

Environmental Contributors to Asthma Why Can't I Breathe?

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Academic Setting

Garfield Middle School has an enrollment of 665 students. Of these 100 are in Special Education and 40 are ESL students. The student population comes from families in the medium to low range income scale. The student body consists of 84.4% non-Anglo and 15.6% Anglo. The school provides bilingual, Title 1 and special education classes for which the school receives state and federal funding. Seventy percent of the student population qualify for free or reduced lunch in the onsite cafeteria.

I will be teaching language arts and literature to sixth grade special education B level students. The general reading level of these students is approximately second, third or fourth grade level. Literacy is an important issue at GMS, and efforts are being made to improve low reading scores.

The unit will be taught in a two-hour block, two times a week for four weeks through the language arts/literature classes

Purpose of Unit

Although several of my students suffer from asthma, it is not a subject that we talk about in school. Many students are embarrassed by their asthma and therefore don't use their inhalers when they need to. Some students want to ignore their asthma and think it will go away if they ignore it. To help them deal with their asthma, I would like to present facts about the disease. I would like to teach my students about some of the known possible causes or triggers of asthma by relating it to indoor allergens and outdoor air pollution and possibly climate and weather. We will discuss some of the national agencies like the Environmental Protection Agency, Clean Air Act and the National Ambient Air Quality Standards that are working to make the air cleaner. We'll discuss factors found inside the home, school or any building, that may contribute to asthma symptoms. Finally, we will discuss professional help that is available to them and their families that can help them lead active, normal lives. My hope is that my students will learn facts about asthma that will help alleviate their embarrassment and encourage them to take healthy control of their asthma.

What is Asthma?

At a hearing before the Subcommittee on Public Health, Dr. John Carl gives a definition of asthma as a variable disease of muscle constriction. It has three

components. First the muscles leave their dilated states and become constricted and tightened down, narrowing the open space in the inside of the airways. Secondly, inflammatory changes in the wall of the airways cause them to be thickened, resulting in more narrowing. Thirdly, increased secretion of mucous in the airways then causes more secretion in the airways. It is that thickening of the airway and inflammatory changes which cause a narrowing of the airway and the mucous producing cycle causes air-trapping. These occurrences in the airways give the sensation a person would experience in holding the breath and then trying to breathe on top of that breath.

Onset of Asthma

In his presentation before the Subcommittee, Dr. Carl says asthma is first diagnosed in childhood with 50% to 80% of children with asthma developing symptoms before age five. Some symptoms are recurrent cough, shortness of breath, wheezing or chest tightness. Factors associated with the onset of asthma in childhood include: allergy, a family history of asthma, perinatal exposure to tobacco smoke, viral respiratory infections, male gender and low birth rate.

Rise in Asthma Prevalence

At a subcommittee meeting on public health, Dr. Carlos Camargo reports: Over the last 20 years, the prevalence of asthma in the U.S. has increased dramatically. In the early 1970's a national survey by the Public Health Service estimated that 3% of the U.S. population has asthma. The most recent figures put asthma prevalence at somewhere between 4 and 8%. An exact estimate is not available. If one assumes 6%, this would represent a 100% increase in asthma prevalence over the past 25 years. If we put this in absolute terms, that means an additional 8 to 10 million Americans with asthma.

Several studies suggest that the increase has been greater among children than adults. For example, between 1980 and 1994, asthma increased 160% among children age 0-4 and 74% among children age 5-14. Among adults age 35-64, the increase was 59%.

The increase also has been greater among women than men. For example, between 1980 and 1994, asthma increased 92% among women and 60% among men. Although data are less consistent, it appears that asthma prevalence also may be rising more among African-American and Hispanics than among Anglos. For decades, African Americans have had consistently higher asthma prevalence rates than Anglos. It appears that asthma morbidity and mortality has increased among poor, minority children living in the inner city according to Rodger Doyle in Scientific American.

Potential Causes of Asthma

The reasons for these trends are not known, but it has been suggested that there are three factors that contribute to these increases: (a) outdoor environmental factors,

specifically exposure to certain pollutants, (b) indoor/local factors and, (c) social/psychological factors (Camargo).

