Chapter 4
Screening for Asthma

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Introduction

Asthma is the most common chronic disease found in children in the United States. Many people believe that asthma is like other chronic diseases such as cancer and heart disease, which may progress slowly over the course of time. It is widely believed that early identification of these chronic disease processes will lead to early treatment and the prevention of some disease consequences. The purpose of this chapter is to explore the value of screening for disease and to evaluate the need to screen children for asthma.

The public is exposed to conflicting opinions about the value of screening for asthma. By screening, we mean population-based efforts to identify cases in people who are not currently exhibiting symptoms. The American Academy of Pediatrics (http://www.aap.org) and the National Institute of Allergies and Infectious Diseases (http://www.niaid.nih.gov) each suggest that no screening tests are currently available for asthma. Instead, asthma diagnosis begins when asthma symptoms are present. Nevertheless, the American College of Allergy, Asthma, and Immunology offers free screenings for asthma. In 2004, they launched an aggressive campaign to encourage screening programs. The public was told that asthma is a serious medical condition that could be life-threatening. Further, concern was raised because most people are exposed to irritants in the air. Reporters, such as Emily Senay, MD, MPH Health and Medical Correspondent for the CBS Early Show, argued that breathing the air "can be deadly." Senay's reports noted that death rates from asthma exceed 5,000 per year and that there are 500,000 asthma hospitalizations per year. She attributed 2 million emergency room visits to asthma and suggested that early identification of cases was necessary. The American College of Allergy, Asthma, and Immunology told the general public that asthma can be stimulated by allergens such as pollen, mold, pet dander, drugs or food additives, viral respiratory infections, exercise, and second-hand smoke. Those who ever experience shortness of breath were urged to see their physicians. Although most organizations suggest that screening is unnecessary, some controversy remains.

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Related Controversies Relevant to Lung Disease Screening

Controversies about screening for lung diseases have a long history. Perhaps the most interesting one concerns studies on screening for lung cancer. It is widely believed that early detection is the best approach to cancer control. The goal of screening is to detect cancer early while tumors are still small. Screening clearly does detect more cases. However, the goal of screening is not simply to detect tumors. It is to save lives. Identifying cancers early does not make much difference if people who have their cancers detected early do not live any longer than those who are not screened.

A widely cited study on cancer screening conducted by the Mayo clinic is at the heart of the controversy. In the Mayo Lung Project (MLP), 9,211 male smokers were randomly assigned to either chest x-ray and sputum cytology every 4 months or to usual-care. Six years later, the screened subjects were no less likely to

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die of lung cancer than those who were not screened. The investigators then extended follow-up through 1996 to allow a median follow-up time of 20.5 years. At the end of the extended follow-up, the lung cancer mortality was 4.4 deaths per 1,000 person-years in the screened group and 3.9 in the usual-care group. Although the differences were not statistically significant, the screened group actually had a higher lung cancer death rate. Screening did lead to the identification of many more cases, and to significant increases in lung surgery (Marcus et al. 2000). It was suggested that screening may have led to the identification of some cancers that would not have been clinically important if left undetected and other tumors for which treatment was not effective.

The study challenges our belief that all cancers must be treated. In fact, there may be many cancers that will not become life-threatening (Welch 2004). Two recent studies exemplify the controversy. The first study, reported in the *New England Journal of Medicine*, evaluated nearly 31,000 people for lung cancer using spiral CT technology (Henschke et al. 2006). The screening identified 484 patients with lung cancer and among these 80% survived for 10 years. This was a remarkable finding because the 10-year survival rate for lung cancer patients has been reported to be only 10%. The paper stimulated interest in spiral CT scanning and led to significant promotion of screening promotions. However, there are problems. First, CT technology is very powerful and it can find many cases that other methods would have missed. The 80% survival includes many people with very minor cases that may not have caused death if left untreated.

