State of the Art in Asthma Education: The US Experience*

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HISTORICAL PERSPECTIVE

Formal development of asthma education programs began in the early 1970s. More powerful inhaled medications had become available, yet their benefits were not being fully realized. Patients’ technique in using metered-dose inhalers, upon which so much of the current pharmacologic management depends, was seriously inadequate. High rates of nonadherence to medication regimens were documented for several chronic health problems, and adherence was poorer for more complex regimens and for medications that had to be used when the person was not having symptoms—both of which were typical of asthma regimens. Environmental control practices of patients were notoriously problematic and, although somewhat less prevalent than among nonasthmatics, active smoking was, and is, an issue for many persons with asthma. These observations suggested that the asthma education occurring in the course of clinical contacts was not as effective as it needed to be.

Recognition of the need for asthma patients to better understand their condition and take a more active role in its management also stemmed from a growing interest in a variety of behavioral factors in the etiology and management of health problems and a recognition of the social and economic burden of chronic illnesses. These factors led to several early efforts to develop more systematic asthma education programs: (1) an emergency room educational intervention by Maiman and colleagues; (2) the educational and rehabilitation efforts of Thomas Creer at the Children’s Asthma Research Institute/National Asthma Center in Denver; (3) the development of the booklet Teaching My Parents About Asthma by Parcel et al; and (4) the Buffalo, NY, family asthma program.

Development of asthma education programs was given impetus in the mid-1970s by the National Heart, Lung, and Blood Institute (NHLBI) when it issued a request for applications to “develop and evaluate self-management systems for childhood asthma.” The following four programs for parents and children were developed and tested: (1) Open Airways by investigators at Columbia University; (2) Living with Asthma at the National Asthma Center; (3) AIR POWER and AIR WISE at the American Institutes for Research; The evaluations were published in the scientific literature. In addition, the NHLBI also published all four programs and fostered their dissemination through regional workshops throughout the United States. In this same period, other programs were developed, such as Asthma Care Training (ACT) for Kids developed by Lewis et al, the office-based program of Fireman et al, and the American Lung Association’s (ALA) packaged program, Superstuff.

The 1981 Conference on Self-Management of Childhood Asthma and the subsequent workshop by that name revealed some of the gaps in the work then underway: a lack of attention to developmental issues in some programs and various weaknesses in evaluation designs. While a number of programs could claim evidence of effectiveness obtained in randomized control trials, uncontrolled studies were common, and the methodology for evaluation had not matured to the point that there was agreement on the most important end points to use to evaluate program effectiveness. Patients or parents’ knowledge about asthma rather than measures of actual asthma management practices, clinical status, or health-care utilization was often the only end point reported.

Early asthma education efforts were concentrated primarily on the needs of children from 6 or 7 to about 13 years of age; little or no attention was given to adolescents, adults, or very young children, and relatively little to other special-needs populations. By the mid-1980s, however, this had begun to change, and there was evidence that education efforts were beginning to recognize the epidemiology of asthma morbidity and mortality in several respects. A special 1988 issue of Health Education Quarterly on the “second generation” of asthma education programs included reports of three programs aimed at adults with asthma, as well as one attempt to extend the ACT program to California Hispanic children and one report of a pediatric asthma program in Italy.

The 1980s also saw new developments in asthma...
epidemiology that influenced the course of asthma education. Earlier, around 1960, England had experienced a sudden, marked increase in asthma deaths, leading to investigation of the possible role of potent nonselective beta-agonist bronchodilators as a cause of death. Later, New Zealand, and to a lesser degree Australia, the United States, and other countries experienced a significant increase in asthma mortality, hospitalization rates, and prevalence that continued through the 1980s and has been linked to undertreatment and lack of response to symptoms, with environmental factors and patient characteristics being implicated. Data from the United States and various other countries also indicate that the problem is unevenly distributed, with more deaths among the very young and the elderly, the poor, inner-city dwellers, and indigenous populations in some countries.

These findings focused worldwide attention on asthma mortality. The need for asthma education began to be more widely acknowledged, and programs developed for many special populations in the United States and in other countries. The US National Institute of Allergy and Infectious Diseases, for example, launched the National Cooperative Inner-City Asthma Study to investigate factors associated with asthma morbidity and to study the impact of education and improved medical care on inner-city children. Evans and colleagues developed and evaluated a school-based asthma education program. In addition to developing an adult asthma education program, the present author (Wilson) and colleagues began development of the Wee Wheezers program for parents of children under the age of 7. Dr. Bailey and colleagues continued their research on an educational program for adults at the University of Alabama-Birmingham.

