PedsCases Podcast Scripts

This is a text version of a podcast from Pedscases.com on “Acute Cough.” These podcasts are designed to give medical students an overview of key topics in pediatrics. The audio versions are accessible on iTunes or at www.pedcases.com/podcasts.

Acute Cough

Developed by Mark McKinney and Dr. Melanie Lewis for PedsCases.com.
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You are listening to PedsCases podcast series. This section deals with acute cough in pediatrics. The objective is to review the most common causes of acute cough, to offer clinical pearls, and to provide key points on management. The information will be presented to mirror the steps of clinical reasoning – I’m going to start off with a differential, then go through key parts to a history and physical without focusing in on any particular cause just yet. In the later half of the podcast, I will focus in on each of the more common causes, how to investigate further, and key points on management.

My name is Mark McKinney. I am a medical student at the University of Alberta. This podcast was developed in collaboration with Dr. Melanie Lewis, a pediatrician and faculty member at the University of Alberta.

Ok, with that let’s get started talking about cough. So the first step is the differential.

Differential

The 3 most common causes of an acute cough are infection, asthma, and aspiration. However, in any acute situation, a good approach is to consider what could be life threatening to your patient and then what is most common.

Potentially fatal conditions include aspiration of a foreign body, food, or fluids; pulmonary embolism; or spontaneous pneumothorax. Of these, aspiration of a foreign body is by far the most common in an otherwise healthy child.

Common causes of acute cough include infection, asthma, allergic rhinitis, and psychogenic cough.

Also consider that this may be a new presentation of what are often considered causes of chronic cough – such as Gastroesophageal Reflux Disease (GERD), which is very common. It may also be reasonable to consider pulmonary edema due to a newly presenting cardiac cause. As this podcast is about acute cough, I’m not going to spend

a lot of time talking about chronic cough. If you want to know more about these, I encourage you to listen to my podcast on chronic cough.

By far, the most common cause for acute cough is infection, in particular viral URTIs. There are many viruses that could potentially be to blame. These are reviewed later in part 2 of the podcast, but are generally approached in the same way. Bacterial infection of the upper respiratory tract causing cough is not common. Lower respiratory tract infections may be bacterial in origin, viral, or a mix of both. Bacterial infections will present as pneumonia, whereas viral infections can cause bronchiolitis or pneumonia. Again, specific bugs that could be to blame vary by age and are reviewed in part 2 of the podcast.

Asthma, whether a new presentation or an exacerbation of known asthma, is a common cause of acute cough. It can often be triggered by a viral pathogen, cold weather, or exacerbated by exercise.

Allergic rhinitis is particularly common in children with a family history of atopy. Cough results from irritation of the oropharynx due to rhinorrhea.

Psychogenic cough is actually quite common as well, but can be fit in low on the differential because it is rarely immediately threatening. Psychogenic coughs are often described as having a bizarre or honking sound, but may also be quiet under-their-breath kinds of coughs.

So in review, first consider potentially life-threatening situations such as foreign body aspiration, pulmonary embolism, or pneumothorax. Next consider infection, asthma, allergic rhinitis, psychogenic cough, or a new presentation of a typically chronic cough condition like GERD. But recognize that the 3 most common causes are viral URTI's, asthma, or foreign body aspiration.

The History and Physical Exam

The history is the most valuable part for evaluating a cough. After this, the diagnosis is often already made, but there are a few further investigations to confirm or sort out specific pathologies. To aid in organization, I have listed the approach to history and physical into 5 categories.

But before continuing, I should make an important point – in children with acute dyspnea, it is very important not to agitate the child. Agitation may lead to loss of a patent airway in cases of partial obstruction, or otherwise exacerbate their symptoms. Be particularly gentle and calm in dealing with a child, and never separate the child from the parent unless absolutely necessary. That being said, let's move on to the history and physical.

1) First consider the age and overall health of the child to give you some context.
   - Is their breathing laboured or do they appear dyspneic?
   - Do they appear very unwell or toxic?
   - Do they have an ongoing condition which may be causing, contributing to, or exacerbating the cough?
   - Look at their growth parameters for evidence of failure to thrive. Also look at their fingers and toes for cyanosis or digital clubbing which might suggest a severe chronic process.
   - Next ask about a family history of atopy (eczema, asthma, or allergies), and examine their skin for eczema. This might suggest asthma or allergic rhinitis is the cause of the cough.

