

# Pathology and contemporary treatment alternatives

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According to the Centers for Disease Control and Prevention, asthma is a complex disease on the rise in the United States. Most at risk include poor or inner city minorities that present with inordinately high rates of mortality resulting from the condition (CDC, 2005). Asthma may also be on the rise due to environmental factors including increased pollution and exposure to environmental toxins that may affect lung capacity (CDC, 2005; Hwang et. al, 2005; Yang, et. al, 1997; Wickman, et. al, 2003).

Asthma is a serious, potentially life threatening condition for the millions of sufferers worldwide. Doctors are still working to determine the cause of this disease and finding new ways to treat it. While there is no cure for asthma yet, researchers have uncovered multiple treatment alternatives that help patients with asthma effectively control their condition.

Education, public response and intervention are all critical success factors for predicting the quality of life for patients with asthma now and in the future. Research supports the use of a defined set of treatment protocols for assisting patients with asthma lead a better quality of life. The basis for treatment, anatomy and physiology of the respiratory tract and pathology of asthma in patients are all discussed in greater detail below.

### Normal Lung Function and Respiratory System

The human body has two lungs located on either side of the chest. The lungs functions include passing oxygen from outside the body into our bloodstream and releasing waste materials in the form of carbon dioxide back into the environment (Gershwin & Klingelhofer, 1992). During each breath the

body inhales oxygen and exhales carbon dioxide (Polk, 18). Oxygen combines with carbohydrates and fat in the body to produce energy. During the process of creating energy water and carbon dioxide are formed that are expelled through breathing.

The lungs consist of several anatomical structures including the bronchial tubes that enable expansion and constriction of the muscles in the lungs and chest. These tubes consist of muscles that allow air to pass deep into the lungs. Bronchial tubes consistently change width, increasing in girth as an individual inhales and becoming narrower upon exhalation. In a person with a well-functioning respiratory system all parts of the airway function synergistically to ensure maximum intake of oxygen and exhalation of carbon dioxide with each breath.

Air enters the body through the nose and mouth. It passes through the pharynx, larynx and trachea, all important parts of the airway (Polk, 18). The noses and sinuses act as conditioners adjusting the air temperature as it passes through other structures in the airway. The pharynx or back of the throat allows liquids and solids entering the airway to "drop out before entering the lungs" (Polk, 19). Likewise the larynx helps prevent other unwanted particles in the air from entering the lungs (Polk, 19). It is here that the body's cough reflex lies. If something unwanted is present in the air being inhaled, the larynx will stimulate a cough reflex to help expel the object. While the larynx isn't the only trigger for a cough reflex it is very important to the entire breathing process (Polk, 19).

When a person inhales, the chest muscles in the body contract allowing the ribs to separate slightly. Air is then drawn into the lungs. The opposite happens when an individual exhales, allowing air to forcefully come out of the lungs. The abdomen is also involved in breathing. The abdomen attaches to the front and back of the ribs, pushing them up and out when breathing. Breathing thus incorporates the chest and abdomen. The more a person engages all the muscles and organs involved in respiration including the abdomen, the better able they are to take a full breath of air.

In times of old doctors ascribed asthma to anyone having difficulty breathing regardless of the cause; during the 20th century however researchers refined asthma to include difficult breathing " Because of a problem that begins in the bronchial tubes of the lungs" (Polk, 15). Asthma is a complex disorder that doctors are still working to fully understand. While doctors have uncovered many potential causes for asthma, they are still not certain what exactly causes it and how to prevent it 100 percent in all patients.

In patients with asthma, the ability of the bronchial tubes to adjust their width is often diminished, resulting in difficulty breathing. Children are often at increased risk for developing asthma, as their bronchial tubes are narrower to begin with than adult tubes, thus less change in width is evident even in healthy lungs.

Exercise induced asthma is a form of asthma that results when the air present in the nose and sinuses isn't prepared appropriately to pass through other parts of the airway (Polk, 19). Normally this form of asthma is easier to

treat than severe forms of asthma whose cause is unknown (Hogshead, 1989; Guyton, 1991).

