



# JOHNS HOPKINS GUIDE TO New Treatments for COPD

BY THE EDITORS OF JOHNS HOPKINS HEALTH ALERTS

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## The Johns Hopkins Guide to New Treatments for COPD

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### **Three Effective Steps for Relief of Chronic Obstructive Pulmonary Disease (COPD)**

Several lifestyle measures are critical for improving your comfort when you suffer from chronic bronchitis and emphysema.

When taken together, chronic bronchitis and emphysema—two distinct conditions known collectively as chronic obstructive pulmonary disease (COPD)—are the fourth leading cause of death in the United States, after heart disease, cancer, and stroke. As many as 16 million Americans have been diagnosed with COPD. Experts estimate another 16 million have the condition without knowing it.

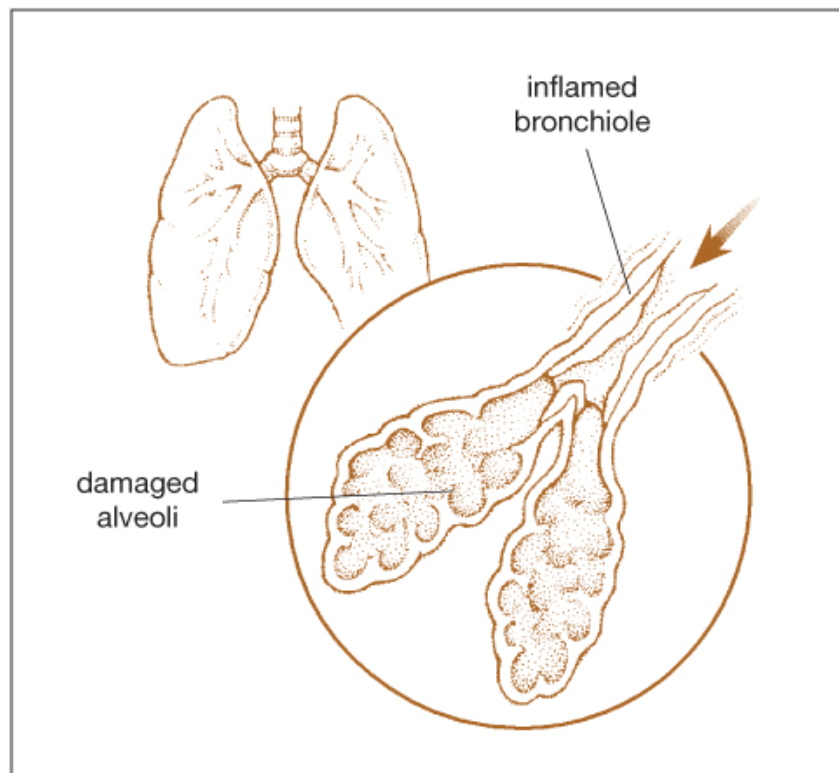
The symptoms of COPD—primarily shortness of breath and a productive cough—can be highly debilitating. Shortness of breath may be uncomfortable enough to trigger panic attacks in some sufferers. In a recent survey of 573 COPD patients, 45% of the respondents reported shortness of breath while washing, dressing, or doing light housework; about a third said they had difficulty breathing while talking or resting; 8% said they were too short of breath to leave home. COPD is also associated with frequent respiratory infections, malnutrition, weight loss, fatigue, and depression.

The survey also revealed that COPD patients tend to underestimate the severity of their illness. More than a third of those with severe symptoms characterized their condition as mild or moderate. Of these, a quarter thought that their symptoms were well controlled or even completely controlled. Surprisingly, although COPD is a progressive disorder that cannot be cured, older adults reported fewer and less severe symptoms than younger ones.

This finding is counterintuitive, but there are at least two logical explanations. First, because people often become less active with age, older adults may not require as much functional lung tissue or as great a respiratory reserve (the ability of the lungs to exchange oxygen and carbon dioxide in response to increased activity) as they did when they were younger. Second, older COPD patients tend



to grow accustomed to their symptoms and may restrict their activities to avoid them. Regardless, lifestyle measures can reduce symptoms of COPD, increase stamina, and produce dramatic improvements in quality of life.



