



Clinical Evaluation of Chronic Cough in Children

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Abstract

Cough is a common complaint in pediatrics, and accounts for many visits to the pediatrician for evaluation. Cough can be disruptive at school and interrupt sleep. In the evaluation of cough, it is important to differentiate between acute and chronic cough. Proper evaluation of specific or nonspecific cough through history, physical examination, and appropriate laboratory studies should be performed. Close observation of all patients to ensure therapeutic benefit is important, along with patient education. [*Pediatr Ann.* 2015;44(8):303-307.]

Cough is one of the most common complaints treated by pediatricians.¹⁻³ Coughing is a normal reflex, which occurs in response to environmental irritants, secretions, or aspirated materials. Cough receptors exist in the upper and lower airways, esophagus, pericardi-

um, stomach, diaphragm, and external ear.⁴ Otherwise healthy school-aged children may cough 10 to 34 times a day.³ Cough most commonly occurs in response to an acute viral upper respiratory tract infection (URTI). Children can have 5 to 8 URIs a year,⁵ and the cough can last on average for up to 3 weeks with 10% lasting up to 25 days.^{5,6} Any cough lasting greater than 4 weeks is defined as a chronic cough.^{1,2,5} Chronic cough is different in children than adults, and therefore, should be evaluated differently in patients younger than ages 15 to 18 years because of differences in anatomy, causes, and treatment.^{1,5} Chronic cough can be described as wet, dry, specific, or nonspecific.^{3,5,7} This article discusses cough lasting greater than 4 weeks (chronic), and that is either specific or nonspecific in nature.

SPECIFIC COUGH

A specific cough is caused by a disease process or physical abnormality. Specific cough is associated with various signs and symptoms. Cyanosis, clubbing, chest wall deformity, or failure to thrive may be evident. Associated craniofacial, neurologic, or cardiac diseases may be present with specific cough. A history of acute choking after eating or play, swallowing difficulties, poor feeding, chest pain, recurrent pneumonia, or hemoptysis may be given. There may be tachypnea,

wet cough, wheezing, rales, or rhonchi, and chest pain may be noted at the time of examination.^{3,4,5} A specific cough may also be dry.

Upper airway cough syndrome—also known as postnasal drip syndrome^{2,7}—is the most common cause of chronic cough in children older than age 6 years. It is associated with postnasal drip, nasal discharge (clear or thick/discolored), clearing of the throat, and nighttime cough. The etiologies may be allergic or nonallergic (perennial, chronic sinusitis, or vasomotor). Nasal mucosa may be boggy. The child in general looks well.^{3,7} Antihistamines and decongestants are recommended by some²; however, they should not be prescribed for children younger than age 6 years. The American Academy of Pediatrics (AAP) advises avoidance of antihistamines and decongestants in children younger than age 6 years, and not to use codeine or dextromethorphan in a child of any age.^{3,8} The use of antibiotics or intranasal glucocorticosteroids may be beneficial in some, but they may have improved regardless of therapy.⁷

Asthma is a cause of chronic cough, and accounts for a large portion of health care time and expense. History, physical examination (wheezing, poor aeration, other allergic signs), and chest X-ray results consistent with asthma (hyperinfla-

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tion and peribronchial cuffing) are important. Chronic cough may be the only complaint (cause for nonspecific cough [see below]). Some children may not exhibit an abnormal chest examination (**Figure 1**). A prescription of inhaled steroids for 2 to 4 weeks should be beneficial in the child with asthma. Follow-up assessments in this time frame are important to gauge response. Continuation of treatment for asthma is appropriate if the diagnosis is confirmed. Spirometry with bronchodilator challenge may also aid in the diagnosis.^{3,7,8}

Protracted (or persistent) bacterial bronchitis (PBB) is not well described nor often diagnosed by pediatricians. This is a controversial topic, and on page 329 of this issue is a full-scale debate about this proposed condition. Some people believe that treatment with 2 to 4 weeks of appropriate antibiotics (amoxicillin-clavulanate or cephalosporins) is indicated. Some also believe that it is important to treat this disease to prevent bronchiectasis and chronic suppurative lung disease (see below).

Some believe that chronic suppurative lung disease and bronchiectasis may be complications of PBB; chronic suppurative lung disease presents similarly but the child may have asthma symptoms, poor growth, clubbing, or chronic hypoxia.

Gastroesophageal reflux (GERD) is commonly thought to be associated with chronic cough; however, data do not support this assumption, and treatment with reflux medications does not usually show any benefit in infants or children.^{2,3,5,7} GERD may play a part in chronic cough in children with neurodevelopmental disorders (eg, cerebral palsy and Down syndrome).^{3,7}

Foreign body should be considered in young children with chronic cough

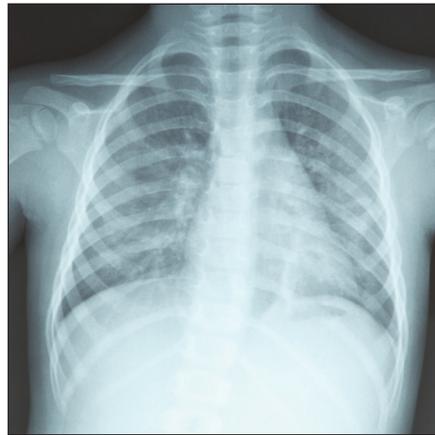


Figure 1. A chest X-ray of a child.

