Adult Pulmonary Practice Guidelines

Contents

Chronic Cough

Common Causes:

Upper Airway Cough Syndrome (UACS) (Clues: Frequent throat clearing, sensation of phlegm in the back of the throat, nasal drainage, rhinorrhea).

Asthma (Clues: Episodic wheezing to triggers, variable dyspnea, history of atopy).

COPD (Clues: Smoking history, chronic daily productive cough, chronic wheezing, and dyspnea).

GERD (Clues: Heartburn, sour taste in mouth, exacerbated by dietary or lifestyle habits).

Laryngo-Pharyngeal Reflux (Clues: dysphonia/hoarseness, non-productive throat clearing, heartburn).

Drugs (Clues: Use of ACE-I's, look for timing, other medications like Amiodarone, Nitrofurantoin, Methotrexate).

Less Common Causes:

Respiratory Tract Infections causing persistent cough (i.e., Pertussis, Mycoplasma Pneumoniae, Chlamydia Pneumoniae, COVID-19)

Non-Asthmatic Eosinophilic Bronchitis (Clues: presence of sputum eosinophils, no airway hyper-responsiveness or airflow obstruction on PFT's, non-productive cough).

Rare Causes:

Bronchiectasis, Lung cancer, chronic aspiration, ILD

Initial Workup (recommended prior to consult)

History and Exam, Medication Use history and compliance, tobacco use/smoking history

CXR PA/LAT

PFT including Spirometry pre- and post-bronchodilator, Lung volumes, and DLCO

*****90% of chronic cough is either UACS, Asthma, or GERD alone or in combination, and if the following: normal CXR, no ACE-Inhibitor use, and non-smoker status, then 99.4% of chronic cough is one of those three, alone or in combination*****

Additional Workup (consider ordering if clinically applicable otherwise can be completed by pulmonary)

24-hour pH monitoring, Methacholine Bronchoprovocation testing, Sputum Eosinophils, High resolution CT CHEST, Respiratory Allergy testing, Sinus x-rays or sinus CT.

Refer to Pulmonary for ANY unexplained or uncontrolled chronic cough for further expert evaluation and management.

Hemoptysis

The term hemoptysis refers to expectoration of blood originating from the lower respiratory tract (i.e., from below the vocal cords). Pseudo-hemoptysis, which is expectoration of blood that comes from the upper respiratory tract and/or the upper gastrointestinal tract, can mimic hemoptysis.

Life-threatening hemoptysis is generally used to describe the expectoration of a large amount of blood and/or a rapid rate of bleeding, or when hemoptysis results in a life-threatening event, including significant airway obstruction, significant gas exchange alterations, or hemodynamic instability. Consider hemoptysis to be life-threatening when there has been approximately 150 mL of blood expectorated in a 24-hour period or bleeding at a rate ≥100 mL/hour. For practical purposes, more than 150 mL is easily quantifiable by patients as roughly a half cup of blood in 24 hours.

Causes of non-life-threatening hemoptysis: Bronchitis, bronchiectasis, bronchial neoplasm, infections, foreign bodies, autoimmune diseases, catamenial hemoptysis, mitral stenosis, AVM's, PE's with associated pulmonary infarction, trauma, DIC, drugs and toxins, vaping.

Causes of life-threatening hemoptysis: Bronchiectasis, particularly CF related, TB, Fungal infections including Aspergilloma and invasive fungal infections, bronchogenic carcinoma, AVM's, mitral stenosis, autoimmune diseases, trauma.

Initial Evaluation/Workup: (recommended prior to consult)

Assess risk factors for malignancy (current or prior smoking, h/o IPF or COPD, HIV/AIDS, Known cancers, asbestos exposure, prior radiation therapy).

Assess risk factors for PE (prior or current VTE, immobilization or surgery within 4 weeks, malignancy, pregnancy, oral contraceptive use).

Ensure patient does not have any features of life-threatening hemoptysis. **Refer ALL patients with life-threatening hemoptysis to the ER for urgent evaluation, stabilization, and management.**

Obtain CXR PA/LAT.

