

Management of Asthma in the Elderly including Management of Asthma-COPD Overlap Syndrome

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AAE 2018 Pharmacology Pre-Conference

Asthma in Special Populations

July 19, 2018

2:45 - 3:30 p.m.

Management of Asthma in the Elderly including Management of Asthma-COPD Overlap Syndrome

- ▶ Describe special characteristics, management, and treatment strategies of asthma in the elderly.
- ▶ Discuss clinical similarities and differences between asthma and chronic obstructive pulmonary disease (COPD).
- ▶ Evaluate interventions to improve asthma control and decrease asthma burden in elderly patients with asthma.

Asthma in the Elderly

- ▶ Asthma is a heterogeneous disease with significant variability in disease expression, severity, and response to therapeutic measures¹
- ▶ Asthma in the elderly is a heterogeneous disease as prevalent as in the youngest population (5% to 10%) and affecting more often women¹
- ▶ Older adults with asthma have an increased likelihood of comorbidities and polypharmacy, with possible worsening of asthma control and reduced treatment adherence ^{2,3}

1. Reed CE. Asthma in the elderly: Diagnosis and management. *J Allergy Clin Immunol* 2010;126:681-7.

2. Rance K, O'Laughlen M. Managing Asthma in Older Adults. *Journal for Nurse Practitioners*. 2014;10(1). www.npjjournal.org

3. Melani AS. Management of asthma in the elderly patient. *Clinical Interventions in Aging* 2013;8 913-922

Special Characteristics of Asthma in the Elderly

- ▶ Lung function decreases with age
- ▶ Stiffening of the chest wall, reduced respiratory muscle function, and an increase in residual volume from loss of elastic recoil
- ▶ Elderly patients with asthma have reduced response to bronchodilators and glucocorticoids
- ▶ Naive T cells decrease, memory T cells increase, and B-cell function decreases, but there is a lesser decrease in innate immunity
- ▶ Eosinophil function remains the same, but neutrophil numbers increase

Characteristics of Asthma in the Elderly

▶ Epidemiological

- Increased morbidity and mortality
- Less frequent atopy

▶ Clinical

- Underdiagnosed and undertreated
- Asthma control more difficult to achieve
- Reduced perception of symptoms
- Difficulties to perform pulmonary function tests
- Numerous co-morbidities

▶ Therapy

- Poor adherence to therapy and follow-up
- Poor inhaler technique
- Polypharmacy and increased risk of interactions

▶ Pathophysiology

- Mixed (more neutrophilic airway inflammation)
- More severe airway obstruction
- Loss of lung elastic recoil - reduced respiratory muscles strength- small airways involvement
- Systemic inflammation and immunosenescence

▶ Management problems

- Insufficient understanding of the disease
- Memory impairment, hearing loss, poor sight
- Psycho-socioeconomic problems

▶ General

- Poor nutrition, sedentary, weight gain
- Reduced access to care

Establishing a Diagnosis of Asthma

- ▶ To establish a diagnosis of asthma, the clinician should determine:
 1. episodic symptoms of airflow obstruction or airway hyper-responsiveness are present
 2. airflow obstruction is at least partially reversible
 3. alternate diagnoses are excluded
- ▶ Guideline recommended methods to establish the diagnosis:
 1. detailed medical history
 2. a physical examination focusing on the upper respiratory tract, chest, and skin
 3. spirometry to demonstrate obstruction and assess reversibility
- ▶ Diagnosis should include chest radiography and computed tomographic scanning to diagnose other lung diseases if FEV1 remains low after treatment

Reversibility is determined by an increase in FEV1 of 12% or greater from the baseline value or by an increase of 10% or greater of predicted FEV1 after inhalation of a short-acting bronchodilator

Asthma in the Elderly

Management is challenged by multiple factors:

- Misdiagnosis
- Underdiagnosis
- Undertreatment
- Comorbidities
- Potentially lower drug response

