How many of your chronic lung infection patients have Bronchiectasis?
Bronchiectasis is a chronic condition that causes airways to widen and become scarred. This often occurs from infection or injury and prevents airways from properly clearing mucus. The inability to clear mucus results in repeated lung infections from a build up of bacteria and toxins in the lungs.

Frequent infections will cause incremental damage to the lungs. Such damage can reduce oxygen exchange over time, resulting in breathing difficulties, chronic cough and chest pain. Regardless of the underlying cause, the common denominator in bronchiectasis is a breakdown of the lung defense system – especially airway clearance mechanisms.1

Although there is no cure for bronchiectasis, it can be effectively treated. Treatment can greatly improve quality of life for affected patients and reduce healthcare costs. Studies have shown that using high-frequency chest wall oscillation (HFCWO) devices for chest compression therapy is highly effective in eliminating mucus from the lungs, increasing airway flow and improving pulmonary function.

Patient Demographics
It is estimated that bronchiectasis is under diagnosed due to its variable symptoms. Bronchiectasis increases with age and is more common in women than in men. It often begins in childhood and becomes more chronic in later years.2
Potential Causes:
- Lung infections that damage the bronchi such as bacterial pneumonia, whooping cough (pertussis) or tuberculosis
- Chronic Obstructive Pulmonary Disease (COPD)
- Non-tuberculosis mycobacteria
- Inability to produce antibodies
- Inadequate immune systems or autoimmune diseases
- Gastroesophageal reflux disease (GERD) with gastric aspiration
- Asthma
- Cystic fibrosis and other inherited genetic conditions

Bronchiectasis Cycle of Chronic Infection
As bronchiectasis progresses, it becomes difficult to break the cycle of infection. Repeated infections produce scarring and lung function becomes progressively diminished. This results in breathing difficulties, chronic coughing and discomfort for affected patients.

The Benefits of HFCWO Therapy
In a study published in BioMed Central Pulmonary Medicine 2013, by Nicolini et al., researchers concluded that HFCWO therapy provides an improvement in both pulmonary function and quality of life related parameters in patients with chronic hypersecretive disease. Since those patients need daily airway clearance, this treatment should be considered among the principal options in chest physiotherapy.

The study showed that patients with dyspnea and quality of life (BCSS, MMRC, CAT) showed a significant improvement in BCSS (p ≤0.001) and CAT (p ≤0.001) than CPT.

In addition, HFCWO showed significant improvements in pulmonary function scores (FVC and FEV1) after treatment (p ≤0.006 and p≤0.001). Blood testing shows a significant reduction of C-reactive protein compared to CPT (p≤0.019). Finally, sputum production increased after HFCWO treatment. Compared to the control group, HFCWO produced the greatest increase in sputum volume and a significant reduction of neutrophile percentage (p≤0.002) and a significant increase in macrophages percentage (p≤0.012).
The AffloVest Solution

AffloVest is the lightest, first truly portable High Frequency Chest Wall Oscillation (HFCWO) vest. AffloVest provides treatment of respiratory diseases like Bronchiectasis, Cystic Fibrosis, ALS, MS and other neuromuscular diseases.

Unlike other HFCWO vests, the AffloVest features built-in oscillating modules that allow for freedom of movement to travel, go for a walk in the park, move around the house, or relax in front of the television. Patient treatment plans can be customized using the targeted motors for specific lobes or chest wall regions using different levels of intensity.

- AffloVest has eight motors creating eight individual wave forms, providing more disruption in the lungs and mobilizing more secretions
- These individual motors allow Afflovest to target different areas of the lungs
- Afflovest is completely postural independent and can be using sitting, standing or lying down
- Three treatment programs allow for a customized patient experience. Choose from Percussion, Vibration and Drainage
- Choose from three treatment levels – Soft (5 Hz), Medium (13 Hz) and Intense (20 Hz)
- Portable design provides freedom of movement and mobility to enhance patient compliance with treatment plans
- Covered Under Most Insurance Plans

In bronchiectasis, long-term use of a HFCWO may prove to be the most effective component of care. The human and economic benefits are even greater if mechanical ventilation, lung reductions surgery and lung transplantation can be avoided.4

References:

Learn more at afflovest.com and hear what Afflovest users are saying at ibcafflovest

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COPD and Bronchiectasis: Similarities and Differences

Bronchiectasis and chronic obstructive pulmonary disorder (COPD): synonyms for the same condition? Not quite. The American Thoracic Society defines COPD as “a group of lung conditions that make it difficult to empty the air out of the lungs.” While bronchiectasis, which is characterized by permanent enlargement of bronchi and bronchioles, may lead to obstructed breathing from abnormal mucus production like COPD, evaluation and treatment for both diseases differ.

