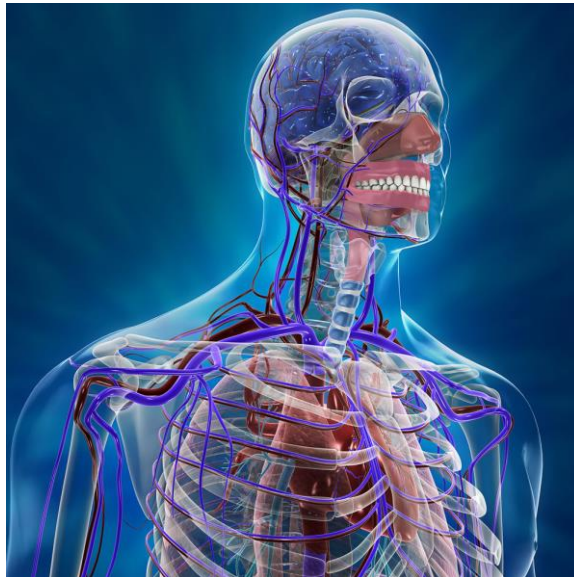


Lecture 3 - Asthma and Other Respiratory Ailments

Tech Lectures®

For the Pharmacy Technician

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Lecture 3 - Asthma and Other Respiratory Ailments

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The Respiratory System

Introduction

Today in the pharmacy setting we find large numbers of prescriptions being filled which involve the respiratory system. From the “common cold,” to more serious lower respiratory tract infections or disease states, these medications benefit those in need. In this CE offering the Pharmacy Technician will be introduced to the respiratory system and disease states involved, along with drugs used.

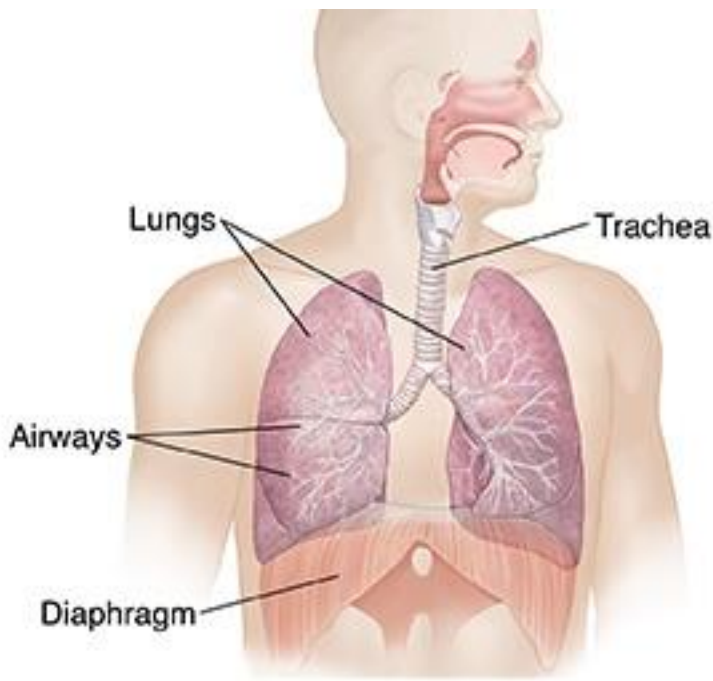
GOALS AND OBJECTIVES:

The Pharmacy Technician will have a basic understanding of the following:

1. Anatomy of the respiratory system
2. Specific disease states
3. Treatment
4. Respiratory Agents
6. Terms used in this CE offering

Respiration is essential for life. the body can survive several weeks without food, a few days without water, but only minutes without air.

Respiration is essential for life. The body can survive several weeks without food, a few days without water, but only minutes without air. A basic understanding and empathy for the customer/patient will help the Pharmacy Technician realize their importance in the pharmacy setting and ensure customer needs are being met.



