Asthma

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Abstract

Asthma is a condition in which the airways narrow and swell and produce extra mucus. This can make breathing difficult and trigger coughing, wheezing and shortness of breath. It is not clear why some people get asthma and others do not, but it is probably due to a combination of environmental factors that trigger asthma, and may include genetic or other risk factors. The symptoms and current trends in the treatment of asthma are discussed.

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Statement of Learning Need

Asthma can be a life threatening condition when left untreated. Clinicians need to be able to recognize the symptoms of asthma and know the current trends in the treatment of asthma.

Course Purpose

To enable the clinician to increase their knowledge and skill to care for patients with asthma.

Target Audience

Advanced Practice Registered Nurses and Registered Nurses
(Interdisciplinary Health Team Members, including Vocational Nurses and Medical Assistants may obtain a *Certificate of Completion*)

Course Author & Planning Team Conflict of Interest Disclosures

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all have no disclosures

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There is no commercial support for this course.

Please take time to complete a self-assessment of knowledge, on page 4, sample questions ***before* reading the article.**

Opportunity to complete a self-assessment of knowledge learned will be provided at the end of the course.

1. **Asthma is a condition in which the airways narrow and swell and**

    a. flu symptoms develop.
    b. another respiratory disease develops.
    c. produce continuous tightness in the chest.
    d. produce extra mucus.

2. **The "classic" signs and symptoms of asthma are cough, wheezing, and**

    a. continuous dyspnea.
    b. shortness of breath when doing minimal physical activity.
    c. intermittent dyspnea.
    d. expelling blood when coughing.

3. **A definitive diagnosis of asthma requires a history or presence of respiratory symptoms consistent with asthma, combined with**

    a. another respiratory disease.
    b. a demonstration of variable expiratory airflow obstruction.
    c. tightness in the chest.
    d. continuous dyspnea.

4. **_____ is a common sign of asthma in children.**

    a. Rhinovirus
    b. Dizziness
    c. Wheezing
    d. Chest-tightness

5. **True or False: Coughing or wheezing attacks that are worsened by a respiratory virus, such as a cold or the flu, are inconsistent with a diagnosis of asthma.**

    a. True
    b. False

Introduction

Asthma is a condition in which the airways narrow and swell and produce extra mucus. This can make breathing difficult and trigger coughing, wheezing and shortness of breath. For some people, asthma is a minor nuisance. For others, it can be a major problem that interferes with daily activities and may lead to a life-threatening asthma attack. Asthma cannot be cured but its symptoms can be controlled. Because asthma often changes over time, it is important that people work with their clinicians to track their signs and symptoms and adjust treatment as needed.

Symptoms Of Asthma

Asthma symptoms vary from person to person. The "classic" signs and symptoms of asthma are intermittent dyspnea, cough, and wheezing. Although typical of asthma, these symptoms are nonspecific, making it sometimes difficult to distinguish asthma from other respiratory diseases. A definitive diagnosis of asthma requires a history or presence of respiratory symptoms consistent with asthma, combined with a demonstration of variable expiratory airflow obstruction.[1]

Asthma signs and symptoms can include:[2]

- Shortness of breath
- Chest tightness or pain

- Trouble sleeping caused by shortness of breath, coughing or wheezing
- A whistling or wheezing sound when exhaling (wheezing is a common sign of asthma in children)
- Coughing or wheezing attacks that are worsened by a respiratory virus, such as a cold or the flu

Signs that asthma is probably worsening include:[2]

- Asthma signs and symptoms that are more frequent and bothersome
- Increasing difficulty breathing (measurable with a peak flow meter, a device that patients can use to check how well their lungs are working)
- Increase in need to use a quick-relief inhaler

For some people, asthma signs and symptoms flare up in certain situations:[2]

- *Exercise-induced asthma***,** which may be worse when the air is cold and dry
- *Occupational asthma,* triggered by workplace irritants such as chemical fumes, gases or dust
- *Allergy-induced asthma,* triggered by airborne substances, such as pollen, mold spores, cockroach waste or particles of skin and dried saliva shed by pets (pet dander)

Severe asthma attacks can be life-threatening. Patients should work with their clinicians to determine what to do when their signs and symptoms worsen — and to determine when they need emergency treatment. Signs of an asthma emergency include:[2]

- Rapid worsening of shortness of breath or wheezing
- No improvement even after using a quick-relief inhaler (such as albuterol)
- Shortness of breath when doing minimal physical activity

Causes Of Asthma

It is not clear why some people get asthma and others do not, but it is probably due to a combination of environmental factors that trigger asthma, and may include genetic or other risk factors.

Asthma Triggers

Exposure to various irritants and substances that cause allergies (allergens) can trigger signs and symptoms of asthma. Asthma triggers are different from person to person and can include:[2]

- Airborne substances, such as pollen, dust mites, mold spores, pet dander or particles of cockroach waste
- Respiratory infections, such as the common cold
- Physical activity (exercise-induced asthma)
- Cold air
- Air pollutants and irritants, such as smoke
- Certain medications, including beta blockers, aspirin, ibuprofen (Advil, Motrin IB, others) and naproxen (Aleve)
- Strong emotions and stress
- Sulfites and preservatives added to some types of foods and beverages, including shrimp, dried fruit, processed potatoes, beer and wine
- Gastroesophageal reflux disease (GERD), a condition in which stomach acids back up into the throat

Risk Factors for Asthma

A number of factors are thought to increase the chances of developing asthma.[2] These include those outlined below.