Current guidelines for asthma therapeutic management do not consider asthma in the elderly as a specific condition

Diagnostic and Treatment Comparison of Elderly and Younger Patients with Asthma

Test/Characteristic	Elderly	Young
Spirometry	May be less useful in frail patients; reference standards not widely available	Generally useful tool to assess asthma severity
Bronchodilator responsiveness eNO	May be less pronounced May be useful	Variable but generally greater May be useful
Methacholine challenge	Less often used because of more frequent contraindications (e.g., cardiovascular disease)	Useful; overall fewer contraindications
Atopy	Less common	Common
Comorbidities	COPD, heart disease more common	Allergic rhinitis more common
Phenotypes	Limited knowledge, but late-onset asthma, long-standing asthma, and ACOS described	Multiple phenotypes described
Sputum cellularity	Generally more neutrophilic	Generally more eosinophilic
Therapy	No age-specific guidelines Optimal regimen unknown More susceptible to adverse effects due to comorbidities, drug-to-drug interactions, and polypharmacy Inability to use certain inhalers due to lack of dexterity and reduced inspiratory flow	Guideline-specific regimens in place that address the needs of most patients

Definition of abbreviations: ACOS = asthma-COPD overlap syndrome; COPD = chronic obstructive pulmonary disease; eNO = exhaled nitric oxide.

Asthma in the Elderly: Co-morbidities

- ▶ Asthma exacerbations and associated comorbidities contribute to the overall severity of the disease in elderly patients¹
- ▶ Comorbidities are considered key characteristics of geriatric patients and contribute to the clinical complexity of the elderly²
- ▶ Contribute to poor asthma management outcomes compared to younger patients with asthma³
- ▶ Differential diagnoses or comorbidities, such as chronic obstructive pulmonary disease (COPD) and congestive heart failure, may mask the diagnosis of asthma in these population⁴
- ▶ Multiple studies have demonstrated that asthma is associated with depression, and that more severe asthma is associated with a greater risk and severity of depression⁵

1. Holgate ST, Wenzel S, Postma DS, Weiss ST, Renz H, Sly PD. Asthma. Nat Rev Dis Primers 2015;1:15025.

2. Yáñez et al. Asthma Research and Practice (2018) 4:5 <https://doi.org/10.1186/s40733-018-0041-x>

3. Wardzyńska A, Kubsik B, Kowalski ML. Comorbidities in elderly patients with asthma: association with control of the disease and concomitant treatment. Geriatr Gerontol Int. 2015;15:902-9

4. Scichilone N, Pedone C, Battaglia S, Sorino C, Bellia V. Diagnosis and management of asthma in the elderly. Eur J Intern Med 2014;25:336-42

