Understanding Chronic Obstructive Pulmonary Disease (COPD): Part I

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Today’s health care climate is focused on two things:

1. Improve the quality of patient care
2. Drive down health care costs

Be it the patient in need of care, the physician who treats them, or the payer, every stakeholder is feeling the pressure to do more with less. Within this equation, chronic respiratory disease occupies a disproportionately large amount of the burden. While chronic disease accounts for roughly 75 percent of U.S. health care spending, chronic respiratory disease is the second highest cause of hospital readmission cases, accounting for nearly 16 percent of the cost of care.

In the United States alone, there are approximately 12 million people living with COPD. And, according to The National Heart, Lung and Blood Institute, another 12 million haven’t even been diagnosed yet, or are still developing the disease. Globally, COPD has become one of the top three leading causes of death. There is no disputing COPD as one of the single largest threats to both human health and the rising cost of care internationally.

As organizations, advocacy groups and others look for solutions to this mounting problem, many are discovering that an accurate understanding of COPD is lacking. They are largely unfamiliar with the disease, what causes it and how to properly address it. This lack of understanding only reinforces existing challenges. Identifying the signs and symptoms early will go a long way to enhance global health and keep costs in check.

What exactly is COPD?

COPD is a term used to describe two primary disease types: chronic bronchitis and emphysema. Each of these disease types has distinct characteristics and related symptoms, but many people can have a combination of the two.

Chronic Bronchitis

Chronic bronchitis is defined as a chronic productive cough, lasting for a minimum of three months at a time, occurring in two consecutive years. The diagnosis must be for a patient in whom other causes of a productive cough, e.g., pneumonia, have been excluded. Pneumonia can have a productive cough for a short period. However, once the pneumonia is resolved, the cough would go away. Chronic bronchitis is most often caused by smoking and is very similar to acute bronchitis, combining airway...
irritation and a continuous cough. In chronic bronchitis, the small airways (bronchioles) in the lungs become swollen and inflamed, and produce large amounts of mucus causing a chronic productive cough.

**Emphysema**

Emphysema is the abnormal, permanent enlargement and damage of air sacs (alveoli) and small airways (bronchioles) in the lungs. Similar to chronic bronchitis, emphysema is often caused by smoking. However, it can also be caused by a genetic disposition to the disease or occupational pollutants. With the deterioration of the alveoli comes a loss of elasticity or recoil effect of the lungs.

Emphysema also causes airways to collapse and is commonly described in layman’s terms as floppy lung disease. It is significantly easier to understand how emphysema plagues a patient if one can understand the basic physiological principles of respiration.

Normal breathing takes place in three phases: inspiratory phase, expiratory phase and pause or rest phase.

The inspiratory phase is an active motion in which the diaphragm muscle contracts and flattens to expand the chest and in turn expands the lungs. The intercostal muscles, located between the ribs, contract to elevate one’s ribs, causing further expansion of the chest wall. Combined, these motions cause a negative pressure in the chest, resulting in ambient air filling the lungs.

The expiratory phase is normally a passive motion. When the diaphragm and intercostal muscles relax, positive pressure is created in the lungs. This positive pressure pushes air out of the lungs rather effortlessly.

For those living with emphysema, this basic body function is interrupted by the loss of elasticity (or recoil) and the destruction of the airways. This causes “air trapping.” When air trapping occurs, the small amount of positive pressure applied to the lungs when the diaphragm and intercostal muscles relax for exhalation can no longer expel air from the lungs. Patients are forced to use additional (accessory) muscles to exhale any waste product, such as carbon dioxide (CO₂), from the lungs.

As the disease progresses, so does the damage to the lungs. Exhaling trapped air, or CO₂, becomes more and more difficult for the body. It now requires a forceful contraction and more energy expenditure. The result is an increased shortness of breath, impacting basic daily functions, such as eating. With increased muscle use, combined with a decrease in caloric intake, rapid weight loss often follows. The overall health of the patient becomes compromised.

The pause, or rest phase, occurs when exhalation is completed, and there is a short break before the next breath. Most COPD patients fail to experience...
a rest phase, as they have to forcefully push in order to remove any air trapped in their lungs. These patients are unable to completely exhale all the trapped air, eventually developing what is referred to as a “barrel chest.”