In 1992 the Texas Natural Resource Conservation Commission began deployment of an air toxics monitoring network. According to William Eschenbacher, et al of the U.S. Department of Health and Human Services, many health concerns drove the need for monitoring. Some concerns were national in scope particularly as they related to pollutants for which the U.S. Environmental Protection Agency established the National Ambient Air Quality Standards (NAAQS). The purpose of the network was to measure the long-term exposure of citizens to several speciated volatile organic air pollutants including: ozone, sulfur dioxide, nitrogen dioxide, carbon monoxide, lead, and particulate matter less than 10 microns in diameter. Some of these pollutants have been associated with the incidence and prevalence of asthma. The project included 15 monitoring sites in 10 counties across Texas, which sample 19 different pollutants. The sum of the monitoring gave extensive analyses of air quality data. Although no agency analysis was focused specifically on asthma, the NAAQS are established based on factors relating to asthma and other respiratory conditions.

Ozone was the most pervasive pollutant in Texas as well as the nation, reports Eschenbacher, et al. Ozone pollution in the troposphere ("bad ozone") is not to be confused with the stratospheric ozone layer ("good ozone") that protects us from harmful ultraviolet rays. Tropospheric ozone pollution is a result of motor vehicle exhaust combining with oxygen under the influence of sunlight. The reactivity of ozone causes health problems because it damages lung tissue, reduces lung function, and sensitizes the lungs to other irritants.

The studies showed that particulate matter contributes to the incidence and severity of respiratory disease. Particulate matter comes from a variety of sources including petrol and diesel exhaust, road dust, smoke and fly ash from industry, wind blown topsoil, backyard incinerators, bush fires, pollens from grasses and other plants. The particles of greatest concern are those which are small enough to be breathed into the lungs, states Eschenbacher, et al.

Nationally monitored carbon monoxide levels have decreased by 34% during the past 10 years as measured at the U.S. EPA's trend sites. This decline is attributed to vehicle emission reductions from cleaner cars and the particular area's inspection/maintenance system.

At a symposium entitled "Asthma as an Air Toxics End Point," Doyle Pendleton, et al presented information which directly considered the evidence that air toxics have important adverse effects in asthmatic patients. One effect has to do with allergic sensitization of the airways themselves. A genetically determined disposition is clearly important, and the concentration of certain allergens in indoor air (indoor and outdoor pollutants are often quite different) appears to be an important co-factor. The observation of a strong influence of maternal smoking as an additional factor suggests that inhaled pollutants and air toxics may alter the

integrity of the airway epithelial barrier, increasing the ease of sensitization to inhaled allergens.

Reports from a document in Environmental Health Perspectives, (1999) indicate that exposure to allergens and air pollutants such as particulate matter, environmental tobacco smoke and ozone affect a susceptible host resulting in airway inflammation and obstruction that leads to respiratory disease. Underlying and influencing each step of this process are societal susceptibility factors (e.g. psychosocial stress, high smoking rates, inappropriate medication use, poverty, and poor access to quality health care) that are specific to the inner city and serve to increase asthma disease.

Another important factor that influences host susceptibility to environmental stimuli is the genetic background of the person exposed. Both environmental allergen exposure and pollution can increase asthma disease. A person with the appropriate genetic susceptibility develops specific IgE antibody to the allergic exposure. Once sensitized, the patient is susceptible to acute asthma episodes in response to very small exposures of airborne allergens.

At a subcommittee hearing on public health, Dr. Carlos Camargo states that pollutants and particulate matter are associated with direct effects on the asthmatic airway and with indirect synergistic effects on allergic sensitization and inflammation.

Underlying these processes are important social or psychological factors that increase susceptibility in poor inner-city residences. Other influences include impaired access to good medical care for acute or chronic treatment of asthma, inappropriate use of beta-adrenergic agents, and emotional stress, depression, and anxiety. Environmental tobacco smoke, gas cooking, and the presence of pets have also been associated with asthma in cross-sectional studies.