The other recent study, published in the *Journal of the American Medical Association*, also considers the screening of about 3,200 people. In this report, 144 had lung cancer and among these 38 died of lung cancer. In other words, the survival rate was about the same as expected without screening (Bach et al. 2007). The studies differed in several important ways. First, the *JAMA* study had a higher detection rate because the patients were older. Second, the study had a longer period of follow up. Part of the reason that survival looks so much better in the *New England Journal* article is that the denominator was inflated by detected cases were that not likely to become life-threatening. Thus, the percentage survival looks better (Black and Baron 2007). Overall the interpretation depends on the outcome measures. Since screening identifies cases earlier, it looks like it improves survival. However, when RCTs compare how many people are alive years after screening, those who have been tested have no advantage. The JAMA paper concluded that screening is not only ineffective, but it may be harmful because it leads to treatment that does not extend the life expectancy.

Part of the controversy about screening for asthma may be similar. Many children who are identified as at risk for asthma may do well without intervention. If they are screened and identified as at risk, they are likely to get treatment. However, it is not clear that the good health they have later in life can be attributed to the early intervention for asthma.

Conceptual Model: The Disease Reservoir Hypothesis

The purpose of health care is to improve health. Health outcomes can be defined in terms of only two concepts: quantity and quality of life. A successful treatment is one that makes people live longer and/or improves quality of life (Kaplan and Wingard 2000; Kaplan 1994). If a treatment neither extends life expectancy nor improves life quality, we must challenge whether it has benefit. Many people express their level of wellness in terms of numbers given by common medical tests, such as the forced expiratory volume in 1 s (FEV_1) or peak flow. These numbers have earned their importance because they are related to the chances of having a shorter life or of developing disabling illness in the future. Other biological markers are less clearly related to meaningful clinical outcomes. Tests or biomarkers should only be considered important if they are correlated with either quality of quantity of life.

It is becoming increasingly clear that there are also huge reservoirs of undiagnosed disease in human populations. As diagnostic technology improves, the healthcare system will be challenged because these common problems will be identified in many individuals who may not benefit from treatment because their length of life or quality of life will never be affected. The problem has been fiercely debated in relation to cancer screening tests such as mammography and prostate specific antigen (PSA) (Welch and Black 1997a; Welch et al. 2000).

According to the American Cancer Society, screening and early detection of cancers save lives (Kaplan and Groessl 2002). It is believed that the reservoir of undetected disease that might be eliminated through more aggressive intervention. Screening guidelines have been proposed and compliance to guidelines is now used as evidence for high quality medical care (McGlynn et al. 2003). Further, test rates are increasing because there are now financial incentives for physicians of offer specific tests, such as mammography (Epstein et al. 2004).

In order to better appreciate the problem, it is necessary to understand the natural history of disease. Public health campaigns assume that disease is binary; either a person has the "diagnosis," or they do not. However, most diseases are processes. It is likely that chronic disease begins long before it is diagnosed. For example, autopsy studies consistently show that most young adults who died early in life from noncardiovascular causes have fatty streaks in their coronary arteries indicating the initiation of coronary disease (Strong et al. 1999). Not all people who have a disease will ultimately suffer from the problem. With many diseases, most of those affected will never even know they are sick. For example, autopsy studies show that nearly half of men who die in their 1970s or 1980s have prostate cancer, (Gosselaar et al. 2005) and that as many as 40% of older women had some evidence of breast cancer at the time they died (Welch and Black 1997b). However, most of these people were never tested for these cancers and never knew of these problems. Diagnosis and treatment could have resulted in complications but are unlikely to have improved health (Welch and Black 1997a).

Among those who do have problems, some may not benefit from treatment. For example, if smokers are screened for lung cancer, many cases can be identified (Klingler 2004). However, clinical trials have shown that the course of the disease is likely to be the same for those who are screened and those not subjected to screening, even though screening leads to more diagnosis and treatment (Marcus et al. 2000). The harder we look, the more likely it is that cases will be found. Advanced MRI technology has revealed surprisingly high rates of undiagnosed stroke. One cross-sectional study of 3,502 men and women over age 65 found that 29% had evidence of mild stokes and that 75% had plaque in their carotid arteries (Manolio et al. 1999).