Anatomy

The term *respiration* in humans involves two processes. One process, internal or cellular respiration, is the process by which glucose or other small molecules are oxidized to produce energy, this requires oxygen (O₂) and the generation of carbon dioxide (CO₂). The second process is external respiration or breathing, which involves inhaling oxygen from the air and exhaling carbon dioxide into it.ⁱ

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The upper respiratory tract, where external respiration

occurs, involves the nose and mouth that connect at the pharynx. The lower respiratory tract involves the larynx (voice box) and the trachea (windpipe), which extends to the thorax, where it divides into the right and left main bronchi, which enter the right and left lung. The bronchi subdivide into smaller bronchi and bronchioles and end up in many smaller airways called alveolar ducts, which terminate into small air sacs or alveoli, where gas exchange occurs.ⁱⁱ

The main function of the lung is (rapid) gas exchange. *Ventilation* is the movement of the air in and out of the lungs. It is the process of transport - inhalation of air containing oxygen to the alveolar sacs and the exhalation of carbon dioxide and other air impurities. This is accomplished by a well-coordinated interaction of the lungs with the central nervous system, the diaphragm and the circulatory system. The fluids of the respiratory tract are produced by mucous glands called *goblet cells*, which secrete a gelatinous liquid that forms protective layers over the trachea, bronchi and bronchioles. Foreign bodies such as smoke particles and bacteria are trapped in this fluid and are removed by the cough reflex.

The diaphragm is a big sheet-like muscle that's at the bottom of the chest cavity. The diaphragm helps you get air in and out of your lungs by moving up and down. When your diaphragm moves down, you breathe in. When your diaphragm moves up, you breathe out.

Respiratory System Ailments & Diseases

The Common Cold (*Acute Coryza*)

The common cold is generally caused by a virus which affects all the airways including the nose, throat, larynx, and often the trachea and bronchi. Most cases of the common cold are seasonal as is the virus involved. Although the use of antibiotics is not recommended for viral infections, in some cases, viral infections can cause a secondary bacterial infection in which an antibiotic would be of value.

Organs affected with upper respiratory infection (URI)
mouth, nose, pharynx

Organs affected with lower respiratory infection (LRI)
larynx, trachea, bronchi and lungs

Onset of the common cold is generally abrupt after a short (1 to 3 day) incubation period. Illness generally begins with nasal or throat discomfort, followed by sneezing, *rhinorrhea*, and malaise. Generally, there is no fever associated with the common cold. Individual symptoms differ, as symptoms can be as light as nasal secretions to more mucoid and purulent discharge, chest tightness, hacking cough and bronchitis especially in individuals who are prone to chronic respiratory tract disease such as asthma.ⁱⁱⁱ Many individuals expect the duration of the common cold to last only a few days. In reality, if no complications occur, symptoms normally resolve in 4 to 10 days.

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The over-the-counter treatment of the common cold is more for symptomatic relief. In case of fever, an analgesic such as acetaminophen is recommended. For congestion, a decongestant may be used but should be limited to short-term use and only by individuals who do not have a cardiovascular disease and are not on certain specific drugs such as hypertensive and hyperthyroid agents. For chest congestion, adequate liquid intake is recommended although there are agents such as guaifenesin be used. For cough, dextromethorphan is used, although sometimes coughing is a reflex used to remove unwanted mucous and foreign bodies. Bed rest and adequate fluid intake is also recommended.

Reye's syndrome is a disease, which is believed to be caused by the ingestion of medications that contain salicylates such as aspirin. It affects mostly children and teenagers and appears soon after flu-like infections such as chicken pox. The effects of Reye's syndrome include abnormal accumulations of fat in the liver and other organs of the body, along with a severe increase of pressure on the brain. It is not encouraged to administer aspirin or any medications containing aspirin to children with viral illnesses.

National Reye's Syndrome Foundation.

Sinusitis

Sinusitis is inflammation of the nasal cavities. It can be acute or chronic. In acute cases, pneumococcal, streptococcal, or staphylococcal bacterial infections usually are responsible. Cases may become chronic when an individual has a cold and the infection spreads to the sinus. Symptoms include: nasal congestion, pain, tenderness, swelling of involved sinus, purulent nasal discharge, headache, malaise, nonproductive cough and low grade fever. Allergic sinusitis may be accompanied with watery eyes and sneezing.^{iv}

Over-the-counter treatment includes analgesics such as acetaminophen for pain relief and topical nasal vasoconstrictors to decrease nasal secretions. Nasal vasoconstrictors should be used for a short period of time due to the potential for serious rebound congestion. Prescription treatment may involve the use of an antibiotic. Bed rest and adequate fluid intake is also recommended.