“Chronic obstructive pulmonary disease and bronchiectasis are different but related diseases that occur separately, but can coexist,” wrote Drs. Shannon A. Novosad and Alan F. Barker, both of Oregon Health and Science University, in “Chronic Obstructive Pulmonary Disease and Bronchiectasis,” published in Current Opinion in Pulmonary Medicine. Yet, the chances of concurrent COPD and bronchiectasis are slim: while COPD is the third leading cause of American death, bronchiectasis can be considered an orphan disease that affects approximately 110,000 Americans.

However, in one study published in Egyptian Journal of Chest Disease and Tuberculosis, “Bronchiectasis in COPD Patients,” 47.8% (33 of 69) of enrolled participants had both bronchiectasis and COPD. The researchers behind the study identified that severe functional impairment, defined as a forced expiratory volume in one second (FEV1) of less than 50%, correlated to developing bronchiectasis, just as greater bacterial colonization and exacerbation rate did, as well.
It can be easy to mistake one disease for the other. Both diseases have symptoms of dyspnea (shortness of breath), chronic cough, potential for daily sputum production, and airflow obstruction. Methods for determining the reason for these symptoms begin with patient history and clinical examination. Patients with COPD commonly have chronic sputum production associated with coughing, yet bronchiectasis patients may have either a dry or wet cough.

As more quantitative measures, lung function and imaging tests are also useful in diagnosing the diseases. COPD is confirmed by a post-bronchodilator FEV1 less than 80% with an FEV1/forced vital capacity (FVC) less than 70%. Bronchiectasis can initially mimic these COPD features, but as bronchiectasis progresses, progressive lung damage can lead to mixed lung function results. Accordingly, thoracic computed tomography (CT) scans are considered the gold standard to diagnose bronchiectasis. A large internal bronchial diameter, thickened bronchial wall, and altered airway geometry evident through CT scans are all indicators of possible bronchiectasis. Imaging results for COPD validate functional tests by highlighting centrilobular emphysema, given that the cause is smoking-related.

It is vital to diagnose one disease versus the other in patients, as “in the early stage of disease [it] is extremely important for the adoption of appropriate therapeutic measures,” according to “Airway Disease: Similarities and Differences between Asthma, COPD and Bronchiectasis,” published in Clinics. Treatments for COPD and bronchiectasis are designed to address the unique causes and risk factors for disease. Whereas COPD is largely associated with lung irritants such as pollution and smoking, bronchiectasis is often a result of respiratory infections or lung transplantation. Some cases of disease can also be associated with host factors including alpha-1 antitrypsin deficiency and other host factors, leading new treatments in the pipeline to take a more genetics-based approach.

In both diseases, the body’s natural inflammatory response involves neutrophils, macrophages, and CD8 T-cells as the primary cell types responsible for trying to attenuate damage in the airways. Consequently, COPD is often treated with anti-inflammatory drugs, such as inhaled corticosteroids. However, bronchiectasis often requires an antibacterial approach to stop the vicious cycle of impaired ciliary function leading to bacterial colonization and thick mucus accumulation, leading to inflammation and impairment of mucociliary clearance.

Differing treatment goals also motivate the use of different therapeutic regimens. Whereas “COPD therapy
An X-Ray of Chronic Bronchitis

is directed primarily to the relief of symptoms and the prevention of disease progression,” wrote Dr. Rodrigo Anthanazio, of Heart Institute (InCor) in Sao Paulo, Brazil, “In bronchiectasis, the primary goal of treatment is to prevent disease progression and improve the quality of life and symptoms.” At times, intervention for COPD can be as simple as smoking cessation, but first-line treatment usually consists of using short-acting beta2-agonists (SABAs) to dilate the airways. While it may seem counter intuitive to use SABAs to treat bronchiectasis, some studies have combined long-acting beta2-agonists (LABAs) with inhaled corticosteroids and shown benefits for patient quality of life scores.