Black and Welch make the distinction between disease and pseudodisease (Black and Welch 1997). Pseudodisease is disease that will not affect life duration or quality of life at any point in a patient's lifetime. A diagnosis followed by surgical treatment may have consequences, often leaving the patient with new symptoms or problems as complications of the treatment. Outcomes researchers consider the benefits of screening and treatment from the patient's perspective (Kaplan 2000).

What is Disease?

The dictionary defines disease as "… the lack of ease: a pathological condition of the body that presents a group of clinical signs, symptoms and laboratory findings peculiar to it and setting the condition apart as an abnormal entity differing from other normal more pathological conditions." Disease, quite literally, is the lack of ease.

The dictionary definition of disease raises several important questions. Do we have disease if there is no lack of ease? In other words, what do we do about conditions that do not cause signs or symptoms? The answer is fairly clear. Pathological conditions that will cause signs or symptoms at some future time must qualify as disease. For example, high blood pressure is associated with the increased probability of stroke or heart attacks in the future (MacMahon 2000). Even though a condition does not cause symptoms or dysfunction now, it must be of concern if it will cause early death, dysfunction or symptoms in the future. But, let's take this one step further. Suppose that a condition does not cause symptoms or dysfunction now and it will never cause early death, dysfunction or symptoms. Does the condition qualify as a disease?

In modern medicine, we know of many conditions that represent genuine pathology of a tissue, but may never cause early death, dysfunction, or symptoms. In fact, this may be so for the majority of cases of prostate cancer (Black 1999). In addition, the substantial majority of cases of low-grade breast cancer, known as ductal carcinoma in situ, would never affect people's lives if they had not been diagnosed. Autopsy studies suggest as many as 60% of men die with prostate cancer while only about 3% of men die of prostate cancer. Similarly, autopsy studies have shown that nearly 40% of older women may have DCIS at the

time of death. However, only about 3% of women die of breast cancer (Welch and Black 1997b).

Is there a Disease Reservoir for Asthma?

Definition of Asthma

One of the biggest challenges in epidemiologic studies of asthma is how the condition is defined. Ford and Mannino (this volume) acknowledged the difficulty in defining asthma. Citing the Second Expert Panel Report of the Guidelines for the Diagnosis and Management of Asthma, they endorsed the definition of asthma as, "a chronic inflammatory disorder of the airways in which many cells and cellular elements play a role, in particular, mast cells, eosinophils, t-lymphocytes, neutrophils, and epithelial cells. In susceptible individuals, this inflammation causes recurrent episodes of wheezing, breathlessness, chest tightness, and cough, particularly at night and in the early morning. These episodes are usually associated with widespread but variable air flow obstruction that is often reversible either spontaneously or with treatment. The inflammation also causes an associated increase in the existing bronchial hyper-responsiveness to a variety of stimuli" (National Asthma Education and Prevention Program. Guidelines for the Diagnosis and Management of Asthma. Bethesda, MD, National Institutes of Health, NIH Publication no. 98–4051, 1997).

Evidence from the Behavioral Risk Factors Surveillance System suggests that there is an asthma epidemic. Cases of asthma have systematically increased between the year 2000 and 2004. There are at least two explanations for this trend. First, there may be a genuine epidemic. The second explanation is that the real rate of asthma in the population is about the same but more aggressive screening leads to an increase in the number of diagnosed cases. We believe the second explanation is a true possibility, given the greater attention to asthma screening in the populations.

Case Detection

The most common method for identifying asthma in epidemiologic studies involves questionnaires. The reliability and validity of these questionnaires have been challenged in a variety of studies (Peat et al. 1992). An alternative approach involves estimation of asthma rates from reviews of medical records. The difficulty with this approach is that it depends upon the reliability of physician assessment of asthma. We know there is remarkable variability in the rate of diagnosis of asthma and this may, in part, be attributable to the application of different standards by different clinicians. The use of administrative databases has also been considered, but these approaches suffer from the same types of biases.

In response to these concerns, it has been suggested that measures of bronchial hyperactivity be used for screening. The difficulty is that bronchial hyperactivity, even though considered to be a physiological standard, is not synonymous with asthma. There are false negatives. For example, one study estimated that 30% of children with asthma do not have bronchial hyperactivity (Phelan 1994). The same study showed that at least 15% of children who never show any other signs of asthma have positive results on the bronchial hyperactivity.