In 1989, the NHLBI funded five projects aimed at achieving long-term control of asthma among black and Hispanic children, at Columbia University, the University of New Mexico, Washington University School of Medicine in St. Louis, the University of Texas Health Sciences Center, San Antonio, and Howard University College of Medicine in Washington, DC. In the fall of 1993, three additional educational efforts were funded to control asthma in low income and inner-city populations. One will develop a computer-assisted multimedia instructional feedback system for African-American and Hispanic students. A second, in Roxbury, Mass, will develop community- and school-based patient education, as well as professional education programs. The third project involves our own research team, the San Joaquin Valley Health Consortium, the American Lung Association of Central California, and the Kaiser Health Care Program. Its overall goal is to reduce asthma mortality and morbidity in Fresno, Calif, which has one of the three highest mortality rates among US counties. The Fresno Asthma Project attempts to bring the three components of the US National Asthma Education Program—public, patient, and professional—down to the community level, with special attention to the needs of Fresno’s large Hispanic and Southeast Asian populations. These various projects in the United States are extending asthma education to black and Hispanic children in eastern inner cities and to rural and urban Mexican and Central American Hispanic and Southeast Asian children in the Southwest and West. It has been particularly important that these projects recognize and address the fact that patient education cannot be effective in the absence of adequate medical care for asthma.

The National Asthma Education and Prevention Program (NAEPP) is the most far-reaching asthma education effort to date and involves many federal agencies, medical specialty societies, and voluntary organizations. It is useful to describe its various activities and plans. The NAEPP, which began in 1989, is modeled on the national hypertension and cholesterol education programs, and its goals are the following (1) raise awareness of patients, health professionals, and the public that asthma is a serious chronic illness; (2) ensure the recognition of the symptoms of asthma by patients, families, and the public and appropriate diagnosis by health professionals; and (3) ensure effective control of asthma by encouraging a partnership among patients, physicians, and other health professionals through modern treatment and education programs.

In 1991, the NAEPP published the well-known Guidelines for the Diagnosis and Management of Asthma. This report, by the NAEPP’s expert panel, placed emphasis on the use of disease-modifying, anti-inflammatory agents, rather than bronchodilators, as first-line therapy. It stressed the use of a stepped-care approach to therapy and objective monitoring of pulmonary function by health professionals and patients. The Guidelines followed an earlier Canadian report on asthma management and were followed by the International Consensus Report on Diagnosis and Management of Asthma, reflecting approaches to asthma therapy throughout the western world. While some of its recommendations have been challenged, it is significant that the Guidelines clearly give patient education an essential role in adequate medical care of asthma. Both the Guidelines and the Consensus Report include practical resources to assist clinicians in educating patients. The NAEPP also has produced a supplementary report on the Management of Asthma During Pregnancy and will issue a report in 1994 on
Management of Asthma in the Elderly, which will contain strategies for patient education.

In 1992, over 900 people attended the NAEPP's First (US) National Conference on Asthma Management. This growth in interest in asthma and asthma education is also seen in the time devoted to this topic in the past few years in meetings of the various medical specialty societies. Further evidence of the dramatic increase in attention to asthma education can be seen in the increased number of articles on this topic since 1974. From 1966 to 1974, fewer than one article per year was indexed in MEDLINE under the combined headings ASTHMA and PATIENT EDUCATION. This increased to 4, 13, and then 24 articles per year in each of the succeeding 5-year periods, and has averaged 44 per year since 1990.

**Effectiveness of Available Asthma Education**

At present, prevalence and hospitalization rates for asthma remain high. While there are indications that asthma mortality in the United States may have leveled, it certainly has not begun to decrease appreciably. Since the majority of all asthma deaths are considered preventable, the need for widespread efforts to control asthma remains acute. While control may require addressing societal problems of access to health care and air quality both within and outside the home, there is a growing consensus that patient education is fundamental to progress. Hence, it is appropriate to consider what is now known about the effectiveness and scope of existing asthma education programs.