- Having a blood relative (such as a parent or sibling) with asthma
- Having another allergic condition, such as atopic dermatitis or allergic rhinitis (hay fever)
- Being overweight
- Being a smoker
- Exposure to secondhand smoke
- Exposure to exhaust fumes or other types of pollution
- Exposure to occupational triggers, such as chemicals used in farming, hairdressing and manufacturing

Diagnosis Of Asthma

To rule out other possible conditions — such as a respiratory infection or chronic obstructive pulmonary disease (COPD) — health clinicians will do a physical exam and ask questions about signs and symptoms and about any other health problems.[2]

Asthma is diagnosed before the age of seven years in approximately 75% of cases. As a result, clinicians treating adolescents and adults will often encounter patients whose diagnosis of asthma was made years earlier. Many children experience a remission of asthma symptoms around the time of puberty, with potential recurrence years later. Asthma may develop at any age, although new-onset asthma is less frequent in older adults compared to other age groups.[3]

Tests to Measure Lung Function

Patients may also be given lung (pulmonary) function tests to determine how much air moves in and out as they breathe. These tests may include those outlined here.

Spirometry

This test estimates the narrowing of bronchial tubes by checking how much air one can exhale after a deep breath and how fast one can breathe out. A maximal inhalation is followed by a rapid and forceful complete exhalation into a spirometer, includes measurement of forced expiratory volume in one second (FEV1) and forced vital capacity (FVC). These measurements provide information that is essential to the diagnosis of asthma. A baseline spirometry is typically obtained in virtually all patients with a suspected diagnosis of asthma.[3]

Peak Flow

A peak flow meter is a simple device that measures how hard one can breathe out. Lower than usual peak flow readings are a sign the lungs may not be working as well and that asthma may be getting worse. Clinicians should give instructions to patients on how to track and deal with low peak flow readings.

Lung function tests often are done before and after taking a bronchodilator medication, such as albuterol to open the airways. If the lung function improves with use of a bronchodilator, it is likely the patient has asthma.[2]

Additional Tests to Diagnose Asthma[2]

Methacholine Challenge:

Methacholine is a known asthma trigger that, when inhaled, will cause mild constriction of the airways. If there is a reaction to the methacholine, one likely has asthma. This test may be used even if the initial lung function test is normal.

Nitric Oxide Test:

The nitric oxide test, though not widely available, measures the amount of the nitric oxide gas that one has in their breath. When the airways are inflamed — a sign of asthma — one may have higher than normal nitric oxide levels.

Imaging Tests:

A chest X-ray and high-resolution computerized tomography (CT) scan of the lungs and nose cavities (sinuses) can identify any structural abnormalities or diseases (such as infection) that can cause or aggravate breathing problems.

Allergy Testing:

This can be performed by a skin test or blood test. Allergy tests can identify allergy to pets, dust, mold and pollen. If important allergy triggers are identified, this can lead to a recommendation for allergen immunotherapy.

Sputum Eosinophils:

This test looks for certain white blood cells (eosinophils) in the mixture of saliva and mucus (sputum) that are discharged during coughing. Eosinophils

are present when symptoms develop and become visible when stained with a rose-colored dye (eosin).

Provocative Testing for Exercise and Cold-induced Asthma:

In these tests, the clinician measures the airway obstruction before and after the patient performs vigorous physical activity or takes several breaths of cold air.

Asthma Classification

To classify asthma severity, a clinician considers the answers to questions about symptoms (such as how often asthma attacks occur and how bad they are), along with the results of the physical exam and diagnostic tests. Determining asthma severity helps clinicians choose the best treatment. Asthma severity often changes over time, requiring treatment adjustments.[2] Asthma is classified into four general categories:[2]

Asthma classification	Signs and symptoms
Mild intermittent	**Mild symptoms up to two days a week and up to two nights a month**
Mild persistent	**Symptoms more than twice a week, but no more than once in a single day**
Moderate persistent	**Symptoms once a day and more than one night a week**
Severe persistent	**Symptoms throughout the day on most days and frequently at night**

Complications Of Asthma

Asthma complications include those highlighted below.

- Signs and symptoms that interfere with sleep, work or recreational activities
- Sick days from work or school during asthma flare-ups
- Permanent narrowing of the bronchial tubes (airway remodeling) that affects how well one can breathe
- Emergency room visits and hospitalizations for severe asthma attacks
- Side effects from long-term use of some medications used to stabilize severe asthma

Proper treatment makes a big difference in preventing both short-term and long-term complications caused by asthma.[2]

Treatment Of Asthma

Prevention and long-term control are key in stopping asthma attacks before they start. Treatment usually involves learning to recognize triggers, taking steps to avoid them and tracking breathing to make sure daily asthma medications are keeping symptoms under control. In case of an asthma flare-up, a quick-relief inhaler, such as albuterol may be needed.[2] The successful management of patients with asthma includes four essential components:[1]

1. Routine monitoring of symptoms and lung function
2. Patient education to create a partnership between clinician and patient
3. Controlling environmental factors (trigger factors) and comorbid conditions that contribute to asthma severity
4. Pharmacologic therapy

The goals of chronic asthma management may be divided into two domains: reduction in impairment and reduction of risk.

Reduction in Impairment

Impairment refers to the intensity and frequency of asthma symptoms and the degree to which the patient is limited by these symptoms. Specific goals for reducing impairment[1] include:

- Freedom from frequent or troublesome symptoms of asthma (cough, chest tightness, wheezing, or shortness of breath)
- Minimal need (≤2 days per week) of inhaled short acting beta agonists (SABAs) to relieve symptoms
- Few night-time awakenings (≤2 nights per month) due to asthma
- Optimization of lung function
- Maintenance of normal daily activities, including work or school attendance and participation in athletics and exercise
- Satisfaction with asthma care on the part of patients and families

Reduce Risk

The 2007 National Asthma Education and Prevention Program (NAEPP) guidelines introduced the concept of risk to encompass the various adverse outcomes associated with asthma and its treatment. These include asthma exacerbations, suboptimal lung development (in children), loss of lung function over time (for adults), and adverse effects from asthma medications. Proper asthma management attempts to minimize the patient's likelihood of experiencing these outcomes. Specific goals for reducing risk include:[1]

- Prevention of recurrent exacerbations and need for emergency department or hospital care

- Prevention of reduced lung growth in children, and loss of lung function in adults
- Optimization of pharmacotherapy with minimal or no adverse effects

Pharmacologic Management

The right medications depend on a number of things — age, symptoms, asthma triggers and what works best to keep asthma under control. Pharmacologic treatment is the mainstay of management in most patients with asthma. The 2007 National Asthma Education and Prevention Program (NAEPP) Expert Panel Report presented a stepwise approach to pharmacologic therapy. These guidelines were intended to support, rather than dictate, care that is based upon the clinician's clinical judgment. The stepwise approach to pharmacotherapy is based on increasing medications until asthma is controlled, and decreasing medications when possible to minimize side effects. Adjustment of the patient's management should be considered at every visit.

