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VI. ASTHMA

A. OBJECTIVES

At the end of this presentation the student will be able to:

1. Identify the stages of asthma.
2. Describe four factors that have been identified as causes of asthma in children.
3. Identify three types of asthma
4. Define three tests that may be required to diagnose asthma.
5. List two types of medications used for asthma and give one example of each.
6. Indicate two strategies for reducing the allergic response for the asthma patient.

B. CURRICULUM OUTLINE

A. What is Asthma?

Hyperactive response

Inflammatory response

B. What Causes Asthma in Children?

Factors contributing to the worldwide increase of asthma

The allergic response

Remodeling and causes of persistent asthma

Genetic Factors

Early respiratory infections: pros and cons

Other contributing medical conditions

Other Asthma types

NSAIDS and Asthma

Nocturnal Asthma

C. What Children Get Asthma?

Gender

Socioeconomic factors

Issues surrounding birth

Other risk factors

D. What are the Symptoms of Asthma in Children?

Typical asthma symptoms

E. How serious is Asthma in Children?

Degree of severity

Risk factors for life-threatening Asthma

Symptoms of a life threatening attack

Long-term outlook

Psychological factors

Effect on school and work

F. What tests may be required to Diagnose Asthma?

Medical history

Ruling out other diseases

Pulmonary function tests
Allergy tests
Diagnosing exercise-induced Asthma

G. What are the General Guidelines for Treating Asthma?

Emergency treatment for an acute attack
Guidelines for treating asthma at home
Understanding drug therapies
Drugs used for acute symptoms
Drugs used in maintenance therapy
Administering inhaled drugs
Monitoring
Non-medical management strategies

H. What are ways to reduce the Allergic Response?

General guidelines
Controlling pets
Air filters and vacuum cleaners
Bedding and Curtains
Disposable Diapers
Exterminating cockroaches and mice
Outdoor protection
Allergy shots
Other recommendations for the home

I. What are other ways to Manage Asthma and Reduce Risk Factors?

Preventing exposure to cigarette smoke
Reducing exposure to air pollution
Dietary recommendations
Exercise
Alternative treatments
Treatment of disorders that might cause asthma

C. CURRICULUM

A. What Is Asthma?

The word asthma originates from an ancient Greek word meaning panting. When any person inhales, the air passes into the lungs through progressively smaller airways called bronchioles. The lungs contain millions of bronchioles, all leading to alveoli, microscopic sacs where oxygen and carbon dioxide are exchanged. Asthma is a chronic condition in which these airways undergo changes when stimulated by allergens or other environmental triggers that cause patients to cough, wheeze, and experience shortness of breath (dyspnea). Asthma appears to have two primary stages:

1. The *hyperreactive* response (also called hyperresponsiveness).
2. The *inflammatory* response.

1. Hyperreactive Response

In the hyperreactive response, smooth muscles in the airways constrict and narrow excessively in response to inhaled allergens or other irritants.

- When people without asthma breathe in and out deeply, the airways relax and open in order to rid the lungs of the irritant. When people with asthma try to take those same deep breaths, their airways do not relax but instead narrow.
- Smooth muscles in the airways of people with asthma may have a defect, perhaps a deficiency in a critical chemical that prevents the muscles from relaxing.

2. Inflammatory Response

The hyperreactive stage is followed by the inflammatory response, which generally contributes to asthma in the following way:

- The immune system responds to allergens or other environmental triggers by activating white blood cells and other immunologic factors to the airways.

- These so-called inflammatory factors cause the airways to swell, to fill with fluid, and to produce a thick sticky mucus.
 - This combination of events results in wheezing, breathlessness, inability to exhale properly, and a phlegm-producing cough.
- Inflammation appears to be present in the lungs of all patients with asthma.