The issue of exercise-induced airway hyperresponsiveness has been studied by a variety of authors. In studies that exclude patients with a known diagnosis of asthma, the prevalence of exercise-induced bronchospasm has been reported to be 19% in a group of fitness center members (Mannix et al. 2003), and 29% among adolescents (Rupp et al. 1992). Among athletes, exercise-induced asthma rates between 11% and 50% have been reported (Parsons and Mastronarde 2005). Among athletes with a history of asthma, the rate has been reported to be as high as 90% (McFadden and Gilbert 1994). The United States Olympic Committee noted that 11.2% of all athletes who competed in the 1984 Winter Olympics experienced exercise-induced bronchospasm (Voy 1986). A similar study conducted as part as the 1996 Summer Olympic Games used questionnaires to identify which athletes had a previous diagnosis of asthma or used asthma medications. The study found that 16.7% reported the use of asthma medication or had a previous diagnosis of asthma. About 4% of the athletes were taking medication for asthma at the time of the Olympic games. Endurance athletic activities may provoke bronchospasm, and as a result, increase the diagnosis rate. In the 1996 Olympics, 50% of the participants in cycling and mountain biking had a previous diagnosis of asthma or were taking asthma medications (Weiler et al. 1998).

One study of high school athletes not involved in elite competitions noted an airway hyperactivity rate of 38% (Mannix et al. 2004).

Population-based studies using methacholine challenge are rare. However, the few that have been completed raise interesting issues. Population studies suggest that the prevalence of symptomatic asthma in the US population is about 4–7%. We would expect that some people are asymptomatic. This might inflate the expected number of people with reactive airways up to about 10%.

Weiler and colleagues are among the few who have done methacholine bronchial provocation (MBP) tests on asymptomatic people. As professors at the University of Iowa, who set up a challenge for the University of Iowa football team prior the teams' appearance in the 1982 Rose bowl football contest. To their surprise, 76 of 151 healthy athletes (50%) had positive tests. Among athletes with some respiratory symptoms, 76% had positive results.

Wyler and Ryan performed a similar study in relation to the 1998 winter Olympic games. Athletes were asked about past history of asthma, medication use and symptoms. A high percentage (22.4%) reported asthma medication use, a diagnosis of asthma, or both. Among Nordic, cross country, or short track events, the rate was 60.7%.

Athletes are more likely to be tested because they have good access to medical care. A diagnosis can get them medication that could enhance performance. If we were to look as aggressively in other populations, it is likely that higher asthma rates would be observed. It is likely that there is a large reservoir of undetected airway reactivity. Many of these cases will be labeled as asthma.

Psychological Distress and Diagnosis of Asthma

Asthma is the most common chronic illness during childhood in the United States. Further, there are substantial disparities in the rate of asthma. African-American children and adolescents have the highest burden of asthma. Latino children also have high rates of asthma. Figure 4.1, based on our California Health Interview Survey, shows the highest rates for American Indian/Alaska Native groups and African-Americans