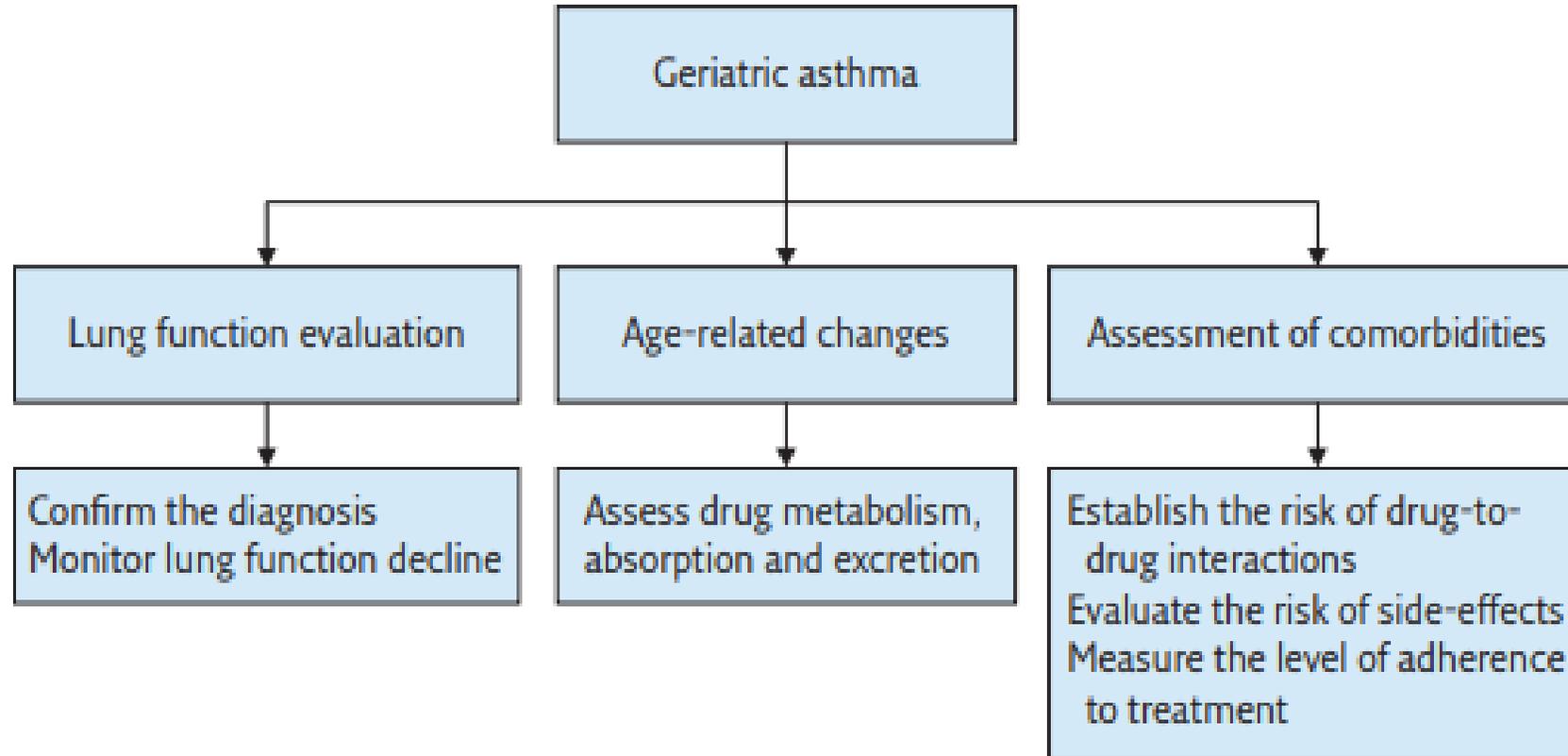
5. Yonas MA, Marsland AL, Emeremni CA, et al. Depressive symptomatology, quality of life and disease control among individuals with well-characterized severe asthma. J. Asthma. Oct; 2013 50(8):884-890.

Pharmacologic Treatment

Pharmacologic Treatment

- ▶ Asthma tends to be more severe and is associated with a high morbidity and increased mortality in the elderly patient
- ▶ Treatment must be carefully selected and closely monitored
- ▶ Pharmacologic treatment must be adjusted to achieve and maintain control and is basically the same for all ages
 - elderly patients have reduced response to bronchodilators and increased side effects from short acting beta agonist and glucocorticoids

Asthma in the Elderly: Pharmacological Management



Short-acting Beta agonists (SABA) and Long-acting Beta agonists (LABA)

- ▶ SABAs should be provided as rescue therapy, on demand, at the minimal dose and frequency
- ▶ SABAs are usually well tolerated but if they cause tremor or tachycardia, the dose should be reduced while maintenance therapy revised to minimize their need
- ▶ Long-acting β -adrenergic agonist can have cardiotoxic effects in patients with heart disease. Aerosol anticholinergic agents can be an alternative. Both increase the anti-inflammatory effects of glucocorticoids
- ▶ SABAs should not be utilized more than 2-3 times a week
- ▶ LABAs should never be used alone as long-term regular monotherapy for asthma