B. What Causes Asthma in Children?

1. Factors Contributing to the Worldwide Increase of Asthma

Asthma is the most common chronic childhood illness. It has dramatically risen worldwide over the past decades. Among the causes and factors that are suspects in asthma in children are the following:

- Asthma in children is highly associated with allergies.
- A family history of asthma also plays a major role in childhood asthma.
- Western dietary habits (which commonly include more fast foods and less fruits, vegetables, fiber, minerals, and other nutrients) may contribute to the development of childhood asthma.
- Overexposure to indoor allergens.
- Trend of making homes more energy-efficient may result in dust mites being trapped inside them.
- Immunizations that prevent many childhood diseases may actually cause changes in immune factors that make people more susceptible to the allergic response.
- Survival rates are now higher in low-birth-weight babies, who may be more susceptible to asthma.
- Declining rates in breastfeeding may be a contributor.

Some experts suggest that part of the dramatic rise in childhood asthma is not due to an increase in actual cases but to higher parental awareness of the disease and differences in diagnostic criteria.

2. The Allergic Response

The allergic response plays a strong role in childhood asthma. About 75% to 80% of children with asthma have allergies. Asthma and nonseasonal or seasonal allergic rhinitis often coexist together. About 8% to 10% of children with asthma also have food allergies. In infants and toddlers, allergy to eggs appears to be a major predictor of asthma. The allergic process, called *atopy*, and its connection to asthma is not completely understood. It involves various airborne allergens or other triggers that set off a cascade of events in the immune system leading to inflammation and hyperreactivity in the airways. One description is as follows:

- The conductor in an orchestra of immune factors that contribute to allergies and asthma appears to be a category of white blood cells known as *helper T-cells*, in particular a subgroup called *TH2-cells*.
- *TH2-cells* overproduce *interleukins* (ILs), immune factors that are molecular members of a family called cytokines.
- Interleukins may be responsible to a *first-phase* asthma attack. These factors stimulate the production and release of a group of antibodies known as *immunoglobulin E (IgE)*.
- These IgE antibodies can bind to special cells in the immune system called *mast cells*, which are generally concentrated in the lungs, skin, and mucous membranes. This response triggers the release of a number of active chemicals, importantly a potent molecule known as *leukotriene*. These chemicals cause airway spasms, over-produce mucus, and activate nerve endings in the airway lining.
- Another cytokine, interleukin 5, appears to contribute to a *late-phase* inflammatory response. This interleukin attracts white blood cells known as *eosinophils*, which accumulate and remain in the airways after the first attack for weeks and mediate the release of other damaging particles that persist in the airways.

Of particular interest are studies reporting that exposure to common allergens, such as dust mites, cats, and dogs in the first year of life may actually prevent later development of allergies and asthma.

3. Remodeling and Causes of Persistent Asthma

Over the course of years, the repetition of the inflammatory events involved in asthma can cause irreversible structural and functional changes in the airways, a process called *remodeling*, that results in persistent narrowing and chronic asthma.

Interleukin 13. Some research suggests that interleukin 13, which is responsible for overproduction of mucus, also causes overgrowth of cells in the smooth muscles that line the airways.

Scarring. Other research indicates that the narrowing of the airways themselves during an asthma attack, can, over time, cause scarring.

Neutrophils. Also under suspicion are specific white blood cells called neutrophils, the scavengers of the immune system, which mop up bacteria and cell debris. Large numbers of neutrophils have been observed in many forms of asthma, although their role has not been defined.

4. Genetic Factors

About one third of all persons with asthma share the problem with another member of their immediate family. Genetic factors appear to play a more important role than environmental factors in such families. Both allergies and asthma are strongly associated with hereditary factors.

5. Early Respiratory Infections: Pros and Cons

Early respiratory infections have been investigated for their role in asthma. Theories exist that suggest respiratory infections may play causal, worsening, or protective roles, depending on specific conditions.

a. Protective Role of Early Respiratory Infections

An important theory blames the dramatic increase in asthma on the *elimination* of childhood infections since immunization has become widespread. The basic theory is as follows:

- In the past, when unvaccinated children developed these infections, the immune system released helper T-1 (TH1) white blood cells that stimulate the body's infection-fighters.

- At the same time, it also suppresses production of the helper T-2 (TH2) cells, which are believed to be major contributors to the allergic response.
- In genetically susceptible children who are vaccinated, the TH2 cells become active and trigger the inflammatory events leading to asthma.