Carlos Camargo, M.D. continues, saying that differences in asthma prevalence (or severity) across different geographic areas provide important clues regarding the causes of asthma, and can assist health planners responsible for controlling the current epidemic. For example, at a global level, many have observed that asthma tends to be more common in developed nations, where indoor living, lack of exposure to certain childhood infections, sedentary living, and obesity are more common. Similar studies also indicate that asthma is largely an urban phenomenon. For example, more than 20% of U.S. asthma deaths in one year occurred in New York City and Chicago, even though these places had only 7% of Americans with asthma. As with other chronic diseases, many different factors are probably responsible. Some of the factors that have been related to asthma, and which require further study, include increased rates of prematurity (and premature infant survival), decreased rates of breastfeeding, unfavorable changes in the outdoor environment (e.g. air pollution), unfavorable changes in the indoor environment (e.g. smoking, indoor allergens, irritant gases), changes in socioeconomic status, changes in diet and physical activity (and development of obesity), and changes in

the medical care environment (i.e. access to medical care). Dr. Camargo says that in 1999, surprisingly, we still lack a good understanding of how these factors relate to one another and of their relative importance in causing asthma. Furthermore, research is urgently needed in this arena, with particular attention to the role of early life factors, cockroach allergen, childhood infections, and obesity.

Given these risk factors for an American child in the inner city — living in a run-down tenement building spending hours upon hours watching television, afraid to go outside due to the fear of violence — one can easily imagine his or her dramatically increased risk of developing asthma. The more we understand this complex picture, the better we can identify potential targets for intervention and assist those responsible for designing and implementing such programs.

Effects of Climate and Weather

In an article entitled, "Climate and Health," Paul Epstein reports that connections between climate and disease are not new. Climate constrains the range of many infectious diseases, and weather affects the timing and intensity of outbreaks. The atmosphere is capable of holding 6% more water vapor with each 1° C rise in temperature. If warmer climate results in increases in evaporation and greater residence time for water vapor in the atmosphere, then as predicted by most climate models, humidity increases would fuel more intense storms and reinforce the greenhouse effect (the trapping of heat by atmospheric gases such as carbon dioxide). An increase in the cloud cover blocks outgoing heat, contributing to disproportionate warming at night the absence of nighttime relief from heat for urban residents is a factor in excessive heat-related deaths. and during winter-conditions that are advantageous for insects that transmit infectious diseases. Indonesian forest fires (the extended drought compounding hazardous land-clearing practices) resulted in widespread acute and chronic respiratory illnesses.

According to the web site "Health Sector" National assessment conclusions cannot be reached about the ultimate consequences of climate changes for air pollution related to health effects. There is a likely chance that some climate change will play a role in exposure to airborne allergens. Climate change will possibly alter pollen production in some plants and the geographic distribution of plant species. Consequently, there is some chance that climate change will affect the timing or duration of seasonal allergies. The impact of pollen and of pollen changes on the occurrence and severity of asthma, the most common chronic disease of childhood, is currently very uncertain.

Affects of Air Pollution on Asthma

In a publication from The Massachusetts Department of Public Health, Reva

Levin says air pollution is determined by a combination of weather conditions, and what's emitted into the air from a variety of sources — chiefly motor vehicles,

industry, power plants, construction equipment, and consumer products.

Air is essential to life. The average person takes about 20,000 breaths a day, processing almost 3,000 gallons of air or almost 2 gallons of air per minute.

Every summer, air pollution drives thousands of Massachusetts's residents indoors, where they also breathe asthma-causing toxins, and into emergency rooms. In fact, more than 750,000 people suffer from heart or lung ailments that are seriously aggravated by air pollution.

Diseases aggravated by air pollution include chronic sinusitis, bronchitis, asthma, and allergies. Studies suggest that air pollution also contributes to pulmonary problems in developing fetuses and young children, as well as to the immune system in adults.

The people most vulnerable to health effects of air pollution are children, the elderly, those who work or exercise outdoors, and those with chronic respiratory ailments.

Children are at the greatest risk from air pollution because they breathe in far more air per pound of body weight than do adults, and their respiratory systems are still developing. Scientists are concerned that repeated short-term damage from ozone exposure may permanently change the lungs.

A new study published by the American Lung Association adds to the substantial evidence that exposure to particulate matter or soot aggravates asthma in children. The study showed that the very smallest particulate matter, primarily those from industrial sources, can be inhaled deeply into the lungs where they can be absorbed into the bloodstream or remain lodged for extended periods of time. It is these fine particles that are most damaging to health.

Public Health Costs of Air Pollution

Some of the public health costs of air pollution include high rates of school absenteeism, rising health insurance costs, and millions of dollars spent in direct costs for medical and hospital care, medication and treatment.

High air pollution levels correlate with higher emergency room admissions and higher deaths from asthma and other chronic obstructive pulmonary diseases.

