Asthma: An Overview

Purpose: To provide an overview of asthma including its risk factors, signs and symptoms, diagnosis and treatment options.

Objectives

- List five risk factors for asthma
- Classify asthma based on signs and symptoms and diagnostic tests
- Discuss treatment options in the management of asthma
- Differentiate between medications to control acute symptoms versus medications to control airway inflammation
- List five tasks of the nurse in the management of a patient with asthma

Introduction

Asthma – a disease that affects over 34 million Americans (1) - is a chronic disease associated with inflammation of the airways and presents with coughing, wheezing, breathing difficulties and chest tightness. Seven million or 9.4 percent of children are afflicted with asthma (2). Asthma is responsible for 3500 deaths each year in the United States (2).

Treatment of asthma has improved over the last few years as scientists have developed a greater understanding of the pathophysiology of the disease. The increased reliance on medications to break down inflammation and prevent
exacerbations as opposed to the use of bronchodilators to treat acute problems highlight recent changes that have improved asthma treatment.

**Pathophysiology**

The major pathophysiological mechanism that is associated with asthma is airway inflammation. Inflammation leads to edema, bronchial hyperresponsiveness and exudate which results in obstruction of the airway. Exposure to allergens, some medications, cold and exercise may lead to loss of the epithelial barrier which is associated with bronchial hyperresponsiveness.

Inner city residences have a higher incidence of asthma. This may be partly explained by the high level of cockroach antigens, dust mites, occupational exposure and air pollution in the inner city.

Scientists have identified multiple mediators that exacerbate asthma, bronchoconstriction, edema and mucus production. Common mediators include: leukotrienes, prostaglandin D2, eosinophilic chemotactic factor and histamine.

Leukotrienes are involved in the production of mucus, airway edema and bronchial hyperresponsiveness. Leukotrienes cause airway constriction and this effect can be reversed with the use of leukotriene receptor agonists.

Acute phase bronchoconstriction is involved in airway obstruction related to some stimuli that the asthmatic patient does not respond to adequately. A late-phase reaction may occur 6-12 hours later secondary to inflammation that does not respond as well to bronchodilator therapy.

Airway remodeling is believed to occur in long-term asthma. This occurs due to prolonged inflammation that causes the airway to change permanently.
Airway remodeling results in reduced pulmonary function over time. This is one major reason that control of airway inflammation is so critical.

**Signs and Symptoms**

Signs and symptoms in asthma are related to mucus production, airway inflammation and edema in the bronchial tubes. The most common signs and symptoms of asthma include: cough, wheeze, shortness of breath and sputum production.

How patients present can vary from person to person. Some individuals present with only wheeze; only cough; or cough and production of mucus that looks like a bronchial infection.

Night time symptoms that wake patients from sleep are common in some individuals. Night time symptoms may occur because of physiological changes such as catecholamine levels and changes in vagal tone that occur at night.

Presentation may vary depending on whether intrinsic or extrinsic asthma is present. Intrinsic (non-allergic) asthma typically has symptoms that occur later in life – often in the 20’s or 30’s. These patients have a lot of mucus production and may be exacerbated by upper respiratory tract infection. Intrinsic asthma can present with shortness of breath on exertion and without wheezing.

Extrinsic (allergic) asthma typically starts in childhood and is exacerbated by specific allergens (often during allergy season) and there is a history of atopy. Extrinsic asthma can also present at different times of year in response to other allergens such as perfume, strong odors or anxiety.
Asthma can also be secondary to exertion. This type of asthma may be related to the inhaled temperature dropping and is exacerbated by both cold and activity. Leukotrienes are believed to be strongly related to the pathophysiology of exercise induced asthma. If this occurs in response to exercise it may occur after exercise ends.

Some individuals will only have asthma flairs at work. Certain workplaces can expose individuals to specific allergens. Some allergens include: fluorocarbons, specific dusts, sulfur dioxide, ammonia, halogens, animal proteins, cereal dusts, legumes, cotton or wood dust. Patients with occupational asthma do not have symptoms when they are not at work.