2) Consider onset and timing of the cough
   - Can the parent identify a specific onset? Sudden, otherwise unexplained cough may suggest PE or spontaneous pneumothorax (particularly in tall thin babies). However, foreign body aspiration is more likely, even without a known specific event. Gradual increase over a matter of hours may suggest asthma or a developing lung pathology (e.g. pneumonia, effusion, or hemothorax)
   - Does anything bring about the cough? Onset with exercise may suggest asthma. However exertional dyspnea is associated with most acute coughs so this alone does not confirm asthma. Complete absence of exertional dyspnea or a cough that decreases with exertion may suggest a psychogenic origin to the cough.
   - Do they have symptoms when they eat? Cough appearing shortly after eating suggests they are aspirating food or fluids.
   - Ask about nighttime coughing. A psychogenic cough will generally disappear at night, whereas in asthma, GERD, or respiratory infections it may be worsen.

3) Consider likelihood of a current infection
   - First ask about vaccinations. But remember – vaccinations do not guarantee immunity, and are only available for specific pathogens. Children are routinely vaccinated against *Haemophilus influenza* type B, pertussis, and 7-13 serotypes of *Streptococcus pneumoniae* in the pneumococcal vaccine. Also ask about annual flu shots.
   - Next, look for symptoms of a respiratory infection. You should do a head and neck exam, and listen to their lungs for breath sounds, crackles, or wheezes. Viral URTIs will commonly present with some combination of fever, sore throat, runny nose, and acute otitis media. Bronchiolitis may be associated with wheezing. If pneumonia is present, you can expect tachypnea and fever, and other findings may include asymmetrically decreased breath sounds, wheezing, crackles, or increased work of breathing, with dullness to percussion over areas of consolidation.

- Ask about infectious contacts. Do they have siblings who are also sick? Do they go to school or daycare, and are children there sick? Daycares and schools tend to be cesspools for infection, so a child who has just started going will probably be sick on and off for a couple of months.

4) Consider the cough itself. Make sure you LISTEN to the cough - don't just rely on parent interpretations. Take note of associated stridor or wheezing as well.
   - Some coughs have distinctive sounds:
     - Barking cough – croup
     - Honking, bizarre cough – psychogenic cough
     - Whooping cough – pertussis (also called paroxysmal cough)
     - Staccato cough – *Chlamydia pneumoniae*
     - Stridor – acute epiglottitis, retropharyngeal abscess, croup.
     - Wheezing – asthma, LRTI, aspiration of a foreign body, pneumonia

5) Consider other signs and symptoms associated with the cough
   - Hemoptysis – foreign body, TB
   - Pleuritic pain can occur with pneumonia, pneumothorax, or foreign body
   - Choking, gurgling, and persistent pneumonias may suggest persistent upper airway obstruction from an unidentified foreign body or congenital abnormality.
   - Coughing until the point of gagging or vomiting should be a red flag for asthma

That wraps up the history and physical exam section. So to review - first consider the overall health of the child and ask about a family history of atopy. Next consider the onset and timing of the cough, paying particular attention to coughing at night, with or after eating, and cough with exertion. Then consider likelihood of a current infection. Evaluate the character of the cough, being sure to listen to it yourself, and finally consider what other signs and symptoms are associated with the cough.

As I said before, the history and physical should give you most of the information you need to get a pretty good idea what's going on. Further investigation and management of an acute cough is targeted at the specific conditions which may have been suggested from the history.

<u>Presentation of Specific Conditions, Further Investigations and Management</u>

Before I get into the individual common causes of acute cough, I want to make another special note: over the counter cough remedies are NOT effective in children and should NOT be used regardless of the cause of the cough. You should talk to the parents and discourage their use. This might take some explaining, but OTC cough remedies have been shown to be ineffective at dealing with coughs, and can occasionally cause harm.

So I'll start the discussion of how to manage the big causes of acute cough with one that's pretty scary for parents.

Foreign Body?
The best place to start is by looking in the throat. If you can see it, remove it with forceps if easily removable, but take care not to stress the child as this could cause movement of the object, obstruction of the airway, and lead to respiratory arrest. If you are at all concerned about the airway, consult an anesthesia colleague and have him or her at the bedside before attempting anything that could upset the child or result in movement of the object. If the child is in respiratory distress, allow them to find a position of comfort – for example upright on their parent's lap. Do not force them to lie down.