IF normal CXR, assess for pseudo-hemoptysis and if findings suggest nasopharyngeal or GI source, refer to ENT or GI.

IF normal CXR and no risk factors for lung malignancy or PE and acute bronchitis is likely diagnosis based on history, then treat for this and observe for recurrence.

If patient has risk factors for lung malignancy or PE, or there is recurrence of hemoptysis, **Refer to Pulmonary for further expert evaluation and management** and consider obtaining the following:

CT with contrast (possibly CTA if PE suspected), CBC, BUN/Cr, LFT's, coagulation profile, D-dimer, BNP, EKG, Echo

Wheezing and Stridor

A wheeze is a continuous musical sound that can be produced by oscillation of opposing walls of an airway that is narrowed almost to the point of closure. Wheezes are usually high pitched, consist of single or multiple notes, occur during inspiration or expiration (more commonly expiration), and originate from airways of any size, from the large extra-thoracic upper airway to the intrathoracic small airways. Stridor refers to a monophonic sound that is loudest over the anterior neck and is typically high-pitched and predominantly inspiratory.

Causes of wheezing:

Extra-thoracic upper airway: Anaphylaxis, vocal cord edema, vocal cord paralysis, paradoxical vocal cord motion, laryngeal stenosis, postnasal drip syndrome, goiter.

Intrathoracic central airway: Tracheal stenosis, tracheal and bronchial tumors, tracheomalacia, excessive dynamic airway collapse, mucus plugs, mediastinal mass.

Intrathoracic lower airway: Asthma, COPD, Cardiac asthma, Carcinoid tumors, bronchiolitis obliterans, bronchiolitis, bronchiectasis.

Evaluation of Wheezing: (recommended prior to consult)

Determine the severity of respiratory compromise and the rapidity of worsening of any shortness of breath and refer immediately to ER if any concerns about impending respiratory failure.

History and Exam, Medication Use history and compliance, tobacco use/smoking history

CXR PA/LAT

PFT including Spirometry pre- and post-bronchodilator, Lung volumes, and DLCO. Also look at the Flow Volume Loop for patterns of large airway obstruction.

Refer to Pulmonary for any unexplained or uncontrolled wheezing for further evaluation and management.

Dyspnea/Shortness of Breath

Dyspnea, or breathing discomfort, is a common symptom that afflicts millions of patients with pulmonary disease and may be the primary manifestation of lung disease, myocardial ischemia or dysfunction, anemia, neuromuscular disorders, obesity, or deconditioning. Examination of the language describing the dyspnea suggests that this symptom represents several qualitatively distinct sensations, and that the words utilized by patients to describe their breathing discomfort may provide insight into

the underlying pathophysiology of the disease. (also see cardiology guidelines regarding dyspnea (Cardiology referral guidelines.pdf (ch.rmc))

Assessing the following will often give the clinician clues to the cause of the dyspnea:

Temporal pattern and triggers: acuity versus chronicity, exertional, nocturnal, positional, exposure based.

Severity of dyspnea.

Associated symptoms: cough, sputum production, chest pain, edema, nasal congestion, muscle weakness.

Descriptors of breathing discomfort: DON'T LET THE PATIENT STOP AT JUST SAYING THEY ARE SHORT OF BREATH. Descriptors of the breathing discomfort give diagnostic clues (i.e. chest tightness, rapid or shallow breathing, air hunger, increased effort to breathing or work of breathing, cannot take a deep breath, suffocation, sense of heavy breathing, etc.). In some cases, patients are not describing dyspnea at all (i.e. anxiety, tiredness/fatigue, or lack of energy).

Exposure and tobacco use history.

Assess room air oxygen saturations at rest and with exertion and prescribe oxygen immediately if oxygen saturations <89%.

CXR PA/LAT

PFT including Spirometry pre- and post-bronchodilator, Lung volumes, and DLCO

Refer to Pulmonary ANY patient with unexplained chronic dyspnea for expert evaluation and management.