6. Other Contributing Medical Conditions

GERD. Gastroesophageal reflux disease (GERD), the cause of heartburn, is common in many asthmatic patients. GERD may cause asthma or its symptoms by spilling acid into the airways, which would then trigger a hyperreactive response. People with asthma associated with GERD may be at risk for long-term erosion of the esophagus.

Sinusitis. Almost half of children and adults with allergic asthma have sinus abnormalities. The presence of sinusitis, however, does not appear to increase the severity of asthma.

Type 1 Diabetes. A 2000 study has reported an association between type 1 diabetes and asthma, indicating some common immune abnormalities that may affect both.

Parental Migraines and Childhood Asthma. Some studies have reported a link between childhood asthma and parental migraines.

7. Asthma Types

a. *Exercise-Induced Asthma.* About 40% to 90% of asthma cases are exercise-induced asthma (EIA), in which exercise triggers coughing, wheezing, or shortness of breath. It occurs most often in children and young adults and during intense exercise in cold dry air. EIA is triggered *only* by exercise and is distinct from ordinary allergic asthma in that it does not produce a long-term increase in airway activity. People who only have EIA, then, do not require long-term maintenance therapy. The warm-up and cool-down periods, which are important for any exercise regimen, may help reduce EIA events.

b. NSAIDs and Asthma

Aspirin-induced Asthma. Between 20% and over 54% of patients have a condition called aspirin-induced asthma

(AIA), in which asthma is worsened after taking aspirin or other nonsteroidal anti-inflammatory drugs such as ibuprofen or naproxen. Although NSAIDs are used to *reduce* inflammation in other disorders, they appear to have the opposite effect in many asthma cases. AIA often develops after a viral infection. It is a particularly severe asthmatic condition and is associated with up to 25% of asthma-related hospitalizations.

c. Nocturnal Asthma

Asthma occurs primarily at night in as many as 75% of asthma patients. Attacks often occur between 2 and 4 AM. Some experts believe that nocturnal asthma is a separate asthma type with specific biologic mechanisms that reduce natural steroids and that occur only at night. This nighttime propensity may also be due to a number of reasons:

- Chemical and temperature changes in the body during the night increase inflammation and narrowing of the airways.
- Delayed allergic responses can occur from exposure to allergens during the day.
- Toward the early morning, the effect of inhaled medications may wear off and trigger an attack.
- An increase in acid reflux (back up of stomach acid) during the night may cause airway constriction.
- Postnasal drip that occurs during sleep may contribute to the higher nighttime risk. Some evidence suggests that conditions relating to sleep itself, such as sleep apnea or sleeping on one's back, may play a role in the worsening of asthma at night; further research is needed.

C. What Children Get Asthma?

The prevalence of asthma increased by 60% in America, since the early 80s, and in Europe it has doubled.

1. Gender

Among younger children, asthma develops twice as frequently in boys as in girls, but after puberty it may be more common in girls.

2. Socioeconomic Factors

Urban Life. Urban life is strongly associated with a higher risk. Although poverty plays a significant role, urban life, in fact, has been associated with a higher risk for asthma in any income group and among both children and adults.

Ethnicity. Since 1980, asthma rates have risen the most dramatically among African American children. A 2000 study found that African American children may have significantly higher levels of IgE than Caucasian children, suggesting a genetic susceptibility.

3. Issues Surrounding Birth

Low Birth Weight. Infants of low birth weight are at higher risk for lung problems and asthma.

Winter Birth. One study suggests that children born in the winter are at greater risk for asthmatic allergies to cockroaches than children born at other times of the year.

Breast Feeding. Children who are fed exclusively breast milk for at least their first four months of life are significantly less likely to develop asthma than other children.

Complications of Pregnancy. According to a 2000 study, complications of pregnancy, specifically those involving the mother's uterus (such as post-birth hemorrhage, pre-term contractions, insufficient placenta, and restricted growth of the uterus), are associated with an increased risk of childhood asthma.

4. Other Risk Factors

Damp Homes. Studies from different parts of the world reported that children who live in damp homes have a much higher risk for asthma than those who don't.

Parental Migraines and Childhood Asthma. Some studies have reported a link between childhood asthma and parental migraines.

