abstract



Chronic cough is defined as a cough that persists longer than eight weeks. It is one of the most frequent complaints of patients attending physicians' outpatient clinics. Contrary to popular belief, the diagnosis and treatment of the majority of patients can be achieved by following an empiric, integrative approach. As chronic cough may be responsible for significant deterioration in quality of life, successful management and treatment is important for individual patients. Unfortunately, failure to adequately manage chronic cough is usually due to physician ignorance of the current diagnostic algorithms, which pertain as much to older as to younger adults.

Key words: *chronic cough, older adults, upper airway cough syndrome, reflux disease, asthma*

Chronic Cough in Older Adults

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Introduction

Cough is an important physiological defense mechanism that helps clear the airway of noxious substances and excess mucus or fluid. It is defined as a forced expulsive maneuver, usually against a closed glottis, and is associated with a characteristic sound.[1] For most individuals, a cough is a self-limiting event associated with a common cold and of little consequence. However, chronic cough, defined as the presence of cough lasting more than eight weeks, is troublesome and can significantly affect quality of life.[2] Recent studies suggest that it is also highly prevalent (occurring in approximately 12% of the general population), and estimates of the cost of treatment derived from sales data from over-the-counter antitussives run at billions of dollars. Data from specialized cough clinics show a preponderance of females and obese patients.[3] Despite perceptions of the incurable nature of an intractable cough, specialized clinics in cough have a diagnostic success rate of 90%. However, assessment and treatment of chronic cough often requires a multidisciplinary approach.

Chronic coughing may occur because of hyperinnervation of the airways or because there are more triggers for coughing (e.g., elevated inflammatory mediator levels). In most individuals cough is a defensive mechanism against aspiration. However, among older adults with neuromuscular disease in whom the cough reflex is compromised, or among those with airway diseases, cough may become excessive and injurious (Table 1). These deleterious potential complications of cough can themselves cause considerable morbidity for a patient.