Nasal vasoconstrictors (spray or drops) contain medication, which constricts (narrows) blood vessels in the nasal passages. This medication counteracts the effect of swollen and dilated blood vessels, which stimulate the nasal membranes to produce large amounts of mucous. In long-term use, tolerance to this drug develops and the body will actually have a "*rebound congestion*" effect in which blood vessels will dilate to counteract the medication's vasoconstriction effect. This is due to blood vessels becoming fatigued and with increased swelling when the effect of the drug wears off. Because of this, continued use is mainly to counteract this "rebound effect" and an individual will become dependent on the medication to stop nasal congestion. The use of nasal vasoconstrictor products does provide relief, but should only be used for a short period of time, due to this rebound effect.

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Pharyngitis

Of respiratory diseases, pharyngitis, the inflammation of the pharynx, is the most common throat disorder. Acute pharyngitis can be caused by both viral and bacterial infections such as streptococcus pyogenes. Acute pharyngitis can also be secondary to a systemic viral infection such as measles or chicken pox. The main symptom involved is throat pain and difficulty swallowing. Although accompanying symptoms may include malaise, fever, headache, muscle and joint pain.^v

Over-the-counter treatment includes analgesics, warm saline gargles, and if needed antipyretics for the reduction of fever. Prescription treatment may involve the use of an antibiotic. Bed rest and adequate fluid intake is also recommended.

Laryngitis

Laryngitis is inflammation of the larynx (vocal cords). Acute laryngitis can be caused by either viral or bacterial infections, excessive use of voice, smoking, or inhalation of dust or chemical irritants. In children under five years of age, acute laryngitis may cause difficulty in breathing or "croup". Laryngitis can also be a complication of the common cold, pharyngitis, or influenza.

Symptoms include: hoarseness or loss of voice, pain, dry cough and malaise. Over-the-counter treatment would include an analgesic and cough suppressant. Prescription treatment may involve the use of an antibiotic.

Chronic Bronchitis

Chronic bronchitis is the inflammation of the bronchial mucous membranes, characterized by hypertrophy (increased size) and hyperplasia (excessive growth of cells). Chronic bronchitis leads to scarring and narrowing of bronchial airways and causes a chronic productive cough.

Chronic bronchitis is strongly associated with long-term cigarette smoking or occupational exposure to industrial dust or air pollution. There is also evidence of a genetic predisposition to developing this disease.

The classic symptom of chronic bronchitis is the chronic cough with mucous production. As the disease-state progresses, airway resistance will increase and the individual will have difficulty breathing. Treatment depends on the severity of the disease state. Generally, individuals are encouraged not to smoke. Bronchodilators, increased fluid intake, diuretics (for accompanying edema) and oxygen therapy may be needed.

"Alpha1 antitrypsin deficiency-related (AAT) emphysema is caused by the inherited deficiency of a protein called alpha1-antitrypsin (AAT) or alpha1-protease inhibitor. AAT, produced by the liver, is a "lung protector." In the absence of AAT, emphysema is almost inevitable. It is responsible for 5% or less of the emphysema in the United States. "

American Lung Association
<http://www.lungusa.org/>

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In serious cases, deterioration of pulmonary function will occur with increasing episodes of respiratory failure. Chronic bronchitis frequently leads to Emphysema or Chronic Obstructive Pulmonary Disease (COPD).

Emphysema

Emphysema may be a result of chronic bronchitis or other respiratory condition as air becomes trapped within the alveoli sacs and causes them to enlarge. This causes dilation of the alveolar spaces, destruction of the alveolar walls and chronic over inflation of the lung. Much of the elastic recoil of the lung is also lost and surface area of the lung is reduced. This makes breathing difficult and individuals with emphysema often times develop hypoxia or oxygen deficiency. Approximately 1.9 million Americans suffer from emphysema, a disease that can seriously affect an individual's health and lifestyle.^{vi}

The cause of emphysema is generally due to long term irritation such as cigarette smoking or occupational exposure to industrial dust, asbestos, or air pollution.^{vii} Symptoms are mainly due to Reduced Forced Expiratory Volume (FEV) as the classic individual with emphysema has shortness of breath (SOB), breathes through pursed lips, is very thin in weight and has a "barrel chest" due to the chronic expansion of the lung.