Asthma

Historical Clues: Episodic wheezing to triggers, variable dyspnea, history of atopy.

Initial workup (prior to starting maintenance asthma medication): PFT including Spirometry pre- and post-bronchodilator, Lung volumes, and DLCO, CXR PA/LAT.

Additional workup **(especially if initial PFT's normal and history suggests trigger based variable wheezing and dyspnea): (consider ordering if clinically applicable otherwise can be completed by pulmonary)**

Methacholine Bronchoprovocation testing.

Look for Eosinophilic Asthma phenotype: CBC with differential, IgE

Look for potential triggers: Regional Respiratory Allergy Panel

Treatment considerations:

The long-term goals of asthma management are to achieve good symptom control, and to minimize future risk of asthma related mortality, exacerbations, persistent airflow limitation, and side effects of treatment. The patient's own goals regarding their asthma and his treatment should also be identified.

Quick acting bronchodilators relieve acute symptoms but do not control asthma.

Leukotriene Receptor Antagonists (LTRA) (i.e., MONTELUKAST): Patients with exercise induced asthma and asthma patients with allergy overlap.

Maintenance Inhalers: Start with maintenance treatment based on severity of symptoms, risk of exacerbations, and degree of lung dysfunction (see below Step therapy) and reassess before stepping up therapy.

Provide a spacer and demonstrate proper inhaler technique with slow inhalation for most inhalers.

Instruct to rinse and gargle with water after all steroid inhalers to prevent thrush.

Consider home peak flow monitoring and keeping an asthma diary.

Absolutely, confirm compliance with existing regimen through medication dispenses and/or calling pharmacies **BEFORE** considering stepping up therapy.

Highly encourage avoidance of KNOWN asthma triggers and assess readiness for smoking cessation and assist with action steps if ready to quit.

Refer all asthma patients to pulmonary at least once for expert evaluation and step asthma management including possible role for new biologic treatments.

Step therapy for asthma:

Step 1 Asthma management: For those patients with infrequent asthma symptoms, e.g., less than twice a month and no risk for exacerbations, including no exacerbations in the last 12 months.

Step 1 (option A): Low-dose ICS-formoterol combination as needed for symptoms.

Step 1 (option B): Take low-dose ICS whenever short acting beta agonist bronchodilator (SABA) is needed.

Step 2 Asthma management: For those patients with asthma symptoms or need for reliever therapy twice a month or more.

Step 2 (option A): Low-dose ICS-formoterol combination as needed for symptoms.

Step 2 (option B): Low-dose ICS maintenance with SABA as needed.

Step 3 Asthma management: For those patients with troublesome asthma symptoms most days (e.g., 4 to 5 days/week), or waking up at night due to asthma symptoms once a week or more.

Step 3 (option A): Low-dose ICS-formoterol combination maintenance and reliever therapy.

Step 3 (option B): Low-dose ICS-LABA combination or medium dose ICS maintenance therapy with as needed SABA.

Step 4 Asthma management: For asthma patient's presenting with severely uncontrolled asthma, lung dysfunction, or with an acute exacerbation of asthma.

Step 4 (option A): Medium-dose ICS-formoterol combination maintenance and reliever therapy.

Step 4 (option B): Medium or high-dose ICS-LABA maintenance with as needed SABA.

Step 5 Asthma management: For asthma patients not controlled on Step 4.

Step 5: Consider add on LAMA, referral for assessment of phenotype, consider high-dose maintenance ICS-formoterol plus biologic therapy (i.e., anti-IgE, anti-IL5/5R, anti-IL4R, anti-TSLP).

COPD

Historical Clues: Smoking history, chronic daily productive cough, chronic wheezing, and dyspnea.

Initial workup/Evaluation: (recommended prior to consult)

Assess readiness for smoking cessation and assist with action steps if ready to quit.

Assess room air oxygen saturations at rest and with exertion and prescribe oxygen immediately if oxygen saturations <89%.