Obesity and Weight Loss. In both adults and children, the incidence of obesity has been increasing parallel to the rise in asthma over recent years.

Mental Health. Research indicates that poor mental health of parents and children are significant predictors of more severe symptoms in childhood asthma.

D. What Are the Symptoms Of Asthma In Children?

1. Typical Asthma Symptoms

Asthma symptoms vary in severity from occasional mild bouts of breathlessness to daily wheezing that persists despite taking large doses of medication. The classic symptoms of an asthma attack are the following:

- Wheezing when breathing out is nearly always present during an attack. Usually the attack begins with wheezing and rapid breathing, and, as it becomes more severe, all breathing muscles become visibly active.
- Shortness of breath (*dyspnea*). The severity of shortness of breath does not necessarily reflect the severity of the attack. Some people experience severe dyspnea but have adequate lung function. On the other hand, some others may not perceive their breathing as very impaired but actually have very low lung function.
- Coughing. In some people the first symptom is a nonproductive cough or chest tightness or pain that is not associated with wheezing.
- Tightness in the chest. If tightness is the primary symptom, it may be an early indicator of a serious attack.
- Rapid heart rate.
- Sweating.
- Chest pain occurs in about three quarters of patients; it can be very severe, although its intensity is not necessarily related to the severity of the asthma attack itself.

Other symptoms of an attack include the following:

- Irritation of the nose and throat, thirst, and the need to urinate are common symptoms, particularly before an asthma attack begins.

- The neck muscles may tighten, and talking may become difficult or impossible.
- The end of an attack is often marked by a cough that produces a thick, stringy mucus.

After an initial acute attack, inflammation persists for days to weeks, often without symptoms. (The inflammation itself must still be treated, however, because it usually causes relapse.)

E. How Serious Is Asthma In Children?

1. Severity of Acute Attacks

Asthma is the third major cause of hospitalization in children under 15. The condition is especially serious in children, particularly those younger than five, because their airways are very narrow.

2. Degree of Severity

The severity of asthma is graded using the following categories: mild intermittent and mild, moderate, and severe persistent. It should be noted that a patient in any of these categories, even mild intermittent, can still experience a severe and even life-threatening attack. In fact, according to one report, 30% of asthma deaths occur in patients with mild asthma.

3. Risk Factors for Life-Threatening Asthma

Factors associated with an increased risk of death from asthma in children include the following:

- Previous life-threatening episodes of asthma.
- Lack of adequate and ongoing health care.
- Significant behavioral problems.
- Underestimating the severity of an acute attack poses the greatest threat. Unfortunately, one study of children found that nearly 40% of them were unaware of asthmatic symptoms when they occurred.

4. Symptoms of a Life Threatening Attack

The following signs and symptoms may indicate a life-threatening situation:

- As the chest labors to bring enough air into the lungs, breathing often becomes shallow.
- Lacking sufficient oxygen, the skin becomes bluish.
- The flesh around the ribs of the chest appears to be sucked in.
- The patient may begin to lose consciousness.

Asthma often progresses very slowly to a serious condition or may develop to a fatal or near-fatal attack within a few minutes. It is very difficult to predict when an attack will become very serious. It should be noted that early symptoms or lack of them do not always reflect the ultimate severity of an attack. In fact, some studies suggest that people at high risk for fatal or near-fatal asthma attacks are those with poor awareness of their own reduced ability to breathe and who are therefore slow in seeking help.

5. Long Term Outlook

Half of asthmatic children achieve remission after age 16. In half of these, however, asthma flares up again in middle age and remains a problem. Children whose condition is serious enough to require steroids are less likely to outgrow their asthma than others.

There is now some evidence that severe asthma can cause long-lasting damage and possibly permanent scarring. Many experts urge introduction of anti-inflammatory medications early on in children with severe conditions.

6. Psychologic Factors

Studies are mixed over the effects of emotional disorders on the severity of asthma. Teenagers and preteens have particular difficulty coping with what they perceive as the social stigma of asthma. Often they will deny their condition and refuse to comply with their drug regimen.

7. Effect on School and Work

A 2000 study reported that nocturnal asthma affected school attendance and performance in children and work attendance in their parents.

