Asthma is a major health problem in the United States and throughout the world. In the United States, it affects approximately 10 million people, 3 million of whom are under the age of 18. It accounts for 458,000 hospitalizations and more than 6.5 million physician visits annually. Approximately 2 million people with asthma suffer from limitations in activity due to their disease. Direct and health care expenditures are high, estimated to exceed $3.0 billion per year in the United States alone. Although mortality from asthma is relatively low, it is 3 times higher in black men and women compared to white individuals in almost all age groups.

Both research and research training related to asthma are important priorities of the National Heart, Lung, and Blood Institute (NHLBI). The major scientific efforts which receive support by the Institute address the characteristic features of asthma, namely bronchial hyperresponsiveness, constriction of the airways, and increased secretion of mucus, as well as the diagnosis, treatment, and prevention of this disease.

NHLBI Research Spectrum

The NHLBI has developed its research programs along a common theme, to create and support a broad spectrum of opportunities encompassing basic research, clinical research, population-based investigations, and research on prevention and health education. The Institute has a legislative mandate to transfer findings from medical research to the community through professional, patient, and public education programs. Active programs throughout this spectrum assure the potential to continually capitalize on generation of new research questions for scientific investigations while assuring that the medical findings are made available to the public in a timely manner.

There have been many accomplishments in basic and clinical research leading to a better understanding of the primary manifestations of asthma. There are many studies at the cellular and molecular level to examine the causes of airway reactivity and the role of different cellular components involved in the inflammatory process. Research investigations are also underway on several chemical substances (mediators, cytokines) which are important in the chain of events that produce inflammation and hyperresponsiveness, as well as the role of neural mechanisms in the development of airway obstruction. Because excessive and thick airway secretions are present in the lungs of individuals with asthma, NHLBI-supported investigations are determining the role of inflammatory mediators, neural peptides, and specific secretory cell types in regulation of mucus secretion.

Data from several studies indicate that behavioral issues may contribute to the morbidity and mortality from asthma. For example, the patient may fail to recognize early warning signs, appreciate the severity of the attack, take appropriate medications, or get medical help quickly. The physician may fail to diagnose asthma, initiate appropriate therapy or follow-up with high-risk patients. In addition, the physician may not adequately monitor the patient's condition using lung function tests, recognize the gravity of the attacks that occur, or educate the patient to prevent symptoms or develop an asthma attack crisis plan.

In the 1980s, several randomized, controlled clinical studies were sponsored by the NHLBI which showed that patient education programs can effectively reduce the number of asthma attacks, emergency room visits, and hospitalizations, particularly in previously hospitalized children. Days lost from school decreased, and school grades improved. Also, education programs significantly reduced health care costs in high-risk populations. Results from these studies set the stage for implementation of a National Asthma Education Program.

National Asthma Education Program

Over the years, the NHLBI has implemented several successful education efforts, among them the National High Blood Pressure and National Cholesterol Education Programs. Success of these efforts can be attributed to the availability of solid scientific evidence on which the program goals are based, operation of the program through the active involvement of intermediary organizations, and an administrative structure to develop consensus communication and education strategies.

The National Asthma Education Program (NAEP) was implemented in 1989 with the following three goals:

1. Raise the awareness of patients, health professionals, and the public that asthma is a serious chronic disease.
2. Ensure the recognition of the symptoms of asthma by patients, families, and the public and the appropriate diagnosis by health professionals.
3. Ensure effective control of asthma by encouraging a partnership among patients, physicians, and other health professionals through modern treatment and education programs.

The NHLBI serves as the Federal agency responsible for the overall administration of the NAEP. However, a key strategy is the active involvement of a coordinating committee, chaired by Dr. Claude Lenfant, Director, NHLBI, with representation from 29 national medical and health professional associations, voluntary health agencies, and Federal agencies. The responsibility of the coordinating committee is to identify major issues of concern and develop program strategies to curtail the increasing asthma problem, and thereby, improve health status. The committee has divided its responsibilities into 3 major areas: school asthma educa-

*From the National Heart, Lung, and Blood Institute, Bethesda.
tion, professional education, and patient/public education. Information packages about asthma, targeted to specific groups, as well as goals for evaluation, are among the activities planned.

In each area, particular emphasis will be given to high-risk and minority populations. For example, asthma guidelines for emergency room practitioners will be prepared in collaboration with the American College of Emergency Physicians and the National Medical Association and will be disseminated to emergency rooms, especially in urban areas with large minority populations.

**EXPERT PANEL REPORT ON DIAGNOSIS AND MANAGEMENT OF ASTHMA**

The first task of the NAEP was to reach a consensus on the diagnosis and management of asthma. This lead to the implementation of an expert panel and preparation of a report* which received the endorsement of all member organizations participating in the coordinating committee in February 1991. (A copy of the report is available by writing the National Asthma Education Program, National Heart, Lung, and Blood Institute, NIH, Bethesda, Maryland, 20892.)