Short-acting Beta agonists (SABA) and Long-acting Beta agonists (LABA)

Theoretically, older patients may have a reduced response to bronchodilators as a result of age-related changes such as stiffening of the chest wall, reduced respiratory muscle function, and an increase in residual volume from loss of elastic recoil in the lung ^{1,2}

Data have revealed that albuterol is effective in both younger and older patients, and the addition of the LABA salmeterol to the ICS fluticasone has been reported to decrease the risk of asthma-related serious exacerbations compared with fluticasone alone²

1. Reed CE. Asthma in the elderly: diagnosis and management. *J Allergy Clin Immunol.* 2010;126(4):681-687

2. Yawn B, Han MK. Practical considerations for the diagnosis and management of asthma in older adults. *Mayo Clin Proc.* 2017;92(11):1697-1705. <http://dx.doi.org/10.1016/j.mayocp.2017.08.005>

Inhaled Corticosteroids (ICS)

- ▶ ICS are the mainstay of asthma treatment in the elderly, although they are at times insufficiently used in this population^{1,3}
- ▶ Asthmatic phenotypes characterized by neutrophilic inflammation of the airways are less likely to respond to ICS than those with prevalent eosinophilic inflammation²
- ▶ In the elderly patient with asthma neutrophilic airway inflammation is more common than in previous ages³

1. Expert Panel Report 3 (EPR-3): guidelines for the diagnosis and management of asthma—summary Report 2007. *J Allergy Clin Immunol* 2007;120(suppl): S94-138.

2. Wenzel SE. Asthma: defining of the persistent adult phenotypes. *Lancet*. 2006;368(9537):804-813.

3. Melani AS. Management of asthma in the elderly patient. *Clinical Interventions in Aging* 2013;8 913-922

Leukotriene Receptor Antagonists (LTRA)

- ▶ Cysteinyl leukotrienes (cysLTs, TC4, LTD4, and LTE4) are potent bronchoconstrictors and chemoattractant for eosinophils → an important therapeutic targets in patients with asthma¹
- ▶ Antagonize cysLT1 receptor LTRAs antagonize cysLT1 receptor
- ▶ Alternative treatment to ICS and LABA in the elderly
- ▶ May contribute to improving adherence profile
- ▶ May increase safety of asthma therapy by avoiding ICS and LABA side-effects, which are more frequent in the elderly¹
- ▶ As add-on therapy to ICS, LTRA appears to have a modest steroid-sparing effect among symptomatic patients²

1. Battaglia S, Benfante A, Spatafora M, et al. Asthma in the elderly: a different disease? *Breathe* 2016; 12: 18-28.

2. Chauhan BF, Ducharme FM. Anti-leukotriene agents compared to inhaled corticosteroids in the management of recurrent and/or chronic asthma in adults and children. *Cochrane Database Syst Rev.* 2012;5:CD002314

Anticholinergics

- ▶ Most commonly used short-acting anticholinergic → not a first-choice as a reliever, being less effective than β_2 -agonists
- ▶ Some elderly patients have a particularly good response to anticholinergics¹
- ▶ Tiotropium may ameliorate chronic asthmatic cough by modulating capsaicin cough reflex sensitivity, possibly providing a new therapeutic option for treating refractory cough in patients with asthma

1. Bonini M, Scichilone N. Tiotropium in asthma: back to the future of anticholinergic treatment Clin Mol Allergy. 2017;15:20 DOI 10.1186/s12948-017-0076-1