Asthma is often associated with wheeze on physical exam. The wheeze is most commonly noted at the end of expiration. The absence of wheezing does not necessarily mean that there is no bronchospasm. During an acute exacerbation of asthma diminished lung sounds and chest hyperinflation may be noted. Asthmatic patients may also show evidence of allergic rhinitis such as boggy nasal turbinates, clear rhinorrhea or a nasal crease on exam. Eczema changes to the skin may also be noted. Severe airway obstruction may be heralded by sternocleidomastoid retraction or pulsus paradoxus.

**Spirometry**

Spirometry is a critical step in the evaluation of asthma. Spirometry is a common pulmonary function test which evaluates the speed and volume of air that is exhaled. It should be done before
treatment is started to help make the diagnosis as well as determine the severity of the disease.

Spirometry measures the amount of air breathed out from maximal inhalation – forced vital capacity (FVC). It also measures the amount of air forced out of the lung in the first second (FEV\textsubscript{1}). This test should be done before and after treatment with a short-acting bronchodilator to determine the degree of reversibility. If there is a 12% increase after the administration of the short-acting bronchodilator than there is reversibility. A reduced FEV\textsubscript{1} to FVC ratio suggests airway obstruction.

The FEV\textsubscript{1} should be evaluated during each asthma office visit and during each exacerbation. The FEV\textsubscript{1} may still be prolonged even when there is no wheezing clinically. Lack of wheezing suggests that there is partial clearing of bronchospasm in the large airways and there still may be bronchospasm in the small airways. In an acute exacerbation, it is important to continue to treat and monitor the patient after the resolution of wheezing.

**Diagnostic Testing**

Limited blood work is helpful in the evaluation of asthma. The eosinophil count is a marker of asthma, but due to overall prediction ability it is not used in the diagnosis of the disease.

Arterial blood gases can be used in severe exacerbations of asthma and may help determine the degree of respiratory failure.
Chest x-ray is not helpful in the management of asthma, but may be helpful in ruling out other causes of pulmonary problems.

The peak expiratory flow (PEF) rate is measured by patients during exacerbations and ideally every day. The reduction in the PEF may be an early indication of a pending asthma exacerbation. The PEF is a tool the patient can use to determine the degree of bronchospasm.

**Classification**

When asthma is diagnosed, the patients is placed into a category based on the control of his/her disease. Classifications include: mild intermittent asthma, mild persistent asthma, moderate persistent asthma and severe asthma.

Mild intermittent asthma is diagnosed when symptoms are present twice a week or less and night time symptoms do not occur more than two times a month. Forced expiratory volume in one second and/or peak flow rate is more than 80%. No symptoms are present between attacks and PEF is normal between attacks.

Mild persistent asthma occurs when symptoms are present more than two times a week but less than daily. Night time symptoms occur more than twice a month but less than once a week. During an attack the PEF or FEV$_1$ does not dip below 80% and between attacks the lung function is normal.

Moderate persistent asthma presents with daily symptoms and nighttime symptoms more than once a week. FEV$_1$ and/or PEF is 60-80% of predicted during attacks and may not return normal after an asthma flair.
Severe asthma occurs when symptoms are continuous with frequent attacks.

Activity is limited because of the asthma, there are frequent nighttime symptoms and pulmonary function is less than 60% of predicted.

**Asthma classification in the adult (12 and older)**

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Intermittent</th>
<th>Mild Persistent</th>
<th>Moderate Persistent</th>
<th>Severe Persistent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms</td>
<td>Less than or equal to 2 days per week</td>
<td>More than 2 days a week, but less than daily</td>
<td>Every day</td>
<td>Over the whole day</td>
</tr>
<tr>
<td>Awakening at night</td>
<td>Less than or equal to 2 times/month</td>
<td>3 to 4 times per month</td>
<td>One to six nights per week</td>
<td>Seven times per week</td>
</tr>
<tr>
<td>How many times are short-acting beta agonist used to control symptom</td>
<td>Less than or equal to two times a week</td>
<td>3 to 6 times a week</td>
<td>Everyday</td>
<td>Multiple times each day</td>
</tr>
<tr>
<td>Interference with normal activity</td>
<td>Not present</td>
<td>Minor</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
<tr>
<td>Lung function</td>
<td>FEV₁ is greater than or equal to 80 % of predicted; FEV₁/FVC normal</td>
<td>FEV₁ is greater than or equal to 80 % of predicted; FEV₁/FVC normal</td>
<td>FEV₁ is greater than 60 % but less than 80 % of predicted; FEV₁/FVC reduced 5 %</td>
<td>FEV₁ less than 60 % of predicted; FEV₁/FVC reduced &gt;5 %</td>
</tr>
</tbody>
</table>
**Differential Diagnosis**