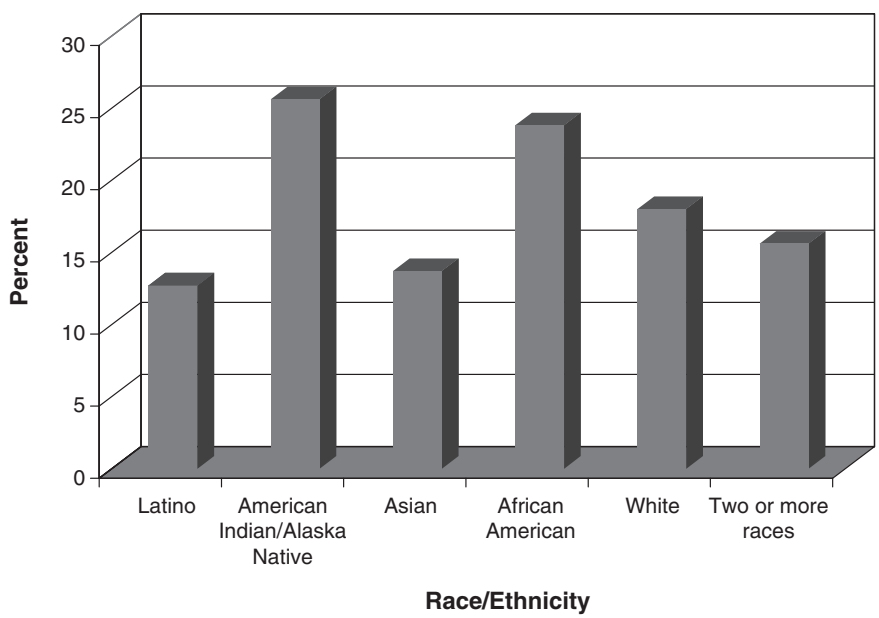

Fig. 4.1 Percent Ever Diagnosed With Asthma by Race/Ethnicty: California Health Interview Survey (CHIS), 2005

and the lowest rates for Latinos. However, the Latinos can be divided into various sub-groups, and when they are disaggregated Puerto Rican children have higher rates of asthma than African-American children. The California study is misleading because only a small portion of California Latinos are Puerto Rican. One study suggested that the rate of asthma among Puerto Rican children is 26%. By contrast, the rate of asthma among Mexican-American children is only 10% (Lara et al. 2006). Studies conducted on the island of Puerto Rico suggest that one in three individuals experience asthma during their lifetime (Ortega et al. 2002). Studies in primary care clinics among mainland Puerto Rican children suggest that nearly half experience asthma (Cloutier et al. 2002). In addition to case finding, evidence suggests that Puerto Rican children in the east Bronx experience a higher degree of functional limitations associated with asthma than do other ethnic groups. For example, they miss more school days and experience more asthma exacerbations (Findley et al. 2003).

The initial reaction to these differences may be that they represent genetic influences. However, there are other explanations. Since much of the diagnosis of asthma is based on self-report, the question of whether or not cultural issues may play a role needs to be explored. For example, there may be cultural difference in the way individuals describe symptoms. Feldman and colleagues (2006) argued that there is substantial co-morbidity between asthma attacks and internalizing disorders among Puerto Rican children. Studying 5–18-year-olds living on the island of Puerto Rico, they used the Diagnostic Interview Schedule for children to assess internalizing disorders. At baseline they evaluated whether or not the children had a lifetime history of asthma. Then, they followed the children 1 year later to determine whether or not they had internalized psychiatric or psychological problems. The results suggested that emotional problems may have been expressed as breathing problems similar to asthmatic symptoms. In other words, the high rate of asthma-like symptom reporting may have been an expression of psychological stress. Other studies have suggested that parents with mental health problems are more likely to report asthma symptoms in their children than parents who have not experienced mental health problems (Ortega et al. 2004a). Since many of the studies in Puerto Rico have used parent report of symptoms, the relationship between asthma and parental interpretation of symptoms is important. One evaluation of 1891 children between the ages of 4 and 17 noted that the diagnosis of asthma was associated with the diagnosis of depression and a symptom of separation anxiety. These results, again, challenge the use of parental reports that are common in epidemiologic studies of asthma (Ortega et al. 2004b). They also raise the question of whether the recorded diagnosis of asthma represents a consistent underlying pathology.

As a result of these concerns, it is very difficult to determine a reliable number for the proportion of children with asthma. However, we do know that there is rather remarkable variation, as pointed out in the Ford and Mannino chapter (this volume). For example, a study of worldwide variation in the prevalence of asthma symptoms (The International Study of Asthma and Allergies in Childhood (ISAAC) Steering Committee 1998) suggested that the 12-month prevalence of asthma was as low as 1.6% in Indonesia and as high as 36.8% in the United Kingdom. Although genetic and environmental factors affect asthma symptoms, it is unlikely that variations these large can be totally explained by these factors. Differences in asthma detection are likely to play an important role.