If the foreign body is not visible, do a CXR on inspiration, expiration, and lateral decubitus. Upright inspiratory views may be normal despite presence of a foreign body, so do expiratory views as well. Only radio-opaque materials like metal will show up on Xray – so you might not be able to see it. However, you can look for hyperinflation on the affected side with expiration, which represents air trapping behind the foreign body. In the lateral decubitus position, the mediastinum should shift towards the lower side – absence of this movement also suggests air trapping.

Lastly if strongly suspected but not visible on Xray, perform a bronchoscopy under anesthetic. If the foreign body is not retrievable by bronchoscopy, a surgical lobectomy may be necessary.

Ok – the next one is a big one. A possible infection.

Infection?
Sorting out all of the possible bugs for a cough can be daunting – but realize that knowing the specific microbe to blame is not necessary most of the time. Focus on the big points - is an upper or lower tract infection? And is likely to be viral or bacterial?

First differentiate if it is likely to be an upper or lower respiratory infection.

URT symptoms include fever, sore throat, runny nose, and acute otitis media. LRT symptoms are fever, tachypnea, increased work of breathing, decreased breath sounds, and adventitia like crackles or wheezes.

If you've decided it's an URTI, it's almost always going to be viral. Bacteria in the URT don't really present as a cough, and are much more rare. There are many viruses that could potentially be to blame, but some are more likely depending on the child's age. In infants, rhinovirus, coronavirus, parainfluenzavirus, and respiratory syncytial virus (RSV) are most common. In children, picornavirus, adenovirus, RSV are most common. In adolescents, it could be just about anything, with younger adolescents being similar to children and older adolescents more similar to adults. In all ages, influenza may cause an URT picture with or without LRT symptoms as well. These symptoms may be more severe, but are often indistinguishable from a cold.

For an URTI, it's usually viral, and it's usually self-limiting without need for further investigation. The best way to manage it is with fluid intake, rest, and symptomatic management. The one exception that can be treated is influenza, and only if treatment is started within the first 2 days of infection. Antiviral treatment with oseltamivir (Tamiflu) will reduce period of symptoms by 1 or 2 days, and lower chances of more severe infections or pneumonia. However this is only necessary in children at greater than normal risk. The average child will do just fine without antiviral medication. Annual flu shots should be encouraged instead.

LRT infections present as either bronchiolitis or pneumonia. Bronchiolitis is generally viral in origin, and will present as tachypnea and fever, mainly in children less than 1 years of age. Pneumonia may be bacterial, viral, or a mix of both. It will present with tachypnea and fever as well, but with associated increased work of breathing, decreased breath sounds, crackles or wheezes, and dullness to percussion. Atypical pneumonias caused by Chlamydia or mycoplasma infections may present similarly, but tachypnea and fever are typically not as severe or may not be present at all.

I'll quickly go through the various bacteria and viruses that commonly cause LRTI in each age group, but this is generally something that comes up with later investigations, not something you'll be able to distinguish clinically.

In infants, bacterial pneumonias are most commonly caused by *E.Coli*, Group B strep or *Listeria*. In children, *Streptococcus pneumoniae* is most common, and *Chlamydia pneumonia* or *Mycoplasma pneumonia* are also common. In adolescents *Mycoplasma* becomes more common. In severe very purulent pneumonias, consider *Staphylococcus* aureus, Haemophilus B, and Group A Strep as possibilities as well.

Viral pneumonias may be present in infants shortly after birth due to cytomegalovirus or herpes. In children, adenovirus, influenza, parainfluenza, or RSV are common. Adolescents may have any of a number of viral causes, similar to adults.

Bronchiolitis is something mainly seen in infants and young children, and usually due to RSV. RSV is particularly common in infants and young children in the winter months and tends to present as wheezing along with the cough. RSV is highly contagious. You can get a nasopharyngeal swab to know for sure if you're looking at RSV if spread is a concern.

Croup due to parainfluenza virus can present as a barking cough, and will have associated stridor if severe. Parainfluenza, like influenza, can present as a mixed upper and lower respiratory tract infection.

B.Pertussis will also cause acute cough, with a distinctive whooping sound called a paroxysmal cough. It's also called "whooping cough" or "the hundred day cough". *Pertussis* infections tend to be past their most treatable stages by the time of presentation and have a very prolonged course before the cough resolves. *Pertussis* is dealt with more in the chronic cough podcast.

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When managing a suspected infection, if you think it might be viral, get a CBC with a differential cell count, blood culture, and serology for mycoplasma. In a toxic-looking child, consider sepsis. If pneumonia is suspected, get a CXR as well. Lastly, nasopharyngeal swabs may be done to look for pertussis or RSV.