All that wheezes is not asthma. All patients who present with wheezing should have other causes of the wheeze considered including:

- Pulmonary embolism
- Congestive heart failure
- Airway obstruction
- Chronic obstructive pulmonary disease
- Gastroesophageal reflux disease

**Treatment**

Treatment of asthma involves controlling the inflammation and controlling bronchospasm. Anti-inflammatory medication is used to treat the underlying disease and the use of bronchodilators should only be used to treat exacerbations. Albuterol use should be monitored. Frequent use of albuterol is an indication that asthma control is not adequate and the patient should be reclassified.

Treatment depends on the classification of the disease. The following section will review treatment options based on the classification of asthma.

**Mild Intermittent Asthma**

Mild intermittent asthma is typically managed with no routine medications. The use of short beta agonists – most commonly albuterol - can be used on an as needed basis. If the patient needs albuterol more than twice a week than the patient should be reclassified into at least mild persistent asthma.
Albuterol is typically dosed 1-2 puffs every 4-6 hours, but doses can be repeated every 20 minutes for severe bronchospasm.

Albuterol is often used in the prevention of an asthmatic exacerbation induced by cold or exercise. If used for prevention, it should be taken five minutes before starting activity. The use of cromolyn - two puffs, 5 minutes before cold exposure or activity - may provide some relief of symptoms. Asthma exacerbations during prolonged exercise can be prevented by taking long-acting beta-2 agonists 30-60 minutes before exercise or a leukotriene receptor antagonist at least 30-60 minutes before exercise.

**Mild Persistent Asthma**

Mild persistent asthma should be treated with long-term anti-inflammatory agents to provide long-term control. Twice daily, low dose inhaled corticosteroids are the recommended agent in mild persistent asthma. Less commonly used agents include cromolyn, nedocromil or montelukast. When symptoms are increased the use of short acting beta-2 agonists are indicated.

Step down therapy can be considered in those who are well controlled on inhaled corticosteroids. Some clinicians will reduce inhaled corticosteroids to once a day from twice a day. The use of a leukotriene receptor antagonist with albuterol as needed is another step down option.

**Moderate Persistent Asthma**

Treatment of moderate persistent asthma typically involves an increase in the dose of inhaled corticosteroids or the addition of a long-acting beta-2 agonist to the current dose of inhaled corticosteroids. If nighttime symptoms are present a
A dose of theophylline can be considered before bed. The use of montelukast to inhaled corticosteroids may improve symptoms with a lower dose of inhaled corticosteroids.

Those with moderate persistent asthma should perform daily peak flow monitoring. Those who have signs or symptoms suggestive of an asthma exacerbation should use a short-acting beta-2 agonist.

**Severe Persistent Asthma**

Severe persistent asthma is often treated with a variety of medications including high-dose inhaled corticosteroids, theophylline or long-acting beta-2 agonists. The use of shorting acting beta-2 agonists is important and sometimes the addition of ipratropium may be used.

When there is an exacerbation the use of systemic corticosteroids – often at 40-60 mg per day which is tapered over 5-10 days - are used to manage the disease.

Some individuals with severe asthma need daily systemic steroids. Clinician should continually consider weaning daily steroids as they are associated with many side effects. The use of inhaled corticosteroids and long-acting bronchodilators should be used as the steroids are tapered. When oral corticosteroids are used for extended periods of time they should be tapered slowly to allow the hypothalamic-pituitary-adrenal system to readjust.

**Medications**

Fast relief medications work to stop an acute asthma exacerbation and may also prevent exercise-induced asthma. Short acting agents have an onset
of action in 2-5 minutes and the effects of the drugs last for 4-6 hours. Common short acting agents include: albuterol, terbutaline and pirbuterol.