Deaths and Hospital Discharges

The disease reservoir hypothesis argues that more surveillance will lead to the identification of more cases of low threshold asthma, or more cases of pseudo-asthma. Thus the hypothesis suggests that the incidence of new cases should increase, but that the rate of serious problems should be unaffected. In order to investigate this, we used data from several sources. First, we considered an analysis completed by the American Lung Association. They examined asthma mortality rates standardized to two populations: 1940 (lower line of Fig. 4.2) and 2000 (upper line of Fig. 4.2). The International Classification of Diseases was revised in 1979 and again in1996. The figure considers the years 1979 through 2003. The changes in asthma death rates may reflect changes in the classification systems. Prior to 1996, asthma was grouped with emphysema and chronic bronchitis to form the category chronic obstructive pulmonary disease (COPD). It is likely that emphysema was increasing between 1979 and 1996. Overall, the best estimate is that asthma deaths have been relatively steady.

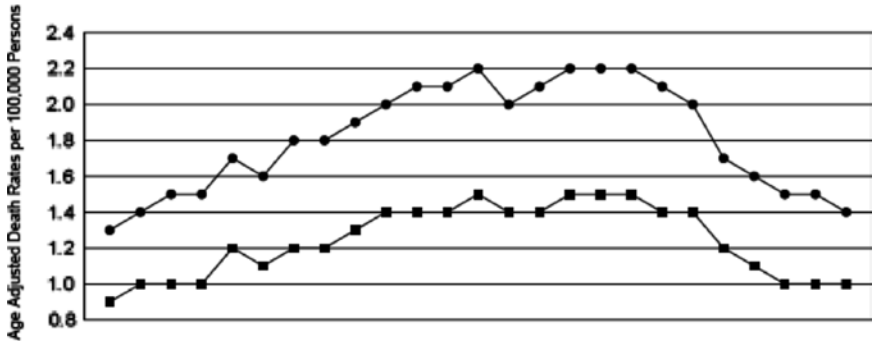

Fig. 4.2 Asthma age adjusted death rates based on the 1940 and 2000 Standard Population, 1979-2003

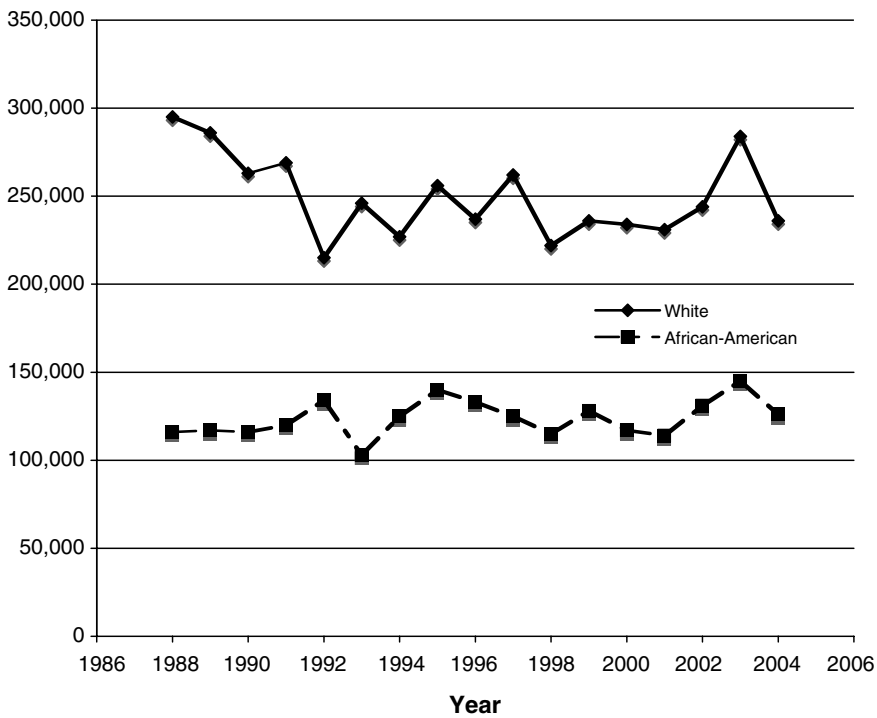

Fig. 4.3 Asthma Hospital Discharges/10,000 Population by Year and Race. Data from NHIS National Hospital Discharge Survey