Preventive, long-term control medications reduce the inflammation in the airways that leads to symptoms. Quick-relief inhalers (bronchodilators) quickly open swollen airways that are limiting breathing. In some cases, allergy medications are necessary.[2]

Long-term Asthma Control Medications

Long-term asthma control medications, generally taken daily, are the cornerstone of asthma treatment. These medications keep asthma under control on a day-to-day basis and make it less likely one will have an asthma attack. Types of long-term control medications include those outlined below.

Inhaled Corticosteroids:

These anti-inflammatory drugs include fluticasone (Flonase, Flovent HFA), budesonide (Pulmicort Flexhaler, Rhinocort), flunisolide (Aerospan HFA), ciclesonide (Alvesco, Omnaris, Zetonna), beclomethasone (Qnasl, Qvar), mometasone (Asmanex) and fluticasone furoate (Arnuity Ellipta). Inhaled corticosteroids are the preferred medicine for long-term control of asthma. They are the most effective option for long-term relief of the inflammation and swelling that makes airways sensitive to certain inhaled substances.

Reducing inflammation helps prevent the chain reaction that causes asthma symptoms. Most people who take these medicines daily find they greatly reduce the severity of symptoms and how often they occur.

Inhaled corticosteroids generally are safe when taken as prescribed. Inhaled corticosteroids are not habit-forming, even if taken every day for many years.

Like many other medications, though, inhaled corticosteroids can have side effects. Most clinicians agree that the benefits of taking inhaled corticosteroids and preventing asthma attacks far outweigh the risk of side effects.

One common side effect from inhaled corticosteroids is an oral candida infection called thrush. A spacer or holding chamber on the inhaler may help to avoid thrush. These devices attach to the inhaler and help prevent the medicine from landing in the mouth or on the back of the throat. Proper oral care can also help to prevent thrush.[5]

Leukotriene Modifiers:

Oral medications — including montelukast (Singulair), zafirlukast (Accolate) and zileuton (Zyflo) — help relieve asthma symptoms for up to 24 hours. In rare cases, these medications have been linked to psychological reactions, such as agitation, aggression, hallucinations, depression and suicidal thinking. Patients should be counseled to seek medical advice right away for any unusual reaction.

Long-acting Beta Agonists:

These inhaled medications, which include salmeterol (Serevent) and formoterol (Foradil, Perforomist), open the airways. Some research shows that they may increase the risk of a severe asthma attack, so patients should take them only in combination with an inhaled corticosteroid. Because these drugs can mask asthma deterioration, they should not be used for an acute asthma attack.

Combination Inhalers:

These medications — such as fluticasone-salmeterol (Advair Diskus), budesonide-formoterol (Symbicort) and formoterol-mometasone (Dulera) — contain a long-acting beta agonist along with a corticosteroid. Because these combination inhalers contain long-acting beta agonists, they may increase the risk of having a severe asthma attack.

Theophylline:

Theophylline (Theo-24, Elixophyllin, others) is a daily pill that helps keep the airways open (bronchodilator) by relaxing the muscles around the airways. It is not used as often now as in past years.

Quick-relief (Rescue) Medications

Quick-relief (rescue) medications are used as needed for rapid, short-term symptom relief during an asthma attack — or before exercise if the clinician recommends it. Types of quick-relief medications include:

Short-acting Beta Agonists:

These inhaled, quick-relief bronchodilators act within minutes to rapidly ease symptoms during an asthma attack. They include albuterol (ProAir HFA, Ventolin HFA, others) and levalbuterol (Xopenex). Short-acting beta agonists can be taken using a portable, hand-held inhaler or a nebulizer — a machine that converts asthma medications to a fine mist — so that they can be inhaled through a face mask or a mouthpiece.

Ipratropium (Atrovent):

Like other bronchodilators, ipratropium acts quickly to immediately relax the airways, making it easier to breathe. Ipratropium is mostly used for emphysema and chronic bronchitis, but it is sometimes used to treat asthma attacks.

Oral and Intravenous Corticosteroids:

These medications — which include prednisone and methylprednisolone — relieve airway inflammation caused by severe asthma. They can cause serious side effects when used long term, so they are used only on a short-term basis to treat severe asthma symptoms.

For an asthma flare-up, a quick-relief inhaler can ease symptoms right away. But if long-term control medications are working properly, a quick-relief inhaler should not be needed very often.

Patients should keep a record of how many puffs they use each week. If they need to use their quick-relief inhaler more often than recommended, they should see their clinician to adjust the long-term control medication.[2]

Allergy Medications

Allergy medications may help if the asthma is triggered or worsened by allergies. These include those highlighted here.

Allergy Shots (immunotherapy):

Over time, allergy shots gradually reduce the immune system reaction to specific allergens. Patients generally receive shots once a week for a few months, then once a month for a period of three to five years.

Omalizumab (Xolair):

This medication, given as an injection every two to four weeks, is specifically for people who have allergies and severe asthma. It acts by altering the immune system.[2]

Bronchial Thermoplasty:

This treatment — which is not widely available nor right for everyone — is used for severe asthma that does not improve with inhaled corticosteroids or other long-term asthma medications.