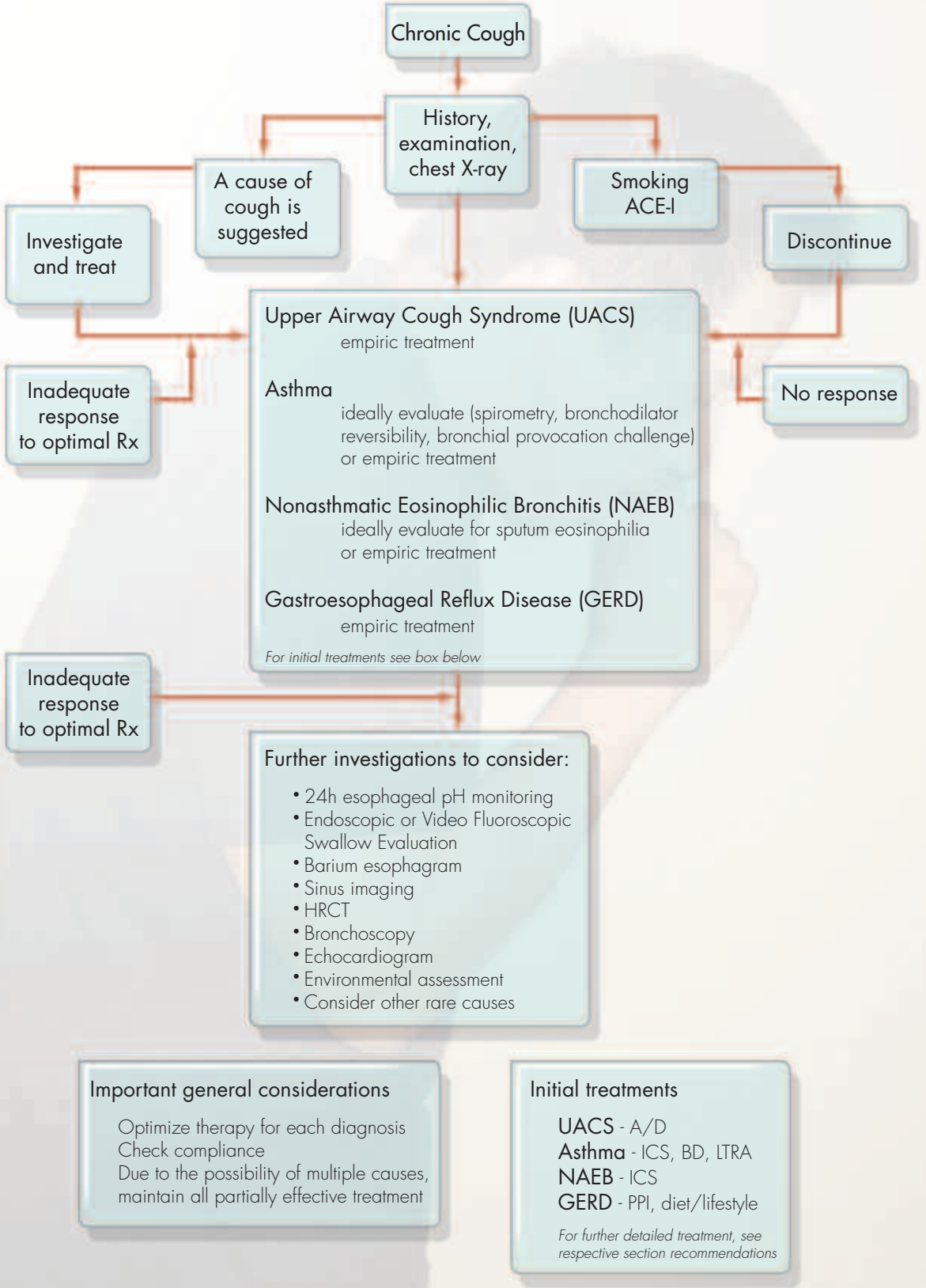
Etiology of Cough

Although the possible etiology of a chronic cough is expansive (Table 2), clinical studies have consistently shown that the majority of cases of chronic cough are attributable to three diseases in nonsmoking adults who are not using an angiotensin-converting enzyme (ACE) inhibitor: one, upper airway cough syndrome (previously known as postnasal drip syndrome); two, cough variant asthma; or three, reflux disease (Table 3).[4] Patients may have one or more of these conditions simultaneously. In the community, chronic cough is most likely due to chronic smoking; however, the majority of these individuals do not seek medical attention.[5] The clinical studies have evaluated a wide age range of individuals, and it is the opinion of experts that the causes of chronic cough are no different in older adults than in younger adults.[6]

Assessment and Management of Patients with Chronic Cough

The American College of Chest Physicians, the British Thoracic Society, and the European Respiratory Society have recently published recommended diagnostic approaches to individuals with chronic cough.[1,3,7] It is recommended that physicians follow one of these diagnostic algorithms and adopt a systematic approach to all patients who have chronic cough (Figure 1). Treatment and diagnostic success rates are higher with this approach. Response to treatment can be assessed with both subjective measures (cough-specific questionnaires) and objective measurements (computerized cough counting).

Figure 1:
Chronic Cough Algorithm for the Management of Adult Patients



Source: Pratter MR, 2006.[7] Reprinted by permission of American College of Chest Physicians.
Abbreviations: Rx, treatment; HRCT, high resolution CT; PPI, proton pump inhibitor; ACE-I, angiotensin-converting enzyme inhibitor; BD, bronchodilator; LTRA, leukotriene receptor antagonist; ICS, inhaled corticosteroid; A/D, antihistamine/decongestant.

Step 1

As with all medical problems, the initial assessment includes a full medical history, including characteristics of the cough, smoking, occupational, medication, and past medical history (e.g., respiratory, cardiovascular, or neurological diseases). Physical examination should concentrate on the ear, nose, and throat as well as the respiratory and neurological systems. However, in the majority of patients both history and physical examination are of limited value.[1] Performance of a chest radiograph is recommended at this stage, and current smokers should be advised to stop smoking and offered pharmacotherapy and counselling to aid cessation.

