



THE CENTER  
FOR MANAGING  
CHRONIC DISEASE

Putting People at the Center of Solutions

## Asthma Health Outcomes Project

Asthma Programs with an Environmental Component:  
A Review of the Field and Lessons for Success

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# Introduction

This report aims to answer the following questions important to all interested in control of asthma: (a) what kind of strategies have been implemented to help improve life for individuals with asthma; (b) what challenges do program providers face in implementing their interventions; (c) what are the factors that help make programs successful; and (d) to what extent are programs implementing the factors that have been associated with success?

The report presents the results of data collection and analyses conducted by the Asthma Health Outcomes Project (AHOP) conducted through a cooperative agreement between the Center for Managing Chronic Disease, University of Michigan and the Indoor Environments Division of the US Environmental Protection Agency. It presents descriptive frequencies and qualitative data from 223 programs drawn from 532 identified worldwide that 1) focused on asthma, 2) included an environmental component, and 3) reported improvements in health outcomes. It also includes findings from a more detailed analysis of a subset (111) of these programs published in peer-reviewed journals.

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Program documents and reports are also available at [www.AlliesAgainstAsthma.net/AHOP](http://www.AlliesAgainstAsthma.net/AHOP)

# Executive Summary

To better understand what makes asthma programs successful, the Asthma Health Outcomes Project (AHOP) at the Center for Managing Chronic Disease, University of Michigan was created and funded under a cooperative agreement with the Indoor Environments Division of the US Environmental Protection Agency (EPA). A process was developed and implemented to identify asthma programs around the world that included an environmental component and have demonstrated a positive impact on asthma-related health outcomes. The aim was to identify the factors that are associated with success.

Through a wide-reaching outreach campaign, AHOP identified 532 asthma programs worldwide, 223 of which reported completing an evaluation that demonstrated improvements in at least one asthma-related health outcome. Through telephone interviews, review of program documents, and examination of published literature, data were gathered for each program related to background, planning, design, administration, implementation, evaluation design, and findings.

Initial analyses found significant variance among the type and quality of evaluations reported. To increase confidence in the findings, quantitative analyses focused on a subset of 111 programs that had reported results in peer-reviewed publications. Bivariate relationships between programmatic factors and health outcomes were analyzed with  $\chi^2$  statistics using Fisher's exact tests ( $p < 0.05$ ). Odds ratios as estimates of the association between various program factors and health outcomes and 95 percent confidence intervals were obtained using unconditional logistic regression.

This analysis identified significant differences among programs that utilized pre-post evaluation designs and those that used other designs, including randomized controlled trials (RCT). An additional analysis was therefore conducted among the 65 programs using RCT to confirm earlier results. Odds ratios for these associations were calculated to determine which associations were in the same direction as those in the preliminary findings.

Results of these analyses suggest themes across programs that are more likely to report a positive impact on health outcomes. These are that programs were:

- Community centered
- Collaborative
- Clinically connected
- Responsive to need

These themes were also evident in a qualitative analysis of program data. In highlighting the strengths and challenges of their programs, respondents discussed the importance of having close ties with the community, strong collaboration across organizations, being connected with clinical care providers, and shaping program activities to address participants' needs. Analyses also demonstrated that programs faced significant challenges in working with low income populations and in implementing rigorous evaluations that fit with their goals and resources.

Program documents, the Preliminary Field Report, and this final report can be found on the AHOP website, [AlliesAgainstAsthma.net/AHOP](http://AlliesAgainstAsthma.net/AHOP).

# Background

Asthma, a chronic inflammatory disease of the airways, is a major public health problem of increasing concern in the United States. According to the most recent data available, between 1980 and 1994 the prevalence of asthma increased 75% overall and 74% among children 5 to 14 years of age.<sup>1</sup> Although since the late 1990s the prevalence has flattened in the U.S., two observations are salient. First, prevalence continues to be high, affecting 15.7 million Americans, including 6.5 million children younger than 18 years old.<sup>2</sup> Second, flattening in the general population has not been observed in low income and minority communities. Indeed the burden of asthma in these hot spots is still increasing with prevalence as high as 25% reported in some areas<sup>3,4</sup>

In the past decade there have been significant advances in asthma management, giving most people with asthma the opportunity to live active and healthy lives. Recommendations for diagnosing and treating asthma have been translated by the National Asthma Education and Prevention Program (NAEPP) of the National Heart, Lung, and Blood Institute (NHLBI) into guidelines for patient care and have been distributed widely. These guidelines emphasize not only quality medical care and support for patient management of symptoms, but also note that a reduction in exposure to environmental allergens such as house dust mites, cockroaches, animal dander, tobacco smoke, and mold can reduce the frequency and severity of asthma attacks for sensitized children.<sup>5</sup> Despite these advances in understanding of the disease, many children continue to suffer with asthma.

In response to the burden and prevalence of asthma, recent years have seen a proliferation of programs and services aimed at improving the health and quality of life of people with the condition. Efforts have ranged from local, community-based efforts with limited funding to multi-million dollar, national initiatives. The complexity of asthma has also shaped the variety of approaches designed to address the disease. As growing evidence demonstrates, genetics, clinical care, environmental factors, and social conditions all contribute to asthma morbidity. While some interventions have focused on a single factor, a growing number of efforts have taken a more comprehensive and integrated approach, utilizing various strategies to address multiple aspects of the disease.

To better understand what makes asthma programs successful, the Asthma Health Outcomes Project (AHOP) at the Center for Managing Chronic Disease, University of Michigan was created and funded under a cooperative agreement with the Indoor Environments Division of the US Environmental Protection Agency (EPA). Through this project a process was developed and implemented to identify asthma programs that included an environmental component and have reported a positive impact on asthma-related health outcomes. The aim was to identify the factors that are associated with success.

<sup>1</sup> <http://www.cdc.gov/nceh/airpollution/asthma/children.htm>

<sup>2</sup> <http://www.cdc.gov/nchs/fastats/asthma.htm>

<sup>3</sup> Nicholas SW et al., Addressing the childhood asthma crisis in Harlem: the Harlem Children's Zone Asthma Initiative. *Am J Public Health*. 2005 Feb;95(2):245-9.

<sup>4</sup> Clark NM et al., Issues in identifying asthma and estimating prevalence in an urban school population. *J Clin Epidemiol*. 2002 Sep;55(9):870-81.

<sup>5</sup> National Asthma Education and Prevention Program Expert Panel report 2: Guidelines for the diagnosis and management of asthma, National Heart Lung and Blood Institute, National Institutes of Health, July 1997

## Program Identification and Data Collection

AHOP was designed to identify a broad range of asthma programs within the United States and internationally. In an effort to reach beyond published studies and information, AHOP developed a set of minimal criteria for inclusion and conducted comprehensive outreach to identify a wide range of asthma programs, including those appearing in the literature, as well as unpublished, community-level asthma programs and services.

The minimal inclusion criteria established by AHOP specified that programs must:

- focus on asthma,
- include an environmental component (e.g., education on trigger identification, control or avoidance, action to change the home or institutional environment, environmental policy interventions), and
- report having completed an evaluation that showed a positive impact on health outcomes or have a health outcomes evaluation in progress.

The outreach effort to identify eligible programs was conducted between September 2003 and July 2005. AHOP conducted an extensive nomination process to identify local and community-based efforts that might be less likely to publish their results and, in addition, conducted extensive literature searches. Through announcements in e-mail listservs, organizational newsletters, targeted direct mailings, and outreach at various conferences and meetings, AHOP received nominations of a wide range of programs including federal research projects, large-scale community coalition demonstration projects, international programs, and local initiatives developed by community schools, clinics, health plans, and other institutions. Where large-scale replication of interventions were implemented (e.g., Open Airways, Asthma Care Training, the Inner-City Asthma Study), only the original evaluations of these interventions were included and replications excluded, unless significant adaptations were made and evaluated.