As in all obstructive lung diseases, the treatment protocol is generally the same. Symptoms may require that bronchodilators be used as well as oxygen therapy.

Symptoms may be reduced depending on the individual's airway and if the obstruction can be reversed. In all cases, spirometry readings and Arterial Blood Gases (ABG) are done as guidelines to treatment.

COPD

Chronic obstructive pulmonary disease (COPD) is often used to describe the progressive, irreversible obstruction of airflow that may result due to a variety of obstructive disorders such as emphysema, chronic bronchitis and asthma. Chronic Obstructive Pulmonary Disease is the fourth leading cause of death in the United States, a major cause of death throughout the world, and the third leading cause for disability in the United States. Smoking causes approximately 80 to 90 percent of COPD cases; a smoker is 10 times more likely than a nonsmoker to die of COPD.

^{viii}Other known causes are frequent lung infections and occupational exposure to industrial dust, asbestos and air pollution

Spirometry involves the measure of volumes and rates at which air is expelled from the lungs. This helps in to assess the capabilities of an individual's lungs.

Example: FEV - Forced Expiratory Volume

- a. total volume of air expired as rapidly as possible

PEF - Peak Expiratory Flow

- a. the maximum flow rate of air that can be generated during forced expiration

Arterial blood gases (ABGs) are used as the best indicator of overall pulmonary function. ABGs tests for levels of oxygen and carbon dioxide in the blood. These gases are important in testing for pulmonary function.

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Depending on the individual and severity of the COPD, treatment may include bronchodilators, anticholinergics, antibiotics, oxygen and learned behavior to control symptoms. Learned behavior is living a healthy lifestyle that includes exercising, avoiding cigarettes, cigarette smoke, other air pollutants, and eating well.

For individuals who suffer severe COPD, lung transplantation is being performed in increasing numbers. A procedure called Lung Volume Reduction Surgery (LVR) shows promise and is being performed with increasing frequency. In this case, a section of the lung is removed to allow reduction in size and accommodate better expansion and compression.^{ix}

Mononucleosis

Mononucleosis is caused by the Epstein-Barr virus (EBV), a member of the herpes virus family. The virus is very common and occurs worldwide with most individuals becoming infected sometime during their lives. In the United States, up to 95% of adults between the age of 35 and 40 years, have been infected with the virus. When an individual is infected during adolescent or young adulthood, mononucleosis can occur 35% to 50% of the time.^x

Initial symptoms may include malaise, anorexia and chills followed by sore throat, fever and swollen cervical (located in neck) lymph glands. Treatment is supportive with bed rest, warm saline gargles and an analgesic for headache and sore throat. The prognosis is good with symptoms usually resolving in 1 or 2 months, although EBV remains dormant or latent in a few cells in the throat and blood for the rest of the person's life.

Asthma

Asthma is a Chronic Obstructive Lung Disease with the following features: airway obstruction, airway inflammation and increased airway responsiveness to physical or chemical stimuli. Once regarded as disease of bronchial smooth muscle constriction, asthma is now recognized as an inflammatory process involving a wide variety of *chemical mediators*.

Asthma may present itself at any age with approximately 10 million individuals in the United States affected.^{xi} This number could be higher as diagnosis is difficult due to other respiratory problems. Besides Anaphylaxis (an acute and immediate reaction), the onset of the chronic disease state of asthma can be due to a hypersensitive reaction to antigen or allergen exposure.

Anaphylaxis

The most serious of allergic or hypersensitivity reaction would be anaphylaxis which is an acute and often times an immediate reaction to an antigen.

In Anaphylaxis, histamine and other chemical mediators cause blood vessels to dilate and fluid to leak from the bloodstream into the tissues. This causes hypotension (low blood pressure) and edema in the tissues including the lungs (pulmonary edema). Other notable symptoms include urticaria, mucous secretion and bronchospasm due to increased bronchial tone. Cardiac effects such as arrhythmias result from decreased vascular tone and capillary leakage. If left untreated, respiratory failure and circulatory collapse can occur.