Generally, over the span of three outpatient visits, bronchial thermoplasty heats the insides of the airways in the lungs with an electrode, reducing the smooth muscle inside the airways. This limits the ability of the airways to tighten, making breathing easier and possibly reducing asthma attacks.[2]

Treat by Severity for Better Control: A Stepwise Approach

Treatment should be flexible and based on changes in symptoms, which should be assessed thoroughly each time the patient sees their clinician. The clinician can then adjust the treatment accordingly. For example, if the asthma is well-controlled, the clinician may prescribe less medication. If the asthma is not well-controlled or is getting worse, the clinician may increase the medication and recommend more-frequent visits.[2]

Asthma Action Plan

Patients should work with their clinicians to create an asthma action plan that outlines in writing when to take certain medications or when to increase or decrease the dose of medications based on their symptoms. This should also include a list of triggers and the steps needed to take to avoid them. A clinician may also recommend tracking asthma symptoms or using a peak flow meter on a regular basis to monitor how well the treatment is controlling the patient's asthma.[2]

Some links to examples of publically available asthma action plans are listed as:

- Centers for Disease Control and Prevention (CDC): https://www.cdc.gov/asthma/tools_for_control.htm
- American Lung Association: http://www.lung.org/assets/documents/asthma/asthma-action-plan.pdf
- Asthma and Allergy Foundation of America (AAFA): http://www.aafa.org/page/asthma-treatment-action-plan.aspx

Acute Exacerbations Of Asthma In Adults

The best strategy for management of acute exacerbations of asthma is early recognition and intervention, before attacks become severe and potentially life-threatening. Detailed investigations into the circumstances surrounding fatal asthma have frequently revealed failures on the part of both patients and clinicians to recognize the severity of the disease and to intensify treatment appropriately.

The National Asthma Expert Panel has published useful algorithms on the management of acute exacerbations of asthma for both the home and acute care settings. These algorithms may be used for asthma exacerbations of any severity. The basic principles of care are the following:

- Assess the severity of the attack
- Assess potential triggers (*i.e.*, dander, pollen, mold, respiratory infection, nonsteroidal anti-inflammatory drugs [NSAIDs], nonadherence)
- Use inhaled short-acting beta agonists early and frequently
- Start systemic glucocorticoids if there is not an immediate and marked response to the inhaled short-acting agents
- Make frequent (every one to two hours) objective assessments of the response to therapy until definite, sustained improvement is documented
- Admit patients who do not respond well after four to six hours to a setting of high surveillance and care
- Educate patients about the principles of self-management for early recognition and treatment of a recurrent attack and develop an "asthma action plan" for recurrent symptoms

Symptoms that patients should recognize as suggesting an asthma exacerbation include breathlessness, wheezing, cough, and chest tightness. Some patients also report reduced exercise tolerance and fatigue as symptoms of an asthma exacerbation.

Some patients are at greater risk for fatal asthma attacks. It is helpful to identify such patients to educate them about identifying early warning signs of deterioration.[4] Risk factors for a fatal asthma attack include:

- Previous severe exacerbation (*i.e.*, intubation or intensive care unit admission)
- Hospitalization or emergency department visit for asthma in the past year
- Three or more emergency department visits for asthma in the past year
- Not currently using inhaled glucocorticoids
- Recent or current course of oral glucocorticoids
- Use of more than one canister of short-acting beta agonist per month
- Difficulty perceiving asthma symptoms or severity of exacerbations
- History of poor adherence with asthma medications and/or written asthma action plan
- Illicit drug use and major psychosocial problems, including depression
- Comorbidities, such as cardiovascular or chronic lung disease

The goals of initial home management are to relieve airflow limitation, prevent or reverse hypoxemia, and initiate or augment controller therapy to prevent a recurrence. Patients with serious exacerbations frequently require evaluation in the office and may need to proceed to the emergency department if improvement is not quickly apparent. Home management is not meant to replace supervised medical care in seriously ill patients.[4]

When the onset of an exacerbation is recognized, the patient should self-administer an inhaled short-acting beta agonist (SABA). After the first hour, if the patient feels initial improvement with the SABA, he or she should repeat a peak flow measurement if they are able to do so from home. Based upon the response to the inhaled beta agonist, the patient should either continue self-care or seek medical attention. The subsequent dose of the SABA depends on the severity of the exacerbation. Mild exacerbations usually respond to two to four puffs every three to four hours, while more severe exacerbations may require six to eight puffs every one to two hours. Patients should contact their clinician, if they need high doses of inhaled beta agonists beyond the first hour of self-treatment.

If after initial home treatment the patient has symptoms or signs suggestive of a severe exacerbation (*i.e.*, marked breathlessness, inability to speak more than short phrases, use of accessory muscles) or a peak flow less than 50 percent of baseline, he or she should seek urgent medical attention. Patients may be advised by their clinician to take a dose of oral glucocorticoids (*i.e.*, prednisone 40 mg) on route to the emergency department.[4]

Patient Response: Effective

If the patient's symptoms (wheezing, dyspnea) resolve and the repeat peak flow measurement increases to above 80 percent of the patient's personal best over the course of approximately one hour, then the patient may safely continue self-treatment. Other important early interventions include removal of or from the offending stimulus (if known), continued administration of inhaled short-acting beta agonists, and consideration of a short course of oral glucocorticoids if beta agonists do not fully correct the decrement in peak flow or if symptoms recur.[4]

Patient Response: Incomplete

An incomplete response to inhaled short-acting bronchodilator is manifest by continued symptoms and a PEF in the range of 50 to 80 percent of personal best. The patient should initiate oral glucocorticoids according to his or her prednisone-based action plan and contact his or her clinician for advice. Timely administration of oral glucocorticoids for asthma exacerbations is probably the single most effective strategy for reducing emergency department visits and hospitalizations for acute asthmatic attacks.[4]