F. What Tests May Be Required To Diagnose Asthma?

1. Medical History

The doctor will seriously consider a diagnosis of asthma if the child has a history of periodic attacks of shortness of breath, coughing, and wheezing, perhaps accompanied by tightness in the chest. The parent should describe the pattern of symptoms and possible precipitating factors, including the following:

- Whether symptoms are more frequent during the spring or fall (allergy seasons).
- Whether exercise, a respiratory infection, or exposure to cold air has ever triggered an attack.
- Any family history of asthma or allergic disorders, such as eczema, hives, or hay fever.

2. Ruling Out Other Diseases

A number of disorders may cause some or all of the symptoms of asthma:

- Asthma and chronic obstructive lung diseases affect the lungs in similar ways and, in fact, may all be present in the same person.
- Panic disorder can coincide with asthma or be confused with it.
- Other diseases that must be considered during diagnosis are pneumonia, bronchitis, severe allergic reactions, pulmonary embolism, cancer, heart failure, tumors, psychosomatic illnesses, and certain rare disorders (such as tapeworm and trichomoniasis).

3. Pulmonary Function Tests

If symptoms and a patient's history are indicative of asthma, the physician will usually perform tests known as pulmonary function tests to confirm the diagnosis and determine the severity of the disease:

- Using a spirometer, an instrument that measures the air taken into and exhaled from the lungs, the physician will determine several values:
 - Vital capacity (VC), which is the maximum volume of air that can be inhaled or exhaled.

- Peak expiratory flow rate (PEFR), commonly called the peak flow rate, which is the maximum flow rate that can be generated during a forced exhalation.
- Forced expiratory volume (FEV1), which is the maximum volume of air expired in one second.
- In cases of airway obstruction, the measurements fall. The doctor then may administer a bronchodilator (a drug that opens the air passages) and take measurements again. If the obstruction clears after using the drug, then a diagnosis of asthma is confirmed.
- If there are no signs of airflow obstruction but the doctor still suspects asthma, a *challenge* test may be performed. The physician administers a specific drug (histamine or methacholine) that usually increases airway resistance in people with asthma but not in those without asthma.
- Another method for inducing airway resistance is to administer cold air.

4. Allergy Tests

The patient may be given skin or blood allergy tests, particularly if a specific allergen or occupational agent is suspected and available for testing. Allergy skin tests may be the best predictive test for allergic asthma, although they are not recommended for people with year-round asthma.

5. Diagnosing Exercise-Induced Asthma

After breathing into a spirometer, the child steps up and down on a single stair until a heart rate of 150 to 200 beats per minute is maintained, as detected with a monitor strapped to the child's chest. The child breathes into the spirometer; if FEV1 has declined more than 15%, then asthma is suspected.

G. What Are the General Guidelines For Treating Asthma?

1. Emergency Treatment for an Acute Attack

Treating an Acute Attack in the Hospital. An acute attack may require hospitalization. Laboratory tests, an electrocardiogram (ECG), and a chest x-ray are performed to determine lung function, oxygen levels, and other indications of

severity or rule out other causes. Depending on the results, the following treatments may be given:

- Beta2-agonists are the standard therapy. They may be administered with a nebulizer or inhaled hourly.
- A corticosteroid is usually given if the patient does not respond to beta2-agonist treatments. They may be given intravenously or orally.
- Antibiotics may be given if sinusitis, pneumonia, or bronchitis is suspected or present.
- Oxygen is usually administered, although one study found that giving 100% oxygen to very ill asthmatic patients might be harmful. A 1999 study indicated that a mixture of helium and oxygen produced significant improvement within 20 minutes, while oxygen alone took six hours.
- According to a small 2000 study of children with moderate to severe asthma, infusions of magnesium sulfate were very effective in treating severe attacks.
- In life-threatening situations, the patient may require mechanical ventilation.

Discharge and Relapse After Hospitalization. Patients are generally discharged when symptoms are gone or minimal and the peak expiratory flow rate is 70% or more of the predicted rate.

2. Guidelines for Treating Asthma at Home

Avoiding allergens, following appropriate drug treatments, and home monitoring are key elements in preventing dangerous asthma attacks and hospitalization. It is particularly important to treat any co-existing sinus or respiratory infection in children with asthma because they might not respond to asthma treatments unless the infection is first cleared up.