Albuterol is the most common drug used and should be used on an as needed basis because regular use increased the risk of tachyphylaxis (a decrease in the effectiveness of a drug after repeated doses).

In addition, excessive use of albuterol is also linked to poor outcomes in asthma. It is not completely clear why this occurs but it is thought that overuse of albuterol controls symptoms and therefore the use of anti-inflammatory agents are not used appropriately. In addition, continued use of albuterol may lead to tachyphylaxis and therefore albuterol may not be as effective.

Bronchodilators come as a meter-dose inhaler (MDI) and in aerosolized form. Nebulized solutions are more expensive and are easier to use. They are more effective for young children and older adults. Onset of action may be a little slower with nebulized solution, but it is more powerful.

Short-acting agents should be used infrequently and for the control of acute symptoms as well as for preventing asthma induced by cold or exercise. Individuals who use frequent albuterol likely need more aggressive control of their disease.

Systemic absorption does occur and the drug may be associated with side effects. Common side effects of albuterol include: tremor,
headache, nervousness, increased heart rate, dizziness, insomnia, nose bleeds and hypokalemia. In some situations albuterol may be associated with paradoxical bronchospasm.

Levalbuterol (Xopenex) can also be used to treat bronchospasm, but is much more expensive and has few advantages over albuterol.

Oral agents are also available, but their onset of action is much slower and may have more side effects because there is more systemic absorption.

**Long-acting bronchodilators**

The two most common agents that are classified as long-acting bronchodilators are salmeterol and formoterol. These agents work for up to 12 hours and reduce the risk of exacerbation. Onset of action is delayed compared to short acting agents and it is critical that nurses teach patients to not use these agents for relief of acute signs and symptoms.

Recent research has suggested that the use of long-acting beta-2 agonists increase the risk of severe and life-threatening exacerbations of asthma and asthma related deaths (5). The use of long-acting bronchodilators may increase the risk of death when used alone. This risk is decreased in those who also use inhaled corticosteroids (6).

The Salmeterol Multicenter Asthma Research Trial (7) showed that there was an increased risk for death with Salmeterol and the
Food and Drug Administration (FDA) placed a warning on the drug and recommended against long-acting beta-2 agonists unless other medications have failed.

Long-acting agents should only be used in moderate to severe asthma with steroid therapy. Because of its risk, the addition of long-acting bronchodilators should be carefully monitored and effect documented to warrant continuation of the therapy. If no improvement is noted the use on inhaled anticholinergic agents may be considered.

**Inhaled Glucocorticosteroids**

Inhaled glucocorticoids are a staple in the management of asthma beyond mild intermittent asthma. The goal of treatment is to reverse some of the pathophysiological changes that occur with asthma, reduce exacerbations and hyperresponsiveness. The use of inhaled corticosteroids cuts the number of exacerbations by 55% (8).

The effects of the corticosteroids are local and work directly in the lungs. Some of the medicine can be swallowed and have a small amount of systemic effects, but this is typically not evident unless very high doses of corticosteroids are used.

Inhaled corticosteroids are given through meter dosed inhalers (MDI). They are also available via dry powder inhalation which does not require hand-mouth coordination.
Inhaled corticosteroids have few side effects. Common side effects noted include a hoarse voice and sore throat which result from the steroid being deposited in the mouth and throat. Candidiasis may also occur. Vocal cord muscle weakness may also be noted. Side effect risk can be reduced by proper use of the inhaler, use of a spacer, and/or rinsing and gargling after the use of the corticosteroid.

The use of high dose inhaled corticosteroids increases the risk systemic side effects such as decreased bone density, glaucoma, cataracts, thinning of the skin, growth stunting in children and suppression of the hypothalamic-pituitary-adrenal axis. Complications of inhaled corticosteroids are much less than oral corticosteroids.

Most inhaled corticosteroids are dosed twice a day, at times during exacerbations they may be given four times a day. When inhaled corticosteroids are given for an acute exacerbation it may take days or even weeks before benefit is noticed. This is sometimes done by prescriber if they notice a reduction in peak flow before the onset of symptoms to help thwart off an asthma exacerbation.