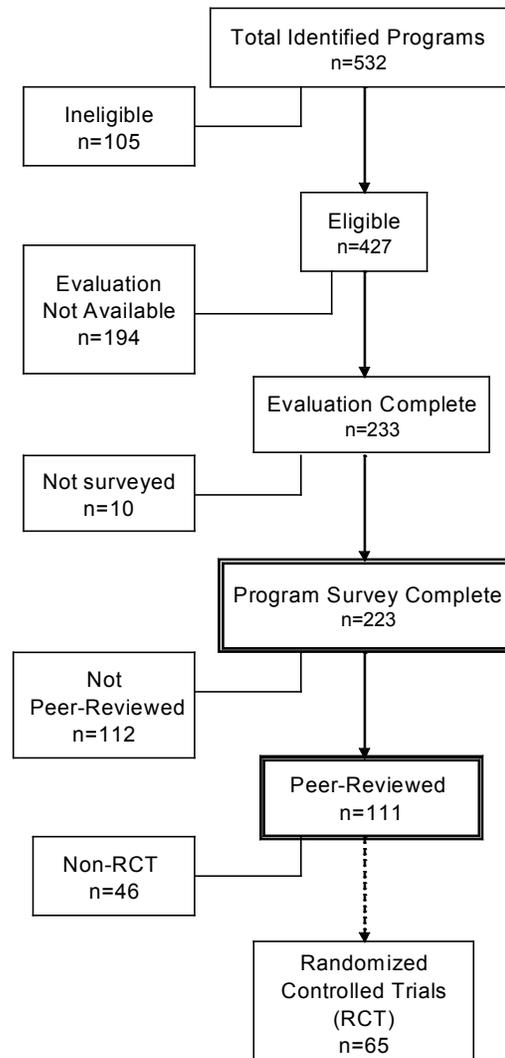
The literature search was limited to articles published in English since 1990, and various search engines were used including PubMed and Medsearch. Research staff received and reviewed e-mail alerts on an ongoing basis to identify programs of interest published in prominent medical journals including the Journal of the American Medical Association, the New England Journal of Medicine, Archives of Pediatric & Adolescent Medicine, the British Medical Journal, and Pediatrics. The National Institutes of Health's online funding database (CRISP: <http://crisp.cit.nih.gov/>), along with other listings of funded asthma programs (CDC's effective interventions, CHCS' Best Clinical and Administrative Practices, CDC's Controlling Asthma in American Cities), lists of relevant conference attendees and/or presenters, and previously published bibliographies were also reviewed to identify eligible asthma programs. Programs were also identified in the literature in journals such as the American Journal of Respiratory and Critical Care Medicine, Journal of Asthma, Annals of Allergy, Asthma and Immunology, European Respiratory Journal, Chest, Thorax, Respiratory Medicine, and Pediatric Pulmonology.

A total of 532 asthma programs were identified worldwide, from 30 countries and 46 US states. Of these, 427 programs met the criteria listed above and were deemed eligible for further review.

A Program Profile form was used to gather initial data from the 427 eligible programs. The Program Profile collected basic programmatic data including program design and implementation and evaluation design and status.

Of the programs completing a program profile form, 55% (n=233) reported having completed a program evaluation that demonstrated a positive impact on health outcomes for people with asthma.

Detailed information about these programs were collected through telephone survey and follow-up correspondence with people involved with the program. Usually the respondent was a program senior staff member. If contact with someone was not possible, data were extracted from published literature (n=54, 24%). Only ten programs initially identified were lost to follow up. For the remaining 223 programs, data were gathered on program background, planning and design, administration and implementation, and evaluation design and findings.



# Data Analysis

## Case Studies

A narrative description of each of the 223 programs can be found in Appendix B; summaries of six of these programs, chosen to demonstrate the breadth of programs identified, can be found throughout section VI, About the Programs.

## Descriptive Data of 223 Programs

Frequency tables (Appendix C) were constructed for available quantitative survey responses to provide further description of the asthma programs reporting successful health outcomes. Most questions in the program survey were closed-ended with response options presented in a *check all that apply format*. For data analysis, each response option was coded as yes or no. Missing, *don't know*, and *not applicable* responses were counted as missing data and were not included in percentage calculations. Therefore the response rates vary across response options.

## Subgroup of Peer-Reviewed Programs

At the time of review, approximately half (n=111) of the eligible programs had published results in peer-reviewed publications. Quantitative analyses of these peer-reviewed programs were conducted to provide greater confidence in the overall results. All peer-reviewed articles on programs that met the initial AHOP inclusion criteria were included in these analyses.

Bivariate relationships between programmatic factors and health outcomes were analyzed with  $\chi^2$  statistics using Fisher's exact tests ( $p < 0.05$ ). Odds ratios were calculated as estimates of the association between various program factors and health outcomes and 95 percent confidence intervals were obtained using unconditional logistic regression.

Outcome variables examined included improvement in various health care utilization measures, quality of life (QOL), school/work loss, behavioral changes, and clinical outcomes. Additional outcome variables were constructed that combined several related outcomes into summary measures for health care utilization, school and work loss, and QOL. These summary variables were examined in addition to the single health outcome variables for associations with program factors.

All analytic file construction and statistical analyses were performed using the SAS/PC program, version 8.2 (SAS Institute, Inc., Cary, North Carolina). Findings of variables significantly related to at least one of the health-related outcomes are included in this report.

To facilitate comparison between the peer-reviewed programs and those not published in peer-reviewed literature, Appendix C includes tables with frequencies of quantitative responses for three groups of programs: peer-reviewed programs, programs not peer-reviewed, and all programs included in the study.

## Subgroup of Peer-Reviewed Programs using Randomized Controlled Trial Evaluation

The analysis of the 111 peer-reviewed programs yielded interesting results related to evaluation design in that programmatic factors that indicated less rigorous evaluation methods (e.g., pre-post evaluation design) were associated with several positive health outcomes. To find out whether the results might be an artifact of the study design utilized, a subgroup of peer-reviewed programs that used a randomized control trial (RCT) evaluation (n=65) was examined to determine if the same associations were found among the programs with the most rigorous evaluation design.

Although the sample of the RCT programs (n=65) did not allow for detailed statistical comparisons, odds ratios were calculated for all factors that were shown to be significant among the broader population (n=111). The results confirmed most of the associations identified previously. Confirmed results are indicated in Section IV of this report.

## Qualitative Analyses of Open-ended Questions

Program respondents were asked open-ended questions related to program successes, barriers, and unintended impacts. Interviewers summarized respondents' answers and recorded direct quotes. Responses to these questions were categorized and a summary is presented in Section VI of this report. A comprehensive analysis was conducted regarding the unintended impacts reported, and a discussion of these results is in Section VII. Results from these qualitative analyses are also presented in the discussions that follow each group of findings from the quantitative analyses.

## Other Analyses

Additional analyses explored results associated with variation in number of strategies employed by a program, but no significant differences were observed. An analysis of the subgroup of programs that reached low income participants was also conducted. These analyses did not yield findings different from those already observed.

# Strengths and Limitations of the AHOP Study

## Limitations

There are limitations to these data. AHOP was designed to look across the breadth of programs in the field to identify factors associated with successful programs. The process was intended to understand what is happening collectively (i.e. across many programs), not to evaluate the effectiveness of particular programs. Therefore caution is needed when applying these findings at the individual programmatic level. Elements that were identified as significantly associated with outcomes may not be the most important or only elements of successful programs, nor can we assume that they are solely responsible for the programs' success. Additionally, the AHOP analyses did not address the quality or intensity of individual programs, which may vary significantly.

An AHOP inclusion criterion was that programs report success in improving at least one health outcome, thereby excluding programs with completely negative outcomes. This fact could present a bias. However, because many of the programs measured more than one health outcome, analyses were based on data from both successful and unsuccessful efforts to measure improvement.

The information utilized for analysis not provided in published information was based on self-reported data, often from program coordinators or managers, not evaluators. AHOP did not gather or assess primary outcome data nor the degree of improvement to health outcomes. Additionally, for the 54 programs that were not interviewed, responses are missing if data could not be extracted from published material, thus providing only a partial picture in the descriptive and qualitative sections of this report and reducing the power in analyses.

In some cases, programs included several components, for example physician education, home visits, and policy change. Only components included in an evaluation were included in these analyses. Survey data were gathered on each component independently, and for most aspects of the analysis of the subgroup of peer-reviewed programs, components were treated independently.

The number of outcomes measured and reported differs by program and this report does not reflect differences in program emphasis that may or may not have existed. For example, programs that set out to improve the physical environment as a primary emphasis are included along with programs that emphasized physician education, as long as success was reported in at least one asthma-related health outcome and the program included an environmental component.

## Strengths

There are also significant strengths and features of this project which make AHOP unique. By employing a widespread outreach campaign, AHOP was able to go beyond published materials to document processes and outcomes in programs from 30 countries and 46 US states reporting a variety of intervention strategies ranging from educational programs to quality improvement initiatives to policy change efforts. AHOP collected data about program planning, implementation, and evaluation. It looked across programs for commonalities in those that reported success in demonstrating an improvement in the health of individuals with asthma. We are unaware of any previous effort to look at such a large number and broad range of asthma programs nor to identify factors associated with success. These AHOP data also allowed identification of trends and frequencies of program practices.

The iterative process of data analysis and reporting is another strength of the study. As preliminary findings emerged, they were reported and presented to the study's expert panel members and practitioners in the field, and their subsequent questions and suggestions helped guide the direction of further analyses. This flexible approach helped AHOP develop a final report responsive to experts' observations including, most especially, practitioners in the field.

# Bivariate Analysis of Peer-Reviewed Programs

In order to identify programmatic factors associated with successful health outcomes, a focused bivariate analysis was conducted on programs with evaluation results reported in peer-reviewed publications (n=111). Relationships between programmatic factors and health outcomes were analyzed with chi-square statistics using Fisher's exact tests. Associations with p-values less than 0.05 are presented in this section—followed by a discussion that draws upon data from both groups of programs, peer-reviewed and those that did not report findings in peer-reviewed publications.