Urgent Medical Attention

Patients should seek immediate medical attention if they have a PEF less than 50% of baseline after one or two doses of inhaled beta-agonist by a metered dose inhaler or nebulizer, report symptoms or signs of severe exacerbation (*i.e.*, marked breathlessness), or are at high risk for a fatal attack. Inhaled beta agonists should continue to be administered while help is arriving.[4]

Acute Care Treatment

The primary goals of therapy for acute severe asthma are the rapid reversal of airflow limitation and the correction, if necessary, of severe hypercapnia or hypoxemia. Airflow limitation is most rapidly alleviated by the combination of repeated administration of inhaled bronchodilators and early institution of systemic glucocorticoids. Until their respiratory distress has abated, patients should receive close monitoring, including serial measurements of lung function (*i.e.*, peak expiratory flow), to assess the response to treatment.

Supplemental oxygen should be administered to virtually all patients with an asthma exacerbation that requires treatment in the emergency department or hospital. The flow of oxygen is titrated to maintain the pulse oxygen saturation (SpO2) ≥90 percent (>95 percent in pregnancy). Usually, oxygenation is easily maintained with nasal cannula, but occasionally a face mask delivery is needed.[4]

The extent of care and intervention patients need after this point are variable, depending on the severity and intensity of the exacerbation Some patients may need to be intubated and mechanically ventilated with an extended course of treatment while others may progress more quickly.
It is important to remember that patients with acute, severe asthmatic exacerbations are at risk for further deterioration in lung function, respiratory failure, and asphyxic death. In many cases, airway obstruction remains labile for days following an acute exacerbation, with wide swings in expiratory flow over minutes or hours. Nocturnal deteriorations are common. An asthmatic attack has not fully resolved even when symptoms have abated. Residual airflow obstruction due to airway inflammation may last for several days. Thus, in addition to short-acting beta agonists to be used as needed, the patient will need glucocorticoids to treat the inflammation and prevent recurrent symptoms.[4] After an exacerbation, it is important to ensure the patient has an appropriate asthma action plan in place and has follow up plans in place with a provider.

Prevention Of Asthma

Although many people with asthma rely on medications to prevent and relieve symptoms, there are several things people can do to maintain their health and lessen the possibility of asthma attacks.[2]

Avoid Triggers

Taking steps to reduce exposure to asthma triggers is a key part of asthma control,[2] including those outlined here.

Use an Air Conditioner

Air conditioning reduces the amount of airborne pollen from trees, grasses and weeds that finds its way indoors. Air conditioning also lowers indoor humidity and can reduce the exposure to dust mites. If air conditioning is not an option, patients can try to keep windows closed during pollen season.

Decontaminate Decor

Patients can minimize dust that may worsen nighttime symptoms by replacing certain items in the bedroom. For example, encasing pillows, mattresses and box springs in dustproof covers. Removing carpeting and installing hardwood or linoleum flooring. Using washable curtains and blinds.

Maintain Optimal Humidity

For those who live in a damp climate, patients should talk to their health clinician about using a dehumidifier.

Prevent Mold Spores

Cleaning damp areas in the bath, kitchen and around the house will keep mold spores from developing. Getting rid of moldy leaves or damp firewood in the yard can also help with this.

Reduce Pet Dander

If patients are allergic to dander, they should avoid pets with fur or feathers. Having pets regularly bathed or groomed also may reduce the amount of dander in surroundings.

Clean Regularly

Cleaning one's home at least once a week. If dust is likely to be stirred up, one should wear a mask or have someone else do the cleaning.

Cover Nose and Mouth in Cold Weather

If one's asthma is worsened by cold or dry air, wearing a face mask can help.

Stay Healthy

Taking care of oneself can help keep symptoms under control,[2] including:

Regular Exercise:

Having asthma does not mean people need to be less active. Treatment can prevent asthma attacks and control symptoms during activity. Regular exercise can strengthen the heart and lungs, which helps relieve asthma symptoms. If patients exercise in cold temperatures, they may want to wear a face mask to warm the air they breathe.

Healthy Weight:

Being overweight can worsen asthma symptoms, and it puts people at higher risk of other health problems.

Gastroesophageal Reflux Disease (GERD)/heartburn control:

It is possible that the acid reflux that causes heartburn may damage lung airways and worsen asthma symptoms. Patients with frequent or constant heartburn should talk to their health clinicians about treatment options. They may need treatment for GERD before the asthma symptoms improve.

Asthma Burden On Healthcare

Asthma is a serious health and economic concern in the United States. It is expensive. Asthma costs the United States $56 billion each year. The average yearly cost of care for a child with asthma was $1,039 in 2009. In 2008, asthma caused 10.5 million missed days of school and 14.2 million missed days of work.

Asthma is common. In 2010, 18.7 million adults had asthma, which is equal to 1 in 12 adults. Also, 7 million children had asthma, which is equal to 1 in 11 children.[6]

Asthma can be fatal. About 9 people die from asthma each day in the United States. In 2009, 3,388 people died from asthma. And asthma is an increasing issue, in the last decade, the proportion of people with asthma in the United States grew by nearly 15%. In 2009, asthma caused 479,300 hospitalizations, 1.9 million emergency department visits, and 8.9 million medical visits.[6]

Effective asthma care can be expensive, and that can make it difficult for people to get the care they need. In many cases, private and public healthcare programs ensure that children receive care. Therefore, adults are less likely to receive the care they need when cost is an issue. Race and ethnicity are important factors, too. Many ethnic and racial minorities

struggle to pay for the medication they need. More than one in four black adults cannot afford their asthma medicine. Also, one in five Hispanic adults cannot afford their asthma medicines.