When the asthma is in a full exacerbation the use of a short course of oral steroids is more effective because they penetrate airways better than topical agents.
**Oral Glucocorticosteroids**

During severe asthma exacerbations the use of oral and sometimes injected corticosteroids is needed to gain control of the symptoms. Prednisone is commonly used and has an onset of action within 8-12 hours.

The use of oral corticosteroids needs to be used cautiously as they are laced with side effects. Side effects are more commonly noticed during long-term management with corticosteroids. A short burst used to get control of an asthma exacerbation is unlikely to cause any severe side effects. Prednisone is typically only used for 5-10 days and given in doses of 40-60 mg per day during an asthma exacerbation.

Side effects of oral corticosteroids are more common with prolonged use. Long-term use of oral corticosteroids can be associated with worsening glycemic control, thinning of the bones and osteoporosis, thinning skin, adrenal suppression and aseptic necrosis of the bone.

**Cromolyn Sodium and Nedocromil**

Cromolyn sodium and nedocromil are occasionally used in the management of asthma. These agents are used to prevent exercise or allergy induced asthma. In some cases they are used in place of inhaled corticosteroids for mild persistent disease. These agents work on the mast cells and reduce hyperresponsiveness. They do
not directly dilate the bronchioles in the lungs. Response to these agents is not evident for a few weeks and it is important to give these agents for one month before efficacy can be assessed. They are used in individuals who want to avoid inhaled corticosteroids. They do not treat an acute exacerbation.

**Leukotriene Modifiers**

Leukotrienes are fatty molecules of the immune system that play a role in inflammation. Montelukast, zafirlukast, and zileuton are common drugs in this class. They do not work as well as inhaled corticosteroids but are effective at reducing exacerbations. They can be used in the prevention of mild exercise induced asthma or in the management of mild to moderate persistent disease. This class also is used in the treatment of aspirin-induced asthma.

Montelukast is the most commonly used agent and is dosed once a day. It is more expensive than other agents used in the treatment of disease. It is often used in combination with steroids and provides a steroid sparing effect.

The other agents in this class include: Zileuton and Zafirlukast. Zileuton is dosed four times a day and can cause liver damage. Zafirlukast is associated with more drug interactions and absorption is affected by food intake.

**Theophylline and Its Derivatives**
The use of theophylline has decreased in past decade because of better and safer options becoming available to treat asthma. It still has its use for select individuals. It is often used by those with nocturnal exacerbations of asthma, those with moderate/severe asthma and those whose symptoms are not able to be managed with other therapies.

Theophylline works by improving the function of the diaphragm, increases mucociliary transport and may provide some anti-inflammatory and bronchodilator effects.

One major disadvantage of the use of theophylline is its toxic effect. These effects are minimized when the drug is in the therapeutic range. The typically recommended range is 10-20 µg/mL and the level should be measured 4-6 hours after the last dose. Common side effects include nausea, vomiting, diarrhea, tremor, insomnia and agitation. These effects are more common at higher doses but can occur at lower doses. Levels greater than 35-40 µg/mL have the potential to be fatal as they cause ventricular arrhythmias and seizures that are not responsive to anticonvulsant therapy.

**Anticholinergic Therapy**

Ipratropium, available as an MDI preparation is commonly used in those with chronic obstructive pulmonary disease, but can be used in asthma. It is not as effective in asthma as its onset of action is
slower. It is often used in the older adult and can be used in those who have bronchospasm related to beta-blockers.

**Immunotherapy**

In those with severe disease the use of immunotherapy is often used. Skin testing is used to determine which allergen provokes asthma. By determining which agents aggravate asthma it will help the patient determine what to avoid.

Immunotherapy involves injections of the causative allergen and is effective when one offending allergen is identified. Those who have asthma caused by allergies should be considered for immunotherapy. If the patient is sensitive to multiple allergens the use of desensitization therapy is less likely to be effective.

**Monitoring Asthma**

Patients need to monitor their symptoms. Having patients keep accurate records of their signs, symptoms, peak flow and short acting bronchodilator use can have a major impact on the management of disease.