“WE CONTINUE TO WORK AS PART OF THE COMMUNITY ON A REGULAR BASIS; WE DON'T JUST GO INTO THE COMMUNITY. WE HAVE ESTABLISHED TRUST AND KEPT THE CORE STAFF INTACT FROM THE BEGINNING, AND WE HAVE DEVELOPED GOOD WORKING RELATIONSHIPS.”

– PROGRAM RESPONDENT

## Community Centered

Programs that had close ties to the communities they were attempting to assist were more likely to report a positive impact on health care utilization outcomes.

Association	n	p-value*	Odds Ratio [95% CI]
Programs that <b>involved community-based organizations in planning the program</b> to any degree were more likely to report a positive impact on <b>health care utilization<sup>a</sup></b> than those that did not.	13	0.03	30.00 [1.47, 611.80]
Of programs that collaborated with other agencies or institutions, those programs that <b>collaborated with community-based organizations</b> were more likely to report a positive impact on <b>health care utilization<sup>a</sup></b> than those that did not.	16	0.04	21.00 [1.50, 293.25]
Programs that had an <b>office located within the target community</b> were more likely to report a positive impact on <b>hospitalizations</b> than those that did not. †	53	0.04	9.71 [1.00, 94.78]
Programs that <b>had an office located within the target community</b> were more likely to report a positive impact on <b>ED visits</b> than those that did not. †	44	0.04	10.18 [1.02, 101.52]
Programs that <b>had an office located within the target community</b> were more likely to report a positive impact on <b>health care utilization<sup>b</sup></b> than those that did not.	55	0.01	18.22 [1.81, 183.03]
Programs that <b>had an office located within the target community</b> were more likely to report a positive impact on <b>health care utilization<sup>c</sup></b> than those that did not.	59	0.01	15.64 [1.58, 154.28]

† direction of relationship confirmed through analysis of peer-reviewed programs that employed randomized controlled trial evaluations

\* Fisher's Exact Test

<sup>a</sup> A general measure of hospitalizations, ED visits, urgent care visits or sick office visits

<sup>b</sup> An individual measure of hospitalizations, ED visits, or urgent care visits

<sup>c</sup> An individual measure of hospitalizations, ED visits, or urgent care visits, or a general measure of health care utilization

Programs that collaborated with community-based organizations, particularly in planning initiatives, were more likely to improve health care utilization outcomes than those that did not. Programs that had an office located in the target community were also more likely to improve health care utilization outcomes, including hospitalizations and emergency department visits, than those without such community-based sites.

### Discussion and Insights

The relationships that emerged among the peer-reviewed programs and the qualitative data from all programs studied point to the importance of community ties for achieving positive health outcomes. Among subgroup of peer-reviewed programs that used a randomized controlled trial evaluation, the importance of having community ties for the most part was not confirmed. This is not surprising given that programs using a community-based approach were much less likely to use randomized control trial designs given their cost and need for experienced evaluators.

The associations involving community ties found among the subset of peer-reviewed articles are important ones worthy of further exploration and discussion. It appears that programs in the field recognize the importance of community ties and those in more academic institutions act less often to achieve this end.

Among the 223 studied by AHOP, 93% of responding programs reported having an office in the target community.

Additionally, in qualitative data, program respondents reconfirmed their significant efforts to develop close ties to the communities with which they work.

When asked about their planning process, two thirds of the respondents reported including community-based organizations in planning the program, and 41% of programs that reported collaborating reported collaborating with community-based organizations.

Program Characteristic	n	%	Total Responses
Involved community-based organizations (CBOs) in planning	104	68	154
Collaborated with non-clinical community-based organizations (CBO)	66	41	163

It may be that having an office in the community increased the reach of asthma programs and, perhaps, also helped them gain credibility with their target populations. Coupling this greater reach with increased credibility may have given some programs more access to families, and thus, a greater opportunity for intervention effect.

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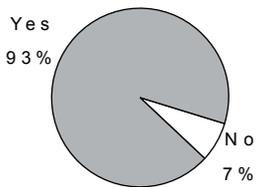
"[WE HAVE] GREAT PEOPLE, WELL-ROOTED IN THE COMMUNITY, WITH LOTS OF COMMUNITY TIES."

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"WE MADE USE OF EXISTING COMMUNITY RESOURCES."

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Program had an office in the target community



Program staff frequently reported making significant efforts to develop close ties to the communities they were trying to assist using methods beyond having an office located in the target community—such as collaborating with community based organizations and hiring staff from the communities they serve. Involving key stakeholders in the planning process also emerged as a means to develop closer relationships to the community. Respondents reported a wide range in the types of individuals included in these processes including those in community-based organizations, individuals with asthma and their families, health educators, school personnel, health care administrators, and state and local government representatives.

## Strategies

Program respondents described several specific strategies that led to success in developing and maintaining strong community ties. Respondents described the ideal relationship as mutually respectful, trusting, open, and collaborative in nature, with all parties working toward a common goal.

### *Building on existing resources and reducing competition*

Many program respondents emphasized that they tried not to “reinvent the wheel” or duplicate services already offered by other community organizations, but rather collaborated in light of existing resources.

### *Inclusive planning*

Careful program planning was a key element of success in establishing relationships. Those that reported strong positive community ties not only planned carefully, but also made efforts to include a variety of community stakeholders in the planning process. This inclusive planning encouraged community awareness and support for the program from the very beginning stages and fostered increased collaboration and buy-in from partners. Depending on the community of interest, the parties included in planning varied from hospital administrators and staff, school teachers and principals, to neighborhood leaders and parents.

#### *In their words:*

“We involved all parties and stakeholders in the planning and delivery of the program—everybody had a voice.”

### *Community-centered*

Program respondents often noted the importance of making the community the focus of the program and maintaining this focus by building ongoing working relationships with people who are part of the community.

#### *In their words:*

“[We] keep a community focus.”

## Clinically Connected

Programs that were clinically connected were more likely to report a positive impact on health outcomes.

“IT WAS HARD FOR [THE HEALTH CARE PROVIDERS] TO GET OUT OF THEIR USUAL REACTIVE, URGENT CARE MODE AND SWITCH TO A CHRONIC DISEASE APPROACH.”

– PROGRAM RESPONDENT

Association	n	p-value*	Odds Ratio [95% CI]
Programs that had a component that <b>took place in a physician’s office or clinic</b> were more likely to report a positive impact on <b>ED visits</b> . <sup>†</sup>	55	0.01	4.92 [1.48, 16.34]
Of programs that used asthma education as a program strategy, those programs in which the <b>asthma education was received by health care providers (including school nurses)</b> were more likely to report a positive impact on <b>school absences</b> . <sup>†</sup>	25	0.02	13.50 [1.57, 103.88]

<sup>†</sup> direction of relationship confirmed through analysis of peer-reviewed programs that employed randomized controlled trial evaluations  
<sup>\*</sup> Fisher’s Exact Test

These data demonstrate that programs with a component that closely involved health care providers, including school nurses, were more likely to report positive results.

### Discussion and Insights

Interventions that took place in clinics and physician’s offices with clinicians who guide patients in asthma management likely strengthened the partnership between the two. Further, educating health care providers such as primary care physicians and nurses in general likely increased and improved both the therapies and asthma self-management education that families received. These factors have been shown in numerous studies to reduce asthma symptoms and enhance school performance.<sup>6-7</sup> Programs included in this study frequently targeted the education of school nurses, who, likely, were then better prepared to help children manage their asthma at school or were better able to link children with primary care providers.

The importance of involving health care providers was recognized in a number of the asthma programs included in AHOP. Just over half of the programs educated or trained health care providers (including school nurses) as part of the overall program strategy.

“[WE CONDUCTED] A BUY-IN CAMPAIGN AMONG COMMUNITY PHYSICIANS.”

– PROGRAM RESPONDENT

Recipients of asthma education (n=214)	n	%
Individuals with asthma	196	92
Family/Caregivers of people with asthma	166	78
<b>Healthcare providers, including school nurses</b>	<b>110</b>	<b>51</b>
Members of the general population	64	30
School personnel, NOT including school nurses	63	29
Daycare workers	51	24
Other	12	6

<sup>6</sup> Charlton I, Antoniou AG, Atkinson J, Campbell MJ, Chapman E, Mackintosh T, Schapira D. Asthma at the interface: bridging the gap between general practice and a district general hospital. *Arch Dis Child* 1994;70:313-318.

<sup>7</sup> Evans R, Gergen P, Mitchell H, Kattan M, Keresmar C, Crain E, Andersen J, Eggleston P, Malveaux F, Wedner J. A randomized clinical trial to reduce asthma morbidity among inner-city children: Results of the National Cooperative Inner-City Asthma Study. *J Pediatr* 1999;153:332-338.