**Pediatric Asthma Education**

Several published reviews of pediatric asthma education already exist. In 1987, Wilson and Mellins summarized the evidence on the effectiveness of available (i.e., published) programs for school-aged children and their parents. Our review was restricted to published programs because programs that have merely been described in an article but not fully documented and published are impossible to replicate, and however meritorious, cannot be widely disseminated. The evidence concerning the effectiveness of these programs was classified using a system originally developed by the Canadian Task Force on the Periodic Health Examination and subsequently modified by the US Task Force on Preventive Services, ie, whether the evidence came from (1) a well-designed randomized clinical trial; (2) a controlled trial without randomization; (3) a case-control analytical study; (4) multiple time series or a dramatic effect in an uncontrolled experiment; or (5) the opinion of respected clinicians or a descriptive study. Six published programs were identified as having evidence of effectiveness on at least one relevant outcome measure in a randomized control study. Two additional programs had evidence only from an uncontrolled time series (pre-post) design. The reviewers concluded that there was credible evidence of the effectiveness of asthma education, but also that health-care providers and administrators would not be convinced that asthma education is critical to care, and that little scientific progress would occur in our understanding of how best to educate patients with asthma, unless one could cite evidence obtained in well-designed, randomized control studies.

A subsequent review in 1991 by Evans and Mellins added only one program to the earlier list of pediatric programs with evidence of effectiveness obtained in a randomized control trial, bringing the total to seven, and a review by Clark and colleagues in 1993 did not increase that list.

Given the available educational programs and work now in progress, we clearly have many of the educational and behavioral change tools needed to make major inroads in control of asthma in the school-aged population. Attempts are underway to address the needs of school-aged children in high risk groups, such as urban minority children, but their success is not yet clear.

However, we have not moved forward very rapidly in meeting the unique educational needs of parents of children up to the age of about 6, especially those aged 3 and under. For the past 5 years, the development and evaluation of an asthma education program for parents of children under the age of 7 has been underway that uses small group education incorporating video technology. Results of the developmental evaluation in a randomized control study with approximately 80 children have been very encouraging—education was associated with a reduction in daytime and nocturnal symptoms compared with the control subjects. Results of the full 2-year follow-up of 350 children are being analyzed and will be reported over the next year. The program itself, Wee Wheezers, will be made available in early 1994. Although it in now known that increases in asthma hospitalization in children are due, almost exclusively, to increases among children under the age of 5, Wee Wheezers appears to be the only program being published that specifically addresses the educational needs of parents of these children. No matter how useful this program proves to be, additional efforts are needed, especially to insure that parents receive education as soon after the diagnosis as possible.

**Asthma Education for Other Age Groups**

Numerically, there are many more adults than children with asthma, because their gross prevalence
rates are roughly equivalent, and there are many more adults than children in the population. Although there have been a number of reports of beneficial outcomes of unpublished asthma education programs for adults, only two randomized controlled studies of subsequently published programs for adults have been conducted. Bailey et al. reported improved inhaler technique, medication adherence, and functional status associated with a program that included a workbook, one-to-one counselling, and various adherence enhancing strategies as compared with a control group that only received an asthma pamphlet. Wilson and co-workers compared (1) a four-session small-group education program and (2) individual teaching using the same instructional content with (3) a self-study workbook alone, and (4) usual medical care without any special education in a randomized control study of 323 persons with moderate to severe asthma. Both small group and individual education proved more effective than the control condition in improving patient’s use of metered-dose inhalers, environmental control in the bedroom, and reducing how much patients were bothered by their asthma. Small-group education also proved substantially more cost effective than individual education and was the only format associated with a reduction in health-care utilization for acute exacerbations over the 2 years of follow-up. While there is every reason to encourage better education by clinicians, both the Wilson and Bailey studies suggest that the investment in educating adult patients, beyond what typically occurs during clinical encounters, is well justified, even when patients have adequate access to medical care from asthma specialists. Both studies demonstrate that the beneficial effects of education, including the improved inhaler technique, can be lasting. Wilson et al. also found that patients must have used inhalers more effectively outside the clinical setting, since the magnitude of the reduction in how patients were bothered by asthma was correlated with the magnitude of improvement in their technique.

Despite their notable successes, however, neither program was totally successful. Neither appeared to have affected patients’ smoking behavior or the presence of cats and dogs in the homes of those who were allergic to them. Moreover, neither program currently addresses the unique needs of older adults with mixed asthma and chronic bronchitis or emphysema, nor the needs of adolescents. The absence of programs that meet the needs of elderly and adolescent asthmatic patients still constitute major gaps in the arsenal of demonstrably effective asthma education programs.