**Refractory Asthma**

When asthma is not controlled well, refractory asthma must be considered. A common cause of refractory asthma is noncompliance. This could occur because of poor inhaler technique, patients not using their medication, overuse of beta-2 agonists with resultant tachyphylaxis or improper use of controller medications.
Other causes of refractory asthma include uncontrolled causes of asthma such as allergens that are not adequately controlled.

**Nurse’s Role**

Asthma is a disease that requires a lot of patient involvement. In order for patients to be involved in their disease, they must be educated. Nurses have an important role in the treatment of the disease. The following are a few points that nurses need to teach patients.

- Stress the importance of compliance with medication, particularly controller medication.
- Teach patients about environmental manipulation such as prevention of allergies.
- Those with exercise induced asthma should take a short-acting bronchodilator 10 to 15 minutes before exercise.
- Avoid viral upper respiratory tract infections by frequent hand washing and avoiding individuals acutely ill with an upper respiratory tract infection.
- Teach patients how to use handheld peak flow meters and encourage them to monitor their levels everyday. A pattern of reduction could suggest an impending exacerbation.
- Teach patients how to use inhalers to enhance delivery of the drug deep into the airway. Teach patients to take a moderately deep
breath and hold. Quick inspirations places the drug in the upper airway.

- For those individuals who cannot use inhalers, the use of a spacer can be suggested. Spacers reduce the risk of corticosteroids being deposited in the mouth and throat and cut down on the need for hand-breath coordination.

- Teach patients to rinse the mouth and gargle after using inhaled corticosteroids.

  Nurses should discuss with patients how to avoid asthma exacerbations. Many allergens are known to lead to asthma exacerbations. Below are a listing of causes and suggestions nurses should give to patients to avoid asthma exacerbations.

  - Dust mites are found inside most homes and can commonly be found in the home in the bedroom, bedding, and carpet. Nurses can encourage patients to encase their mattress and pillow, wash the bedding every week in hot water, maintain indoor humidity to below 60% with dehumidifiers or central air conditioning and remove carpeting from the home.

  - Animal dander is a common allergen that can cause asthma to worsen. Animals with feathers or fur should be kept out of the bedroom and ideally out of the home.

  - Mold is another common allergen. Indoor mold comes from excessive moisture. Patients should be encouraged to use
humidifiers as well as making sure that there are no leaky pipes or faucets. Any standing mold should be cleaned with bleach.

- Cockroaches are known to exacerbate asthma. Patients should be taught not to keep food out - keep it in closed containers.

- Pollen is a cause of asthma in many patients. Patients with pollen sensitivity should watch pollen counts and avoid going outside as much as possible when pollen counts are high. In addition, patients should keep windows closed and drive with the windows up in the car. Those with allergic rhinitis should consider taking medications to manage allergies.

- Encourage patients to not smoke and to avoid being around anyone who is smoking.

- If possible tell patient to have someone else do the vacuuming in the home. Vacuuming stirs up dust and therefore those with asthma should stay out of rooms that were recently vacuumed. If the asthmatic patient must do the vacuuming have the patient wear a dust mask and a vacuum with a HEPA filter.

- Tell patients to avoid strong odors such as paints, hair spray and perfumes.

- Avoid the use of fireplaces, bonfires, and wood burning stoves.

- If cold air aggravates asthma make sure the patient covers his/her mouth with a scarf on windy/cold days.
Patient’s Role

As discussed above, patients have a large role in the management of the disease. Patients need to understand their disease, know how to take their medicine, monitor their peak flow rate and have an asthma action plan.

An asthma action plan is a key part to adequately managing asthma. The asthma action plan is a written plan that each asthmatic should have to understand how to adequately control their disease. It should include the patient’s doctor, doctor’s phone number and the hospital’s phone number. The action plan should also include a listing of each medication that the patient takes.

The action plan should define what constitutes the green, yellow and red zones. It should also provide an explanation of what to do when in one of these zones. The chart should be filled out by the patient in collaboration with the prescriber.

At the top of the chart the best peak flow should be recorded and the ranges for each of the zones.

- Green - above 80%
- Yellow – between 50-79%
- Red – below 50%

The green zone indicates that the patient feels well, is able to perform his regular activities and is not experiencing any shortness of breath, wheeze, and cough or chest tightness. The peak flow
meter should be at more than 80 percent of the best peak flow meter attempt.