Nearly half of the programs delivered program activities at a physician’s office or clinic, and almost one fifth took place in a hospital.

Program setting(s) (n=220)	n	%
<b>Physician’s Office/Clinic</b>	<b>107</b>	<b>49</b>
Home	95	43
<b>Hospital</b>	<b>50</b>	<b>23</b>
School/School system	49	22
Community	21	10
Daycare/Preschool	17	8
Other	33	15

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“[OUR] NURSE  
COORDINATOR’S  
COMMITMENT AND  
DEDICATION [WAS CRITICAL  
TO OUR SUCCESS].”

– PROGRAM RESPONDENT

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### Challenges and Strategies

Asthma is a chronic disease that demands ongoing professional medical care management, and most surveyed programs described efforts to work with health care providers as part of their programs. However, qualitative data revealed barriers to program success often included difficulties in connecting and collaborating effectively with care providers.

Programs surveyed by AHOP – programs that were large and small, community and clinic-based, federally-funded research projects and local initiatives, even programs that were led by physicians or managed by health systems – described similar barriers:

#### *Change-resistant health care culture*

Program respondents described the difficulties they encountered when their asthma program required health care providers to change their approach to usual asthma care management. In general, the culture of clinical care was perceived as resistant to change and not open to new ways of doing things. Program respondents described a range of responses to their attempts to introduce new initiatives including fear, mistrust, power struggles, and inertia.

*In their words:*

“[We encountered] inertia - change is hard.”

“[There was] fear and resistance among the school nurses initially, [because the program required] going outside of normal job duties.”

“Some providers felt we were telling them what to do.”

“[We had] difficulty with primary care provider buy-in, [because] the use of the [new] care pathway did not require writing orders, [so care providers had to] relinquish control.”

### *Lack of adherence to current asthma care guidelines*

Program respondents described specific difficulties regarding the failure of health care providers to adhere to current asthma care guidelines. This was sometimes attributed to their lack of knowledge or training. This situation was a frustrating barrier for programs attempting to enhance the quality of clinical care.

*In their words:*

"[A major barrier was the] reluctance of providers to follow national guidelines."

"[It was difficult to] drill home proper medical management practices to our own providers. Also [we found] limited knowledge of the importance and benefits of asthma self-management among the primary care providers."

### *Inadequate time*

Program respondents reported that health care providers frequently cited their lack of time as a barrier to providing good patient care. They also reported that these providers generally did not feel that education of their asthma patients was a priority given limited time for the clinical encounter.

*In their words:*

"The environment we worked in was stressed - providers are stretched thin."

"Patient education is not considered a priority for most doctors who concentrate primarily on medical treatments and prescribing medications."

"Physicians did not have the time to spend evaluating their practice and to make changes to improve care."

### *Financial disincentives*

When clinical care providers were willing to participate in or deliver asthma program activities, they were often not financially compensated for their efforts or did not know how to seek available compensation. This real or perceived financial disincentive to participation was a commonly reported barrier. Many asthma program respondents reported efforts to encourage health plans to reimburse providers for time spent on patient asthma education, and some of those surveyed reported success with this strategy.

*In their words:*

"[There was] no way to reimburse clinics for the loss of billable hours while their providers attended a CQI seminar."

"It was difficult to attract insurance companies to support the asthma program."

"The hospital lost inpatient dollars as a result of this study, because of the reduction in length of stay. The hospital administrator was not happy, and told the principal investigator to cease and desist the study or lose her job. Then a new administrator came in and encouraged the program, even made it into a disease management initiative and part of the care pathway."

### *Provider resistance*

When initiating programs, program respondents frequently described encountering a general tone of resistance from clinical care providers, perhaps due, in part, to a lack of trust in the program's ability to improve patients' health beyond what the health care provider could offer alone. This resistance was an especially challenging barrier to the many programs that relied on patient referrals from health care providers.

#### *In their words:*

"Getting primary care providers on board was a challenge - convincing them it was a quality program and getting them to refer patients."

"Sites with medical specialists didn't see the need to refer patients to an asthma program."

"Physicians had a lackadaisical attitude about referring patients who needed help, which was very frustrating."

"In the beginning, the program had to convince the providers in the community that the program was not trying to take their patients away and that the program was credible."

### **Effective Strategies**

Despite these barriers, many programs did find ways to work effectively with clinical care providers and attributed the overall success of the program to the positive relationships and support they enjoyed from such connection.

### *Careful Planning/ Needs Assessment*

Programs that experienced successful collaborations with clinical care providers reported taking the time to engage in program planning that was attentive to the needs of their particular health care community. The experience of many asthma programs indicated the importance of developing systems and processes that were convenient and manageable for use by clinical care staff at all levels.

#### *In their words:*

"The original needs assessment wasn't very thorough and didn't include clerical or other staff [at the clinic]. The program staff later went back and did informal chats and interviews with all clinic staff. Then we redesigned the program under the guidance of an organizational expert and gave clinics more ownership of the program. We created screening forms, medical record forms, and treatment plan forms for use by the clinics to streamline processes, and to address concerns raised by clinic staff about an increase in asthma visits creating a burden on the clinic."

### *Clinical Buy-in*

Many programs that were successful in moving beyond provider resistance and a change-resistant health care culture did so through a deliberate effort to engender buy-in and generate support, trust, and respect from clinicians. These efforts were thought to be more successful when they were initiated by collaborating health care administrators or clinicians.

*In their words:*

“The hospital took ownership of the program and allowed physicians to feel they had a strong buy-in. This was their ‘pet project’.”

### *Program Champions*

Many program respondents attributed their success to the efforts of a few people they called “program champions.” These program champions were influential clinical opinion-shapers who drummed up support for and interest in the program through their networking, communication, and outreach efforts, both formal and informal. In some cases, programs paid staff members for this work, but in most cases the program champions were driven primarily by their passion for and commitment to the project.

*In their words:*

“The new leader of the health department has personally shepherded the program through budget changes.”

# Collaborative

Programs that collaborated to some degree with agencies or institutions were more likely to report a positive impact on asthma outcomes.

“[WE HAVE A] GREAT PARTNERSHIP THAT RESISTED A BUDGET CUT BY RALLYING TOGETHER TO FIGHT IT.”

– PROGRAM RESPONDENT

Association	n	p-value*	Odds Ratio [95% CI]
Programs that <b>collaborated with other agencies or institutions</b> were more likely to report a positive impact on <b>hospitalizations</b> than those that did not.†	43	0.02	8.75 [1.42, 53.91]
Of programs that collaborated with other agencies or institutions, those programs that <b>collaborated with governmental agencies</b> were more likely to report a positive impact on <b>ED visits</b> than those that did not.†	29	0.04	10.00 [1.02, 95.23]
Programs that <b>involved community-based organizations</b> in planning the program to any degree were more likely to report a positive impact on a general measure of <b>health care utilization</b> <sup>a</sup> than those that did not.	13	0.03	30.00 [1.47, 611.80]
Of programs that collaborated with other agencies or institutions, those programs that <b>collaborated on technical assistance</b> were more likely to report a positive impact on <b>health care utilization</b> <sup>a</sup> than those that did not.	15	0.04	17.50 [1.22, 250.36]
Of programs that collaborated with other agencies or institutions, those programs that <b>collaborated on policy action</b> were more likely to report a positive impact on <b>school absences</b> than those that did not.†	18	0.01	24.56 [imputed]
Of programs that collaborated with other agencies or institutions, those programs that <b>collaborated on policy action</b> were more likely to report a positive impact on <b>medication use</b> than those that did not.†	27	0.04	10.00 [1.03, 97.50]

† direction of relationship confirmed through analysis of peer-reviewed programs that employed randomized controlled trial evaluations

\*<sup>2</sup> Fisher’s Exact Test

<sup>a</sup> A general measure of hospitalizations, ED visits, urgent care visits or sick office visits

“WORKING WITH THE SEPARATE CULTURES [OF THE] NUMEROUS PARTNERS INVOLVED (COMMUNITY, ACADEMIC, GOVERNMENT) WAS A CHALLENGE, BUT IT WAS ALSO A STRENGTH TO THE PROGRAM.”

– PROGRAM RESPONDENT

These data provide support for the importance of collaboration for a range of desired outcomes.

## Discussion and Insights

Collaboration led to changes in health care use. Further, when collaboration centered on policy change, programs were more likely to be successful regarding school and medicine use outcomes. Policy work, no doubt, requires broader participation and/or special expertise to achieve the goal. Given that collaboration on policy change was associated with school absences, it may be the case that programs in the study worked on policies to facilitate asthma management in the school setting, e.g., legislation to allow students to carry rescue inhalers and school nursing policies that encourage more communication between school nurses and the students’ primary care providers. The association between collaboration on policy action and improved medication use may speak to the complex array of factors that affect medication use, e.g. insurance, prescription, and asthma

management education coverage policies that can best be changed through collaboration among the key stakeholders.