Further evidence comes from the study of hospital discharges. If there was really an epidemic of serious asthma, we would expect that there would be an increase in the number of people admitted to hospitals with asthma. Figure 4.3 uses data from the National Center for Health Statistics, National Hospital Discharge Survey to explore this issue. For both White and African-Americans, the rate of hospital discharges per 10,000 persons in the populations remained relatively steady between 1989 and 2004. The finding that there are more incident cases of asthma, but not more serious outcomes is consistent with the disease reservoir hypotheses predictions. More screening finds more cases, but many of these cases will not have serious health consequences.

What Happens to Undetected Cases?

To appraise the value of screening, we must know the natural history of the condition. Unlike some cancers that are expected to progress over the course of time, evidence does not clearly show that cases of asthma progress from mild to moderate to more severe conditions. For example, if asthma goes undetected and it is a progressive disease, we would expect it to emerge at latter ages. Thus, it would be predicted that the number of cases would increase with age. Figure 4.4, using data from the population-based.California Health Interview Survey shows that the proportion diagnosed with asthma does increase until about age 17. Thereafter, it declines and levels off. Failure to detect asthma early in life does not appear to lead to an increase in new cases later in life.

The Advantages of Early Intervention

Early identification of asthma would be important if early treatment changed the course of disease. It remains unclear whether early treatment has an important impact on the course of the disease. Systematic clinical trials have been used to address this issue. For example, Bisgaard and colleagues (2006) studied 1-month-old infants. They randomly assigned the infants to a 2-week course of inhaled bedesonide (400 UG/day) or to a placebo. All of the infants had demonstrated a 3-day episode of the wheezing prior to entering the study. Children were followed for 3 years to determine the number of symptom-free days. This study showed that infants treated with active medication were symptom-free on 83% of the days while those treated with placebo were symptom-free on 82% of days. These differences were nowhere near statistically significant. Further, a number of children who had persistent wheezing in the active medication group (24%) did not significantly differ from the percentage of children who experienced wheezing in the placebo group (21%). Overall, the study offered no evidence that early intervention affected the course of the disease.

Criteria for Screening

A variety of groups have proposed guidelines for screening. On an international level, Wilson and Jungner proposed the most commonly cited criteria (Feldman et al. 2006). According to these authors, ten criteria should be met in order to justify a screening test. The World Health Organization has adopted these

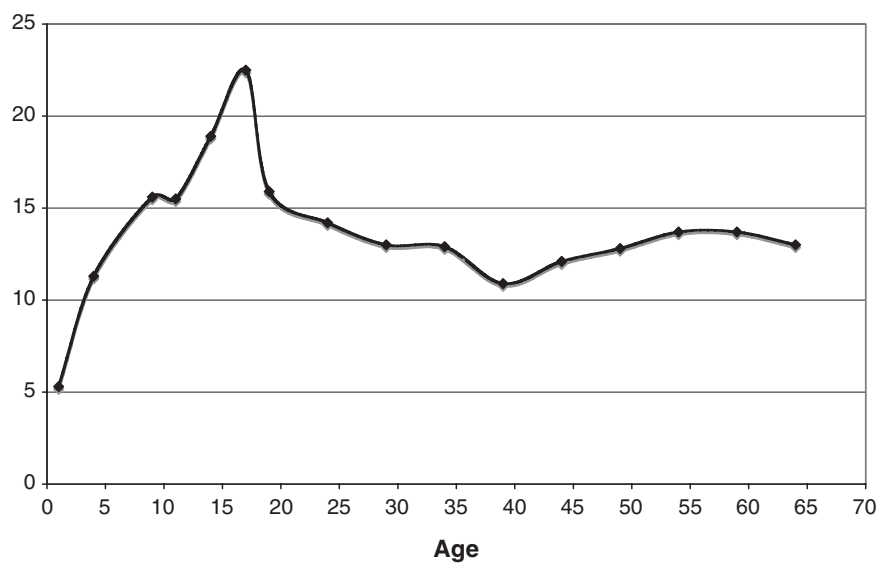

Fig. 4.4 Percent Asthma Diagnosis by Age: CHIS 2005

Table 4.1 Wilson proposed ten criteria for screening and the decision to screen for asthma