Assess for annual Low Dose CT Scan screening criteria for lung cancer risk factors and order LDCT if eligible. **Refer to Pulmonary Department with ANY concerning findings on LDCT for recommendations and follow up.**

Order PFT's including Spirometry pre- and post-bronchodilator, Lung volumes, and DLCO. PFT's should be repeated every 1-2 years.

Referral to Pulmonary Rehabilitation if history suggest loss of functional status, increased exercise intolerance, or progressive shortness of breath.

Treatment considerations:

Quick acting bronchodilators in everybody but emphasize that these relieve acute symptoms but do not provider long-acting relief. This can include both short acting beta agonists and short acting muscarinic antagonists.

Long-acting bronchodilators are preferred over inhaled steroids and can include combinations of LABA/LAMA.

Consider an inhaler corticosteroid trial and stop if no improvement.

Oxygen is used to treat hypoxia and NOT to treat air hunger and should be used during the times that the patient was found to be hypoxic on pulse oximetry testing and not used "as needed".

Vaccines help prevent infections that are known to cause exacerbations of COPD which can cause a permanent stepdown loss of lung function. Highly encourage Influenza, Pneumococcal, and COVID 19 vaccines.

Provide a spacer and demonstrate proper inhaler technique with slow inhalation.

Instruct to rinse and gargle with water after all steroid inhalers to prevent thrush.

Absolutely, confirm compliance with existing regimen through medication dispenses and/or calling pharmacies **BEFORE** considering stepping up therapy.

Refer to Pulmonary for expert management of COPD including discussions of advanced treatments for very severe COPD including lung transplant and surgical/endobronchial lung volume reduction.

Pleural Effusion

Determining the cause of the pleural effusion is greatly facilitated by analysis of the pleural fluid to differentiate the fluid as a transudate versus an exudate.

Light's criteria for an exudate:

Pleural fluid protein/serum protein ratio greater than 0.5, or

Pleural fluid LDH/serum fluid LDH ratio greater than 0.6, or

Pleural fluid LDH greater than the two-thirds the upper limits of normal serum LDH.

Common causes of transudates: Heart failure, Hepatic hydrothorax, Nephrotic syndrome, Hypoalbuminemia, Peritoneal dialysis, Atelectasis.

Common causes of exudates: Infections, Traumatic, Malignancy related, Connective tissue diseases, Chylothorax.

Initial Evaluation/Workup: (recommended prior to consult)

PA/Lateral/Lateral decubitus films to see if there is a significant effusion that layers out and free flowing.

Thoracentesis (ultrasound guided by Interventional radiology): Diagnostic at a minimum, therapeutic as well if the patient is symptomatic from effusion.

Post thoracentesis films including CXR and possibly CT CHEST with contrast to look for adequate lung re-expansion, residual fluid, loculated fluid pockets, underlying lung parenchymal abnormalities, and pleural enhancement.

Send pleural fluid for following tests: pH, glucose, total protein, LDH, cell count and differential, gram stain and culture, cytology, cholesterol.

Also send serum for total protein and LDH.

Refer to Pulmonary for expert consultation ANY pleural effusion that does not have a clearly obvious cause and/or solution for treatment/resolution.

Interstitial Lung Disease

Interstitial Lung Disease or Diffuse parenchymal lung disease consist of disorders of known causes (autoimmune disease related, environmental/occupational, drug related) and unknown causes.

Unknown causes include the idiopathic interstitial pneumonias, granulomatous lung disorders, and other forms of ILD (LAM, Pulmonary Langerhans cell histiocytosis, eosinophilic pneumonia).

The idiopathic interstitial pneumonias are further categorized as chronic fibrosing (IPF/Usual Interstitial Pneumonitis, Non-Specific Interstitial Pneumonitis), acute/subacute fibrosing (Cryptogenic Organizing Pneumonia, Acute Interstitial Pneumonia), and Smoking-related (Respiratory bronchiolitis ILD, Desquamative Interstitial Pneumonia).