As the alveoli (the tiny air sacs at the ends of the bronchial trees) are damaged by emphysema, the lungs are able to transfer less and less oxygen to the bloodstream, causing shortness of breath. Also, chronic inflammation of the airways may inhibit the entry of air into the alveoli.



## **The Damaging Effects of COPD**

Gradually declining lung function due to airway obstruction is the hallmark of COPD. By reducing the elasticity of the lungs and destroying the walls between the air sacs (alveoli), emphysema leads to airway collapse and reduced airflow. Chronic bronchitis is an inflammatory disease of the airways that is frequently worsened by acute bacterial infections. The inflammation causes increased mucus production and swelling of the walls of the bronchial tubes, which leads to narrower passages.

Both emphysema and chronic bronchitis decrease the ability of the lungs to take in oxygen and remove carbon dioxide and are sometimes associated with spasms of the airways. Both conditions also coexist in many COPD patients.

As COPD advances, sufferers are vulnerable to acute episodes, which are typically prompted by a viral or bacterial infection. Extremely hot or cold air temperatures and poor air quality may worsen COPD symptoms. Acute episodes of COPD are marked by increased shortness of breath, wheezing, and a cough that produces more phlegm (the color of the phlegm may also change). People in the later stages of COPD are often underweight and malnourished because eating is tiring and the work of breathing increases calorie needs by 20% to 50%.

People with COPD also typically lose muscle mass owing to inactivity, leading to general weakness as well as weakness of the muscles that control breathing. Disability and discomfort often prompt psychological problems, primarily depression. Serious potential medical complications include congestive heart failure and pulmonary embolism (a blood clot carried to the lungs).

Long-term smoking is responsible for 80% to 90% of COPD cases. Heredity, exposure to secondhand smoke and air pollution, and frequent respiratory infections during childhood may also play a role in COPD.



If you have COPD, you can improve your quality of life by following these three important steps:

**\* Step 1: Not Smoking**

Not smoking can dramatically improve symptoms and stamina in COPD patients. However, only about 8% of smokers are able to quit on their own. You can increase your likelihood of success by talking with your doctor and enrolling in a support group. Using nicotine gum, a skin patch, a nasal spray, or an inhaler to decrease the irritability, restlessness, food cravings, and anxiety often associated with nicotine withdrawal doubles the chances of quitting successfully.

Zyban (bupropion), a medication also prescribed as an antidepressant known as Wellbutrin, may help reduce cravings and withdrawal symptoms in some people. Don't give up. Most people try to quit several times before they succeed.

**\* Step 2: Exercise**

Exercise builds muscle strength and stamina and improves breathing ability in everyone, including those with COPD. Consequently, regular exercise may enable people with COPD to work harder and longer without triggering symptoms.

An exercise program designed to combat COPD symptoms should contain the same two elements as any exercise plan: aerobics to increase heart rate and resistance training to increase muscle strength. However, people with COPD should be supervised by a respiratory therapist, who will establish guidelines to ensure a safe, comfortable workout and provide special breathing training exercises designed to help control breathing rate, decrease the amount of energy needed to breathe, and improve respiratory muscle function. People with COPD should not exercise when the air quality is poor and should avoid airborne toxins, including secondhand cigarette smoke, at all times.

**\* Step 3: A Healthy Diet**

Good nutrition may reduce the risk of respiratory infections, which can be life-threatening in patients with COPD. However, fatigue, depression, or the side effects of medications may rob people of their motivation to eat. Up to 60% of people with COPD do not get enough calories and nutrients from dietary sources alone.