3. Understanding Drug Therapies

Parents can greatly reduce the frequency and severity of asthma attacks by understanding the difference between coping with and controlling the disease.

Medications for asthma are categorized by their ability to achieve either of the following:

- Relieve acute asthma symptoms. Generally, the drugs that relieve symptoms are bronchodilators, which open the airways during an asthma attack; they include short-acting beta-adrenergic agonists (beta2-agonists), theophylline, and certain anticholinergic agents.
- Control long-term persistent inflammation. The primary drugs used to control inflammation are corticosteroids (commonly called steroids), leukotriene-antagonists, and cromolyn.

For moderate to severe asthma, simply coping with asthma symptoms without also controlling the inflammation is a common and serious error. Asthma flare-ups are much more common in children who do not comply with the prescribed treatment.

4. Drugs Used for Acute Symptoms

Generally, on a day-to-day basis, the drugs that relieve symptoms are bronchodilators. Bronchodilators include the following:

- Short-acting beta2-agonists (also called beta-adrenergic agonists).
- Theophylline.
- Inhaled ipratropium bromide (an anticholinergic agent).

5. Drugs Used in Maintenance Therapy

Because inflammation is now known to play a key role in all forms of asthma, anti-inflammatory drugs are currently recommended as the primary therapy for any asthmatic condition more serious than occasional episodes of mild asthma.

- Cromolyn is an anti-inflammatory agent and is used for moderate asthma in children.
- Corticosteroids (commonly called steroids) are more powerful anti-inflammatory agents and are used to reduce the inflammatory response in moderate to severe asthma.
- Long-acting beta2-agonists (salmeterol, formoterol) have no effect on inflammation but are beneficial for prevention of exercise-induced asthma and for nighttime mild asthma.
- Leukotriene-antagonists are anti-inflammatory agents that are proving to be effective alone or in combination with steroids.

Combining such drugs with steroids may be very effective in reducing both severe and mild symptoms, improving lung function, and reducing the need for high doses of steroids.

6. Administering Inhaled Drugs

Most asthma drugs are inhaled using special devices or nebulizers. This method is very difficult for small children. They can be administered with a nebulizer or be taken orally but most are inhaled.

Metered-Dose Inhaler. MDI-delivered drugs must be used regularly as prescribed and the patient carefully trained in their use in order for them to be effective and safe.

Dry Powder Inhalers. A number of inhalers now deliver a powdered form of medications directly into the lungs and do not threaten the environment. DPIs are proving to be as effective as the older devices, and generally have a better taste and children can manage them easier than the MDI.

Nebulizers. Nebulizers are often used for children younger than three years and sometimes for older children who have difficulty using the MDI. A nebulizer is a machine that delivers a fine spray of medication-containing liquid. It takes five to 10 minutes to administer any medication using a nebulizer. And, because the spray is less targeted than with the inhaler, it must deliver large amounts of the drug.

7. Monitoring

Children with asthma who are monitored daily for peak air flow and whose medications are adjusted accordingly tend to have fewer hospitalizations and a better quality of life than those who rely on the occasional physician or emergency room visit to control symptoms.

Monitoring typically involves the following steps:

- A peak flow meter is the standard monitoring device for measuring peak expiratory flow rate (PEFR).
- Patients with severe asthma should take PEFR readings two or three times a day. The overall goal should be to achieve less than a 20% (and ideally only 10%) variation in readings between evening and morning rates.

- It is important to use the meter at the same times each day and to stand or sit in the same position in order to keep an accurate record.
- Patients should keep an ongoing record of their peak flow readings to help them detect worsening of their condition.
- They should also record attacks, exposure to any allergens or triggers, and medications taken.
- After about two months, patients and physicians can use the data recorded for administering medications effectively and to recognize problems before they become serious.

In general, many people fail to monitor their asthma. Experts believe that, ideally, portable monitors should be available to measure forced expiratory volume (FEV1).