Although clinicians are an important part of effective asthma management, many ethnic and racial minorities do not see a medical clinician regularly as part of their asthma care. More than one in four black adults is unable to afford routine medical visits. And, nearly one in seven Hispanic adults can't afford routine medical visits. This poses a significant issue for patients to receive care for their asthma. The CDC has developed the National Asthma Control Program (NACP) to help combat some of these issues and make it easier for all people with asthma to receive the care they need.[6] The CDC's National Asthma Control Program (NACP) was created in 1999 to help the millions of people with asthma in the U.S. gain control over their disease.

The program's goals include reducing the number of deaths, hospitalizations, emergency department visits, school days or workdays missed, and limitations on activity due to asthma. The NACP funds states, cities, school programs, and non-government organizations to help them improve surveillance of asthma, train health professionals, educate individuals with asthma and their families, and explain asthma to the public.

The NACP program has improved asthma treatment, management, and control in the U.S. The NACP collects data on state-specific levels to focus efforts and resources where they are needed. CDC's funded programs have improved the quality of asthma care, improved asthma management in schools, and fostered policies to help reduce air pollution.[6]

Summary

Asthma is a serious medical condition that affects millions of people in which the airways narrow and swell and produce extra mucus. This can make breathing difficult and trigger coughing, wheezing and shortness of breath.

For some people, asthma is a minor inconvenience. For others, it can be a major problem that interferes with daily activities and may lead to a life-threatening asthma exacerbation.

Asthma cannot be cured, but its symptoms can be controlled. Because asthma often changes over time, it is important that people stay connected with their care providers to track their signs and symptoms and adjust treatment as needed. It is also important that people with asthma have an action plan and know what to do and when to seek help when their symptoms change or worsen. Asthma is a potentially serious respiratory condition, but with diligence and attention, can be successfully managed.

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Completing the study questions is optional and is NOT a course requirement.

1. **Asthma is a condition in which the airways narrow and swell and**

    a. flu symptoms develop.
    b. another respiratory disease develops.
    c. produce continuous tightness in the chest.
    d. produce extra mucus.

2. **The "classic" signs and symptoms of asthma are cough, wheezing, and**

    a. continuous dyspnea.
    b. shortness of breath when doing minimal physical activity.
    c. intermittent dyspnea.
    d. expelling blood when coughing.

3. **A definitive diagnosis of asthma requires a history or presence of respiratory symptoms consistent with asthma, combined with**

    a. another respiratory disease.
    b. a demonstration of variable expiratory airflow obstruction.
    c. tightness in the chest.
    d. continuous dyspnea.

4. **_____ is a common sign of asthma in children.**

    a. Rhinovirus
    b. Dizziness
    c. Wheezing
    d. Chest-tightness

5. **True or False: Coughing or wheezing attacks that are worsened by a respiratory virus, such as a cold or the flu, are inconsistent with a diagnosis of asthma.**

    a. True
    b. False

6. **Asthma *triggers* does NOT include**

    a. extra mucus.
    b. cold air.
    c. physical activity.
    d. respiratory infections, such as the common cold.

7. Certain medications that typically may trigger asthma do NOT include

a. prednisone.
b. aspirin.
c. ibuprofen.
d. naproxen.

8. Asthma is diagnosed before the age of seven years in approximately _____ of cases.

a. 25%
b. half
c. 40%
d. 75%

9. Which of the following lung function tests for asthma estimates the narrowing of bronchial tubes by checking how much air one can exhale after a deep breath and how fast one can breathe out?

a. COPD
b. Peak flow
c. Spirometry
d. Methacholine challenge

10. True or False: Asthma may develop at any age, although new-onset asthma is less frequent in older adults compared to other age groups.

a. True
b. False

11. _____ is a simple device that measures how hard one can breathe out.

a. A spirometer
b. A peak flow meter
c. A bronchodilator
d. A nitric oxide test

12. Lung function tests often are done

a. before taking a medication called a bronchodilator.
b. after taking aspirin to see if lung function changes.
c. before and after taking a medication called a bronchodilator.
d. without taking any medication.

13. Which of the following is true about asthma?

a. Asthma may be cured with proper treatment.
b. Asthma is uncommon in adults.
c. Asthma is a common disease in adults and children.
d. Asthma is not a life-threatening condition.

14. True or False: Many children experience a remission of asthma symptoms around the time of puberty, and in these cases there is no recurrence.

a. True
b. False

15. If a patient experiences mild constriction of the airways when given the methacholine challenge, then

a. the patient likely has asthma.
b. the patient has COPD, not asthma.
c. the patient does not have asthma.
d. a normal lung function test is needed to rule out asthma.

16. Asthma symptoms that occur more than twice a week, but no more than once in a single day, are classified as

a. mild intermittent.
b. mild persistent.
c. severe.
d. moderate persistent.

17. Airway remodeling that affects how well one can breathe refers to

a. a diagnosis of COPD, not asthma.
b. a temporary narrowing of the bronchial tubes caused by GERD.
c. a permanent narrowing of the bronchial tubes.
d. the methacholine challenge.

18. The goals of chronic asthma management may be divided into two domains:

a. adolescent asthma and adult asthma.
b. mild asthma and moderate asthma.
c. reduction in impairment and reduction of risk.
d. recurrent impairment and management of risk.