Collaboration appears to be valued in the field. Virtually all (90%) of the asthma programs reporting to AHOP were involved in some type of collaboration or partnership. While the most common partners were clinical institutions such as hospitals/health systems, collaboration with government agencies was also widespread. Among these collaborating programs, slightly over half collaborated with government agencies, and 41% collaborated with community-based organizations. There were significant reports of collaboration with schools, universities, voluntary agencies, and organizations, and partnerships with community clinics and health plans/health insurers were also noted.

Types of collaborators (n=163)	n	%
Hospital/Health system	104	64
Governmental agency	91	56
School/School system	75	46
University/Academic institution	74	45
Voluntary organization (e.g., ALA, AAFA)	69	42
Non-clinical community-based organization (CBO)	66	40
Community clinic	53	33
Health plan/Health insurer	51	31
Other	73	45

The most common form of collaboration was sharing resources or materials, followed by collaboration on program planning. About 60% of those who collaborated reported giving or receiving technical assistance from various collaborating partners, and 43% collaborated on policy action. Although most respondents reported that a history of collaboration already existed among these agencies or institutions when the asthma program began, a significant number reported that these relationships were initiated because of the asthma program.

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"THIS PROGRAM UNITED FOUR HOSPITALS AND PHYSICIANS THAT HATED EACH OTHER PREVIOUSLY, AND GOT THE EMERGENCY ROOM DOCTORS TALKING TO THE PRIMARY CARE PROVIDERS."

– PROGRAM RESPONDENT

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Types of collaboration	n	%	Responses
Sharing resources or materials	139	86	161
Joint program planning	135	83	162
Making cross referrals of participants	97	61	160
Technical assistance	95	59	160
Collaboration on policy action	69	43	159
Memorandum of agreement	53	34	158
Other	15	9	162

### Benefits

Respondents reported several benefits of the collaborations and partnerships they formed in their communities:

#### *Sustainability*

They reported that their programs became more sustainable when multiple partners worked together to secure and maintain funding or other needed resources.

*In their words:*

"Partnership with AAFA, county board of supervisors and county school district has allowed for sustainability."

### *Credibility*

Respondents reported that they gained credibility in the community by linking with respected and well-known community institutions.

*In their words:*

"Our affiliation with [a local university] creates credibility within the community."

### *Buy-in from stakeholders*

Bringing community partners to the table as part of the asthma program team was seen to increase support and buy-in both from representative stakeholders and from the community at large.

*In their words:*

"[The participation of] community partners has made selling the program easy."

### *Diverse Resources*

Collaboration with a range of partners from various fields infused programs with a more diverse set of skills and multiple perspectives that led to more effective planning and implementation, and often encouraged increased innovation.

*In their words:*

"[We partnered] with hospitals that provided RN and RT trainers."

"[We received] technical assistance from a local research institute."

## Responsive to Need

Programs that were responsive to the needs of both groups of people and individual participants were more likely to report improved health outcomes.

Association	n	p-value*	Odds Ratio [95% CI]
<hr/> <p>“THE PROGRAM FILLS A NEED IN THE COMMUNITY.”</p>			
<p>Programs that <b>conducted a needs/resource assessment</b> were more likely to report a positive impact on <b>school/work loss<sup>a</sup></b> than those that did not.</p>	22	0.02	22.09 [2.25, 216.6]
<p>Programs that were <b>intentionally designed to target a particular race or ethnic group</b> were more likely to report a positive impact on <b>QOL for parents/caregivers</b> than those that were not. †</p>	16	0.02	18.3 [imputed]
<hr/> <p>– PROGRAM RESPONDENT</p>			
<p>Programs that <b>tailored their content or delivery based on individual participants’ health or educational needs</b> were more likely to report a positive impact on <b>QOL for adults</b> with asthma than those that did not. †</p>	22	<0.01	121.00 [imputed]
<p>Programs that <b>tailored their content or delivery based on individual participants’ health or educational needs</b> were more likely to report a positive impact on <b>QOL<sup>a</sup></b> than those that did not.</p>	42	0.01	12.08 [1.88, 77.66]
<p>Programs that <b>tailored their content or delivery based on individual participants’ health or educational needs</b> were more likely to report a positive impact on <b>QOL<sup>b</sup></b> than those that did not.</p>	53	<0.01	10.57 [2.13, 52.58]
<hr/> <p>“[IN OUR PROGRAM,] EDUCATION IS AVAILABLE TO PATIENTS IN A MANNER THAT IS CULTURALLY AND LINGUISTICALLY APPROPRIATE FOR THE ILLITERATE OR NON-ENGLISH SPEAKING.”</p>			
<p>Programs <b>that tailored their content or delivery based on individual participants’ health or educational needs</b> were more likely to report a positive impact on <b>symptoms</b> than those that did not. †</p>	54	0.03	4.81 [1.26, 18.31]
<p>Of programs that included assessment of sensitivity to specific environmental triggers as an environmental strategy, those programs that <b>tailored the intervention based on this assessment of trigger sensitivity</b> were more likely to report a positive impact on <b>QOL<sup>a</sup></b> than those that did not.</p>	14	<0.01	161.00 [imputed]
<hr/> <p>– PROGRAM RESPONDENT</p>			
<p>Programs that <b>included assessment of trigger exposure as an environmental strategy</b> were more likely to report a positive impact on <b>QOL for adults</b> with asthma than those that did not. †</p>	25	0.02	15.60 [1.48, 164.38]

Of programs that included assessment of sensitivity to specific environmental triggers as an environmental strategy, those programs that <b><i>tailored the intervention based on this assessment of trigger sensitivity</i></b> were more likely to report a positive impact on <b><i>QOL<sup>b</sup></i></b> than those that did not.	16	0.03	45.00 [imputed]
Of programs that included assessment of sensitivity to specific environmental triggers as an environmental strategy, those programs that <b><i>tailored the intervention based on this assessment of trigger sensitivity</i></b> were more likely to report a positive impact on <b><i>QOL for children</i></b> than those that did not. <sup>†</sup>	8	0.04	65.00 [imputed]

† direction of relationship confirmed through analysis of peer-reviewed programs that employed randomized controlled trial evaluations

x<sup>2</sup> Fisher's Exact Test

a Includes Quality of Life for children, parents/caregivers, or adult patients

b Includes Quality of Life for children, parents/caregivers, or adult patients, and/or functional status

Programs that utilized responsive and individualized approaches were more likely to affect quality of life and asthma symptoms. This tailoring included adapting the content or delivery based on participants' individual needs, particularly assessing and tailoring the intervention based on individuals' exposure and sensitivity to environmental triggers.

## Discussion and Insights

Among the 223 programs that reported to AHOP, nearly three quarters reported conducting a needs/resource assessment, during which most considered the needs of the community specifically.

Most programs did not report intentionally designing their program to target any particular race or ethnic group. Among the programs that did target particular race or ethnic groups, the most commonly reported group was Black/African-American, followed by Hispanic/Latino. A few program respondents reported targeting Asian, American Indian/Alaskan Native or Native Hawaiian populations.

Most respondents (84%) reported tailoring their program's content or delivery method based on individual health or educational needs, and many programs were also tailored to respond to individual participants' exposure and sensitivity to asthma triggers.

Race/Ethnicity of target population (n=221)	n	%
No specific target	176	80
Hispanic/Latino	28	13
Black/African-American	24	11
Asian	10	5
White	8	4
American Indian/Alaskan Native	2	1
Native Hawaiian	1	0
Other	1	0

Race/Ethnicity of target population (n=221)	n	%
No specific target	176	80
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White	8	4
American Indian/Alaskan Native	2	1
Native Hawaiian	1	0
Other	1	0

"[THE PROGRAM ALLOWED FOR] FLEXIBILITY WITH THE CARE OF ASTHMA PATIENTS; THERE IS A WILLINGNESS TO TRY/USE DIFFERENT TYPES OF CARE AND STRATEGIES."

– PROGRAM RESPONDENT

More than half of the respondents reported assessing exposure to asthma triggers. Of those, over half reported using clinical interviews to assess exposure, visual assessment, and self-report. Nearly one-fifth conducted analyses of physical samples. Among the 39% of responding programs that reported conducting a clinical assessment of sensitivity to environmental triggers (either through skin or blood test), over three-quarters reported tailoring the program based on this assessment.

Most respondents reported that their planning process included a needs/resource assessment, during which almost all considered the needs of their particular community. This allowed programs to consider and respond to the specific context in which they were working.

*In their words:*

"We built a program that is truly responsive to city residents and health care institutions."

"The program is flexible enough to be modified based on both community needs and science."

An apparent pattern is the association between factors associated with shaping or tailoring of an intervention to participants' need and improved quality of life. This may be explained by the fact that an individual who receives attention from tailored programs perceives and actually experiences in general a better level of quality of life following a good intervention. Perhaps the administration of a quality of life measure increases quality of life scores because the respondent feels more attended to. Another possibility is that his or her specific need is truly better met, e.g. he or she learned how to avoid triggers specific to his or her individual sensitivity. Or findings may be the result of a combination of all explanations.