Effectiveness of Different Educational Formats
A wide variety of educational formats have been used to provide asthma education to patients—small group programs, individual instruction, education through physicians and other types of educators, videotape, and computers. The majority of effective asthma education interventions have used a small group format, and evidence cited above suggests that this format is more cost-effective than individual instruction with comparable content. However, this evidence was obtained using a group program that is behaviorally based and allows for tailoring of problem solving activities to the needs of individual patients. There is no reason to believe that all small group programs, however designed, would necessarily be more effective than all programs of individual education.

There is ample evidence that the usual types of written patient education materials and pamphlets alone have little effect in altering behavior. Even providing patients with a workbook carefully designed to incorporate motivational and behavior change strategies, when the workbook was the only intervention, had limited value. A small number of workbook recipients appears to have read the material thoroughly and may have benefited, but many were unaffected. Skills, such as inhaler technique, were not improved at all by written instructions and illustrations, as opposed to individual feedback and coaching.

There is relatively little known about the effectiveness of other formats. The evidence shows that patient teaching within the clinical encounter, as it is currently done, is not effective in a high proportion of cases. However, it is not known how much more effective such encounters might be if physicians or nurses working with them were given appropriate materials to use and instruction in how best to carry out education. It would seem that maximizing the effectiveness of the education occurring when patients are seen for medical care has to be desirable, because many patients may not be reached easily by other types of educational programs. Smoking cessation interventions delivered through physicians have had some success in changing patient behavior. It is unlikely, however, that physicians can spend the time required to insure patients attain a sound understanding of their condition and are motivated to change relevant behaviors and aspects of their lifestyle. Moreover, they may not be the persons best suited to provide this type of education. Whether the requisite time of other health professionals can be devoted to this task in the clinical setting remains to be determined.

There has been relatively little reported experience with the use of videotape or computer-assisted
instruction for asthma education. Videotape segments play key roles within the Wee Wheezers program but do not constitute a stand-alone instructional package. No well-constructed asthma video has been produced that has been evaluated in a well-designed, controlled study, let alone one that has been compared to a parallel group program or any other educational format. For cost reasons and because of the potential for widespread distribution, there is reason to do much more to determine what can be accomplished with the videotape and other electronic media. Further progress in understanding how to deliver asthma education in the most cost effective manner possible will require direct comparison of various educational approaches, not only with “usual care” or “usual care plus an asthma pamphlet,” but with each other, and if not in the same study, at least using similar evaluation procedures and outcome measures.

**CONTENT OF ASTHMA EDUCATION**

There is broad consensus about what it is that asthma patients need to be taught in order to manage their condition: (1) preventive medication use; (2) environmental control and avoidance of precipitants; (3) effective use of medications to manage symptoms; (4) successful communication with health-care providers and others about asthma; (5) knowledge of utilization of health-care services; and (6) information on maintaining overall health and well-being. Much thought has been applied to deriving instructional content for patients from recommended medical therapy. Certainly, there is enough consensus about what parents or patients need to accomplish in order to prevent and control asthma symptoms to provide guidance in the task of education. However, there are important areas of disagreement concerning therapy that have implications for education. The research done to define what patients and parents of patients in different age groups do that is effective or ineffective in managing asthma clarifies that specific behaviors that will accomplish the goals of asthma management are very different depending on whether one is talking about parents of very young children, about school-aged children, about their parents, about adults with asthma, or about elderly patients. These differences substantially affect what needs to be taught, even when the difference is as small as between parents of an infant/toddler and of a 4- to 6-year-old. A few examples will illustrate how gaps in our understanding of the specifics of asthma management and developmental issues interact and affect educational content.

**Symptom Recognition vs PEFR Monitoring**

It would be relatively easy to obtain agreement that an individual must recognize symptoms of asthma in order to respond appropriately to them. The question is how they are best taught to do this. For school-aged children and adults, an asthma educator might teach symptom recognition by describing the common symptoms (cough, wheezing, increased respiratory rate, speech and activity patterns, etc.) and the early warning signs that may occur, getting patients to identify their own early warning signs, and teaching some form of self-monitoring using a peak flowmeter or an asthma diary. But where should the emphasis be placed? For all of the clinical arguments in favor of at-home use of peak flow monitoring, a review by Clark and colleagues in 1992 concluded: “The limited data available regarding patient use of PEFIR are inconclusive,” and “Response to symptoms may be as good a basis for improving illness as PFM by patients when improvement is defined as decreased number of physician visits and use of specific medicines.” Further research is needed to delineate the patient populations for which PFM is most useful, thus clarifying the emphasis that should be placed on peak flow monitoring in different age groups.