Asthma is the sixth most prevalent chronic condition among adults and children. In the last ten years the incidence of asthma has doubled especially among minority populations living in urban areas. Asthma is the most common chronic disease for children. It is the leading cause of school absenteeism; one third of all missed school days are attributed to asthma. For children, asthma is the number one cause of doctor's office visits, emergency room visits and hospital admissions.

History of Asthma

Evelyn Zamula reports in the FDA Consumer magazine that medications for asthma have come a long way since the days of the ancient Egyptians, who treated the disease by administering camel or crocodile dung or by burning herbs on a hot brick and having the asthma patient inhale the fumes. The great 12th century physician and Jewish theologian Moses Maimonides prescribed hot chicken soup.

According to Dr. Carl from the Department of Health and Human Services, the disease of asthma has been around a long time, about two millennia. The disease was known to Hippocrates. The word asthma is derived from the ancient Greek word meaning to breath hard or panting. And even the ancient world recognized that asthma could cause death by suffocation. In the 18th century, Thomas Watson described to the Royal Society his postmortem findings of an asthma victim, commenting on the over inflation of the lungs even after their removal from the thorax.

In the 19th century an attitude developed among physicians that asthma was a mild disease. This possibly came about because physicians were so regularly confronted with patients dying from progressive tuberculosis.

The observations responsible for changing this concept of asthma, and ultimately for the emergence of our current concept of asthma pathogenesis (disease producing) derived from studies of epidemiology, physiology, and pathology of the condition.

Research to determine the health hazards from particulates had its origins in a large body of research on the health effects of breathing polluted outdoor air. In the United States, outdoor air pollution research got its start in southern California. The first city in the United States to experience problems with photochemical air pollution (also known as smog) was Los Angeles, which had become highly industrialized and heavily populated during World War II. The number of motor vehicles was increasing more than twice as rapidly as the population. Smog first appeared in Los Angeles in the 1940s and air pollution research began shortly thereafter. Meteorologic and topographic factors undoubtedly aggravated the outdoor air pollution problems in Los Angeles.

Today the Southern California Chapter of AAFA (Asthma and Allergy Foundation of America) is the largest in the U.S. and raises thousands of dollars each year to operate three breath mobiles that bring free treatment and medication to students in public schools, according to the web site for the Allergy and Asthma Foundation of America (Alexander).

Treatment of Asthma

In a statement prepared by Dr. Camargo et al, for the subcommittee on Public Health, the committee members relate the process of treatment and goals of asthma therapy. Treatment of the first phase of narrowing can be accomplished by providing the patient with short acting "rescue" medication to dilate-or relax-the

constricted airway muscle. Such bronchodilator therapy may be successful in at least partially returning the patient back to their baseline level of airway function. This is a short-term effect, however, and has essentially no effect on the inflammatory component of asthma, which provides the driving force in long-term asthma disease.

Treatment of the second or inflammatory-phase of the asthmatic response is much more difficult since it requires commitment to a long-term therapeutic approach. This often requires the regular administration of long-term "controller" medications, such as inhaled corticosteroids, long considered the gold standard agents in diminishing airway inflammation.

Goals of asthma therapy include: prevention of chronic lifestyle-altering symptoms, prevention of symptom exacerbations, maintaining normal activity levels, maintaining normal lung function, optimizing medication therapy while minimizing drug side effects, and satisfying the child's and family's expectations for asthma care.

Asthma control may be defined as: no coughing or wheezing, no difficulty breathing, no nighttime awakening due to asthma symptoms, normal activities (including play, sports, exercise, school, and daycare), no acute episodes requiring acute physician visit, emergency room visit, or hospitalization, no school absences due to respiratory symptoms, no caregiver work absence. Achievement of these treatment goals can and should be expected.

As with many chronic illnesses, successful treatment of asthma is far more complex than having good pharmacological agents available. Successful treatment strategies require significant patient and parent behavioral commitments, such as participating with daily monitoring of pulmonary function, proper techniques for use of inhaled agents, and attention to environmental control measures to decrease exposure to known "triggers," such as irritants or allergens (tobacco or wood smoke, cockroach, house-dust mites, pets or molds), changes in weather or humidity, cold air, exercise, viral upper respiratory infection, or psychosocial stressors. Since the acute symptoms of asthma usually occur in a temporally variable pattern, use and understanding of written action plans to direct the patient how to "step up" self administered therapy help to prevent or attenuate overt asthma "attacks." The primary reasons for failure to achieve successful treatment are lack of-or nonadherence to-or appropriate treatment plans and either patient-specific or health system-associated barriers to care.