Step 2
Angiotensin-Converting Enzyme Inhibitor-Induced Cough

In following the diagnostic algorithms the initial step in management of any patient with a chronic cough is to discontinue ACE inhibitors, even if there does not appear to be a temporal relationship between commencement of the cough and ACE inhibition. ACE inhibitor–induced cough has been reported in up to 35% of patients treated with these agents. The resolution of cough associated with an ACE inhibitor usually occurs within two weeks but may take up to three months in some individuals.[1] Substitution with an angiotensin-II receptor blocker is recommended if necessary.[8]

Step 3a
Abnormal Chest Radiograph

If the chest radiograph is abnormal, then management and evaluation of the patient is determined by the chest radiograph findings. This may involve referral to a specialist physician, proceeding to a computed tomography (CT) thorax or high-resolution CT, pulmonary function testing, bronchoscopy, and possible lung biopsy or echocardiogram. The management of these multiple pulmonary, extrapulmonary, or cardiovascular diseases is beyond the scope of this review.

Step 3b
Normal Chest Radiograph

If the chest radiograph is normal, then the diagnostic algorithm should be followed (Figure 1). The consensus guidelines agree that the approach to chronic cough should involve empiric treatment for the most common causes of cough rather than proceeding initially to invasive investigations. This has been found to be a more cost-effective method than performing a batch of diagnostic investigations. Following failure of empiric treatment directed at asthma, reflux disease, and upper airway cough syndrome, referral to a respiratory physician, or specialist cough clinic is advised. However, patient discomfort and distress, or lack of available diagnostic testing and patient preference may prompt earlier referral.

Upper Airway Cough Syndrome

As upper airway cough syndrome (UACS) is the most common cause of chronic cough, the recommendations are that patients should be treated empirically for this condition, especially as approximately 20% of patients are unaware of the presence of postnasal drip. Empirical treatment includes treatment with a first-generation antihistamine and a decongestant. Meta-analysis of the side effects of these first-generation antihistamines has not shown them to be more sedating than the newer generation of antihistamines; however, for older adults the antihistamines should initially be prescribed only at bedtime prior to escalating to twice-daily dosing. Decongestants (e.g., oxymetazoline hydrochloride) cause side effects including palpitations, worsening of hypertension or glaucoma, and difficulties with urination, which may be problematic for older adults. If empiric treatment fails then further investigations (including sinus imaging, skin testing, and nasal eosinophils) may be performed if the history or examination is suggestive of UACS. While CT sinus radiographs are more sensitive than plain sinus imaging, it should be noted that in a prospective study an ear, nose, throat (ENT) examination was as accurate in diagnosing UACS. The differential diagnosis of UACS may include allergic or nonallergic (NARES) rhinitis, bacterial sinusitis, and vasomotor rhinitis. Treatment of these diseases includes antibiotics for bacterial sinusitis, ipratropium bromide nasal spray and antihistamine/decongestant for vasomotor rhinitis, intranasal steroids, oral leukotriene inhibitors and nonsedating antihistamines.[1,9]

Table 1: Complications of Cough

Cardiovascular
Arterial hypotension
Rupture of subconjunctival and nasal veins
Cardiac arrhythmias
Neurologic
Cough syncope
Headache
Cerebral air embolism
Cerebrospinal fluid rhinorrhea
Seizures
Stroke due to vertebral artery dissection
Gastrointestinal
Gastroesophageal reflux events
Malfunction of gastrostomy button
Hydrothorax in peritoneal dialysis
Splenic rupture
Inguinal hernia
Genitourinary
Urinary incontinence
Musculoskeletal
Rupture of rectus abdominis
Rib fractures
Respiratory
Laryngeal and tracheobronchial trauma
Exacerbation of asthma
Pneumothorax, pneumomediastinum
Miscellaneous
Petechiae and purpura
Disruption of surgical wounds
Increased emotional upset
Decrease in quality of life

Table 2: Common Causes of Cough in Patients with a Normal Chest Radiograph

Upper Airway Cough Syndrome (UACS)
Asthma syndromes
Cough variant asthma
Eosinophilic bronchitis
Reflux disease
Gastroesophageal reflux
Laryngopharyngeal reflux
Esophageal dysmotility