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Asthmatic response to an allergen involves the following five processes:

Triggering → Signaling → Migration → Tissue Binding and Attachment → Resolution

Triggering

- exposure to a specific allergen
- get mast cell involvement which release chemical mediators
 - histamine, leukotrienes, prostaglandins

Signaling

other cells are signaled to become active such as T-lymphocytes, to help regulate the production of different leukotrienes

Migration

- additional cells are attracted to the area of inflammation
 - neutrophils, monocytes, lymphocytes
- these cells are responsible for late asthmatic response

Tissue Binding and Attachment

- Tissue binding produces bronchial-constriction and increased mucous production
- some chemical mediators are directly or indirectly toxic to the bronchial epithelium

Resolution

- inflammatory response should resolve
 - not always the case with the asthmatic due to continued antigenic stimulation or due to the immune system inability to shut itself off.

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Although individualized, the symptoms of asthma may include the following: expiratory wheezing, chest tightness, dyspnea or shortness of breath (SOB), and persistent cough. Treatment protocol is based on severity of the disease. For mild asthma, the use of a beta-2 agonist inhaler may be sufficient along with a mast cell stabilizer inhaler. For moderate asthma, theophylline or a corticosteroid inhaler unit may be required. For severe asthma higher doses of corticosteroid inhaler or oral tablet or higher theophylline doses may be needed. Asthma is a disease state, which can be controlled. Therapy is individualized and the physician's directions should be followed.

Other Respiratory Disease States

Cystic Fibrosis – is an inherited disease of the secretory epithelia, which affects respiratory passages, pancreas, salivary glands and sweat glands. The cause is thought to be the inability of an individual to transport Sodium (Na) and Chloride (Cl) ions across the plasma membrane of certain epithelial cells. Symptoms include pancreatic insufficiency in which pancreatic ducts are blocked and unable to release digestive enzymes, breathing difficulty due to increase thick mucous production and cirrhosis of the liver. Individuals with this disease state are also unable to absorb fat or fat-soluble vitamins such vitamins A, D and K. One standardized evaluation for Cystic Fibrosis consists of the “*sweat test*,” a test to measure the Sodium and Chloride content of an individuals' sweat.

Influenza - is caused by a virus and has the following symptoms: chills, fever, headache, and muscular aches. Cold like symptoms generally appear after the fever subsides. October or the beginning of the flu season is when health care workers, elderly and immuno-compromised, individuals have the need for the seasonal influenza vaccine.

Lung Cancer - is a malignancy of pulmonary tissue that destroys gas exchange capabilities of the lungs. Lung cancer develops due to damaged or diseased lungs. Pre-existing conditions associated with lung cancer are cigarette smoking and second hand smoke. Other factors include occupational exposure to industrial dust, asbestos or air pollution. Treatment protocol depends on the type of cancer. This could include chemotherapy, radiation and/or surgery. Treatment protocols would also include any pre-existing conditions.

Pneumonia - refers to an acute infection (viral or bacterial), or inflammation of the alveoli. Alveoli sacs fill up with fluid and dead white blood cells (WBC) reducing the amount of air space in lungs. Pneumonia is the most common infectious cause of death in the United States especially among children, elderly and immuno- compromised individuals.

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Pulmonary Edema - refers to abnormal accumulation of interstitial fluid in the interstitial spaces and alveoli of the lungs. Causes can be either increased pulmonary permeability, which would be of pulmonary origin, or increased pulmonary capillary pressure which would be cardiac origin leading to congestive heart failure.

Tuberculosis - refers to an infectious, communicable disease caused by a *mycobacterium*. Lung tissue is destroyed and replaced by fibrous connective tissue, which is inelastic and thick. Tuberculosis is spread when uninfected individuals inhale the pathogenic organism mycobacterium tuberculosis, exhaled into the air, by an infected individual.

Treatment^{xii}

Treatment of respiratory disease states depends on different variables such as the severity and type of symptoms. Short-term goals include relieving immediate symptoms while long-term goals include maintaining minimal chronic symptoms, minimal exacerbations, minimal need for medications, and normal or near normal pulmonary function. Medications are also individualized to meet the individual's needs:

Corticosteroids

Oral / Inhaled

Oral corticosteroids such as dexamethasone or prednisone reduce the immune system response of inflammation and may be used to reduce or alleviate symptoms. Inhaled corticosteroids such as budesonide or triamcinolone suppress inflammation, therefore decreasing bronchial hyper-responsiveness.

