



BATTLING BACTERIA

The Role of Antibiotics in COPD

BY: LAUREL RANGER

Acute exacerbations are a distressing fact of life for people with chronic obstructive pulmonary disease (COPD). These episodes can be debilitating and have a negative impact on a person's quality of life. On average, those with moderate to severe COPD experience about one to three acute exacerbations per year. Approximately 10 million outpatient medical visits and 280,000 hospital admissions related to COPD exacerbations occur each year. The likelihood of hospitalization rises with greater disease severity and increasing age.

The worsening cough, more copious, thickened yellow or green phlegm, and the increasing shortness of breath that signal an exacerbation are familiar to most people with COPD. Some also experience wheezing, chest tightness, and low-grade fever during an exacerbation. Being aware of these symptoms and monitoring for signs of an impending exacerbation are important because timely and appropriate medical treatment may prevent serious complications.

WHAT CAUSES EXACERBATIONS?

"About 80% of exacerbations are infectious in nature. Bacteria cause about 50% of those infections, with viruses causing the rest," explains Sanjay Sethi, MD, Attending Physician in the Division of Pulmonary Critical Care and Sleep Medicine at the Veterans Administration Western New York Healthcare System at

Buffalo and Associate Professor of Medicine at State University of New York (SUNY) at Buffalo.

New techniques and advances in genetics have given us a better understanding of the role bacteria play in both exacerbations and the progression of COPD. "Although there has been some dispute in the past about the importance of bacteria in exacerbations and COPD, new evidence indicates that bacteria are not innocent bystanders in this disease," Dr. Sethi asserts. "Bacteria cause acute exacerbations, airway inflammation, and possibly progressions of lung disease."

The "vicious circle" hypothesis suggests that bacteria have a major role in the progression of COPD. An irritant such as smoking may damage the natural clearing mechanisms of the lungs and airways initially, resulting in an inability to clear away bacteria. This in turn leads to "bacterial colonization"—that is, bacteria living within the airways and lungs without causing outward signs of infection. However, bacterial by-products do damage the linings of the airways, and colonization itself can lead to infection and an acute exacerbation. The body responds to infections with inflammation of the airways, which can cause a cascade of by-products that further damage the linings of those passageways. The accumulating damage compromises the airways, leading to progression of the underlying COPD.

WHAT CAN BE DONE?

Much can be done to manage exacerbations and to reduce the damage they do to the lungs. Three main “bugs” cause bacterial exacerbations: *Haemophilus influenzae*, *Moraxella catarrhalis*, and *Streptococcus pneumoniae*. All three can be eradicated by a number of available antibiotics. In more seriously ill patients, other bacteria such as *Pseudomonas aeruginosa* may be the cause. Again, in most cases, prompt and appropriate treatment will eliminate these bacteria.

New evidence suggests that the number of acute exacerbations a person suffers can affect lung function and disease progression. “The progression of COPD is associated with the frequency of exacerbations, so how we manage these episodes can have a significant impact on the progress of the disease,” explains Antonio Anzueto, MD, Associate Professor of Medicine at the University of Texas Health Science Center and Chief of Pulmonary Medicine at the South Texas Veterans Healthcare System, both in San Antonio. Although smoking is a major factor, even after adjusting for smoking status, those with less-frequent exacerbations continue to exhibit better lung function than people who have frequent exacerbations.

“Treatment options for exacerbations include removal of irritants such as dust, pollutants, and cigarette smoke, the use of bronchodilators and corticosteroids, and of course, antibiotics,” notes Dr. Anzueto. Interestingly, effective antibiotic therapy has been found to reduce relapses by approximately 40% when compared with no therapy. Relapses occur in 21% of people experiencing an exacerbation. They can increase the risk of complications and cause further decline in lung function as well as contribute to the overall frequency of episodes.

People with COPD play an important role in determining the effectiveness of their treatment. Understanding a few key issues in antibiotic therapy may help those with COPD keep on track with their medications. For instance, not all antibiotic therapy is equally effective. Taking the wrong kind of antibiotic can cause more harm than taking nothing at all—a key point to remember for anyone tempted

to try someone else’s medication or finish up an old prescription. Antibiotics should never be taken without checking with a clinician first. Furthermore, it is essential to finish the complete course of antibiotics prescribed, because bacteria can develop resistance to a particular antibiotic if an inadequate amount is taken. Unfortunately, those bacteria not killed by the drug are merely weakened and, over time, the bacterial population develops a resistance to the medication and can no longer be killed off by that drug.

In addition, because different types of bacteria respond to different antibiotics, medical advice should be sought early in an attack so an accurate history can be obtained. This will help the clinician to select the most appropriate antibiotic. Finally, a health care provider should be consulted before taking any other medication, such as cough medicine or antihistamines, during an exacerbation. Sometimes extra doses of daily inhaled bronchodilators are called for, but this must be done under the advice of a medical professional.

Another key point to remember is that taking an antibiotic for a viral infection won’t cure the current infection—antibiotics do not kill viruses—and it may encourage the bacteria living in the airways of the lungs to develop resistance. Then, the next time that person has a bacterial infection, the drug won’t work.

WHAT CAN BE DONE TO PREVENT EXACERBATIONS?

You’ve heard it before, but the best way to prevent exacerbations is to stop smoking. This will help restore some of the airways’ natural ability to clear away bacteria & stagnant secretions. People with COPD should be sure to get pneumococcal vaccinations or boosters if they haven’t had a vaccination in the past five to 10 years. Annual influenza vaccination is also recommended. In addition, people with COPD can avoid respiratory infections by limiting contact with others who are sick, should make every effort to eat well, get adequate rest, & exercise regularly. Finally, if symptoms of an exacerbation occur, a clinician should be contacted as soon as possible.

Calling Dr. Bauer ...



Dr. Michael Bauer



Dear Dr. Bauer,
I've been hospitalized with two COPD exacerbation events. I was treated with antibiotics. Antibiotics are ineffectual against viral infections, are there no drugs to combat viruses?
Jerry D.

You ask a very good question about the cause and treatment of pulmonary infections in those with underlying lung disease. The common cold (cough, nasal congestion, clear sputum production) is almost always the result of a viral infection. Drug companies are performing research daily to find a safe, cheap pill that will kill viruses. Viruses are "simple" forms of life that have been around billions of years because of their adaptability and resistance to stresses in the environment. Vaccines to some viruses such as influenza have been developed at great cost but it is just touching the tip of the iceberg since we are exposed to many other viruses every day.

When a patient with lung disease is admitted to the hospital with an "exacerbation," we have few effective tests that can differentiate between a viral or a bacterial cause. Both result in very similar symptoms of fever, cough, green sputum and shortness of breath. We often order blood cultures and sputum cultures for bacteria, but these can take days to get an answer. Culturing viruses is very hard in a hospital laboratory. Not knowing an exact cause, doctors will frequently start right away with antibiotics with the hope that if it is a bacteria, we can get on top of it right away. Bad viral infections sometimes make us more susceptible to secondary bacterial infections when they weaken our body's defenses.

Using antibiotics too frequently and for too long a period will make the patient prone to develop a "resistant" infection. This seems to be happening more and more. Patients need to know that antibiotics can be very effective but need to be used only with appropriate indications.

Let me take this opportunity to wish all of our *Pulmonary Paper* readers a very happy holiday season and a great New Year in 2014!

Question for Dr. Bauer? You may write to him at *The Pulmonary Paper*, PO Box 877, Ormond Beach, FL 32175 or by email at info@pulmonarypaper.org.

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