Treat bacterial infections with relevant narrow-spectrum antibiotics. If a viral infection is the most likely cause, do not treat with antibiotics as they are only useful for bacterial infections and overuse can lead to increasing antibiotic resistance. If you suspect a viral cause – be confident in this diagnosis and do not needlessly prescribe antibiotics.

Note that while a URTI will almost always be viral, both viral and bacterial infections can cause lower respiratory tract infections. Bacterial infections tend to show up as pneumonia, whereas viruses can cause bronchiolitis or pneumonia. While I have mentioned several of the most common pathogens for respiratory infections, realize that there is a wide variety of bugs that could come up depending on the population that you are dealing with – if you are ever unsure on a course of action, consultation with a pediatric infectious disease specialist is recommended.

Asthma?
Suspect asthma in a child whose cough is brought about by exercise or triggers like cold air and irritants, where the cough is associated with wheezing, and if there is a family history of atopy. They may also cough to the point where they start gagging or vomit.

A very practical test for asthma is to empirically put them on a bronchodilator. If the cough goes away or is significantly reduced, they likely have asthma. Spirometry and PFTs are not done in children under about 6 years old because they won't cooperate well enough. However in older children, spirometry may be a useful investigation. Decreased ratio of FEV1/FVC is expected, with near full reversal post-bronchodilator.

Asthma is typically managed in children with an inhaled short-acting beta agonist as needed, and an inhaled corticosteroid twice daily for management. Do not forget the importance of patient and parent education, particularly with respect to avoidance of triggers. Common triggers can include smoking in the household, allergens and irritants like pollen or dust, or a household pet. The family may need to strongly consider removing a pet from the household if it is a trigger. The constant presence of a trigger like a pet may promote chronic inflammation and airway changes which will permanently worsen the asthma. A written action plan and good follow up early on is essential to good management of asthma.

Allergic rhinitis?
This is a strong possibility in a child with a family history of atopy. Like asthma, avoidance of triggers is key to management of allergic rhinitis. Consider a trial of allergen avoidance, anti-histamines, and intranasal corticosteroids. If anti-histamines

aren't helping after a week or two, this probably isn't allergic and you should start looking for something else.

Pulmonary embolism?
PE will present with sudden onset cough, increased work of breathing and dyspnea. Pleuritic chest pain is a key symptom, although the child may not be able to report this. Referral to emergency is recommended. If you ARE the ER doc, evaluate by getting a D-dimer blood test – which is a high sensitivity test for clotting. If it is not elevated, this suggests strongly against PE: If it is elevated, this might be PE and warrants further investigation. A contrast-CT can be used to visualize a PE, or VQ-matching study can be done. Treatment is with anti-coagulants and a thrombolytic.

Psychogenic cough
Psychogenic coughs include both habit coughs and tic coughs. Generally this will be a later diagnosis after ruling out other possibilities, but key findings including a bizarre or honking sound to the cough, reduced cough when distracted, and disappearance of the cough at night – unlike infections, GERD, or asthma where it would be worse at night. Keep a high index of suspicion for psychogenic cough, and consider it whenever the cough does not fit the other pictures of acute cough.

That's it for the management of the most common causes of acute cough. I'll do a quick recap of the topics covered in this podcast.

Conclusion

Remember to start broadly by forming a differential. Consider potentially life-threatening possibilities such as foreign body aspiration, pulmonary embolism, or pneumothorax. Next consider infection, asthma, allergic rhinitis, psychogenic cough, or a new presentation of a typically chronic cough condition like GERD. But recognize that the most common causes are viral URTI's, asthma, or foreign body aspiration.

For the history and physical, first consider the overall health of the child and ask about a family history of atopy. Next consider the onset and timing of the cough, paying particular attention to nighttime coughing, coughing with or after eating, and exertional cough. Consider likelihood of an infection. Evaluate the character of the cough and listen to it yourself, and consider what signs and symptoms are associated with the cough. Remember, keep the child calm when doing your physical exam.

Finally, target any further investigations or management at the specific conditions suggested by the history and physical exam, but discourage the use of OTC cough remedies because they don't work.

This concludes this PedsCases podcast on acute cough. Again, my name is Mark McKinney and this podcast has been produced in collaboration with Dr. Melanie Lewis. I hope this has been an informative look at a very broad and very common topic.

References

References available upon request.

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