COPD is commonly referred to as a progressive disease, getting worse and worse over time. The progression of the disease is best diagnosed by spirometry (the measuring of breath). Spirometry will identify how obstructed the patient’s airways are from airway secretions and can show roughly which part of the airways are being obstructed. It can also help the treating physician determine the stage of the disease. COPD has four stages:

**Stage 1 (Mild):** Commonly identified by minimal shortness of breath, with or without the onset of a cough and/or sputum.

**Stage 2 (Moderate):** Commonly identified by a noticeable shortness of breath, typically brought on by physical activity, with or without a cough or sputum. This is often the stage where medical attention is sought.

**Stage 3 (Severe):** Commonly identified by a shortness of breath, which inhibits the ability to perform normal daily activities. The patient’s quality of life may become diminished by a reduced exercise capacity, possible hospitalizations and/or require oxygen therapy.

**Stage 4 (Very Severe):** Commonly identified by a largely impaired quality of life, resulting from a dramatically reduced capacity to breathe. The patient usually experiences frequent exacerbations or flare-ups, resulting in hospitalizations.

As the disease progresses, it becomes harder for patients living with COPD to exchange oxygen and carbon dioxide. Eventually, exacerbations become life threatening and are referred to as respiratory failure. If exacerbations persist over time, the patient becomes classified as having chronic respiratory failure (CRF). At this point, the patient is likely living with the latter stages of COPD, that is stage 3 or stage 4.

**COPD and the Health Care Landscape**

The increase in prevalence of chronic conditions like COPD has been largely to blame for the global health care crisis. Over the past several decades, health care reached a tipping point. Simply put, the global economy cannot financially afford the cost of care as it stands. In order to drive down costs, the health care system, and those within it, must change. Patients must be equipped with the tools and information to live better and healthier, and providers must be more proactive about caring for their patients. Historically medicine has been reactive – treating patients once they’ve already become sick. This reactive approach rapidly drives up the cost of care and does little to promote healthy living habits or preventing chronic conditions.

Though the current state of health care is commonly considered a “crisis,” it has sparked a positive
change in perspective. Many are thinking differently and creatively about how to encourage healthy living and improve patient care. Some providers are developing what are known as disease management programs, working with patients in the early stages of COPD and trying to reverse the course of this difficult disease. Others are pioneering technological innovations, developing medical devices that enable quality care to take place in the home, rather than the hospital.

Unfortunately there is no cure for COPD. Reducing the incidence of this disease and making a quality of life difference for those living with it will require a shift in how we approach health, as patients and as clinicians. Proposed treatments and solutions will come in many forms. And in all likelihood, there will be no silver-bullet solution.

In the next issue of Ventilator-Assisted Living, we will discuss how high-touch clinical care and high-technology are coming together to play a significant role in the care and treatment of COPD.

References:


From Around the Network

Canadian Study on Prolonged and Long-Term Mechanical Ventilation

Currently there is no national strategy in Canada for the management of individuals at risk for or requiring prolonged and long-term mechanical ventilation (PMV/LTMV). Due to the lack of a national or provincial database to inform policy development, a study has been designed to collect the information needed to establish a national PMV/LTMV network of health care providers. The study will also describe health service provisions and promote the delivery of safe, high quality care to this population in different health care settings, including the home.

The study is being coordinated by the Lawrence S. Bloomberg Faculty of Nursing, University of Toronto, and the Survey Research Unit, Centre for Research on Inner City Health, St. Michael’s Hospital, Toronto. For more information, contact the Principal Investigator, Louise Rose (louise.rose@utoronto.ca). www.stmichaelshospital.com/crich/sru/ventilation.php.

Families of Children with Special Health Care Needs

The Department of Health and Human Services (HHS) has announced $4.9 million in Affordable Care Act funding to support Family-to-Family Health Information Centers. The Centers are run by and for families with children with special health care needs. They provide information, education, training and outreach for families of children and youth with disabilities and the professionals who serve them. www.familyvoices.com