If you have COPD, you are more likely to meet your calorie and nutritional needs by:

- \* eating a variety of foods
- \* focusing on foods that contain antioxidants (vitamins C, E, and beta-carotene), which are found in deep green and yellow-orange fruits and vegetables
- \* limiting salt, caffeine, and alcohol
- \* avoiding foods that cause gas or bloating
- \* eating five or six small meals a day rather than a few large meals
- \* choosing calorie-dense foods like peanut butter
- \* considering taking a high-calorie nutrition supplement and/or a vitamin supplement (beta-carotene supplements are not recommended, however, because current evidence indicates they may increase the risk of lung cancer in people who smoke)



## Other Treatments for COPD

When lifestyle measures are insufficient, inhaled bronchodilators, which relax and open constricted airways, can sometimes relieve COPD symptoms. If inflammation or extreme sensitivity to irritants is a problem, some physicians add an inhaled corticosteroid to the regimen.

Antibiotics should be prescribed when a bacterial infection is suspected; influenza and pneumonia vaccinations should be up-to-date; and expectorants can help loosen and expel mucus.

Supplemental oxygen is beneficial for people with advanced COPD disease who have severely impaired lung function and an abnormally low blood-oxygen concentration. Surgery may be considered in selected patients. There are two options: lung reduction, an experimental procedure, and lung transplantation. Only about 1,250 lung transplants are performed annually worldwide owing to the scarcity of donated organs.





## **Living with COPD – Breathing Training Brings Benefits**

\* Breath training helps to control breathing rate, decrease the amount of energy required for breathing, and improve the position and function of the respiratory muscles for people suffering from COPD.

Recent observations have underscored the benefits of pulmonary rehabilitation programs for people with COPD (chronic obstructive pulmonary disease). While maintaining general strength through regular aerobic exercise is beneficial, lung exercises to strengthen the muscles used for breathing are also important for people with COPD. Breath training helps to control breathing rate, decrease the amount of energy required for breathing, and improve the position and function of the respiratory muscles. A respiratory therapist can help people with COPD practice the following techniques:

### **\* Pursed-lip breathing for COPD.**

Inhale through your nose, and then exhale with your lips pursed in a whistling or kissing position. Each inhalation should take about two seconds and each exhalation should last about four to six seconds. It is not clear how pursed-lip breathing brings symptom relief for people with COPD, but it may work by keeping the airways open.

### **\* Diaphragmatic breathing for COPD.**

The diaphragm is the main muscle used for normal breathing. People with COPD, however, may also use the muscles in the rib cage, neck, and abdomen to breathe. This method is less efficient than using the diaphragm. To practice using the diaphragm, lie on your back, place your hand or a small book on your abdomen, and breathe. Your hand or the book should rise on inhalation and fall on exhalation. Practice for 20 minutes twice daily. Once you have mastered this skill while lying down, try to do it while sitting up.

### **\* Forward-bending posture for COPD.**



Breathing while bending slightly forward from the waist relieves symptoms for some people with severe COPD, possibly because the diaphragm has more room to expand.

Some research suggests that pulmonary rehabilitation may also increase survival for people with COPD, but this has not been proven.



## **Before You Take Antibiotics for Bronchitis, Consider This**

Johns Hopkins professor Peter B. Terry, M.D. explains how overuse can lead to antibiotic resistance.

Many people who develop bronchitis go to their physician assuming they'll receive antibiotics to clear up the bronchitis. But a recent study found that people with bronchitis or other uncomplicated lower respiratory tract infections who take antibiotics for their condition have little difference in relief of symptoms compared with patients who don't take antibiotics.

The study, published in the Journal of the American Medical Association, included 807 patients with bronchitis or a similar uncomplicated lower respiratory tract infection. It did not include patients with chronic lung disease or suspected pneumonia. Participants were randomly assigned to receive either immediate antibiotics, no antibiotics, or delayed antibiotics if bronchitis symptoms had not gone away after 10 days.

Compared with immediate antibiotics, giving patients either no antibiotics or delayed antibiotics was associated with little difference in the duration or severity of bronchitis symptoms. On average, patients were ill with bronchitis for three weeks in total; taking antibiotics reduced moderately bad bronchitis symptoms an average of only one day. "It is difficult to justify widespread antibiotic prescribing for uncomplicated lower respiratory tract infection on this basis given the dangers of antibiotic resistance," the researchers concluded.