Antihistamines

Antihistamines such as sedating diphenhydramine or non-sedating loratadine work by blocking H-1 receptor sites from histamine attachment. Antihistamines often provide relief of mild to moderate symptoms such as allergic rhinitis (hay fever).

American Lung Association

Founded 1904. Refers callers to regional resources for information on lung health, smoking and environment. Local chapters can refer to support groups for persons with chronic lung disorders (emphysema, chronic bronchitis, asthma, pulmonary problems, etc.) if available.

1-800-LUNG-USA

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Mast Cell Stabilizers

Mast cell stabilizers such as cromolyn sodium or nedocromil sodium are used to prevent the release of mediators from the mast cell, specifically histamine. Although sometimes used for allergies, generally this class of inhalant drugs is used for prophylactic (preventive) purposes of asthma induced by allergens. The obvious result would be decreased hyper-responsiveness and anti-inflammation.

Leukotriene Receptor Antagonists

Leukotriene receptor antagonists such as Zafirlukast and Zileuton are used to prevent the attachment of the chemical mediator leukotriene to specific receptor sites. By preventing attachment, you lessen bronchial hyper-responsiveness and inflammation.

Beta-2 Agonists

Oral / Inhaled

Oral Beta-2 agonists, such as albuterol and metaproterenol are used to stimulate beta-2 adrenergic receptor sites in the lungs, which cause relaxation of smooth muscles and bronchodilation. Inhaled short acting beta-2 agonists such as albuterol and long acting beta-2 agonists such as salmeterol are used in an inhalation formulation for acute exacerbations of asthma symptoms.

Other Drugs

Epinephrine

In Anaphylaxis epinephrine is used parenterally to reduce swelling of the bronchioles (airways) and raises the blood pressure by constricting blood vessels.

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Xanthine Derivatives

Xanthine derivatives, such as theophylline, are used to increase dilation of the bronchioles. Generally, this drug is reserved for the treatment of allergic asthma and other respiratory disease states, which require bronchodilation.

Theophylline, a xanthine derivative, is considered to have a narrow therapeutic window. This means dosing to achieve therapeutic effects is relatively close to dosing which may cause toxic effects. For theophylline, a serum concentration of 10mg/L to 20mg/L of serum is the general markers to achieve therapeutic effect. In some individuals, during acute viral illness, theophylline metabolism may be inhibited. Because metabolism by the liver is responsible for 90% of theophylline elimination, this inhibition may increase serum theophylline concentrations as much as twofold. The resulting rise in concentration may increase the risk of toxicity which could include the following symptoms: hypokalemia, cardiac dysrhythmia and seizures.

Glynn-Barnhart A, Hill M, Szeffler SJ. Sustained release theophylline preparations: practical recommendations for prescribing and therapeutic drug monitoring. Drugs. 1998

Anti-Cholinergics

Anti-cholinergics such as the inhaler Ipratropium bromide is a slow acting weak bronchodilator. Ipratropium is chemically related to atropine; thus, it antagonizes the action of acetylcholine.

Sympathomimetics

Sympathomimetics or decongestants such as pseudoephedrine are used to alleviate symptoms of nasal congestion by shrinking swollen membranes in the nasal passages. Overuse of decongestant sprays used to treat nasal congestion can, with excessive use, cause inflammation of the nasal passages and have a rebound effect or worsening of symptoms due to tissue dependence on the medication. In some cases, decongestants are combined with antihistamines.

Signing for Sudafed

Federal Law known as the Combat Methamphetamine Epidemic Act of 2005, was enacted in March with the renewal of the Patriot Act. Beginning September 30, P.L. 109-177, sec. 701-756 puts limits on the purchase of products containing pseudoephedrine.

These decongestants, like Sudafed, must be kept behind the counter and you can buy no more than 3.6 grams per day or 9 grams per month. Purchasers will be required to present ID and sign a log book with their name, address, and the date and time of purchase.

Many OTC products have been replaced with the drug phenylephrine in place of pseudoephedrine

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Expectorants

The use of expectorants is to increase fluid output in the respiratory tract. This can be accomplished by reducing viscosity and surface tension of respiratory secretions through adequate water intake or the use of over-the-counter products such as Robitussin® which contains Guaifenesin (glyceryl guaiacolate), the main ingredient found in many nonprescription cough preparations.