Program respondents referred to "tailoring" in many ways. In general, their comments reflected efforts to make their programs as relevant as possible to individual participants. These efforts included matching specific needs uncovered in their assessments with program content, providing access to services and materials in different languages, finding ways to be culturally specific, and providing information appropriate for low literacy participants. In general these efforts to be responsive were deemed important to success.

*In their words:*

"[The program tailored the education] to the needs of each patient by monitoring patients closely and by using a patient checklist to identify educational needs."

"[We] matched the Community Home Workers with participants culturally and linguistically."

"The design of the actual education session with consideration to literacy, [including] having the sessions and information on tape, and [addressing] cultural issues [were strengths of the program]."

"The [program] video dealt with a real problem and featured 'real' people; two physicians were bilingual, the production company was bilingual and had a health care focus."

### *Flexibility*

Respondents reported that it was important to be flexible in order to meet participants' needs. They discussed the importance of being creative so that interventions could be adapted for use in settings and circumstances other than those originally anticipated. They reported accommodating families by meeting at times and in places most convenient for them and making adjustments in logistics or content as the need arose so families could continue to participate in the program.

*In their words:*

"[A strength of the program] involves the community and the one-on-one education with a selection of venues. [There is] the option of a home visit or [patients] can come to the society's office if they don't want them to come into the home."

"[The program was successful because of] our ability to adapt to schools' needs."

### *One-on-one relationship building*

Respondents consistently asserted that utilizing a one-on-one approach to build relationships between program staff and participants was an important strategy for success. Staff that had direct client contact – especially when it occurred frequently over time – learned to gauge patient needs and respond more effectively. Through case managers, community health workers, health care providers and even clinic staff, respondents reported a variety of ways to have contact with participants on a more intimate level. Doing so enabled staff to better identify and respond to participant needs. They also noted that staff who worked in this way were seen as having a particular dedication to the program, which was seen as important to success.

*In their words:*

"[A success of the program was the] richness of the interactions between nurse and patient. They developed a rapport."

"[Through] use of care managers, care is more patient-centered."

"Educators were dedicated to the program; [they] worked after hours to visit families at times convenient for the family."

"[The program used] one-on-one education and regular follow up from Life Coaches. Patients may feel greater accountability for making behavioral and lifestyle changes because they know the person is calling them."

"Educators [demonstrated] dedication to the program, [and a] commitment to a holistic approach, not simply handing over medication."

"The case manager/asthma coordinator is devoted to the patient and is a great resource for the patient."

### *Challenges to environmental remediation*

A few respondents noted the challenge of implementing environmental remediation efforts, particularly within rental housing.

*In their words:*

“Getting rental property owners to have environmental interventions done [was a challenge]. Also, tenants did not want to rock the boat due to a tight housing market.”

“...participants feared the landlords’ response, although it was illegal for the landlord to evict the tenant based on home violations.”

## Socioeconomic Status

Programs that included participants of higher socio-economic status were more likely to report improved medication use.

Association	n	p-value*	Odds Ratio [95% CI]
Q71b Programs that <b>had suburban participants in the program evaluation</b> were more likely to report a positive impact on <b>medication use</b> than those that did not.†	36	<0.01	25.00 [imputed]
Q74b Programs that <b>had middle-income participants in the program evaluation</b> were more likely to report a positive impact on <b>medication use</b> than those that did not.†	35	0.02	7.33 [1.53, 35.11]

† direction of relationship confirmed through analysis of peer-reviewed programs that employed randomized controlled trial evaluations  
 \* Fisher's Exact Test

These data indicate that the programs that worked with suburban and middle-income participants were more likely to improve medication use than those that did not.

### Discussion and Insights

Examination of all programs reporting to AHOP suggests that while less than half of programs specifically targeted participants based on their geographic category or income level, most programs included urban and low income participants, groups disproportionately affected by asthma. Although less than half of programs targeted urban participants and less than 15% targeted rural or suburban participants, 88% of programs included urban participants in their evaluation, while only 41% included suburban and 33% included rural.

Just 37% of programs specifically targeted participants based on their income level, and 96% of programs included low income participants in their evaluation. No programs targeted high income populations. A few programs included middle (39%) or high income (17%) participants in their evaluation.

Geographic Area	Target Population (n=221)		Evaluation Participants (n=220)	
	n	%	n	%
No specific target	114	52	n/a	n/a
Urban	89	40	158	88
Suburban	14	6	73	41
Rural	17	8	60	33

Income Level	Target Population (n=220)		Evaluation Participants (n=138-139)	
	n	%	n	%
No specific target	139	63	n/a	n/a
Low income	81	37	134	96
Middle income	2	1	54	39
High income	0	0	24	17

“ALTHOUGH OVER 800 PATIENTS WERE IDENTIFIED FOR THE STUDY, ONLY 100 WERE REACHED. THIS POPULATION IS VERY TRANSIENT AND IT WAS DIFFICULT TO REACH THEM.”

– PROGRAM RESPONDENT

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“THE SCOPE OF THE INTERVENTION TASK GIVEN THE PERSONAL PROBLEMS OF THIS LOW-INCOME POPULATION WAS REALLY DAUNTING.”

– PROGRAM RESPONDENT

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Medication use is the only outcome for which these quantitative data demonstrate disparities among populations of different socioeconomic status. Asthma self-management is a complex process, and learning to use medication appropriately can be a significant challenge. Families must have access to clinical care and to the medicines that are crucial in asthma therapy. Disparate access and varying ability among families from different socioeconomic status to secure appropriate care and medication will have an effect on eventual medication use. It is also likely that families of lower socioeconomic status face other significant life challenges (e.g., securing employment or safe and affordable housing, living in stressful circumstances) that may make acquiring and using appropriate medicines more challenging.

Although use of medicines was the only area in the AHOP quantitative data where socioeconomic differences appeared to affect outcome and in general findings for all participants did not differ from findings of subgroups of participants, qualitative data revealed many challenges in working with low income groups.

### Challenges working with low income populations

Critical challenges included recruiting participants and maintaining involvement. Potential participants’ other needs often overwhelmed their desire and/or ability to take part in a program.

#### *Transience*

The participation of families who move often was particularly difficult when implementing and/or evaluating programs.

#### *In their words:*

“Families involved in the program were transient and difficult to contact and follow up with.”

“Patients not attending appointments [was a challenge]. [Patients] were transient; [we were] unable to contact them, most don’t have phones.”

“Medicaid populations are very difficult to capture—address, phone number, understanding materials, [and their] ability to change their environment.”

### *Financial and other needs*

Lack of money hindered participation in instrumental ways. Families often could not afford items needed for asthma control and by necessity expended what resources they had to resolve problems perceived to be more pressing.

*In their words:*

"[A program barrier was] the socioeconomic status of the families—[trying] to provide them with all they need."

"[We had] so many low-income patients. They need transportation, mattress covers, etc."

"Going into homes required staff to come and go into families that have a pretty fragile lifestyle."

### Strategies to reach low income populations

Because of the challenges facing lower income participants, several respondents noted that making the program free and/or offering free or low cost goods was an effective strategy to reach them.

*In their words:*

"Services are free; free goods are given out."

"[A program strength was] being able to give so many goods to families. [We] used local resources like dollar stores."

## Rigor of Evaluation

Programs that used less rigorous evaluation design and analysis methods were more likely to show positive, but potentially unreliable, outcomes.

Association	n	p-value*	Odds Ratio [95% CI]
Programs that used <b>a Pre-Post evaluation design without a comparison group</b> were more likely to report a positive impact on <b>hospitalizations</b> than those that did not.	69	<0.01	5.75 [1.69, 19.52]
Programs that used <b>a Pre-Post evaluation design without a comparison group</b> were more likely to report a positive impact on <b>health care utilization<sup>a</sup></b> than those that did not.	73	<0.01	8.04 [1.69, 38.14]
Programs that used <b>a Pre-Post evaluation design without a comparison group</b> were more likely to report a positive impact on <b>unscheduled office visits</b> than those that did not.	24	0.02	21.00 [imputed]
Programs that used <b>a Pre-Post evaluation design without a comparison group</b> were more likely to report a positive impact on <b>health care utilization<sup>b</sup></b> than those that did not.	80	<0.01	9.33 [2.00, 43.63]
Programs that used <b>a Pre-Post evaluation design without a comparison group</b> were more likely to report a positive impact on <b>QOL<sup>c</sup></b> than those that did not.	46	0.01	15.70 [imputed]
Programs that used <b>a Pre-Post evaluation design without a comparison group</b> were more likely to report a positive impact on <b>QOL<sup>d</sup></b> than those that did not.	58	0.01	15.24 [imputed]
Programs that used <b>a Pre-Post evaluation design without a comparison group</b> were more likely to report a positive impact on <b>school/work loss</b> than those that did not.	39	0.04	5.35 [1.22, 24.81]
Programs that <b>did NOT use an RCT evaluation design</b> were more likely to report a positive impact on <b>school/work loss</b> than those that did not.	39	0.04	5.50 [1.22, 24.81]
Programs that <b>did NOT use an RCT evaluation design</b> were more likely to report a positive impact on <b>hospitalizations</b> than those that did.	69	0.01	0.25 [0.09, 0.70]
Programs that <b>did NOT use an RCT evaluation design</b> were more likely to report a positive impact on <b>health care utilization<sup>a</sup></b> than those that did.	73	<0.01	0.19 [0.06, 0.59]
Programs that <b>did NOT use an RCT evaluation design</b> were more likely to report a positive impact on <b>health care utilization<sup>b</sup></b> than those that did.	80	0.01	0.21 [0.07, 0.63]