Long-acting muscarinic antagonist (LAMA): Tiotropium

- ▶ Tiotropium is a long-acting muscarinic antagonist (LAMA) with duration of action exceeding 24 hours-- attributed to its slow dissociation from muscarinic receptors
- ▶ LAMAs have the potential to improve asthma control include bronchodilation or inhibition of cholinergically mediated bronchoconstriction, possibly inhibit airway smooth muscle hypertrophy and hyperresponsiveness^{1,2}
- ▶ Tiotropium has been included as a new add-on treatment for GINA Steps 4 and 5 in patients aged ≥ 18 years with a history of exacerbations (Evidence A)³

1. Price D, Fromer L, Kaplan A, et al. Is there a rationale and role for long-acting anticholinergic bronchodilators in asthma? NPJ Prim Care Respir Med 2014; 24: 14023
2. Bonini M, Scichilone N. Tiotropium in asthma: back to the future of anticholinergic treatment Clin Mol Allergy. 2017;15:20 DOI 10.1186/s12948-017-0076
3. Global Initiative for Asthma GINA 2018 GINA Report: Global Strategy for Asthma Management and Prevention: 2018 available from <http://ginasthma.org/2018-gina-report-global-strategy-for-asthma-management-and-prevention/>

Oral Corticosteroids

- ▶ Recommended as step 5 management in the GINA guidelines¹
- ▶ Associated with many side effects²
 - osteoporosis, fracture, infection, obesity, coronary artery disease, avascular necrosis, stroke, cataract, diabetes and skin thinning, in a dose-dependent way, which could be more problematic in severe or elderly asthma patients
- ▶ Limited to patients who could have more benefits than side effects

1. Global Initiative for Asthma GINA 2018 GINA Report: Global Strategy for Asthma Management and Prevention: 2018 available from <http://ginasthma.org/2018-gina-report-global-strategy-for-asthma-management-and-prevention/>

2. Lefebvre P, Duh MS, Lafeuille MH. Et al. Acute and chronic systemic corticosteroid-related complications in patients with severe asthma. *J Allergy Clin Immunol.* 2015;136:1488-1495.

Biologic Agents

- Studies and reviews have found that omalizumab is an effective and safe therapy option for moderate to severe allergic asthma. Anti-IgE Trials of older adult patients with severe allergic asthma, omalizumab had significant clinical benefit^{1,4}
- Anti-IL-5 therapy with mepolizumab, reslizumab, and benralizumab has been shown, in phase III trials to be efficacious in reducing asthma attacks and improving lung function in poorly controlled patients with asthma^{2,3}
- Subgroup analysis from recent trial data has suggested that mepolizumab is effective in elderly asthmatics with eosinophilic inflammation⁴
- Data are still lacking in severe "nonatopic" asthma in the elderly
- Anti-IL-4 Ralpha (dupilumab), anti-IL-13 (tralokinumab), and other targeted therapies hold promise as potential future targeted therapies in asthma^{2,3}
- GINA 2018 Step 5 recommends anti-IgE or anti IL5 add-on treatment⁵

1. Maykut RJ, Kianifard F, Geba GP. Response of older patients with IgE-mediated asthma to omalizumab: a pooled analysis. *J Asthma*. 2008;45:173-181.

2. Verma P, Randhawa I, Klaustermeyer WB. Clinical efficacy of omalizumab in an elderly veteran population with severe asthma. *Allergy Asthma Proc*. 2011;32:346-350

3. Zervas E, Samitas K, Papaioannou AI, et al. An algorithmic approach for the treatment of severe uncontrolled asthma. *ERJ Open Res* 2018; 4: 00125-2017 [https://doi.org/10.1183/23120541.00125-2017].

4. Ortega H, Bhabita M, Yancey S, Rohit K. Response to treatment with mepolizumab in elderly patients. *Am J Respir Crit Care Med*. 2015;191: A4177.

5. Global Initiative for Asthma 2018 Global strategy for asthma management and prevention. Available from: <http://www.ginasthma.org/guidelines-gina-report-global-strategy-forasthma.html>.