Conclusion

Observation and studies have been done to find out how indoor allergens and outdoor air pollution affect the lungs to bring about difficulty in breathing. Research and observation indicate that outdoor air pollution, indoor allergens and social and psychological factors may trigger asthma. There is indication that climate and weather changes may increase the incidence of respiratory problems.

There are national agencies working to test and clean the air in cities. Much study remains to be done on the causes of asthma. Adherence to a treatment program that involves both the person with asthma and their family can result in asthma control.

Lesson Plans

Objective: Familiarize students with kinds of outdoor pollution and indoor pollution in the environment.

As a group students will brainstorm different kinds of outdoor pollution. The teacher will write their ideas on the board. Then students will copy these ideas into their journals under the title Outdoor Pollution.

The teacher will explain the "bad ozone," ozone in the troposphere, as formed when motor vehicle exhaust combines with oxygen under the influence of sunlight.

Particulate matter will be introduced and examples given such as: dust, exhaust, road dust, smoke, fly ash from industry, wind blown top soil, pollens from grasses and other plants. (We get lots of this here in Albuquerque, much of it "natural").

Students will be asked to look up definitions for: pollution, troposphere, and environment.

Students will brainstorm different kinds of indoor pollution.

Students will write this information in their journals. Ideas will be shared and the teacher will add to their list.

Students will be informed that the journal keeping is a way to organize the information they are learning but also will be used as a resource for creating the booklet that they will make as part of the class. They will be given more information about the booklet in a few days.

Students will place petri dishes holding Vaseline around the school. The dishes will be collected in 24 hours. Students will observe what gets collected in the dishes.

Objective: Students will experience a breathing exercise and learn some facts about breathing.

Students will be asked to take a deep breath, filling the lungs. Then without exhaling, they will take another deep breath.

Related to the breathing exercise above, students will write about the experience in their journals and then read their writings out loud in class. Students will be told that the average person takes about 20,000 breaths a day, processing almost 3,000 gallons of air or almost 2 gallons of air per minute.

Students will draw and label the bronchial tubes. A health book can be used as a resource for the drawing.

The petri dishes will be collected. Students will observe the matter that has accumulated on the Vaseline. Students will discuss the different sources of particulates found in the dishes. We will discuss that this matter is in the air that we breathe. The matter can be viewed under a microscope or a dissecting scope if one is available from the science department.

The information from this lesson will be written in their journals. The bronchial tube drawing will also be put in the journal.

Objective: Students will listen and take notes as a respiratory therapist describes "Asthma."

Students will learn how to read a peak flow meter and determine their lung capacity for breathing.

Students will write a letter to their caretakers telling them what they learned from the speaker and what they observed about their own lung capacity.

Objective: Students will watch the movie, "Coaches Final Lesson" (APS has this video at Dlights.)

After the movie students will discuss the story as a class and then summarize it in their journals.

Students will read the newspaper for the "Pollution Count," on a daily basis.

Students will record the information in their journals.

Objective: Students will listen to a talk on "Triggers of Asthma" from a speaker from the American Lung Association.

Students will take notes in their journals.

Students will work in groups to make a collage titled "Triggers of Asthma", using magazine and newspaper pictures.

Students will go to the web site: www.lungUSA.org and find an article of interest and print it out. Students will read the article and write four sentences in their journals to summarize the article.

Objective: Students will learn the definitions of some vocabulary words.

Student will copy the words and write the definitions as we discuss each one.

Students will learn the definitions for: constriction, dilates, inflammatory, mucous, secretion, epithelial, environment, asthma, ozone (bad ozone) particulate matter, EPA, and trigger.

Students will make a "word search puzzle", using the vocabulary words. Another classmate will solve the puzzle.

Objective: Students will read a book from the student list about Asthma.

Students will give an oral book report.

Objective: Students will be given the assignment to make a booklet, "Facts About Asthma." The booklet should be written for a primary grade student to read and learn about the facts of Asthma.