19. Which of the following is an adverse outcome associated with asthma and its treatment that is specific to children?

a. Suboptimal lung development
b. COPD
c. Loss of lung function over time
d. Airway remodeling

20. True or False: If a patient's lung function is tested and then improves with use of a bronchodilator, it is likely the patient has asthma.

a. True
b. False

21. _____ are the preferred medicine for long-term control of asthma.

a. Leukotriene modifiers
b. Theo-24 and Elixophyllin
c. Ipratropium (Atrovent)
d. Inhaled corticosteroids

22. In rare cases, _____ have been linked to psychological reactions, such as agitation, aggression, hallucinations, depression and suicidal thinking.

a. long-acting beta agonists
b. combination inhalers
c. inhaled corticosteroids
d. leukotriene modifiers

23. True or False: Having a blood relative (such as a parent or sibling) with asthma IS a risk factor for asthma.

a. True
b. False

24. _____ keep asthma under control on a day-to-day basis and make it less likely one will have an asthma attack.

a. Inhaled corticosteroids
b. Leukotriene modifiers
c. Theophyllines
d. Short-acting beta agonists

25. Which of the following drugs should not be used for an acute asthma attack because they can mask asthma deterioration?

a. Leukotriene modifiers
b. Theo-24 and Elixophyllin
c. Bronchodilators
d. Long-acting beta agonists

26. One common side effect from _____ is an oral candida infection called thrush.

a. long-acting beta agonists
b. theophylline
c. inhaled corticosteroids
d. leukotriene modifiers

27. True or False: Ipratropium (Atrovent) is mostly used for emphysema and chronic bronchitis, but it is sometimes used to treat asthma attacks.

a. True
b. False

28. _____ heats the insides of the airways in the lungs with an electrode, reducing the smooth muscle inside the airways.

a. A spirometer
b. Bronchial thermoplasty
c. Nitric oxide
d. Airway remodeling

29. Patients who are at *greater* risk for fatal asthma attacks include patients

a. with bronchial thermoplasty.
b. who have the symptoms of asthma and wheeze.
c. with poor adherence to their asthma action plan.
d. taking leukotriene modifiers.

30. If after initial home treatment a patient has symptoms or signs suggestive of a severe asthma exacerbation, the patient should seek urgent medical attention if his or her peak flow is

a. less than 50 percent of baseline.
b. less than 40 percent of baseline.
c. below baseline.
d. less than 25 percent of baseline.

31. A patient who has asthma exacerbation that requires treatment in the emergency department or hospital should receive supplemental oxygen

a. if the patient has a peak flow less than 75 percent of baseline.
b. if the patient has airway remodeling.
c. in all cases.
d. if the patient had bronchial thermoplasty.

32. True or False: Bronchial Thermoplasty is widely available and generally used for moderate to severe asthma.

a. True
b. False

33. Asthma patients should

a. be less active.
b. get regular exercise.
c. avoid exercise-induced asthma by exercising in colder climates.
d. exercise indoors.

34. About 9 people die from asthma _____ in the United States.

a. every two weeks
b. each week
c. each month
d. each day

35. True or False: Air conditioning helps reduce some of the triggers that cause asthma attacks.

a. True
b. False

CORRECT ANSWERS:

1. **Asthma is a condition in which the airways narrow and swell and**

   d. produce extra mucus.

   "*Asthma is a condition in which the airways narrow and swell and produce extra mucus.*"

2. **The "classic" signs and symptoms of asthma are cough, wheezing, and**

   c. intermittent dyspnea.

   "*The 'classic' signs and symptoms of asthma are intermittent dyspnea, cough, and wheezing.*"

3. **A definitive diagnosis of asthma requires a history or presence of respiratory symptoms consistent with asthma, combined with**

   b. a demonstration of variable expiratory airflow obstruction.

   "*A definitive diagnosis of asthma requires a history or presence of respiratory symptoms consistent with asthma, combined with a demonstration of variable expiratory airflow obstruction.*"

4. **_____ is a common sign of asthma in children.**

   c. Wheezing

   "*Asthma signs and symptoms can include: … A whistling or wheezing sound when exhaling (wheezing is a common sign of asthma in children).*"

5. **True or False: Coughing or wheezing attacks that are worsened by a respiratory virus, such as a cold or the flu, are inconsistent with a diagnosis of asthma.**

   b. False

   "*Asthma signs and symptoms can include: … Coughing or wheezing attacks that are worsened by a respiratory virus, such as a cold or the flu.*"

6. Asthma *triggers* does NOT include

a. extra mucus.

"*Asthma is a condition in which the airways narrow and swell and produce extra mucus.*"

7. Certain medications that typically may trigger asthma do NOT include

a. prednisone.

"*Asthma triggers are different from person to person and can include: … Certain medications, including beta blockers, aspirin, ibuprofen (Advil, Motrin IB, others) and naproxen (Aleve).*"

8. Asthma is diagnosed before the age of seven years in approximately _____ of cases.

d. 75%

"*Asthma is diagnosed before the age of seven years in approximately 75 percent of cases.*"

9. Which of the following lung function tests for asthma estimates the narrowing of bronchial tubes by checking how much air one can exhale after a deep breath and how fast one can breathe out?

c. Spirometry

"*Spirometry. This test estimates the narrowing of bronchial tubes by checking how much air one can exhale after a deep breath and how fast one can breathe out.*"

10. True or False: Asthma may develop at any age, although new-onset asthma is less frequent in older adults compared to other age groups.

a. True

"*Asthma may develop at any age, although new-onset asthma is less frequent in older adults compared to other age groups.*"

11. _____ is a simple device that measures how hard one can breathe out.

b. A peak flow meter

"*A peak flow meter is a simple device that measures how hard one can breathe out.*"

12. Lung function tests often are done

c. before and after taking a medication called a bronchodilator.

"*Lung function tests often are done before and after taking a medication called a bronchodilator such as albuterol, to open the airways. If the lung function improves with use of a bronchodilator, it is likely the patient has asthma.*"

13. Which of the following is true about asthma?

c. Asthma is a common disease in adults and children.

"*Asthma is common. In 2010, 18.7 million adults had asthma. That is equal to 1 in 12 adults. And 7 million children had asthma. That is equal to 1 in 11 children.*"

14. True or False: Many children experience a remission of asthma symptoms around the time of puberty, and in these cases there is no recurrence.

b. False

"*Many children experience a remission of asthma symptoms around the time of puberty, with potential recurrence years later.*"

15. If a patient experiences mild constriction of the airways when given the methacholine challenge, then

a. the patient likely has asthma.