Other Treatments

- ▶ Theophylline: used as oral sustained-release formulations
 - third-choice, but may provide a benefit as add-on therapy in patients who do not achieve control with ICS/LABAs^{1,2}
 - Relatively small therapeutic index with significant side effects, particularly at higher doses and in the elderly
- ▶ Long-term use of macrolides is gaining popularity in neutrophilic forms of difficult-to-treat asthma³

Theophylline is now rarely used, but if prescribed close monitoring is imperative due to potential for side-effects and risk of drug interactions, particularly in the aged patient, with frequent heart conditions and poly-pharmacy

1. National Heart, Lung, and Blood Institute; National Asthma Education and Prevention Program. Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma. Bethesda: National Heart, Lung, and Blood Institute; 2007. Available from: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>.

2. Global Initiative for Asthma 2018 Global strategy for asthma management and prevention. Available from: <http://www.ginasthma.org/guidelines-gina-report-global-strategy-forasthma.html>.

3. Brusselle GG, Joos G. Is there a role for macrolides in severe asthma. *Curr Opin Pulm Med.* 2014;20(1):95-102. doi: 10.1097/MCP.000000000000017.

Adverse Effects Non-Asthma Medications

Medication	Adverse Effect
Beta-blocker	Bronchospasm Diminished response to bronchodilator Worsening asthma
NSAID	Bronchospasm Worsening asthma
ACE-I	Increased cough
Non-potassium-sparing diuretics	Worsening cardiac function hypokalemia
Cholinergic agents	Bronchospasm

Pharmacological Challenges in the Treatment of Asthma in the Elderly

- ▶ Polypharmacotherapy is a significant risk factor for adverse drug reactions in the elderly¹
- ▶ Concomitant non-respiratory medications
- ▶ Pharmacokinetic changes that are primarily due to the decline in the function of the liver and the kidneys and reduced hepatic clearance of drugs increases the potential for drug interactions
- ▶ Lack of coordination between activation of the device and inhalation of the active drug may increase the oral deposition and decrease the lung deposition
- ▶ Long-term and high-dose use of ICS may be associated with increased risk of adverse events
- ▶ Bronchodilators are affected by ageing-related changes of their pharmacokinetic and pharmacodynamic properties²
- ▶ Anticholinergic response is decreased in parasympathetic activity and reduction in receptor numbers or post-receptor coupling with age³

1. Onder G, Petrovic M, Tangiisuran B, et al. Development and validation of a score to assess risk of adverse drug reactions among in-hospital patients 65 years or older: the GerontoNet ADR risk score. *Arch Intern Med* 2010; 170: 1142-1148

2. Bellia V, Battaglia S, Matera MG, et al. The use of bronchodilators in the treatment of airway obstruction in elderly patients. *Pulm Pharmacol Ther* 2006; 19: 311-319

3. Gupta P, O'Mahony MS. Potential adverse effects of bronchodilators in the treatment of airways obstruction in older people: recommendations for prescribing. *Drugs Aging* 2008; 25: 415-443

Clinical Similarities and Difference: Asthma and Chronic Obstructive Pulmonary Disease

Table 1 Features favoring asthma or COPD for syndromic diagnosis of airway disease based on the Global Initiative for Asthma/Global Initiative for Chronic Obstructive Lung Disease report

Feature	Asthma	COPD
Age of onset	Before age 20 years	After age 40 years
Pattern of respiratory symptoms	Variation in symptoms over time Symptoms worsen during the night or early morning Symptoms triggered by exercise, emotional change (including laughter), or exposure to dust/allergens	Persistence of symptoms despite treatment Good and bad days but always daily respiratory symptoms and exertional dyspnea Chronic cough and sputum preceded by onset of dyspnea, unrelated to triggers
Lung function	Record of variable airflow limitation (spirometry, peak flow)	Record of persistent airflow limitation (post-bronchodilator $FEV_1/FVC < 0.7$)
Lung function between symptoms	Normal	Abnormal
Past history or family history	Previous doctor diagnosis of asthma Family history of asthma and other allergic conditions (allergic rhinitis, dermatitis)	Previous doctor diagnosis of COPD, chronic bronchitis, or emphysema Heavy exposure to a risk factor: tobacco smoke and biomass fuels
Time course	No worsening of symptoms over time. Symptoms vary either seasonally or from year to year May improve spontaneously or have a response to bronchodilator immediately or to ICS over weeks	Symptoms slowly worsen over time (progressive course over years) Rapid-acting bronchodilator treatment provides only limited symptom relief
Chest X-ray	Normal	Severe hyperinflation