Programs that <b>did NOT use an RCT evaluation design</b> were more likely to report a positive impact on <b>QOL<sup>c</sup></b> than those that did.	46	0.02	0.10 [0.01, 0.86]
Programs that <b>did NOT conduct a sample size calculation</b> were more likely to report a positive impact on <b>hospitalizations</b> than those that did.	41	0.04	0.18 [0.03, 0.97]
Programs that <b>did NOT conduct a sample size calculation</b> were more likely to report a positive impact on <b>health care utilization<sup>a</sup></b> than those that did.	43	0.03	0.10 [0.01, 0.88]
Programs that <b>did NOT conduct a sample size calculation</b> were more likely to report a positive impact on <b>health care utilization<sup>b</sup></b> than those that did.	48	0.02	0.09 [0.01, 0.75]
Programs that <b>did NOT conduct a sample size calculation</b> were more likely to report a positive impact on <b>ED visits</b> than those that did.	31	0.03	0.15 [0.02, 0.85]
Programs that <b>did NOT conduct a sample size calculation</b> were more likely to have a positive impact on <b>school/work loss</b> than those that did.	25	0.04	0.97 [0.01, 0.97]
Programs that <b>did NOT conduct a sample size calculation</b> were more likely to report a positive impact on <b>school absences</b> than those that did.	19	0.02	0.05 [imputed]
Programs that <b>did NOT include logistic regression</b> as a method of statistical analysis were more likely to report a positive impact on <b>ED visits</b> than those that did.	54	<0.01	0.06 [0.01, 0.50]
Programs that <b>did NOT use ANOVA</b> as a method of statistical analysis were more likely to report a positive impact on <b>health care utilization<sup>a</sup></b> than those that did.	69	0.01	0.20 [0.06, 0.67]
Programs that <b>did NOT use ANOVA</b> as a method of statistical analysis were more likely to report a positive impact on <b>health care utilization<sup>b</sup></b> than those that did.	76	0.04	0.29 [0.10, 0.88]
Programs that <b>did NOT use linear regression</b> as a method of statistical analysis were more likely to report a positive impact on <b>health care utilization<sup>a</sup></b> than those that did.	69	0.04	0.12 [0.01, 1.21]
Programs that <b>did NOT use linear regression</b> as a method of statistical analysis were more likely to report a positive impact on <b>lung function</b> than those that did.	35	0.03	0.07 [imputed]
Programs that <b>used chi-square</b> as a method of statistical analysis were more likely to report a positive impact on <b>medication use</b> than those that did not.	50	0.02	9.90 [1.16, 84.47]

These data indicate that programs using pre-post tests without a comparison group were more likely to report positive, but possibly unreliable, results related to a range of health outcomes including hospitalizations, unscheduled office visits, quality of life, and school/work loss, than those that did not.

Similarly, programs that used less rigorous statistical analysis methods such as those that did not conduct a sample size calculation, or use logistical or linear regression or ANOVA, reported positive, but possibly unreliable, results regarding health outcomes including medication use change in emergency department visits, and improvements to lung function.

## Discussion and Insights

Among the 223 programs reporting to AHOP, the rigor of evaluation designs and methodology varied greatly. About half used a pre-post design without a comparison group and about one third used RCT.

<b>Evaluation Design (n= 220)</b>	<b>n</b>	<b>%</b>
Pre-post design, without a comparison group	105	48
Randomized Controlled Trial	76	35
Time Series	26	12
Comparison Group, without randomization or matching	15	7
Case Studies/ Case Series	5	2
Matched Comparison	3	1
Other	3	1

About one third of respondents reported having calculated a sample size. The most frequently reported statistical method was chi-square at 50%, followed by T-test and descriptive. One fifth of respondents used ANOVA, and few programs used logistical and linear regression.

While program respondents displayed a tremendous amount of enthusiasm and passion for their work, many expressed the need for more guidance in the area of evaluation. Several noted that they were not conducting a “research study” and therefore had not seen a need for rigorous evaluation. Some reported that their program did not have access to the knowledge or tools to implement more sophisticated evaluation although they would have liked to. There was a sense among most program staff that their efforts are improving the lives of people with asthma, and there was strong interest in learning how to demonstrate this impact.

Almost all of the programs reported using either RCT or pre-post test without a comparison group, with limited reports of other designs. These findings, therefore, are most likely

demonstrating a positive association with the use of a pre-post study design coupled with a negative association with the use of an RCT. As a range of health care outcomes were examined in the sample projects, this finding was not surprising. Positive results could be an artifact of the study design utilized. It is not unusual in the course of asthma to see groups of patients improve over time for many reasons, including improvement of asthma in children as they age, seasonal variation of symptoms, and regression to the mean. Because of this, pre-post studies lacking a comparison or control group will frequently show positive changes in asthma outcomes.

Similarly, programs that reported using less rigorous analysis methods, such as use of a simple chi-square analysis, reported greater improvements to health outcomes than those that conducted more rigorous analyses, for example those that used sample size calculations, logistical or linear regression, or ANOVA.

These potential weaknesses when conducting evaluations suggest the need for employment of more rigorous methods to ensure valid and reliable findings. However, the implication is not that all asthma programs should be evaluated with an RCT. Rather, whenever possible, programs should develop a well-designed evaluation that is conceived of along with the program design, optimally rigorous and appropriately matched to the program strategies and intended outcomes, as well as feasible given available resources. The most rigorous forms of evaluation can be costly. On the other hand, mounting programs with no potential for success is an exceedingly costly proposition. Further, there are a number of efforts that might help programs to be more effective: (a) make available rigorously evaluated models that illustrate the ingredients of success; (b) provide rigorously evaluated strategies to disseminate models to a wide range of potential program providers; and (c) provide technical assistance to organizations and communities who wish to implement programs, including evaluation assistance.

## Program Planning to Achieve Specific Health Outcomes

The table below summarizes the findings from the analysis of the subgroup of peer-reviewed programs, organized by health outcome. Programs may benefit from using these findings by first deciding which health outcomes are most important for them to achieve and then using the associations found in this study to decide which program factors they might consider prioritizing in the design and implementation of the program. Details on specific programmatic factors can be found on the pages indicated in the third column, including statistical results for each association, the extent to which associated programmatic factors are seen among the complete group of 223 programs in the study, discussion of the findings, and insights about the factors from the perspective of staff who implemented programs.

A program within a managed care organization, for example, may consider the reduction of emergency room visits to be its primary goal. It could first locate the health outcome ‘emergency department visits’ in the left-hand column of the table below. Moving to the middle column, the table indicates that the program might take special care to include a component that takes place in a physician’s office or clinic, locate an office in the target community, and collaborate with government agencies. By turning to the page indicated in the far right column of the table, program planners can find details about these three associations, learn how many programs of the 223 in the study had these specific programmatic characteristics, review a discussion of the findings, and get insights about these programmatic factors from those interviewed in this study.