The Rubric is as follows:

The information must be typed on a word processor. 10 points

All information must be written in complete sentences with capitalization and punctuation. 10 points

Paragraphs are to be indented. 5 points

Headings must be used 5 points

The topics to be included are:

Indoor and outdoor pollution 10 points

The petri dish experiment 10 points

Facts about our breathing 10 points

A picture with labels of the bronchial tubes 10 points

The definition of asthma 10 points

What the peak flow meter does 10 points

Triggers of asthma 10 points

Four vocabulary words that you learned and their definitions 10 points

The cover page must include:

The name of your booklet 4 points

Your name 4 points

Date 4 points

You may decorate your front page 10 points

Evaluation

Students will be evaluated on the daily class note-taking in their journals.

They will be given a grade for their book report.

Students will be given a grade for their Word Search Puzzle

Students will be given a grade for the letter they write to their caretaker.

Students will receive a grade for the Internet article they print out and summarize.

Students will receive a grade for the group collage.

Students will be given a grade for the booklet that they create.

Content Standards and Benchmarks

Content Standards and Benchmarks incorporated in the Lesson Plans.

Content Standards for Language Arts

Content Standard 1

Students will understand and use Language Arts for communication.

Benchmark: Students will use and expand vocabulary and linguistic skills to communicate effectively.

Content Standard 2

Students will understand and use Language Arts as a learning tool.

Benchmark: Students will explore and expand connections among areas of Language Arts study and apply critical thinking skills in listening, speaking, reading, and writing.

Content Standard 3

Students will listen and read for a variety of purposes.

Benchmark: Students will read and study a wide range of materials.

Benchmark: Students will select and use appropriate reading materials and other information sources for a variety of purposes.

Content Standard 4

Students will use a variety of listening and reading strategies appropriately.

Benchmark: Students will use technological resources to assist comprehension.

Benchmark: Students will use the social skills of audience behavior in a variety of settings.

Content Standard 5

Students will speak clearly and write effectively for a variety of audiences and purposes.

Benchmark: Students will expand writing skills and explore a variety of writing forms by writing on a regular basis.

Content Standard 6

Students will speak clearly, effectively and correctly.

Benchmark: Students will construct clear, concise, complete, mechanically and grammatically correct sentences and paragraphs.

Content Standard 7

Students will respond personally, analytically, and critically to written and spoken language and other media.

Benchmark: Students will apply media literacy, knowledge and skills to classroom and daily life.

Content Standard 9

Students will use language and literature to gain insight into their own and other's lives, and to build understanding of the moral and aesthetic dimensions of human experience.

Benchmark: Students will use language and literature to build understanding of self and others.

Contents Standards for Science

Content Standard 5

Students will acquire the abilities to do scientific inquiry.

Benchmark: Design an investigation or experiment to answer questions about local community issues that involve science.

Content Standards for Health Education

Content Standard 1

Students will comprehend concepts related to health promotion and disease prevention.

Benchmark: Describe how lifestyle, pathogens, family history and other risk factors are related to the prevention or cause of diseases and other health problems.

Materials Needed:

Speaker from American Lung Association of NM (1-505-265-0732) or you could present facts.

College Student in Respiratory Therapy at TVI (or maybe a school nurse)

Journals

Microscopes and or dissecting scopes and petri dishes from school science department

Health book for diagram and labels of the bronchial tubes

Vaseline

Video "Coach Learns lesson"

Internet for research sites

Newspaper to track "Pollution Count"

Annotated Student Bibliography

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A young girl describes what it's like to live with asthma.

Gosselin, Kim et al. The ABC's of Asthma: An Asthma Alphabet Book for Kids of all Ages. Jay Jo Books, 1998.

This book explains asthma, things that trigger asthma episodes, items used in the treatment of asthma and encouragement to children who have asthma.

Krementz, Jill. How it Feels to Fight for Your Life. Boston: Joy Street Books, 1989.

Fourteen children tell how they battle pain and the uncertainty and changes brought on by asthma.

London, Jonathon. The Lion Who had Asthma. Morton Grove, IL: A. Whitman and Co. 1992.

Sean's nebulizer mask and his imagination aid in his recovery following an asthma attack.

Murphy, Wendy B. Asthma. Conn: Millbrook Press, 1998.

The book explains the various causes of asthma, what happens during an attack and how the disease can be controlled.

Ostrow, William (Contributor). All About Asthma. Concept Books, 1989.

A child with asthma will find clear biological information and comfort in this book written by an asthma sufferer.

Winthrop, Elizabeth. Marathon Miranda. N.Y: Holiday House, 1979.

Miranda feels left out of everything. She meets a marathon runner and with apprehension starts to run.

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