Notes: Adapted with permission from Global Initiative for Asthma and Global Initiative for Chronic Obstructive Lung Disease. Diagnosis of diseases of chronic airflow limitation: asthma, COPD, and asthma-COPD overlap syndrome (ACOS).¹

Abbreviations: FEV₁, forced expiratory volume in 1 second; FVC, forced vital capacity; ICS, inhaled corticosteroid.

1. Global Initiative for Asthma GINA 2018 . GINA Report: Global Strategy for Asthma Management and Prevention: 2018 available from <http://ginasthma.org/2018-gina-report-global-strategy-for-asthma-management-and-prevention/>
2. Global Initiative for Chronic Obstruct Lung Disease GOLD 2018. Global Strategy for the Diagnosis, management and prevention of chronic obstructive pulmonary disease . available from <http://goldcopd.org>

Asthma and COPD Overlap (ACO)

- ▶ Asthma and COPD also share several important clinical features, including cough and breathlessness, as well as many pathophysiologic mechanisms, including bronchoconstriction, airway inflammation, and excess mucous production. It is no surprise, thus, that patients with one diagnosis can often show signs consistent with the other.
- ▶ One of the strongest risk factors, outside of cigarette smoking, for the future development of COPD remains a diagnosis of childhood asthma, indicating that the link between these diseases is likely a lifelong phenomenon.⁷ As our population ages, a larger number of patients with obstructive airway disease will be classified as having overlap syndrome.
- ▶ Further study is certainly warranted at this time to establish diagnostic and therapeutic guidelines that are specifically tailored to this growing subset of patients.
- ▶ Realizing that the overlap syndrome may represent a distinct phenotype of asthma is important for the clinician and ongoing investigation is necessary to more fully define this group of patients and discover what treatments are most effective for them.

Patients with ACO Compared with COPD or Asthma

- ▶ Known to experience frequent exacerbations
- ▶ Have a poor quality of life
- ▶ More rapid decline in lung function
- ▶ Higher mortality
- ▶ Disproportionate amount of health care resources

1. Gibson PG, Simpson JL. The overlap syndrome of asthma and COPD: what are its features and how important is it? *Thorax*. 2009;64:728-735.
2. Kauppi P, Kupiainen H, Lindqvist A, et al. Overlap syndrome of asthma and COPD predicts low quality of life. *J Asthma*. 2011;48:279-285.
3. Andersén H, Lampela P, Nevanlinna A, Säynäjäkangas O, Keistinen T. High hospital burden in overlap syndrome of asthma and COPD. *Clin Respir J*. 2013;7:342-346.

Asthma and COPD Overlap

Zeki et al reported that 38% of elderly asthmatics corresponded with the overlap syndrome when it was defined as one of two clinical phenotypes:

- ▶ 1. allergic disease consistent with asthma (with or without emphysema or reduced DLco)
- ▶ 2. COPD with emphysema accompanied by reversible or partially reversible airflow obstruction (with or without an allergic syndrome or reduced DLco).