Antitussives

Dextromethorphan hydrobromide is the main ingredient found in many nonprescription cough preparations. In some preparations this drug can be found in combination with an expectorant such as guaifenesin. The mechanism of action for antitussives is to selectively suppress the cough center in the medulla. Prescription antitussives include codeine and hydrocodone.

Oxygen

Oxygen (O₂) is an effective therapy for individuals with COPD. Depending on the severity, treatment can be for acute exacerbations or continuous, at least 19 hours per day. Although O₂ therapy helps an individual greatly, it can be expensive and intrusive as individuals are reluctant to wear a nasal cannula, especially in public.

The goal of therapy is to alleviate hypoxemia (insufficient oxygenation of the blood), and criteria are mainly based on Arterial Blood Gases (ABG).^{xiii} Long-term therapy is necessary for individuals with severe COPD.

Conclusion

The importance of understanding disease states, especially respiratory ones, cannot be overstated. From the common cold to COPD, the patient needs must be met to ensure a quick recovery and to minimize chronic symptoms and exacerbations. The respiratory system is truly one of the greatest marvels of human anatomy and physiology. Unfortunately, age, environmental factors and one's own habits, such as smoking, will cause wear and tear and in the case of COPD, irreversible breakdown and damage. The Pharmacy Technician needs to not only understand basic respiratory disease states, but also understand and empathize with the customer with a respiratory disease such as COPD. For many of these customers, a trip to the pharmacy is an all day excursion that requires a great deal of exertion. A smiling face, caring attitude and empathy will make that trip much more memorable for the customer in need.

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About the Author

Joe Medina, CPhT, Pharm D., former Program Director of a Pharmacy Technician Program at two community colleges in Colorado, is a lifetime national advocate for the Pharmacy Technician Profession. Mr. Medina has helped produce several published textbooks and co-authored *the "Pharmacy Technician Workbook & Certification Review"* through Morton Publishing. With fifteen years as a Pharmacy Technician and over 20 years as a Pharmacist, Mr. Medina understands the needs of the Pharmacy Technician and the important role they play in interacting with Pharmacists, Medical paraprofessionals and the community in the Pharmacy setting.

Glossary

chemical mediators - chemical substances released such as leukotrienes and prostaglandins. Rapid release of mediators will result in reduction of pulmonary function

croup – A term used when acute laryngitis may cause difficulty in breathing in children under five years of age

goblet cells - secrete a gelatinous mucous that forms protective layers over the trachea, bronchi and bronchioles

mycobacterium - slender gram-positive organisms which can cause tuberculosis and leprosy

rhinorrhea - thin watery discharge from nose

vaccine - a suspension of infectious agents or some part of them, administered for the purpose of establishing resistance to an infectious disease.

ventilation - is the movement of the air in and out of the lungs. It is the process of transport (inhalation) of air containing oxygen to the alveolar sacs and the exhalation of carbon dioxide and other air impurities.

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Some Respiratory Agents^{xiv}

Antihistamines

<u>Generic Name</u>	<u>Trade Name®</u>
Histamine 1 Blockers	
Azelastine	Astelin NS
Cetirizine	Zyrtec
Chlorpheniramine	Chlor-Trimeton
	Teldrin
	<i>Various</i>
Clemastine	Tavist-1
Cyproheptadine	Periactin
	<i>Various</i>
Diphenhydramine	Bendryl
	Banophen
	Diphedryl
	<i>Various</i>
Emedastine	Emadine
Fexofenadine	Allegra
Hydroxyzine	Atarax
	Vistaril
	Vistazine
	<i>Various</i>
Loratadine	Claritin
Loratadine / Pseudoephedrine	Claritin-D
Promethazine	Phenergan
	<i>Various</i>

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Antitussives

Chlropheniramine and Hydrocodone	Tussionex
Dextromethorphan	Benlyn Adult Formula
	Benlyn Pediatric
	Robitussin Pediatric Cough
	Sucrets Cough Control Formula
	<i>Various</i>
Guaifenesin / Codeine	Robitussin AC
	<i>Various</i>
Benzonatate	Tessalon Perles