During a bronchospasm attack involuntary spasms may prevent lung tissue from expanding to their normal size. Air can become trapped in the lungs. Cellular and structural changes often occur within the airway and lungs of patients with asthma, including thickening of the airway wall and inflammation (Saetta & Turato, 2001).

Normally as air passes through the lungs the bronchiols or airways get smaller. In a patient with uncontrolled asthma however, the sides of the airways typically become enlarged or inflamed (CDC, 2005). During an acute attack, the muscles or bronchiols surrounding the airways constrict, thus reducing the amount of air a person can pass in and out of their lungs (CDC, 2005). Once this constriction begins, mucus starts forming in the airways, causing even greater constriction and distress. Typical symptoms associated with an asthma attack include wheezing, chest pain and tightness, coughing and difficulty breathing (CDC, 2005).

No one is immune from asthma. Children, adults and the elderly are all at risk. Some people are more at risk than others including people who smoke, those with seasonal allergies and anyone with recurring acute respiratory infections (CDC, 2005). Signs of asthma include physical qualities of the disease a patient, family member or doctor can easily identify such as dyspnea (trouble breathing) (Polk, 7). Symptoms include complaints generally associated with the condition, and may include headaches or chest pain, skin

flushing and itching (Polk, 8). Dyspnea results from multiple conditions other than asthma including infections, allergies, foreign bodies present in the airway and associated factors (Polk, 8). It is important a clinician differentiate between asthma and other causes of the disease.

### Basis Contemporary Treatments For Managing Asthma

The National Asthma Education and Prevention Panel consistently work with doctors to develop contemporary treatments to manage asthma (Moonie, et. al, 2005). Many of these treatments are based on empirical research that supports reduction of patients symptoms and prevention of chronic attacks. The goal of contemporary asthma care and treatment includes " control of asthma and good quality of life for asthmatic patients" (Gaga, et. al, 80). The basis for much of contemporary care is empirical based research, though trends are changing in an attempt to encourage doctors to improve patient awareness and education.

Many asthma drugs historically are administered through inhalation. Inhalers are often prescribed " on an empirical basis rather than on evidence based awareness: (Virchow, 24). Much of the asthma management guidelines currently available offer " non-specific advice regarding inhaler choice" (Virchow, 24). As such it is important that GP work with patients to decide what the ideal inhaler is for all patients involved. The ideal inhaler according to Virchow (2005) is one that (1) is breath activated, " releasing medication only when all prerequisites for successful inhalation are met, (2) has a low intrinsic airflow resistance so children and elderly patients may use it and (3)

is one that provides a flow-independent deposition of drugs in the lungs as well as feedback that reassures patients whether the drugs has been inhaled properly (24).

Newman (2005) suggests the pressured metered-dose inhaler or pMDI delivers asthma medications in a reliable " multi-dose presentation" (1177). Key components of this devices help determine the amount of drug delivered to the patient. The researcher further suggests that pMDIs can be developed that are breath actuated and coordinated with " spray-velocity modifiers" to help patients unable to use " conventional press and breathe pMDI's correctly" (Newman, 1177). Modern or contemporary pMDI's according to Newman should also contain non-ozone depleting propellants, a sentiment confirmed by Virchow (2005) as well.

Patients with severe refractory asthma require more comprehensive treatment. High-doses of inhaled corticosteroids are often insufficient for treating this form of asthma. Most require contemporary treatments including oral corticosteroid administration and use of immunosuppressants (Sano, Adachi, Kiuchi & Miyamoto, 2005). Chronic use of these drugs however present a high risk for adverse side effects. A study conducted by Sano, et. al (2005) suggests that nebulized sodium cromoglycate " is expected to be a new second-line therapeutic option in severe asthma" (1).

Gaga, et. al (2005) suggests that many doctors are not achieving good quality of life and control of asthma for patients. Their study of treatment outcomes for asthmatic patients in specialized care suggests that

contemporary treatments should include more patient education combined with increased use of LABAs (Long-acting beta2-agonists) and leukotriene antagonists to help prevent bronchoconstriction and improve quality of life for patients.