Despite available treatments, a commonality of both COPD and bronchiectasis is a high hospitalization rate. The most recent data published in the Chest article “Hospital Discharges, Readmissions, and Emergency Department Visits for Chronic Obstructive Pulmonary Disease or Bronchiectasis among US Adults: Findings from the Nationwide Inpatient Sample 2001-2012 and Nationwide Emergency Department Sample 2006-2011” indicates that the rate of hospitalization has remained steady for more than 10 years. Over 240 of 100,000 individuals are hospitalized with either COPD or bronchiectasis, and emergency department visits number close to 1.5 million per year.

At times, it can be difficult to directly compare bronchiectasis and COPD, as research specific for bronchiectasis is sometimes scarce. A predicted increase in research comes as a double-edged sword because the increase is warranted due to an increased rate of disease occurrence in the population, despite efforts to mitigate airway disease. As more studies are conducted, the similarities and differences between bronchiectasis and COPD will continue to become more well defined.

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Bronchiectasis Increasingly Recognized As Underdiagnosed

Patients with bronchiectasis are intimately familiar with the disease’s vicious cycle of symptoms. Recurrent inflammation and infection, two hallmarks of the disease, lead to compromised mucociliary clearance, disallowing mucous removal and allowing further inflammation and infection in the bronchi. Despite these uncomfortable and hazardous symptoms, bronchiectasis is too often underdiagnosed by clinicians, as cited by several sources, including the University of Chicago Medicine.

According to a recent study commissioned, underdiagnosis may be due largely to its grouping under chronic obstructive pulmonary disease (COPD). “The clinical features of the COPDs frequently overlap,” wrote Jane M. Braverman, PhD, in the article “Airway Clearance Indications in Bronchiectasis: An Overview.”

Contributing further to underdiagnosis is the fact that bronchiectasis is a manifestation of other airway diseases such as cystic fibrosis, meaning that bronchiectasis may simply be overlooked by a diagnosis of severe symptoms of cystic fibrosis. Other triggers of bronchiectasis include exposures to caustic fumes in the environment, lung infections, or blocked airways.

It may be surprising that bronchiectasis is underdiagnosed, as it was considered a common condition before the advent of antibiotics and immunizations against childhood diseases. After the mid 1950s, when
immunization campaigns and antimicrobial agents became mainstream, childhood infection declined, as did the prevalence of bronchiectasis diagnoses. For a comparison, in 1940 a report indicated that 92% of patients with bronchiectasis died as a result of the disease, while in 1969 the percentage declined to 50%, and in the 1970s it was less than 10%.

Nowadays, approximately 110,000 people each year in the United States are treated for bronchiectasis, translating into a medical expenditure of $630 million a year. These treatments can only treat the symptoms of bronchiectasis, as there is no cure for the condition. The goal of treatment is to clear mucus from the lungs to end the vicious cycle and provide relief to patients. Yet in order to receive treatment, patients must first be diagnosed.

Researchers are aware that bronchiectasis is underdiagnosed, and they are identifying ways in which the disease can be brought to the front of clinicians’ minds when they are presented with the symptoms of bronchiectasis. At The University of Texas Health Center at Tyler Hospital and Clinics, a team of doctors conducted a retrospective study of 123 patients with well-documented bronchiectasis records to establish a “characteristic clinical picture of bronchiectasis... [that] should allow ready recognition of the disease.” The study, “Clinical, Pathophysiologic, and Microbiologic Characterization of Bronchiectasis in an Aging Cohort,” was published in the journal Chest.

Over half of the confirmed cases of bronchiectasis were identified using a CT scan, while a large percentage was diagnosed by bronchography or surgery. Looking at patient histories revealed that 70% of patients had an event that may have caused their bronchiectasis, such as pneumonia. Seventy percent also had chest crackles upon examination, while 34% had wheezing.