8. Non-Medical Management Strategies

Asthma triggers a vicious emotional-physical cycle:

- Breathlessness and wheezing incite a fear of suffocation and death, even in very small children.
- This anxiety produces further constriction on the muscles surrounding the airways, which makes breathing even more difficult.

Caregivers must first focus on alleviating their own anxiety, which can heighten a child's own fears. The next step is to help the child relax. One method for this is as follows:

- The child sits comfortably, bending slightly forward with the eyes closed.
- The hands are placed gently over the naval.
- The child is then told to pretend the stomach is a balloon.
- The "balloon" must be "blown up" by inhalation, not exhalation. The child can tell if this is working because the hands will move slightly apart.
- When the child breathes out, the "balloon" will be made flat.

This exercise both relaxes the child and discourages shallow, oxygen-poor breathing. Massaging the child in gentle circles on the chest is relaxing and may also loosen mucus.

Other recommendations include the following:

- A child may also find relief by lying stomach-down on several pillows so that the head is slightly lower than the chest

while the caregiver gently pats the back between the shoulder blades.

- Giving the child warm liquids, such as soup or hot cider, is effective in loosening mucus and may also relax bronchial muscles. Cold fluids, like cold air, should be avoided.
- Overhydration, too much liquid, can be harmful, however, so these drinks should not be forced on the child.
- Warm, moist air from vaporizers can greatly ease and moderate asthma attacks.
- Daily massages and breathing and relaxation techniques to reduce stress can be very helpful.

H. What Are Ways To Reduce the Allergic Response?

1. General Guidelines

The more allergies a child has, the more severe the asthma. An asthma attack can be induced or aggravated by direct irritants to the lungs. Important irritants or allergens included the following:

- Dust mites, specifically mite feces, which are coated with enzymes that contain a powerful allergen. These are the primary allergens in the home. (In one study, allergies to dust mites did not appear to have any affect on hospitalization, although they are capable of triggering asthma attacks.)
- Animal dander (flakes of skin) and hair, including from cats, house mice, and dogs. Cats pose the greatest risk of all common pets. House mice are proving to be significant sources of allergens.
- Pollen.
- Molds.
- Fungi.
- Cockroaches are major asthma triggers and may reduce lung function even in people without a history of asthma.

2. Controlling Pets

Pets pose particular problems for children with asthma; they can trigger asthma but are often emotionally important to the household. If families of asthmatic children choose to keep pets, the following precautions may be helpful in reducing risk:

- Cats tend to trigger more severe asthma than dogs, although some asthmatic children can be severely affected by dogs as well.
- Pets should be kept outside or, if this isn't possible, be confined to carpet-free areas outside the bedroom.
- Cigarette smoke and damp houses increase the risk for reactions to cat allergies.
- Washing cats and dogs once a week can reduce allergens. Dry shampoos, such as Allerpet, are available for both cats and dogs that remove allergens from skin and fur and are easier to administer than wet shampoos.

3. Air Filters and Vacuum Cleaners

Air cleaners, filters for air conditioners, and vacuum cleaners with HEPA filters can help remove particles and small allergens found indoors.

4. Bedding and Curtains

Using semipermeable coverings to fully encase mattresses and pillows is the most proven effective step in reducing dust mite levels. Curtains should be replaced with shades or blinds and bedding washed using the highest temperature setting.

5. Disposable Diapers

Researchers recommend that children with asthma or other respiratory diseases should use cloth diapers and avoid disposable diapers until more research has been conducted.

6. Exterminating Cockroaches and Mice

Cockroaches should be eliminated by professional exterminators, although a study reported that ridding a home of cockroaches and cleaning the house using standard housecleaning techniques failed to eliminate the cockroach allergens themselves.

7. Outdoor Protection

Camping and hiking trips should not be scheduled during times of high pollen count (in the Northern states, May and June for grass pollen and mid-August to October for ragweed). Patients should avoid strenuous activity when ozone levels are highest.

8. Allergy Shots

An international conference of allergy experts concurred in 2000 that allergy shots (immunotherapy) are highly effective in managing allergic asthma for adults and children.

9. Other Recommendations

Damp housing increases the risk for asthma; reducing indoor humidity can lower dust mite populations.