The yellow zone indicates that the asthma is worsening and there may be some cough, chest tightness, shortness of breath, wheeze, waking up at night and some limitation in activity. Peak flow is between 50-79 percent of the best peak flow.

The action plan for the yellow zone may include:

Take your short acting beta-2 agonist two to four puffs every 20 minutes for three doses. It may also involve taking a nebulized treatment. If the symptoms and peak flow are back to the green zone after the treatment continue to monitor.

If symptoms and peak flow do not get back to the green zone after one hour than 2-4 puffs of short-acting beta-2 agonists should be taken every 20 minutes times three or a nebulizer should be used once. An option to start an oral steroid should be considered. If the steroid is taken or being considered the prescribing physician should be notified.

The red zone is very serious with the peak flow being less than 50 percent. These individuals are extremely short of breath, are unable to perform daily activities and have not received relief from quick relief medications.

These individuals should take 4 to 6 puffs of their short acting bronchodilator or a nebulizer treatment at the same time as an oral
steroid. The patient’s doctor should be called immediately or the patient should go to the hospital via 911 if they are still in the red zone after fifteen minutes or the doctor has not been reached.

Patients should watch out for any cyanosis in the lips or fingernails and difficulty doing routine activities such as walking or talking secondary to shortness of breath.

**Severe Asthma**

Some patients with severe asthma are candidates for admission. Severe asthma exacerbations that may warrant admission is suggested by abnormal vital signs such as a respiratory rate above 30 per minute, heart rate above 120 per minute, pulsus paradoxus of greater than 18 mm Hg; a peak expiratory flow rate less than 120 L/min; accessory muscle use; moderate to severe dyspnea; poor response to beta-2 agonists with oral corticosteroids; and underlying cardiac disease.

**Summary**

Asthma is a prevalent chronic disease that can range from mild to severe. Adequate management of the disease is a team effort between the patient, nurse and doctor. The nurse’s primary role in the disease is understanding the disease and helping the patient understand their disease and their role in its management.
Figure 1

Asthma Action Plan

Name: __________________________________________________

Date: ________________________________________________

Primary Care Doctor: _________________________________

Doctor Phone number: ________________________________

Pulmonary Doctor: _________________________________

Doctor Phone number: ________________________________

Hospital Phone Number: _____________________________

Medications

________________________________________________________________

________________________________________________________________

________________________________________________________________

________________________________________________________________

________________________________________________________________

________________________________________________________________

Best Peak Flow: _______________________________________

Green Zone

Symptoms: None

Peak flow above 80%: ____________________________________

Plan: continue to take medications as prescribed
**Yellow Zone**

Symptoms: Shortness of breath, increased night time wakening, wheeze, cough and limited activity.

Peak Flow (50-79% of best peak flow) __________ to ___________ (record the ranges)

What to do:

1. Add a quick acting bronchodilator and continue with all regular medicine.
   - 2 to 4 puffs of __________ every 20 minutes times three
   - Use __________ as a nebulizer one time
2. Recheck peak flow and monitor symptoms in one hour if back to base line without symptoms continue to monitor
3. If symptoms do not return to baseline in one hour than
   - 2 to 4 puffs of __________ every 20 minutes times three
   - Use __________ as a nebulizer one time
   - Take the oral steroid: _____________________; ________ mg/day; for __________ days
   - Call doctor
   - Add oral steroid: ______________________________
     ? ________ mg per day
     ? For __________ (3 to 10) days

**Red Zone**

Symptoms: Extreme shortness of breath that has not abated with quick relief medications. The patient is unable to perform routine activities.

Peak flow is 50 % or less of the best peak flow. _________________ (record 50% of the maximal peak flow rate)

What to do:

1. Add a quick acting bronchodilator and continue with all regular medicine.
   - 4 to 6 puffs of __________
   - Use __________ as a nebulizer one time
   - Take the oral steroid: _____________________; ________ mg/day; for __________ days
   - Call doctor
   - Call 911 if still in the red zone after 15 minutes or you have not reached your doctor.
References