Delving into the more technical side of testing, pulmonary function tests identified airway obstruction in more than half (54%) of the patients. Samples of sputum generally tested positive for the pathologic microbial flora Pseudomonas aeruginosa. It may be valuable to examine the sputum of all patients with symptoms of bronchiectasis, as it may indicate superior treatments options, just as it does in the case of COPD – bearing in mind that the two diseases are not the same. By creating a clinical picture of bronchiectasis, doctors are more aware of the signs of disease, and this may help reduce the high rate of underdiagnosis.
The team at UTHC believes a reason for underdiagnosis resides “in the fact that few textbooks in pulmonary medicine portray bronchiectasis as a significant and/or common lung problem.” One book that is useful to describing bronchiectasis is *The Little Black Book of Pulmonary Medicine*, a compilation of diagnostic techniques and therapeutics for a wide range of pulmonary diseases, which are also described in detail. The book indicates that bronchiectasis can be diagnosed through high-resolution CT scanning of the chest or plain chest X-rays. Nearly all (91%) of the patients in the UTHC study showed fibrotic stranding and infiltrates in chest radiographs, which contributed to diagnosis. Prolonging diagnosis is hazardous to the patient, as chronic infection may lead to malnourishment due to high metabolic requirements.

“Many patients, if caught early enough and treated aggressively, can lead a fairly normal life,” indicated a representative from the University of Chicago Medicine’s Center for Advanced Lung Diseases. “Living with this disease process requires diligence and commitment.” Ultimately, the disease also requires a diagnosis. As researchers work to attain a greater understanding of the disease onset and symptoms, bronchiectasis may soon be higher on the list of possible diseases that cause patient symptoms, rather than considered a differential diagnosis.

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Hospital Readmission an Issue in Bronchiectasis, COPD

Hospital readmission for patients with bronchiectasis and COPD is a major problem. In fact, one out of every eleven patients with COPD is readmitted to the hospital only 30 days after discharge. A recent report from the Division of Population Health at the Centers for Disease Control and Prevention (CDC), published in Chest Journal, indicates that although 21% of COPD and bronchiectasis patients are readmitted to the hospital within 30 days of discharge, 7% of patients are readmitted with COPD or bronchiectasis as the primary diagnosis and 18% with COPD or bronchiectasis as any diagnosis.

Individuals with severe cases of the disease or who are living in low socioeconomic areas tend to have higher rates of hospital readmission. The study “Socioeconomic Deprivation, Readmissions, Mortality, and Acute Exacerbations,” published in Internal Medicine Journal, revealed that 46% of patients considered to be among the 20% most deprived in New Zealand had at least one readmission following discharge from a diagnosis of bronchiectasis, and 21% died within a year of admission to the hospital. Those with an increased severity of disease were more likely to be readmitted, but there was no correlation between disease severity and mortality.

Another study, entitled “Hospital discharges, readmissions, and emergency department visits for chronic obstructive pulmonary disease or bronchiectasis among US adults” and published in Chest
examined trends in hospital readmission rates from 2001 to 2012 among adults aged ≥18 years in the United States who had either bronchiectasis or COPD. Using data from the Nationwide Inpatient Sample and Nationwide Emergency Department Sample, the researchers examined temporal trends in the numbers and rates of hospitalizations by patients with COPD or bronchiectasis, including their mean length of stay, in-hospital case-fatality rate, 30-day readmission rate, and numbers and rates of emergency room visits. The researchers in this study concluded that, despite local and national efforts to reduce total hospitalizations and emergency department visits over the past decade, they have in fact increased for COPD, and the age-adjusted rates of hospitalizations and emergency department visits for COPD or bronchiectasis have not changed significantly in the United States during the period studied.

In spite of these findings, estimates from the Medicare Payment Advisory Commission indicate that up to 76% of COPD readmissions may be preventable. Elderly patients with COPD are less likely to be readmitted to the hospital by simply receiving quality nutrition treatment during their stay. It is noted that proper disease management extends beyond the confines of the hospital, as a previous study showed that one hands-on approach beneficial to some bronchiectasis patients is at-home intravenous antibiotic therapy.