Bronchodilators

Beta 2 Agonists	
Albuterol	Proventil
	Ventolin
	Volmax
	Xopenex
	<i>Various</i>
Metaproterenol	Alupent
	Metaprel
	<i>Various</i>
Salmeterol	Serevent
Salmeterol and fluticasone Propionate	Advair Discus
Xanthine Deriviatives	
Theophylline	Slo-Bid
	Theo-Dur
	Theobid
	Aminophylline
	<i>Various</i>
Anti-Cholinergic	
Ipratropium	Atrovent

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Decongestants

Sympathomimetics	
Pseudoephedrine	Sudafed
Phenylephrine	Neo-Synephrine Nasal <i>various</i>
Epinephrine	Adrenalin (1:1000)

Expectorants

Acetylcysteine	Mucomyst
Guaifenesin	Breonesin
	Fenesin
	Humibid
	Mucinex
	Organidin
	Robitussin
Potassium Iodide	Pima
	SSKI
	<i>Various</i>

Anti-inflammatory Agents

Mast Cell Stabilizers	
Cromolyn Sodium	Gastrocrom
	Intal
	Nasal crom
	<i>Various</i>
Nedocromil	Tilade
Leukotriene Receptor Antagonist	
Montelukast	Singulair
Zafirlukast	Accolate

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Corticosteroids	
Beclomethasone	Beclovent
	Beconase AQ
	Vanceril
	Vancenase
Budesonide	Pulmicort
	Rhinocort
Dexamethasone	Decadron
	<i>Various</i>
Fluticasone	Flonase
	Flovent
Lipoxygenase Inhibitor	
Zileuton	Zyflo

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Select the most correct answer

1. Of the following statements, which one is false?
 - a. one standardized evaluation for Cystic Fibrosis consists of the “sweat test”
 - b. the over-the-counter treatment of the common cold is more for symptomatic relief
 - c. the classic symptom of chronic bronchitis is a chronic cough without mucous production
 - d. Mononucleosis is caused by the Epstein-Barr virus
2. The exchange of oxygen and carbon dioxide gases between the lungs and the blood cells occurs
 - a. in the trachea
 - b. in the bronchi
 - c. in the bronchioles
 - d. in the alveoli sacs
3. Which of the following respiratory agents comes in a perle formulation?
 - a. pseudoephedrine
 - b. diphenhydramine
 - c. benzonatate
 - d. none of the above
4. Of the following disease states, which one is caused by a mycobacterium
 - a. mononucleosis
 - b. tuberculosis
 - c. cystic fibrosis
 - d. emphysema
5. Asthma is now recognized as an inflammatory process involving a wide variety of chemical mediators. Which of the following processes produces bronchoconstriction and increased mucous production in an asthmatic’s response to an allergen?
 - a. triggering
 - b. signaling and migration
 - c. tissue binding and attachment
 - d. resolution

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6. Of the following which disease state is the most common throat disorder?
 - a. sinusitis
 - b. pharyngitis
 - c. laryngitis
 - d. bronchitis

7. The main function of the lungs is (rapid) gas exchange. To facilitate this, the lungs depend on which of the following?
 - a. central nervous system (CNS)
 - b. diaphragm
 - c. circulatory system
 - d. all of the above

8. Of the following classification of drugs, which one deals with decongestion?
 - a. histamine-1 blockers
 - b. xanthine derivatives
 - c. antitussives
 - d. sympathomimetics

9. Which organ would be affected in an Upper Respiratory Infection (URI)?
 - a. bronchi
 - b. pharynx
 - c. larynx
 - d. trachea

10. Many individuals feel the duration of the common cold should last only a few days. In reality, if no complications occur, symptoms resolve in:
 - a. 4 to 7 days
 - b. 4 to 8 days
 - c. 4 to 9 days
 - d. 4 to 10 days

Lecture 3 - Asthma and Other Respiratory Ailments

11. Which of the following statements are true?

- a. It is not encouraged to administer aspirin or medications containing aspirin to children with viral infections
- b. nasal vasoconstrictors should be used for a short period of time due to the potential for rebound congestion
- c. spirometry involves the measure of volumes and rates at which air is expelled from the lungs
- d. all of the above are true statements

12. Of the following which is the best indicator of overall pulmonary function?

- a. AAT
- b. DOG
- c. ABG
- d. SOB

Submit your answers to the following online link for grading

<https://form.jotform.com/241495429219160>

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