Step 4
Asthma/Nonasthmatic Eosinophilic Bronchitis

Asthma is one of the most common etiologies (24–29%) of chronic cough in adult nonsmokers. It may present solely with a chronic cough and without other symptoms such as wheeze or dyspnea: this is referred to as cough variant asthma (CVA). Despite a heightened cough sensitivity reflex, individuals with CVA often do not have increased bronchial hypersensitivity and therefore pulmonary function tests and reversibility testing may be normal. In this instance, methacholine challenge testing should be performed to document bronchial hyperresponsiveness. A negative methacholine inhalation challenge (MIC) test essentially rules out asthma but does not exclude nonasthmatic eosinophilic bronchitis (NAEB). Empiric treatment may be undertaken in patients unable to perform testing. The treatment of CVA is first, inhaled bronchodilators; second, inhaled corticosteroids; and third, leukotriene antagonists.[10] Resolution of symptoms may take up to eight weeks, and for some individuals with a severe cough the introduction of a short course of oral steroids (e.g., 30–40 mg prednisone for one or two weeks) may be necessary.[1,11] Prior to the commencement of oral steroids assessment of airway inflammation should be performed with induced sputum to determine if the diagnosis is NAEB (sputum eosinophilia >3%). The treatment of NAEB requires more aggressive anti-inflammatory (inhaled or oral corticosteroids) therapy than CVA.

Step 5
Reflux Disease

Patients who do not respond fully to treatment in Steps 1–4 should next be treated for reflux disease. The reported prevalence of reflux disease is 5–41%.[12] Treatment at an earlier stage could be considered if patients have prominent reflux symptoms. Even patients who do not have prominent reflux symptoms should be treated with antireflux therapy with a proton pump inhibitor. Several mechanisms are proposed for reflux-related cough including microaspiration of gastric content, esophageal motor dysfunction, and a vagally mediated esophageal reflex stimulated by volume reflux. Esophageal pH-monitoring can be performed if available, though caution is advised as it may not indicate patients who will respond to antireflux therapy.[12] Recommendations for treatment are for high-dose proton pump inhibitor taken 30–60 minutes before meals, for at least eight weeks, and to be continued for three months following resolution of the cough. Resolution of cough associated with reflux is slow and may take approximately six months.[1] For nocturnal acid reflux breakthrough, the addition of a H2 blocker may be necessary. The addition of a prokinetic agent such as metoclopramide may be necessary for some patients. For all patients, the discontinuation of medications that may exacerbate reflux should be attempted, and clinicians should advocate adherence to lifestyle changes including elevation of the head of the bed, smoking cessation, weight reduction, and avoidance of foods and drinks that relax the lower esophageal sphincter (e.g., coffee, peppermint, chocolate, alcohol, and citrus fruits). Furthermore, the treatment of concomitant obstructive sleep apnea may also ameliorate reflux symptoms. Unfortunately, treatment duration for individual patients is extremely variable, and some patients have reflux disease that is refractory to treatment. For these patients antireflux surgery could be considered once other causes of cough have

Table 3: Differential Diagnosis of Chronic Cough

Drug-induced cough
Upper Airway Cough Syndrome
Allergic rhinitis
Chronic sinusitis
Gastrointestinal disease
Reflux disease
Zenkers diverticulum
Respiratory disease
Cough variant asthma
Chronic bronchitis
Eosinophilic bronchitis
Post infectious
Bronchiectasis
Tuberculosis
Subglottic/airway stenosis
Tracheobronchomalacia
Tracheobronchomegaly
Tracheobronchial amyloidosis
Tracheoesophageal fistula
Lung carcinoma
Chronic interstitial pulmonary disease
Chronic aspiration
Foreign body
Tracheobronchial tree
Laryngopharynx
Sinonasal
External auditory canal
Neurogenic
Traumatic vagal injury
Post-upper respiratory infection neuropathy
Middle ear pathology
Cardiovascular disease
Congestive heart failure
Pulmonary infarction
Thoracic aortic aneurysm
Thyroid disorders
Psychogenic

been excluded, and investigations such as 24 hour esophageal pH-monitoring, esophageal manometry, and barium meal have been performed.[1]

Step 6

Additional Investigations

At this stage, additional investigations such as high-resolution computed tomography (HRCT) to look for interstitial pulmonary disease or bronchiectasis, bronchoscopy to investigate for endobronchial lesions, or oropharyngeal swallowing studies should be considered. It is impossible to discuss all of these etiologies of cough in detail, but in the next section I highlight some other causes of chronic cough that should be considered in the older adults or that need clarification.