The COPD Foundation is actively involved in helping patients reduce their hospital readmission rate. In October 2014, the foundation launched its Praxis (Prevent and Reduce COPD Admissions through expertise and Innovation Sharing) program, which is a focused effort of researchers from academia, healthcare, and industry to reduce COPD exacerbation-related hospital readmission. There are also regulations in place to fine hospitals with high rates of chronic lung disease patient hospital readmission, though this system may be flawed because the wrong facilities may actually be fined.

With clinical recognition of the hospital readmission rate for COPD and bronchiectasis, researchers continue to develop better methods to fully understand, treat, and prevent disease recurrence. In July 2014, researchers learned an important lesson from a study published in *BMJ* describing the results of “An Early Rehabilitation Intervention to Enhance Recovery During Hospital Admission for an Exacerbation of Chronic Respiratory Disease: Randomized Controlled Trial.” A total of 389 patients, 82% of whom had COPD, completed a prescribed regimen of progressive aerobic, resistance, and neuromuscular electrical stimulation training, along with a self management and education package. Contrary to the hypothesis, patients undergoing the intervention had greater mortality at 12 months, suggesting that progressive exercise rehabilitation alongside current standard physiotherapy practices may be dangerous for patients with early-stage acute illness.

**Breathing Vests Could Potentially Cut Down on Hospital Readmissions for Bronchiectasis, COPD**
While medical practitioners have therapeutics available to them for the treatment of both bronchiectasis and COPD, modern therapy for these diseases include a suite of treatment and care options that, when combined, can improve the quality of life of patients and reduce the number of visits made to the hospital due to exacerbations. In a guideline from the NIH’s National Heart, Lung, and Blood Institute, the use of “Chest Physical Therapy” (CPT) is suggested as one form of viable preventative care. Also known as “physiotherapy,” CPT makes use of percussive chest clapping to dislodge mucus in the lungs and air passages. Standard techniques involve a kind of percussive massage performed by a respiratory therapist or family member, but medical devices are now offering an alternative to this standard approach.

Often dubbed “breathing vests,” the NHLBI notes that an “inflatable therapy vest that uses high-frequency air waves” that can help “force mucus toward your upper airways so you can cough it up” is one viable choice for automating the CPT process, allowing patients to receive therapy while going about their normal lives. Past breathing vest designs included bulky, cumbersome external units that attach to the vest, providing air compression or vibration, however, next-generation designs such as the Afflovest offer a lightweight, compact, and untethered solution that allow for maximum mobility during treatment.

By using these vests, taking medication as prescribed, and eating a nutritious diet, patients with COPD and bronchiectasis will likely increase their quality of life and decrease the rate of hospital readmission.

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Progress Being Made in Bronchiectasis Drug Therapies and Medical Devices

Unlike some diseases, bronchiectasis is treated by controlling its signs and symptoms, not necessarily by treating the disease itself. This is due to the fact that few patients respond to direct treatment and are better served by controlling infection and reducing inflammation to overall improve bronchial hygiene. Four main categories of interventions serve to treat bronchiectasis: pharmacological intervention, medical devices, surgery, and pulmonary rehabilitation. While research in and refinement of surgery and pulmonary rehabilitation are ongoing, the most cutting-edge advances in treatment are from the pharmacological and medical device fields.

One requirement for a diagnosis of bronchiectasis is an infection in the lungs that is associated with cough and sputum production, according to “Treatment of Bronchiectasis in Adults,” published in UpToDate. When the cause of infection is bacterial, antibiotics can be administered to clear bacterial colonization of the lungs. The American Journal of Respiratory and Critical Care Medicine study “Short- and Long-Term Antibiotic Treatment Reduces Airway and Systemic Inflammation in Non-Cystic Fibrosis Bronchiectasis” identified that high airway bacterial loads can increase inflammation in the airways and increase the risk for exacerbations. The team, led by Dr. James D. Chalmers at The Queen’s Medical Research Institute, then investigated how antibiotics improve airway inflammation and found that either short-term or long-term antibiotics reduce inflammation.
Viral infections can also increase the risk of pulmonary exacerbations in adults with bronchiectasis. In the study “The Role of Viral Infection in Pulmonary Exacerbations of Bronchiectasis in Adults: A Prospective Study,” which was published in *Chest*, a team from The First Affiliated Hospital of Zhengzhou University determined that half of patients who experience an exacerbation test positive for a viral infection. These are most commonly coronavirus, rhinovirus, and influenza A/B. Unfortunately, viral infections are difficult to treat, as they do not respond to antibiotics that kill bacterial infections.