However, even when this has been accomplished, developmental factors affect how symptoms can be recognized, and hence, what must be taught to enable symptom recognition. For example, very young children, under the age of about 4, cannot use a peak flowmeter, and parents cannot rely on verbal reports of toddlers, let alone infants! These parents (and even the parents of slightly older children) must be taught observational skills that differ from what would be taught to older children, their parents, or adults. Simply naming or describing the symptoms is not enough. Parents, and for that matter health professionals, need to be shown the various symptoms as they are manifest in infants and toddlers. They need to form a picture of normal breathing rate and patterns in very small children, as distinct from the breathing indicative of asthma symptoms. They need practice in making these distinctions. This requires a very different type of instruction. Because it is not feasible to have children with symptoms present at the time of instruction, we have used children videotaped in emergency rooms as the most efficient means of accomplishing this instructional task. The ultimate purpose (symptom recognition) is the same for parents of very young children and for older patients; the specific skills being taught and the instructional task are quite different. At the other end of the age spectrum, little is known about the feasibility and utility of teaching elderly patients to monitor their peak flow. In addition to the fact that physical and sensory limitations may preclude their doing so, there is an open question as to the interpretation of these
measurements in light of the possibility of significant fixed airflow obstruction and of a greater degree of involvement of the small airways than in younger patients. The focus of teaching for the elderly may need to be on changes in the quality of their sensation of dyspnea, and they and their caretakers may need to be taught how to recognize other clues that lung function is deteriorating.

Other Content Issues

There are many other examples that might be cited of ways in which the content of asthma education must be made appropriate to the target population. Cultural and language differences may affect educational content and process. Elderly patients need information on comorbid conditions and potential medication interactions; children typically do not. Even the goals of asthma management, and hence, the expectations that the education sets for patients may differ as a function of the patient's age and the duration of their asthma.

Even among programs ostensibly aimed at the same population, there currently are some differences in emphasis that may be overlooked and that have important implications for the potential success of educational efforts. First, current medical guidelines emphasize the prevention of symptoms through use of medications and environmental control/avoidance. However, some programs have been advocated that focus solely on teaching proper use of inhalers; others appearing in the past several years are focused on management of symptoms using PEFR or symptom monitoring and a set of explicit rules relating symptoms and peak flow rates to medication use. In such programs, routine medications typically are only mentioned at the top of the written asthma action plan, as though one could assume that patients are taking these medications regularly and doing the other things, such as avoiding precipitants, that may be necessary to control asthma with minimal medication. Both written asthma action plans and inhaler instruction are important. However, teaching patients how to manage symptoms may be less than half the battle, especially when their symptoms could have been prevented. Changing preventive behaviors may be the harder task. It means getting patients to use routinely anti-inflammatory medications that do not offer any immediate benefit, to modify their lifestyle and environment so as to avoid exposure to aeroallergens and irritants, to cease smoking, or to handle personal and family problems in a manner that does not impair either their relationships or asthma control. Judging from the recent reports of educational programs focused solely on symptom management, opinions differ as to where the educational emphasis should be placed. To

the authors' knowledge, there has been no direct test of the effectiveness of a more comprehensive educational program compared with one focused only on use of an action plan.

There are similar differences in perspective on how much emphasis should be placed on modifying specific asthma self-management practices and how much on teaching patients general and potentially generalizable skills in "self-regulation," designed to empower them to make desired changes in their lives. These are not either/or propositions, but represent a difference in theoretic orientation that affects educational content. Further study of the cost and effectiveness of these various approaches is required, especially in view of the limited success of current programs with the more difficult behavior change problems such as smoking and aeroallergens in the home.

Evaluation of Asthma Education

Since the 1970s, considerable progress has been made in designing rigorous evaluations of asthma education programs. The serious deficiencies of uncontrolled studies are recognized. Yet much remains to be done in developing or selecting outcome measures and measures of other key process variables that are reliable, valid for the purpose intended, and that permit comparison across clinical studies. The 1992 NIH Workshop on the Measurement of Outcomes for Asthma Clinical Research inventoried the full range of available measures -- physiologic status, symptoms, medication regimen, patient and family self-management behaviors and medication adherence, quality of life, and utilization of health services. Participants concluded that consensus on the best measures to use was possible in some areas but not yet possible in others. The proceedings of this workshop have been published. To benefit maximally from asthma education research requires the capability for comparison across studies and populations. The choice of measures is critical to this process and the outcomes workshop report represents a useful review of progress in that area.