"*Methacholine challenge. Methacholine is a known asthma trigger that, when inhaled, will cause mild constriction of the airways. If there is a reaction to the methacholine, one likely has asthma. This test may be used even if the initial lung function test is normal.*"

16. Asthma symptoms that occur more than twice a week, but no more than once in a single day, are classified as

b. mild persistent.

"*Mild Persistent: Symptoms more than twice a week, but no more than once in a single day.*"

17. Airway remodeling that affects how well one can breathe refers to

c. a permanent narrowing of the bronchial tubes.

"*Permanent narrowing of the bronchial tubes (airway remodeling) that affects how well one can breathe.*"

18. The goals of chronic asthma management may be divided into two domains:

c. reduction in impairment and reduction of risk.

"*The goals of chronic asthma management may be divided into two domains: reduction in impairment and reduction of risk.*"

19. Which of the following is an adverse outcome associated with asthma and its treatment that is specific to children?

a. Suboptimal lung development

"*The 2007 National Asthma Education and Prevention Program (NAEPP) guidelines introduced the concept of risk to encompass the various adverse outcomes associated with asthma and its treatment. These include asthma exacerbations, suboptimal lung development (in children), loss of lung function over time (for adults), and adverse effects from asthma medications.*"

20. True or False: If a patient's lung function is tested and then improves with use of a bronchodilator, it is likely the patient has asthma.

a. True

"*Lung function tests often are done before and after taking a medication called a bronchodilator such as albuterol, to open the airways. If the lung function improves with use of a bronchodilator, it is likely the patient has asthma.*"

21. _____ are the preferred medicine for long-term control of asthma.

d. Inhaled corticosteroids

"*Inhaled corticosteroids are the preferred medicine for long-term control of asthma.*"

22. In rare cases, _____ have been linked to psychological reactions, such as agitation, aggression, hallucinations, depression and suicidal thinking.

d. leukotriene modifiers
"*In rare cases, these medications [leukotriene modifiers] have been linked to psychological reactions, such as agitation, aggression, hallucinations, depression and suicidal thinking. Patients should be counseled to seek medical advice right away for any unusual reaction.*"

23. True or False: Having a blood relative (such as a parent or sibling) with asthma IS a risk factor for asthma.

a. True

"*A number of factors are thought to increase the chances of developing asthma. These include: Having a blood relative (such as a parent or sibling) with asthma.*"

24. _____ keep asthma under control on a day-to-day basis and make it less likely one will have an asthma attack.

a. Inhaled corticosteroids

"*These medications keep asthma under control on a day-to-day basis and make it less likely one will have an asthma attack. Types of long-term control medications include: Inhaled corticosteroids.*"

25. Which of the following drugs should not be used for an acute asthma attack because they can mask asthma deterioration?

d. Long-acting beta agonists

"*Long-acting beta agonists. These inhaled medications, which include salmeterol (Serevent) and formoterol (Foradil, Perforomist), open the airways. Some research shows that they may increase the risk of a severe asthma attack, so patients should take them only in combination with an inhaled corticosteroid. Because these drugs can mask asthma deterioration, they should not be used for an acute asthma attack.*"

26. One common side effect from _____ is an oral candida infection called thrush.

c. inhaled corticosteroids

"*One common side effect from inhaled corticosteroids is an oral candida infection called thrush.*"

27. True or False: Ipratropium (Atrovent) is mostly used for emphysema and chronic bronchitis, but it is sometimes used to treat asthma attacks.

a. True

"*Ipratropium is mostly used for emphysema and chronic bronchitis, but it is sometimes used to treat asthma attacks.*"

28. _____ heats the insides of the airways in the lungs with an electrode, reducing the smooth muscle inside the airways.

b. Bronchial thermoplasty

"*Generally, over the span of three outpatient visits, bronchial thermoplasty heats the insides of the airways in the lungs with an electrode, reducing the smooth muscle inside the airways.*"

29. Patients who are at *greater* risk for fatal asthma attacks include patients

c. with poor adherence to their asthma action plan.

"*Risk factors for a fatal asthma attack include: … History of poor adherence with asthma medications and/or written asthma action plan.*"

30. If after initial home treatment a patient has symptoms or signs suggestive of a severe asthma exacerbation, the patient should seek urgent medical attention if his or her peak flow is

a. less than 50 percent of baseline.

"*If after initial home treatment the patient has symptoms or signs suggestive of a severe exacerbation (e.g., marked breathlessness, inability to speak more than short phrases, use of accessory muscles) or a peak flow less than 50 percent of baseline, he or she should seek urgent medical attention.*"

31. A patient who has asthma exacerbation that requires treatment in the emergency department or hospital should receive supplemental oxygen

c. in all cases.

"*Supplemental oxygen should be administered to virtually all patients with an asthma exacerbation that requires treatment in the emergency department or hospital.*"

32. True or False: Bronchial Thermoplasty is widely available and generally used for moderate to severe asthma.

b. False

"*Bronchial Thermoplasty: … This treatment — which is not widely available nor right for everyone — is used for severe asthma that does not improve with inhaled corticosteroids or other long-term asthma medications.*"

33. Asthma patients should

b. get regular exercise.

"*Taking care of oneself can help keep symptoms under control, including: Get regular exercise.*"

34. About 9 people die from asthma _____ in the United States.

d. each day

"*Asthma can be fatal. About 9 people die from asthma each day in the United States.*"

35. True or False: Air conditioning helps reduce some of the triggers that cause asthma attacks.

a. True

"*Air conditioning reduces the amount of airborne pollen from trees, grasses and weeds that finds its way indoors. Air conditioning also lowers indoor humidity and can reduce the exposure to dust mites. If air conditioning is not an option, patients can try to keep windows closed during pollen season.*

References

The reference section of in-text citations include published works intended as helpful material for further reading.

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