Bacterial infections are most commonly treated with antibiotics, and a specialized class of antibiotics known as macrolides are undergoing clinical trials. Within this category of drugs is erythromycin, tested in “The Bronchiectasis and Low-Dose Erythromycin Study (BLESS).” Patients treated with erythromycin experienced modest improvements in the rate of exacerbations, rate of decline in forced expiratory volume in one second (FEV1), and sputum production. On the other hand, azithromycin is a macrolide that most likely is not effective in treating bronchiectasis. Two studies, “Azithromycin for Prevention of Exacerbations in Non-Cystic Fibrosis Bronchiectasis (EMBRACE): A Randomized, Double-blind, Placebo-controlled Trial,” and “Effect of Azithromycin Maintenance Treatment on Infectious Exacerbations among Patients with Non-Cystic Fibrosis Bronchiectasis: The BAT Randomized Controlled Trial,” each noted no improvements in lung function of patients treated with azithromycin. In fact, during the BAT trial, colonization of resistant organisms was more than three times greater in azithromycin-treated patients than in placebo patients.

Nonmacrolide antibiotics are already in use today and can be inhaled or orally dosed. Aerosolized tobramycin, indicated primarily for cystic fibrosis, has been tested in bronchiectasis and was found to decrease colonization of *Pseudomonas aeruginosa* and modestly lowered the rate of hospitalizations. However, treatment did not change FEV1 or exacerbation rate, and complications such as bacterial resistance or even death occurred. Other inhaled antibiotics include gentamicin, aztreonam, ciprofloxacin, and cloistin. While most of these antibiotics were noneffective in patients with bronchiectasis, ciprofloxacin significantly reduced sputum bacterial load compared to placebo, motivating future studies in safety and efficacy of treatment.

More than pharmacological interventions are being pursued for bronchiectasis treatment. In children, external percussion vests and airway oscillating devices have been used to treat bronchiectasis. These methods for respiratory physiotherapy are proven to help patients with cystic fibrosis by helping patients remove mucus from their airways. The article “Current Devices of Respiratory Physiotherapy,” published in the journal *Hippokratia*, lists positive expiratory pressure, high frequency chest wall oscillation, oral high frequency oscillation, and intrapulmonary ventilation as the most common means to administer respiratory physiotherapy.

“Multiple studies have shown that high frequency chest wall compressive vests [are] an effective therapy
for airway clearance for patients with conditions such as cystic fibrosis and bronchiectasis,” stated a report from Harvard Pilgrim Health Care. “Randomized controlled trials demonstrated improvements in pulmonary function values, sputum production, antibiotic use, and/or frequency of hospitalization.”

As with medications, airway clearance devices such as compressive vests don’t always fit patients’ health needs and lifestyles. However, when choosing a device, clinicians should consider not only the effectiveness of the device, but also the required usage, mobility, convenience and comfort as well, since patient compliance is key to the success of airway clearance devices.

One of the main advantages to respiratory physiotherapy is the gift of independence for patients with bronchiectasis. Many of the devices can be used without an assistant, allowing children to receive treatment in the comfort of their own homes.

Just as not all medications are suitable for all patients, not all respiratory physiotherapy techniques are suitable for all patients. Physicians must determine if it is safe for a patient to start treatment. Physicians may prescribe treatment if patients will benefit from improved airway clearance and if external chest manipulation is ideal to enhance mucus transport and drain fluid from the bronchi.

While bronchiectasis is considered to be a complex disease that is cumbersome to manage, treatments are improving. Off-label or expensive medications may soon be less common to treat bronchiectasis, and treatments such as respiratory physiotherapy may decrease patient reliance on medications, decreasing the risk for side effects and the threat of bacterial resistance.

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