Reduced hospitalizations, ED visits, symptoms, night waking, time off work, improved lung function, and quality of life
- Three essential components
  - Self-monitoring of symptoms and/or PEF
  - Written action plan
  - Describe how to recognize and respond to worsening symptoms
    - Individualize the plan for the patient’s health literacy and autonomy
    - Provide advice about a change in treatment plan
  - Regular medical review

Treating Modifiable Risk Factors
- Provide skills and support for guided self-management
  - This comprises self-monitoring of symptoms and/or PEF, a written action plan and regular medical review
- Prescribe medications or regimens that minimize exacerbations
- Encourage avoidance of tobacco smoke (active or ETS)
  - Provide smoking cessation advice and resources at every visit
- For patients with severe disease
  - Refer to a specialist center if available, for consideration of add-on medications for patients with confirmed allergies
  - Appropriate food avoidance
  - Ensure availability of injectable epinephrine for anaphylaxis

Identify and Address Poor Adherence
- Barriers to adherence
  - Inadequate education about disease and therapy
  - Perceived burden of medication regimen
  - Device is difficult to use
  - Depressed mood
  - Medication-related cost
  - Adverse effects

Identify and Address Poor Adherence (continued)
- Red Flags for non-adherence
  - Failure to refill prescriptions
  - Excessive use of rescue medication
  - Frequent exacerbations
  - Rapid decline in FEV1

Identify and Address Poor Adherence (continued)
- Strategies for Individualizing Inhaler Choice
  - Good hand-breath coordination is required for meter-dose inhalers (MDIs)
    - May not be suitable for elderly, confused, or those with hand conditions (e.g. arthritis)
  - Dry-powder inhalers (DPIs) do not require coordination of actuation and inhalation and are easier to use than MDIs
  - Breath actuation may be difficult in patients with poor inspiratory effort
  - Avoid changing inhaler types for individual patients

Nebulizers May be Beneficial for Some Patients
- Small-Volume Nebulizers
  - Effective drug delivery requires less intensive patient training vs pMDIs and DPIs
  - Newer portable and efficient models available
  - Efficacy of long-term nebulizer therapy is similar or superior to pMDIs/DPIs in moderate-to-severe COPD, including during exacerbations
  - Consider maintenance nebulizers in
    - Elderly patients
    - Severe disease
    - Frequent exacerbations
    - Physical and/or cognitive limitations
  - Patient/caregiver satisfaction is high

How to Utilize Multidisciplinary Care Team

- Nurses
- Specialists
- Pharmacists

Summary: What is the “primary role” in improving outcomes?

- Early diagnosis
- Guideline-driven management
- Multidisciplinary care that fosters patient self-management

Summary: Stepwise Approach to Diagnosis and Initial Treatment

For an adult who presents with respiratory symptoms:
1. Does the patient have chronic airways disease?
2. Syndromic diagnosis of asthma, COPD and ACOS
3. Spirometry
4. Commence initial therapy
5. Referral for specialized investigations (if necessary)
   - Velcro crackles
   - Diagnostic uncertainty
   - Frequent exacerbations

Summary: Guideline-driven Management

- GINA guidelines for asthma
  - Minimize daily symptoms and exacerbation risk with stepwise therapy options
  - Consider add-on therapy to reduce exacerbations
- GOLD guidelines for COPD
  - Select therapy based on severity of symptoms and frequency of exacerbation
  - Refer patients with stage 3 and 4 COPD to specialist
  - Refer suspected IPF cases to specialist

Thank you!