Chronic Aspiration Due to Oropharyngeal Dysphagia

Chronic cough may be an indicator of oropharyngeal dysphagia.[13] Oropharyngeal dysphagia should be considered for any older adult patient but especially for those patients with the medical conditions listed in Table 4 who complain of chronic cough related to feeding. Those patients should be sent for an oropharyngeal swallowing evaluation either by video-fluoroscopic swallow (VES) evaluation or fiberoptic endoscopic evaluation of swallowing (FEES).[14] Management of oropharyngeal dysphagia requires a multidisciplinary approach with the involvement of nursing, speech, and language pathology, as well as dietetics, physiotherapy, occupational therapy, and physicians.[15]

Postinfectious Cough

Postinfectious cough should only be considered for adults with a recent history of an upper respiratory infection and a normal chest radiograph in whom a cough has been present for greater than two weeks but less than eight weeks. If a cough is present for longer than eight weeks other etiologies of the cough should be sought. If both Bordetella pertussis and bacterial sinusitis have been ruled out in these patients empiric treatment with inhaled ipratropium bromide may be beneficial.[16]

Psychogenic/Habit Cough

Psychogenic or habitual cough is diagnosed more frequently among the pediatric population than among the adult population. The consensus guidelines suggest that this diagnosis should be made with extreme caution and only following extensive evaluation to rule out other medical conditions in particular genetic tic disorders. In the event that psychiatric therapy fails, a diagnosis of unexplained (idiopathic) cough is a preferred diagnosis.[17] Proposed criteria for the determination of psychogenic cough have not been properly validated and their clinical utility is uncertain.[18]

Idiopathic Cough

Unexplained cough is a diagnosis of exclusion, and the incidence in clinical studies varies widely, constituting up to 20% of referrals to cough clinics. However, some of these patients may have a failure of treatment rather than a lack of diagnosis. Prior to making such a diagnosis a thorough investigation and treatment of the patient should be performed,[19] preferably at a specialist clinic. Unexplained cough occurs predominantly in middle-aged women at the time of menopause and is associated with lymphocytic inflammation of the airways.[1] There is no recommended treatment; however, a recent case report documented the symptomatic improvement of five patients with gabapentin, although the proposed method of action is unclear.[20]

Cough Suppressant Therapy

While medication that is aimed at specific etiology of cough is successful, nonspecific antitussive agents are generally ineffective or poorly tolerated due to side effects. This medication is recommended for short-term use only. Such agents include levodropropizine, moguisteine, codeine, or dextromethorphan for chronic bronchitis. In patients with known lung cancer dihydrocodeine and hydrocodone are recommended.[21]

Conclusion

Chronic cough is a common complaint in all age groups. Older adults are well represented in most of the clinical studies. Further research studies need to be performed to clarify the prevalence, etiology, and success of treatment of

Table 4: Medical Diagnoses Associated with Chronic Aspiration

Cerebrovascular disease
Seizure disorder
Vocal cord paralysis
Parkinson's disease
Amyotrophic lateral sclerosis
Alzheimer's disease
Cervical spine injury

Key Points

- Chronic cough is defined as cough lasting more than eight weeks.
- It causes significant deterioration in quality of life.
- Evaluation and management of cough should be performed following a diagnostic algorithm.
- Concomitant evaluation for complications of cough is important.
- No patient with a troublesome cough should continue on an angiotensin-converting enzyme inhibitor.
- Smoking is one of the most common causes of persistent cough.

chronic cough among older adults; however, adhering to the current diagnostic algorithms is likely to lead to the successful management of chronic cough in the majority of older patients. The diagnosis of idiopathic cough should be made with caution and only following a thorough work-up of the patient to exclude other causes of cough. Ongoing research on cough sensory receptors may allow for the development of more specific therapies for cough suppression, and newer investigative tools such as induced sputum and exhaled breath condensate may help to clarify the diagnostic dilemma of chronic cough.

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