I. What Are Other Ways To Manage Asthma and Reduce Risk Factors?

1. Preventing Exposure to Cigarette Smoke

Parents who smoke are strongly urged to make strenuous efforts to quit. Studies are finding that exposure to second-hand smoke in the home increases the risk for asthma and asthma-related emergency room visits in children. Parental smoking has been shown to increase the airway responsiveness of infants as early as the first two to 10 weeks of life.

2. Reducing Exposure to Air Pollution

The effects of air pollution on asthma are not entirely clear. Children breathe faster than adults, taking in more pollutants, and therefore appear to be particularly susceptible to soot and other small particles in the air. Evidence strongly suggests that air pollution can worsen existing asthma.

3. Dietary Recommendations

Food Allergies. If young children show signs of or test positive for food allergies, however, parents should be extra cautious in preventing exposure to *any* asthma trigger. Contrary to what many believe, dairy products do not appear to exacerbate asthma symptoms in people who are not already allergic to them.

Obesity and Weight Loss. In both adults and children, the incidence of obesity has been increasing parallel to the rise in asthma over recent years. Studies report a strong association between the two conditions, and there is some evidence that losing weight can relieve asthma symptoms.

Lung-Healthy Diet. Some evidence indicates that having low dietary intake of antioxidant nutrients (vitamins A, C, and E

and other food chemicals) could increase the risk for lung damage.

4. Exercise

Asthmatic children should be encouraged to swim and play sports. Intense activities lasting less than two minutes, such as sprinting or competitive swimming, are less problematic than longer exercises. It should be noted that asthma is no reason to avoid exercise. Some studies are indicating that long-term exercise, particularly aerobic, may help control asthma and reduce hospitalization.

5. Alternative Treatments

According to some studies, alternative therapies such as acupuncture, hypnosis, meditation, breathing relaxation techniques, and homeopathic remedies are being widely used by both children and adults with asthma with some good results.

6. Treatment Of Disorders That Might Cause Asthma

Preventing and Treating Respiratory Infections. The common cold is a major trigger of many asthma attacks in children. Washing hands is a very simple but effective preventive measure. When a child has a cold, they should not be given combination remedies that contain decongestants and antihistamines. Asthmatic children suffer particularly when they contract influenza. Parents should discuss vaccinations against influenza.

Reducing Stress. People with asthma have no higher rate of anxiety or depression than the general population, but extreme emotions, including stress and depression, are associated with more severe symptoms and even an increased risk of fatal asthma attacks.

D. BIBLIOGRAPHY

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E. PRE TEST EVALUATION

Asthma

1. Identify the stages of Asthma.

1. _____

2. _____

2. Describe four factors that have been identified as causes of asthma in children.

1. _____

2. _____

3. _____

4. _____

3. Identify three types of Asthma.

1. _____

2. _____

3. _____

4. Indicate two strategies for reducing the allergic response for the asthma patient.

1. _____

2. _____

5. Define three tests that may be required to diagnose asthma.

1. _____

2. _____

3. _____

6. List two types of medications used for asthma and give one example of each

1. _____ Example _____

2. _____ Example _____

7. Indicate two strategies for reducing the allergic response for the asthma patient.

1. _____

2. _____

F. POST TEST EVALUATION

Asthma

1. Identify the stages of Asthma.

1. _____

2. _____

2. Describe four factors that have been identified as causes of asthma in children.

1. _____

2. _____

3. _____

4. _____

3. Identify three types of Asthma.

1. _____

2. _____

3. _____

4. Indicate two strategies for reducing the allergic response for the asthma patient.

1. _____

2. _____

5. Define three tests that may be required to diagnose asthma.

1. _____

2. _____

3. _____

6. List two types of medications used for asthma and give one example of each

1. _____ Example _____

2. _____ Example _____

7. Indicate two strategies for reducing the allergic response for the asthma patient.

1. _____

2. _____

G. INSTRUCTOR EVALUATION

Using a scale of One (lowest) to Five (highest) please rate the following:

The Instructor met the stated objectives. 1 2 3 4 5

The content was informative. 1 2 3 4 5

The information was presented in
an interesting and logical format. 1 2 3 4 5

The most useful information in this lecture was _____

_____.