The researchers also found that the approaches of not offering antibiotics or using delayed antibiotics were both acceptable to most bronchitis patients. "I hope that this study makes physicians think more carefully about prescribing antibiotics to patients with bronchitis and other uncomplicated lower respiratory infections," says Peter B. Terry, M.D., author of the John Hopkins Lung Disorders White Paper



and Professor of Medicine, Division of Pulmonary and Critical Care Medicine, Johns Hopkins University School of Medicine.

Dr. Terry notes that a number of studies over the last several decades have clearly shown that about half of cases of acute bronchitis are caused by a virus. “Since antibiotics don’t work against viruses, then in these patients, taking an antibiotic won’t alter the natural course of their bronchitis.” But, Dr. Terry adds, some patients with bronchitis have bacteria growing in their airways and then become infected with a virus that encourages the bacteria to multiply, leading to pneumonia. “These bronchitis patients will respond to antibiotics,” Dr. Terry says. “The problem becomes how to know when a patient’s bronchitis is viral or not. That’s where a doctor’s judgment comes in.”

Absence of a fever and clear or light yellow phlegm usually suggests the bronchitis is viral, while fever, and dark yellow or green sputum that is thick and sticky is more suggestive of bacterial bronchitis infection. A doctor also needs to take into account the age and general health of the patient, according to Dr. Terry. “There are certain considerations a physician has to think about very carefully. If you’re young and healthy and get acute bronchitis, you are likely to have a strong enough immune system to fight it off. But if you have severe chronic obstructive pulmonary disease [an infection that further narrows already damaged airways and compromises lung function], physicians tend to be more conservative with these patients.”



## **People With Emphysema May Benefit From Surgery**

\* For people with moderately severe emphysema, lung volume reduction surgery is considered the only surgical alternative to lung transplantation.

More than three million Americans have emphysema, and some of them—those who have emphysema that predominantly affects the upper lobes and low exercise capacity—may benefit from surgery called lung volume reduction surgery to remove diseased lung tissue. The procedure is believed to create more space in the chest cavity for the working lung tissue to expand.

For people with moderately severe emphysema, the procedure is considered the only surgical alternative to lung transplantation. However, volume reduction surgery is risky because lung function is already compromised and patients with emphysema are generally older and likely to be in poor health.

The first large study examining the risks and benefits of lung volume reduction surgery to treat emphysema, published in 2003, showed patterns when researchers categorized patients based on the type and symptoms of their emphysema. Patients with predominantly upper-lobe emphysema and low exercise capacity before the surgery had the greatest benefit: Their mortality rate was cut in half compared with the medical therapy group, and their exercise capacity improved. Patients who had emphysema throughout their lungs but were still able to exercise benefited the least from surgery: They had twice the mortality rate of the medical therapy group and had little or no improvement in exercise capacity.



Although identifying these patient subgroups after the conclusion of the study is not statistically ideal, the findings are still considered valuable. Now doctors have a better way to know which of their patients with severe emphysema are most likely to benefit from lung volume reduction surgery.

In response to the study, Medicare now covers the procedure for appropriate candidates with emphysema.

### Recognizing COPD Complications

***COPD complications can be serious. Johns Hopkins specialists provide bottom line advice to help you recognize a COPD problem before it turns dangerous.***

If you have COPD, how do you know when you're not merely in discomfort, but in danger? Here are some danger signs that you shouldn't ignore:

- **COPD flare-ups and infections.** If you feel increasing shortness of breath, more mucus in your throat, and greater wheezing and coughing than usual, you may be experiencing a COPD flare-up -- something you need to share with your doctor. You should also call if the material you cough up changes color or if you have a fever lasting more than 24 hours. COPD flare-ups often result from a bronchial infection, which may be treatable with antibiotics, or from breathing fumes, dust, or pollution.
- **COPD and heart failure.** Swelling of the legs, ankles, and feet is a warning that someone with COPD may have developed a type of heart failure called cor pulmonale, or right ventricular failure. Because COPD makes the heart work harder (particularly the right side, which pumps blood into the lungs), that side of the heart may enlarge. As the blood pressure in the lungs rises, the right ventricle contracts less efficiently. Cor pulmonale increases the risk that a blood clot will develop in a leg vein.
- **COPD and pneumothorax.** A hole that develops in the lung, allowing air to escape into the space between the lung and the chest wall, pneumothorax causes the lung to collapse, leading to severe shortness of breath. People with COPD have an increased risk of pneumothorax, because changes in their lungs cause air to be emptied unevenly from the lungs. Symptoms of pneumothorax include: sudden shortness of breath; painful breathing; sharp chest pain, often on one side; chest tightness; dry, hacking cough; rapid heart rate.
- **COPD and too many red blood cells.** Weakness, headaches, fatigue, and light-headedness may indicate the presence of an uncommon condition