(wet or dry). The onset of cough is often associated with eating or playing, and may not have responded to other therapies. Poor appetite or dysphagia may develop. Failure to thrive and unilateral breath sounds on examination may be evident. Chest X-ray or computed tomography (CT) scan looking for hyperinflation or foreign body (not always seen) and bronchoscopy should be performed.⁷

Postinfectious cough should be considered in children and adolescents with chronic cough. Whooping cough, spasmodic cough, and/or posttussive emesis may be present. Pertussis should always be considered despite presence (or lack thereof) of vaccination. Children should be treated with antibiotics if polymerase chain reaction or culture shows *Bordetella pertussis*.⁷ Testing for tuberculosis (TB) should also be considered in individuals, especially those at risk for exposure—TB in the home, immune deficiency, or exposure through work or travel.³ Evaluation for other organisms (*Mycoplasma pneumoniae*, *Chlamydia pneumoniae*, and respiratory syncytial virus) should also be considered.²

Chronic cough related to congenital heart disease, congestive heart failure,

trachea-esophageal fistulas, anomalies of the airway (tracheomalacia, laryngomalacia, congenital malformations of the bronchi, airways, or lungs, and vascular ring), and malignancy should be considered also. History, physical examination, and appropriate laboratory studies would aid in the diagnosis.

NONSPECIFIC COUGH

Nonspecific cough is present without evidence of underlying disease or physical abnormality. Laboratory tests are also normal. Nonspecific cough is often dry; however, this is not always suggestive of a nonspecific cough.

Cough-dominant asthma should be considered even without other signs and symptoms of asthma. Treatment is as above for specific cough and should not be continued unless the diagnosis of asthma is confirmed because children with nonspecific cough, unrelated to asthma, may improve with time regardless of treatment.^{4,7}

Increased cough receptor sensitivity may result in nonspecific cough. Some children may simply be more sensitive to irritants, or it may arise as the result of inflammation (eg, viral infection^{7,8}).

Habit (psychogenic) cough is a dry, barking, or honking cough that develops usually after a viral infection.^{7,8} The cough does not interfere with eating or activities, and is absent with sleep. The cough often occurs at school, and is usually heard at the pediatrician visit. Chronic cough of this nature can occur with tic disorders. Habit cough occurs in up to 10% of patients with chronic cough of unknown etiology who are unresponsive to treatment. It is a diagnosis of exclusion.^{7,8}

Otogenic cough⁷ is due to irritation to the external ear. Cerumen, foreign bodies, and bugs can cause this.

EVALUATION OF CHRONIC COUGH

Assessment of the chronic cough begins with a thorough history and physical examination (**Table 1**). The child's underlying medical history should be reviewed for history of prior episodes, birth history where relevant, asthma, allergies, snoring, heart disease, failure to thrive, immune deficiency, or neurodevelopmental issues. Medications should also be reviewed (angiotensin-converting-enzyme inhibitors are a documented cause of chronic cough).^{4,5} The duration (length of time cough present), frequency (how often during the day), and type (wet, dry, barking, spasmodic) of cough should be determined. When the cough occurs—during the day (or night)—is important. A history of fever, prior illness, chest pain, shortness of breath, color changes (pallor or cyanosis), and changes in activity should be elicited.³⁻⁵ Changes in eating, swallowing, and voice should be determined. Upper respiratory complaints (congestion, rhinorrhea, headache, sore throat) should be assessed. The child or family member should be asked about potential triggers; smoking in the home, daycare attendance, pets, environmental irritants (eg, mold), similar symptoms in family members, and if there is a history of foreign body ingestion. Medical records should be reviewed to determine vaccine status against pertussis and influenza (family vaccine history also). Travel history and risk factors for TB should be evaluated.

On physical examination, respiratory and heart rate should be obtained (**Figure 2**). The overall appearance of the child should be documented for evidence of cyanosis, pallor, distress, and difficulty in breathing, and quality of his/her breathing (labored, shallow, difficult, noisy, stridor) and voice. Weight should be documented and reviewed