Suggesting an overlap syndrome of asthma and COPD was the most common situation in older patients

Asthma

Asthma is a heterogeneous disease, characterized by chronic airway inflammation

Defined by history of respiratory symptoms -- wheeze, shortness of breath, chest tightness and cough that vary over time and in intensity, together with variable expiratory airflow limitation

COPD

COPD is a common, preventable and treatable disease that is characterized by persistent respiratory symptoms and airflow limitation due to airway and/or alveolar abnormalities caused by significant exposure to noxious particles or gases

Asthma-COPD overlap (ACO)

ACO is characterized by persistent airflow limitation with severe features, associated with asthma and several features usually associated with COPD

ACO identified by the features shared with asthma and COPD

This is not a definition, but a description for clinical use, as ACO includes several different clinical phenotypes and several different underlying mechanisms

1. Global Initiative for Asthma GINA 2018 . GINA Report: Global Strategy for Asthma Management and Prevention: 2018 available from <http://ginasthma.org/2018-gina-report-global-strategy-for-asthma-management-and-prevention/>
2. Global Initiative for Chronic Obstruct Lung Disease GOLD 2018. Global Strategy for the Diagnosis, management and prevention of chronic obstructive pulmonary disease . available from <http://goldcopd.org>

Interventions to Improve Asthma Control and Decrease Asthma Burden

- ▶ Management of asthma in elderly patients is directed at controlling symptoms and eliminating or reducing exacerbating triggers
- ▶ Assess and monitor important exacerbating factors including comorbid diseases, appropriate medication usage, drug-drug interactions and drug side-effects, and physiologic differences
- ▶ Consider long-acting muscarinic antagonist (LAMA) addition for patients with severe asthma
- ▶ Manage osteoporosis and other coexisting diseases
- ▶ Influenza and pneumococcal immunization

Nonpharmacological Interventions

- ▶ Environmental controls

Most common aeroallergens to which older patients are sensitized are not consistent among studies, but typically include cats, dust mites, and cockroaches^{1,2}

- ▶ Smoking cessation

- ▶ Influenza and pneumococcal vaccines

- ▶ Promotion of active healthy lifestyle, appropriate diet and exercise, appropriate weight

- ▶ Patient education and multidisciplinary management

- ▶ addressing various aspects of pharmacotherapy, education, psycho-socio-economical problems co-morbid conditions and acute care needs³

1. King MJ, Bukantz SC, Phillips S, Mohapatra SS, Tamulis T, Lockey RF. Serum total IgE and specific IgE to *Dermatophagoides pteronyssinus*, but not eosinophil cationic protein, are more likely to be elevated in elderly asthmatic patients. *Allergy Asthma Proc.* 2004;25:321-325.
2. Rogers L, Cassino C, Berger KI, et al. Asthma in the elderly: cockroach sensitization and severity of airway obstruction in elderly nonsmokers. *Chest.* 2002;122:1580-1586.
3. Boulet LP. Asthma in the elderly patient. *Asthma Research and Practice* (2016) 2:3 DOI 10.1186/s40733-015-0015-1

Management of Asthma in the Elderly: Questions We Must Address

What are the effects of aging on lung and immune system?

Better characterize the phenotype

- Role of microbiome and infections

- Role of environment

- Influence of atopy, smoking, co-morbidities, gender

Determine what is the optimal management of asthma

Should drug therapy be better targeted to this population

- What is the response to therapy?

- What are the risks?

How do we educate the elderly using shared decision-making and develop an effective multidisciplinary plan?

What other questions should we consider?

Summary

- ▶ Physiological changes and comorbidities impact the elderly patients diagnosis and management.
- ▶ Asthma is often underdiagnosed and undertreated in the elderly.
- ▶ Management of asthma in elderly patients is directed at controlling symptoms and eliminating or reducing exacerbating triggers.
- ▶ Assess and monitor important exacerbating factors including comorbid diseases, appropriate medication usage, drug-drug interactions and drug side-effects, and physiologic differences.
- ▶ Asthma management in older adults should include comprehensive asthma education and frequently monitoring symptoms and medications.
- ▶ Additional prospective studies with new biologic medications for asthma are needed in the aged population.