Initial Evaluation/Workup: (recommended prior to consult)

History and Exam, Medication Use history and compliance, tobacco use/smoking history, occupational history, military service history.

Prior films of CXR's and CT CHEST.

CXR PA/LAT

PFT including Spirometry pre- and post-bronchodilator, Lung volumes, and DLCO

High Resolution CT CHEST

Labs: **(consider ordering if clinically applicable otherwise can be completed by pulmonary)**

Screen for autoimmune disease with Rheumatoid factor, anti-Cyclic Citrullinated Peptide antibodies, ANA.

Treatment Considerations:

Refer ALL patients to Pulmonary department for expert consultation to assist with diagnosis confirmation, follow up plan, and treatment considerations.

Assess readiness for smoking cessation and assist with action steps if ready to quit.

Assess room air oxygen saturations at rest and with exertion and prescribe oxygen immediately if oxygen saturations <89%.

Oxygen is used to treat hypoxia and NOT to treat air hunger and should be prescribed during the situations the patient was found to be hypoxic on pulse oximetry testing and not used "as needed".

Vaccines help prevent infections that are known to cause exacerbations of COPD which can cause a permanent stepwise loss of lung function. Highly encourage Influenza, Pneumococcal, and COVID 19 vaccines.

Referral to Pulmonary Rehabilitation if history suggest loss of functional status, increased exercise intolerance, or progressive shortness of breath.

Assess for annual Low Dose CT Scan screening criteria for lung cancer risk factors and order LDCT if eligible. **Discuss with Pulmonary Department with ANY concerning findings on LDCT for recommendations and follow up.**

Pulmonary Hypertension

Pulmonary hypertension (PH) is a disease characterized by elevated pulmonary artery pressure on right heart catheterization (mean pulmonary artery pressure ≥20 mmHg at rest with a pulmonary vascular resistance ≥3 Wood units). The World Health Organization (WHO) classifies patients with PH into five groups based upon etiology:

Group 1 – Pulmonary arterial hypertension (PAH)
Group 2 – PH due to left heart disease
Group 3 – PH due to chronic lung disease and/or hypoxemia
Group 4 – PH due to pulmonary artery obstructions
Group 5 – PH due to unclear multifactorial mechanisms

Common Symptoms: Dyspnea, fatigue, symptoms of RV failure including exertional chest pain, exertional syncope, weight gain from edema, anorexia, abdominal pain and swelling.

Exam clues: Prominent pulmonic component of second heart sound, elevated JVP, S3/S4 gallop, wide splitting S2, holosystolic murmur from TR, hepatomegaly, ascites, peripheral edema.

Other clues: EKG with RV strain pattern, right axis deviation, RV hypertrophy. CXR with enlargement of central pulmonary arteries, RV enlargement, RA dilatation. Labs with elevated BNP.

Initial Workup: (recommended prior to consult)

Transthoracic Echocardiogram: This will help determine whether the patient has high or low probability of Pulmonary hypertension, signs of RV overload, and whether the patient also has a high or low probability of left heart disease, which is crucial for determining need for further workup including right heart catheterization.

Additional Workup: (usually completed by pulmonary)

Assess for chronic lung disease and hypoxia:

Assess room air oxygen saturations at rest and with exertion and prescribe oxygen immediately if oxygen saturations <89%.

PFT including Spirometry pre- and post-bronchodilator, Lung volumes, and DLCO

Six Minute Walk test through Pulmonary Rehabilitation Department

High Resolution CT CHEST

Screen for sleep related breathing disorders and refer to sleep medicine if positive.

Assess for pulmonary artery obstruction:

CT angiogram and/or V/Q scan

Right Heart Catheterization:

Generally performed with the goal of confirming the diagnosis of PH, assessing the contribution of left-sided heart disease, and determining vasoreactivity. This is only ordered by cardiology.

Refer PH patients to Pulmonary to determine whether the patient will need a right heart catheterization and for further expert evaluation and management.

Provider Decision Support

4/18/2023 Dr Lodhi