Criterion	Met	Comment	Reference
The condition should pose an important health problem	Yes	Asthma is an important health problem. There is an apparent epidemic of asthma in children	Cloutier et al. 2002
The natural history of the disease should be well understood	Unclear	Although the natural history of asthma has been studied, considerable controversy remains about what happens to asthma and reactive airways if they are untreated. NHIS data suggest that prevalence declines with age	Fig. 4.4
There should be a recognizable early, latent, pre-symptomatic stage	No	Asthma typically emerges as a symptomatic disease. There is not sufficient evidence suggesting that early intervention modifies the disease process	Bisgaard et al. 2006
Treatment of disease in the early stages should be of more benefit than treatment in a later stage	No	Emerging evidence questions whether or not early treatment for asthma provides benefit	Bisgaard et al. 2006
There should be a suitable test	No	A variety of methods are available to test for asthma. Many epidemiologic studies are based on self report-questionnaires. The reliability of these questionnaires has been challenged	Peat et al. 1992
The test should be acceptable to the population	No	Although questionnaires are minimally invasive, they are also less reliable. Challenge tests involve expense and are less acceptable to the population	Peat et al. 1992
There should be adequate facilities for the diagnosis and treatment of abnormalities detected	No	Increasingly, asthma is a disease of low-income children. These are the same populations that tend to have inadequate access to healthcare. Further, treatment of asthma is moving toward high expense medications	Phelan 1994
There should be an agreed policy on who to treat	Unclear	Over the last few years, treatment guidelines for the management of asthma have immerged. Thus, there is a growing consensus on who should be treated for symptomatic asthma. On the other hand, there appears to be no clear consensus on the management of children with the early stages of asthma or those in the pre-symptomatic stages	
Case finding should be continuous	No	Screening must be repeated at intervals. If screening is undertaken, it needs to be repeated on a regular basis. There have been significant challenges to the notion that we should screen for asthma. Thus, it is unclear that regular interval screening should be applied	Gerald and Sockrider 2007
The costs of screening should be economical in relation to total healthcare – all costs must be balanced against benefits	No	The costs of screening may be substantial, however the benefits of screening are not well understood. At this time, it does not appear that benefits exceed costs	Screening not studied. Optimal treatment (Simonella et al. 2006)

criteria and they are summarized in Table 4.1. The Table also comments on whether each criterion is met for asthma screening. For example, asthma is clearly an important public health problem, and there is accepted treatment for those recognized with the disease. On the other hand, several of the criteria are not met. For example, it is not clear that we understand the natural history of the disease. Further, it is not clearly

understood that there is a latent or early symptomatic stage other than truly symptomatic expression of asthma symptoms. Further, it is not clear that there is a suitable screening test that is acceptable to the population.

Gerald and associates, on behalf of the Behavioral Science Committee of the American Thoracic Society, considered the issue of screening for asthma (Gerald and Sockrider 2007). They systematically worked through the WHO guidelines and concluded that the adoption of population-based asthma case detection is not appropriate at this time. The statement is in contrast to the American College of Allergy, Asthma, and Immunology who argue that systematic screening may be of value to children. The ATS committee challenged the evidence supporting the position. However, they noted that too little was known about asthma phenotypes and the natural history of asthma to recommend systematic screening. Further, the cost-effectiveness of asthma screening remains unknown.

Summary

Screening for disease is an attractive alternative. If a disease progresses slowly, early identification may lead to early treatment and the prevention of adverse health effects. Criteria have been established to help decide whether screening for disease is meaningful. This chapter challenges the value of screening for several diseases. Further, we explore the potential of screening children for asthma. At this point, few of the criteria for screening are met. We conclude that there is not sufficient evidence to screen children for asthma. Further, it is suggested that screening may not be a valuable use of health care resources.

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