TABLE 1. Evaluation of Chronic Cough	
History	<ul style="list-style-type: none"> Duration of cough Quality of cough Frequency of cough Occurrence (day/night) Associated upper respiratory complaints Significant medical history for lung disease or other chronic conditions Exposure to cigarettes/smoking Foreign body ingestion Physical symptoms (chest pain, color changes, shortness of breath) Vaccination history for child (and caregivers) Travel history and exposure to infectious diseases (daycare, tuberculosis, pertussis)
Physical examination	<ul style="list-style-type: none"> Document fever, respiratory rate, and heart rate Examination of ears, nose, and throat Thorough chest examination of lung sounds and cardiac evaluation Abdominal examination for masses and/or organomegaly and evaluate for rectal prolapse Extremities examination for swelling, cyanosis, pallor, edema, clubbing Neurologic examination for neurodevelopmental disorders Assessment for genetic syndromes
Laboratory evaluation	<ul style="list-style-type: none"> Chest X-ray (baseline) Spirometry (baseline) Bronchoscopy^a Chest computed tomography^a Sinus computed tomography^a Allergy testing^a Tuberculosis screening^a
<p>^aWhere indicated. Adapted from Chipps and Jesitus,³ Grad,⁴ and Chang and Glomb.⁵</p>	

with past records for evidence of failure to thrive or acute weight loss. Attention should be made to whether the cough occurs during the office visit, and if so, documented for quality (wet, dry), type (spasmodic, whoop, persistent), and frequency. An examination of the ears, nose, and throat should be performed looking for allergic facies and shiners, and boggy nasal turbinates. The neck should be palpated for lymphadenopathy. Careful auscultation of the heart

and lungs should be performed. Examination for abdominal masses, organomegaly, or distention, and rectal prolapse should be done. The child should be assessed for swelling of the extremities, edema, and neurodevelopmental or genetic abnormalities.⁴

Initial laboratory examination should include a chest X-ray and spirometry—possible in most children older than age 6 years.³⁻⁵ Chest X-ray evaluates for infection, lymphadenopa-



Figure 2. A doctor examining a child with chronic cough symptoms.

thy, asymmetric aeration, interstitial lung disease, cardiac size and shape, peribronchial cuffing, effusion, and pleura involvement. An abnormal chest X-ray is indicative of specific chronic cough; it warrants the appropriate evaluation and treatment, or referral to the appropriate subspecialist. Spirometry with bronchodilator challenge (along with a chest X-ray showing hyperinflation and peribronchial cuffing) is consistent with asthma.^{3,4} Bronchoscopy is indicated when foreign body is suspected by history or chest X-ray. Bronchoscopy is beneficial in the evaluation of anatomic abnormality suggested by examination or imaging, chronic suppurative lung disease, or bronchiectasis.^{4,5} Bronchoscopy can be conducted to obtain cultures, remove obstruction (foreign body or mucous plug), and evaluate ciliary function. The use of chest CT should be based on clinical benefit

and radiation exposure.⁵ Sinus X-rays or limited CT with chronic cough and esophageal pH monitoring are of limited value as sinuses may show opacification in children without cough,^{3,5} or opacification may be due to viral infection or other inflammatory processes. As discussed above, the correlation of GERD and chronic cough is variable. Allergy testing and TB screening should be conducted where indicated.⁴

Treatment for chronic cough is outlined above (**Table 2**) and based on the diagnosis made by clinical evaluation, and supporting laboratory data. Most importantly, in the management of chronic cough, is compliance and close follow-up. Medications should be given for 2 to 4 weeks depending on diagnosis and the child reevaluated for benefit. If no improvement is seen, therapy should be discontinued and the child reassessed. Over-the-counter medications (antihistamines and dextromethorphan) and codeine should be avoided in the treatment of cough in the pediatric population as discussed above. Parent (and patient)

TABLE 2.

Treatment of Chronic Cough

- Trial of inhaled glucocorticosteroids (suspected asthma)
- Trial of intranasal glucocorticosteroids (upper airway cough syndrome)
- Trial of antibiotics (suspected protracted bacterial bronchitis or chronic suppurative lung disease)
- Testing for pertussis or tuberculosis screening^a
- Screening for cystic fibrosis and/or immune deficiencies^a
- Referral to pulmonology or otolaryngology for bronchoscopy^a
- Referral to other subspecialists based on history, physical examination, and laboratory results^a
- Clinical follow-up 2 to 4 weeks after initiation of treatment
- Patient education on diagnosis and treatment plan

^aWhere indicated.

Adapted from Chipps and Jesitus,³ Grad,⁴ Chang and Glomb,⁵ and Grad.⁷

education is important. Understanding the diagnosis, management plans, and the need for follow-up assessment is important to ensure compliance. Environmental changes should be discussed with the family and child (exposure to tobacco, smoking, environmental irritants, and foreign body) to aid in the treatment and care of the individual. Influenza vaccine and pertussis vaccine should be administered based on current AAP guidelines, and adult family members advised to be vaccinated.

CONCLUSION

Cough is a common pediatric problem, and accounts for frequent office visits. It is important to differentiate between acute cough and chronic cough in evaluation of the patient. Specific versus nonspecific cough should be determined based on performing a careful and detailed history and physical examination, and obtaining appropriate laboratory data. Referral to a subspecialist may be necessary. Patient and parent education, and close observation to determine

the benefit of therapy (and need for potential further evaluation) is critical to the management of chronic cough.

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