known as secondary polycythemia, which arises when there isn't enough oxygen in the blood. Someone who develops polycythemia may have visual disturbances such as blind spots, distorted vision, and flashes of light. Gums and small cuts may bleed, and there may be a burning sensation in the hands and the feet.

**Bottom line advice on COPD:** If the problem is a flare-up of COPD, quick treatment can prevent serious breathing problems that might send you to the hospital. Call your doctor immediately if:

- \* You have COPD and you have shortness of breath or wheezing that is rapidly worsening.
- \* You have COPD and are coughing more deeply or more frequently, especially if you have an increase in mucus or a change in the color of the mucus you cough up.
- \* You have COPD and cough up blood.
- \* You have COPD and have increased swelling in your legs or abdomen.
- \* You have COPD and have a fever over 100°F.
- \* You have COPD and have severe chest pain.
- \* You have COPD and develop flu-like symptoms.
- \* You have COPD and feel that your medication is not working as well as usual.





### Further Information

For more information on COPD and its related conditions, please visit our Lung Disorders page:

[http://www.johnshopkinshealthalerts.com/alerts\\_index/lung\\_disorders/22-1.html](http://www.johnshopkinshealthalerts.com/alerts_index/lung_disorders/22-1.html)

and Symptoms and Remedies pages:

Chronic Bronchitis

[http://www.johnshopkinshealthalerts.com/symptoms\\_remedies/bronchitis/89-1.html](http://www.johnshopkinshealthalerts.com/symptoms_remedies/bronchitis/89-1.html)

Chronic Obstructive Pulmonary Disease (COPD)

[http://www.johnshopkinshealthalerts.com/symptoms\\_remedies/copd/98-1.html](http://www.johnshopkinshealthalerts.com/symptoms_remedies/copd/98-1.html)

Emphysema

[http://www.johnshopkinshealthalerts.com/symptoms\\_remedies/emphysema/96-1.html](http://www.johnshopkinshealthalerts.com/symptoms_remedies/emphysema/96-1.html)

### The Johns Hopkins White Paper 2007: Lung Disorders



The Johns Hopkins White Papers redefine the term "informed consumer." In The Johns Hopkins White Paper 2007: Lung Disorders, specialists from Johns Hopkins Medicine report on the latest prevention strategies and treatments for lung disorders. Thousands of Americans rely on Johns Hopkins expertise to help them manage their serious respiratory conditions.

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When drawing a breath is a challenge, the pulmonary specialists at Johns Hopkins offer timely information, new research findings, and the best medical advice available to help you cope with your condition.

You will gain valuable insight on managing your lung disorders: emphysema, COPD, chronic bronchitis, asthma, pneumonia, tuberculosis, lung cancer, and sleep apnea.

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This is a guide to documenting your first project. The first time is always the hardest, and I hope this guide will get you started down the righteous path. At the end, you should have a project that is ready for public release. Feel free to read this document straight through, or simply use it as a reference. Why write docs? You will be using your code in 6 months. Well there's a few things you should know about working in the medical department first! This guide will cover everything regarding basic medical procedures, for surgery or cloning see the Guide to Surgery or Guide to Cadavers. There's a plethora of equipment available to any aspiring doctor, most of which can be found in the NanoMed dispenser. Whilst working in the medbay there is a wide variety of chemicals you might encounter. They can be found in the Smartfridge, southwest corner of Chemistry Lab.