Despite multiple contemporary treatment choices, managing acute severe asthma attacks still present a tremendous health challenge to health care professionals (Barnard, 2005). Contemporary guidelines for treating acute emergency attacks currently include treatment with oxygen and inhaled beta 2 agonists, which can be administered continuously to help preserve life in acute patients (Barnard, 532). Patients discharged after such treatment should also engage in review of current medications and consider " a short course of oral steroids, a written asthma action plan and detailed advice about deterioration that may occur within 48 hours" (Barnard, 533).

Butz et. al, (2005) are among a growing body of contemporary researchers that suggests that self management and patient education are critical success factors for treating patients with asthma in modern society. Their studies suggested home based educational programs that focus on accurate symptom identification and demonstration of " asthma medication delivery services" may improve patient quality of life and assist children with asthma and asthma like conditions (Butz, et. al, 190).

Delaronde, Peruccio & Bauer (2005) find that " individualized telephonic case management" from registered nurses specifically trained in contemporary asthma treatment may improve asthma medication use and subsequent



quality of life for patients with asthma (361). This research correlates with a growing body of evidence supporting patient education and direct support as practical contemporary treatment practices.

The basis for much of contemporary treatment lies in the gold standards or clinical practice guidelines outlined by the National Asthma Education and Prevention Program's Expert Panel (CDC, 2005). These standards offer patients and health care practitioners specific guidelines for recognizing, diagnosis, treating and providing ongoing care to asthmatic patients.

Because asthma is a difficult disease to diagnose, clinicians should utilize multiple diagnostic tools to determine whether airflow obstruction in patients results from asthma or other underlying conditions. Doctors should also acquire a comprehensive medical and family history and attempt to quantify the severity of a person's condition (CDC, 2005).

Other contemporary diagnostic criteria helpful for assessing a patient's condition include lung function tests (also referred to as spirometry) (CDC, 2005). Because there is no cure for asthma at this time doctors must work to improve the quality of life for patients presenting with asthma as effectively treat acute attacks. Doctors also work with patients to prevent attacks and recurrent episodes. Not one treatment modality works for all people because every case of asthma is unique. Because of this doctors often use various medications including injections, oral medications, vapors and inhalers. Use of inhalers to expand airflow is currently one of the most common and effective long-term treatment choices for patients with asthma.

Contemporary long lasting medical treatments should include use of corticosteroids to help reduce inflammation in the lungs and airways. Most patients will inhale these medicines or take them orally. Long acting beta2-agonists are also identified as effective long-term treatments for patients with asthma. While inhalers, nebulizers and other medications all serve the asthmatic population, education should also form the foundation for modern treatment practices.

Multiple researchers have concluded that patient education is effective for improving the quality of life in patients with asthma. Education also ensures that patients understand how to use their medications and do use them to prevent acute attacks. Education may be particularly beneficial for children by helping them adopt healthy behaviors early on that can help control their condition.

Asthma is a complex disease involving structural and physiological components. Patients with asthma face a life long and often debilitating condition that under severe circumstances may result in increased morbidity. Fortunately there are many treatments currently available that effectively manage this condition. Contemporary management and treatment of asthma is based on empirical research that suggests multiple forms of medication for preventing and treating acute asthma attacks.

The most common forms of treatment include corticosteroid administration through inhalers or oral forms. There are other equally effective medical treatments however that may work well for patients depending on the

severity of their illness. No two patients are alike with respect to the condition thus treatment must be tailored to the individual.

New research suggests that doctors and patients focus on prevention and education to help improve patients quality of life and experience of their disease (West, 1990). Education that starts early, as when patients are children, is likely to be more effective than education that starts years after an individual has attempted to manage their disease using other methods. Adequate evidence suggests that the manner of delivery for education does not impact a patients success rate. Thus information may be distributed in person, in the home or even over the telephone if necessary.

The currently body of literature available suggest that education in the classroom may also be an important avenue for teaching prevention and treatment in the future (West, 1990). It is important that researchers and doctors continue exploring new avenues for treating and preventing this insidious disease.