The main features of the report are based on the principal that asthma is a chronic disease with acute exacerbations and requires continuous medical care. Effective management of asthma relies on the following 4 integral components: (1) objective measures of lung function to assess the severity of asthma and to monitor the course of therapy; (2) comprehensive pharmacologic therapy designed to reverse and prevent the airway inflammation characteristic of asthma as well as to treat airway narrowing; (3) environmental control measures to control allergens and irritants that induce or trigger asthma exacerbations; and (4) patient education that fosters a partnership among the patient, his or her family, and the clinician. The report also identified other areas which require consideration in the management of asthma, such as patients at risk for asthma-related death; pregnancy and asthma; occupational asthma; and asthma in the older patient.

**NHLBI RESEARCH DIRECTIONS**

Implementation of the NAEP completes the biomedical spectrum. Information learned from implementation of this program has already had an important impact on our research efforts. A few examples are provided here.

In reviewing the statistics available for asthma morbidity and mortality, it became clear that asthma has a significant effect on minority populations in this country. A number of factors may be contributing to this problem, including lack of access to continuing medical care, lack of adherence to treatment regimens, problems associated with self-management, low educational and literacy levels, inadequate housing, and language and other cultural differences between health care providers and patients that impede effective interaction.

Through its demonstration and health education research grant program, the Institute launched a research initiative designed to address the issue of controlling asthma among black and Hispanic children. Research approaches underway at 5 participating institutions include the following: developing school and community-based outreach efforts to identify and assist children with asthma; offering comprehensive medical care to asthmatic children in health clinics already providing well-child care; educating clinic physicians about asthma; educating families about asthma management; providing a 24-h telephone advice service staffed by a physician; providing a state-wide program to identify and provide comprehensive medical care and self-management education to rural Hispanic children with asthma and their families.

This one special grant program was initiated in 1990; investigators are working together to learn from the multiple approaches that are being used. This is just a beginning to an important problem; there is much left to do in health education research and behavioral medicine related to asthma. Because we are highly committed to programs that have an impact on minority populations, the NHLBI initiated a panel of minority pulmonary physicians to develop a series of program objectives that may help address some of the issues that relate to pulmonary health.

In looking at prevalence of asthma by age group, it appears that prevalence is higher in boys than girls under the age of 18; and in men than women over the age of 65. However, in the groups 18-44 and 45-64, prevalence appears to be higher in women. These data are interesting and do need to be further examined. If correct, there are several issues to address. First, why is asthma higher in women in this age group; what is the impact of treatment, especially steroids, on bone loss in postmenopausal women; and what about the treatment of asthma in women who are pregnant?

The NAEP recently launched a special working group on pregnancy and asthma. This group has had its first meeting; it plans to produce its report by the end of the year. Prior to its release, it will have received the full endorsement of the NAEP. Representatives of the American Association of Obstetrics and Gynecology and the National Institute of Child Health and Human Development participate in this panel. The group has already identified a variety of questions that require research investigations.

While preparing the Guidelines for Management of Asthma, many areas were identified where physician decisions are predicated on very little scientific data. There are many opportunities for clinical investigations. The Institute recently awarded contracts for the "Childhood Asthma Management Program," a multicenter investigation to examine the effects of inhaled steroids on lung growth and development; one third of the children who participate in this study will be drawn from minority populations. We need to learn more about β₂-agonists and their interactions with steroids in the treatment of asthma, and there is always the need to develop new drug delivery systems and ways to sustain drug action.

There are multiple areas for basic research investigations. For example, the NHLBI recently announced a program on the genetics of asthma; research groups who submit applications in response to this announcement will be required to include minority populations in their protocols. There are many other topics that require additional research investigations, including continued work on pathogenetic mechanisms, including inflammation, cell adhesion mechanisms and their role in asthma, and the role of environmental...
factors in the genesis of asthma.

CONCLUSIONS

The NHLBI asthma program spans the biomedical research spectrum. In addition to active projects and many future needs in basic, clinical and health research, the National Asthma Education Program, through its coordinating committee structure, is actively identifying needs and opportunities to reach its multiple program goals. A variety of directions are planned to reach the public, the patient, and the health care professional to assure that children and adults with asthma are identified and effectively treated. Each of these program areas will have special initiatives to reach minority populations. Through this network of medical organizations, voluntary health groups, and federal agencies, the approach has proven effective in our fight to reduce mortality and morbidity from heart disease. We have every reason to believe it will be effective in our fight to reduce the morbidity and mortality from asthma.

REFERENCES

1. Mellins RB. Patient education is key to successful management of asthma. Am Rev Respir Dis 1989; S47-S52