Implementation of Asthma Education as Integral to Medical Care

Moving to the population level, it is useful to consider what progress has been made in insuring that all patients with asthma, and their families, receive education appropriate to their needs. Sound data on this point are lacking, but it appears that asthma education still has not reached the majority of patients. Nevertheless, interest has increased dramatically. Health care systems have begun to note the mortality from asthma and the high costs of emergency room and hospital care for asthma. Patients increas-
ingly expect to have a significant voice in their own health care and information that will allow them to participate meaningfully in the decision process. Health-care administrators are beginning to register on these "consumer" expectations. The motivation to sponsor asthma education programs appears to be increasing rapidly in the voluntary health associations but also within managed care settings and institutions where large numbers of patients receive their primary medical care from emergency rooms. In the United States, with changes in US health care in the offing, managed care systems are beginning to realize that they will need to understand how to educate diverse populations for whom they, heretofore, have not had responsibility.

Our own experience indicates the change in the climate surrounding asthma education. When we completed development of the AIR POWER program in the late 1970s in cooperation with the Kaiser-Permanente Medical Care Program, Kaiser had no mechanism for systemwide adoption of asthma education. Over the subsequent years, other pediatric asthma education programs occasionally developed in individual Kaiser clinics. By the time we completed the adult education program, however, the situation had changed dramatically. Registering on the beneficial results obtained in that study and on Kaiser's costs for asthma care, the regional office of patient education developed an educator training program and offered financial support for asthma educators to teach the program for 1 year, plus time for an administrative assistant at each center to organize classes and recruit patients. To receive this support, each of the 14 sites eventually funded in Northern California had to provide evidence of a commitment to continue to support offering the program at their site on an ongoing basis. This model is gradually being expanded to Kaiser programs throughout the United States. No one expects this to ensure that every Kaiser asthma patient receives such education in the immediate future, but much progress has been made.

From observing health-care systems wrestle with implementing asthma education programs, some observations arise.

Selection and Training of Educators

First, a central problem in adopting asthma education programs is the selection and training of educators. The various abilities that may be needed—knowledge of asthma, group facilitation skills, understanding of behavior change strategies used in the program, and cultural and language background/ skills appropriate to the target population—are not all possessed by the typical nurse or respiratory therapist; and they are not all found in the typical community volunteer. Careful training is needed to insure that educators can deliver programs effectively.

Tendency to Abbreviate Programs

Second, when an available asthma program is adopted, there is an almost irresistible tendency to shorten the program due to the anticipated difficulty in getting patients to attend more than one educational session. The "attendance" problem cannot be ignored, and because of this, we need even more experimentation with how asthma education can be maximally effective and efficient. But behavior change, especially lifestyle change, is not an efficient proposition! When programs are shortened, it is the more powerful behavior change strategies that tend to be dropped, in favor of retaining information transmission. While it may be possible to shorten available programs and even make them more effective at the same time, it is doubtful that simply providing information in an efficient manner will lead to the kinds of behavioral change that such programs need to engender.

The Role of Asthma Education in Improving Asthma Care

It is becoming realistic to envision a time when the education of patients with asthma will be taken for granted as a part of standard care as it is with respect to diseases such as diabetes. Behavioral and health education research will increase its contribution to our understanding of asthma and the most effective means for its control, and possibly, prevention. Almost nothing reveals one's level of understanding of a topic as quickly as attempting to teach it to someone else, particularly if one has to document what is being taught. The NAEPV Expert Panel's report was intended to educate physicians on the current best practice in the medical management of asthma. Importantly, the process of developing that document served to surface many unknowns with respect to this disorder, and the reception of the document brought out still other unresolved issues. Similarly, the development of patient education involves the preparation of "practice guidelines" for patients. Such an exercise forces careful consideration of the evidence behind the recommendations being made. The multidisciplinary teams engaged in the development of asthma education bring fresh perspectives and have raised questions about asthma and its management that might otherwise have been overlooked or finessed. Such questions have stimulated and will continue to stimulate research, both basic and applied, that will significantly advance the scientific understanding of asthma.
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