Health Outcome	Associated Programmatic Factors	Theme and page # (for more detail)
Hospitalizations	had an office located within the target community	Community Centered, p. 12
	collaborated with other agencies or institutions.	Collaborative, p. 20
Emergency Department Visits	had a component that took place in a physician’s office or clinic	Clinically Connected, p.15
	had an office located within the target community	Community Centered, p. 12
	collaborated with governmental agencies (of programs that collaborated with other agencies or institutions)	Collaborative, p. 20
Health Care Utilization (hospitalization, ED, urgent care, sick visits, or a general measure of utilization)	involved community-based organizations in planning the program	Community Centered, p. 12
	collaborated with community-based organizations (of programs that collaborated with other agencies or institutions)	Community Centered, Collaborative p. 12 & 20
	collaborated on technical assistance (of programs that collaborated with other agencies or institutions)	Collaborative, p. 20
	had an office located within the target community	Community Centered, p. 12

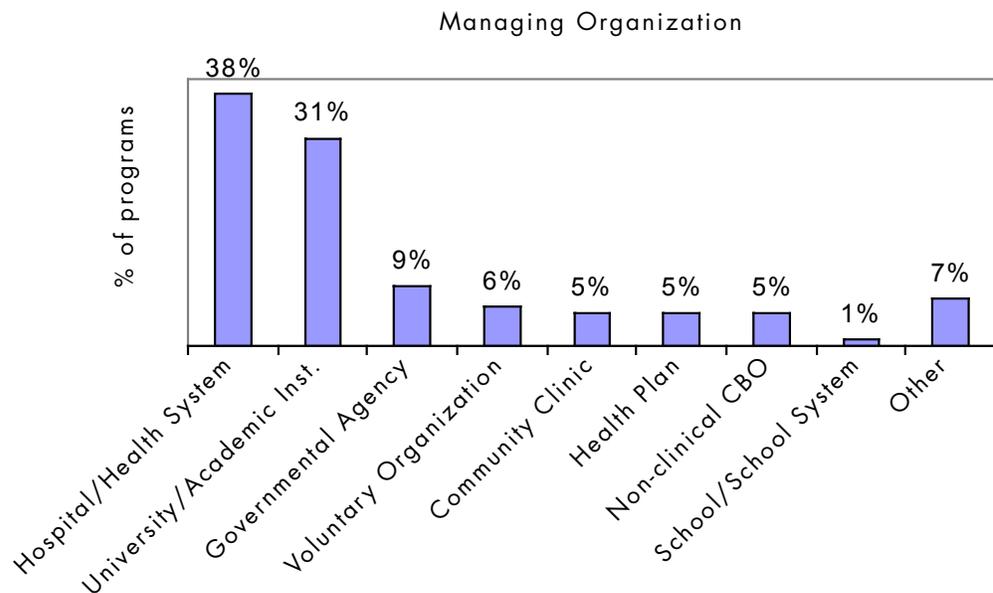
<b>Health Outcome</b>	<b>Associated Programmatic Factors</b>	<b>Theme and page # (for more detail)</b>
Symptoms	tailored their content or delivery based on individual participants' health or educational needs	Responsive to Need, p. 23
Medication Use	collaborated on policy action (of programs that collaborated with other agencies or institutions)	Collaborative, p. 20
School Absences	asthma education was received by health care providers, including school nurses (of programs that used asthma education as a program strategy)	Clinically Connected, p. 15
	collaborated on policy action (of programs that collaborated with other agencies or institutions)	Collaborative, p. 20
School Absences and/or Work Loss	conducted a needs/resource assessment	Responsive to Need, p. 23
Quality of Life for Children	tailored the intervention based on this assessment of trigger sensitivity (of programs that included assessment of sensitivity to specific environmental triggers as an environmental strategy)	Responsive to Need, p. 23
Quality of Life for Parents/ Caregivers	intentionally designed to target a particular race or ethnic group	Responsive to Need, p. 23
Quality of Life for Adults	tailored their content or delivery based on individual participants' health or educational needs	Responsive to Need, p. 23
	included assessment of trigger exposure as an environmental strategy	Responsive to Need, p. 23
QOL of Any Group, QOL of Any Group and/or Functional Status	tailored their content or delivery based on individual participants' health or educational needs	Responsive to Need, p. 23
	tailored the intervention based on an assessment of trigger sensitivity (of programs that included assessment of sensitivity to specific environmental triggers as an environmental strategy)	Responsive to Need, p. 23

## About the Programs: Key Program Descriptives

This section provides key descriptive data from the quantitative responses of the 223 programs included in AHOP. Percentages are derived from an available case analysis--programs for which data were not available for a particular response were not included in the percentage calculation. For most questions with multiple choices, answers are not mutually exclusive — programs were asked to indicate “all that apply”; therefore, percentages often will not add up to 100%. Brief case studies are provided throughout the section to highlight the breadth of programs included in the analysis. Complete tables of descriptive frequencies with the number of respondents for each question can be found in Appendix C.

### Program Background & Context

Over one third of programs included in this study were managed by a hospital or health system and another third were managed by a university or other academic institution. Several other managing agency types were cited in much smaller percentages of programs. The same agency types that managed the programs were also usually responsible for starting the program.



About one third of the programs were part of a larger initiative. Just less than one third of the programs were part of or managed by a coalition. Most programs (90%) reported collaborating with other agencies or institutions. Of programs that collaborated, the agencies with which they most frequently reported collaborating were: hospitals or health systems (64%), governmental agencies (56%), and schools or schools systems (46%). The most commonly reported kinds of collaboration were sharing resources or materials (86%), joint program planning (83%), and making cross referrals of participants (61%). Over half of the programs that reported collaborating (65%) reported a history of collaboration among groups prior to the asthma program.

While 28% of programs were based on a formally evaluated and peer-reviewed program, over half (62%) of the programs were not. 10% of programs were prepackaged programs or part of a replication project.

Funding for programs began anywhere from 1975 to 2004, with 46% starting between 1995 and 1999 and 40% between 2000 and 2004. The majority of programs also began implementation of activities between 1995 and 2004. The reported annual budget to support the program was distributed across a wide spectrum--ranging from less than \$25,000 to over one million dollars. 80% of programs included the evaluation costs in their figures.

Annual Funding	n	%
Less than \$25,000	13	11
\$25,000 – \$49,999	12	10
\$50,000 – \$99,999	20	17
\$100,000 - \$149,999	15	13
\$150,000 - \$199,999	12	11
\$200,000 - \$499,999	25	21
\$500,000 – \$999,999	15	13
\$1,000,000 and above	7	6
Total	119	100

Most programs were supported through grants or other external funding (86%). Of those, the most frequently cited external funding sources were the federal government (46%), foundations (36%), and pharmaceutical companies (16%).

Most programs reported having less than 15 staff overall (80%), with 60% of programs reporting between one and four full-time equivalent staff members. 77% of programs did not have any volunteers.

### Program Planning and Design

Nearly three quarters of programs conducted a needs and/or resource assessment as part of their planning process. Issues examined by most programs that conducted an assessment included organizational capacity, strengths of the community, and environmental conditions.

Many different groups were involved in planning the programs, with the three most frequently cited groups being healthcare providers, academic researchers, and health educators. Nearly half the programs conducted a pilot study, and all of those programs were adapted based on the results of the pilot study.

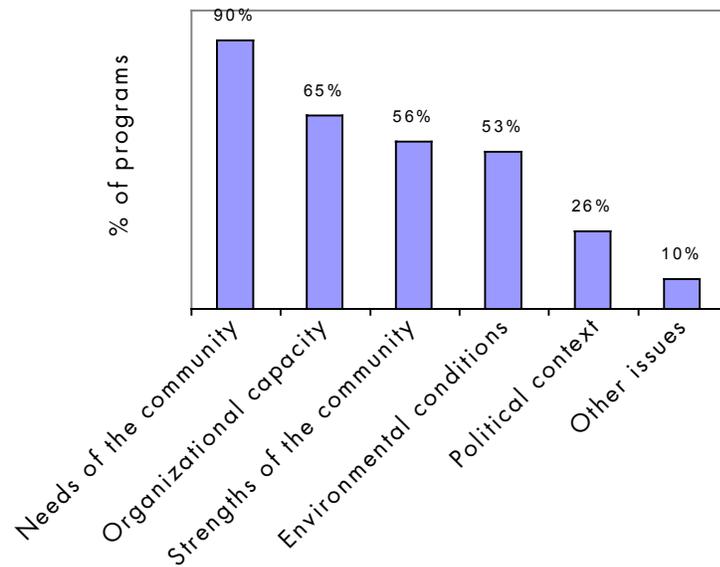
#### PARTNERS FOR ASTHMA MANAGEMENT PLANNING & EDUCATIONAL RESOURCES (PAMPER)

*The Partners for Asthma Management Planning and Education Resources is an example of a program for kids with asthma that is run by a coalition in a community setting. At home and in the school in Cedar Rapids, Iowa, children with asthma and their caregivers benefited from management education over several months. The project, overseen by the Linn County Asthma Reduction Coalition in conjunction with a general health and well-being network for the county, reported positive improvements to several health outcomes including healthcare utilization, school absences, symptoms, medication use, and use of an asthma action plan.*

**PROACTIVE ASTHMA CARE IN CHILDHOOD: GENERAL PRACTICE BASED RANDOMISED CONTROLLED TRIAL**

*A study in Sydney, Australia is an example of an international research study in a clinical setting that targeted children with asthma through improved asthma care. The study used a randomized controlled trial design to assess the feasibility and effectiveness of a general practice based, proactive system of asthma care in children. The study involved 174 patients and 24 general practitioners. All practitioners received one-on-one academic detailing on a system of structured asthma care, whereas the intervention practitioners also received instructions on implementing the system, received a patient and practitioner resource kit, and were prompted when a child's next visit was due. The study reported that children who had seen practitioners in the intervention group had reduced ER visits, less speech-limiting wheeze, were more likely to use a spacer, and had an asthma action plan.*

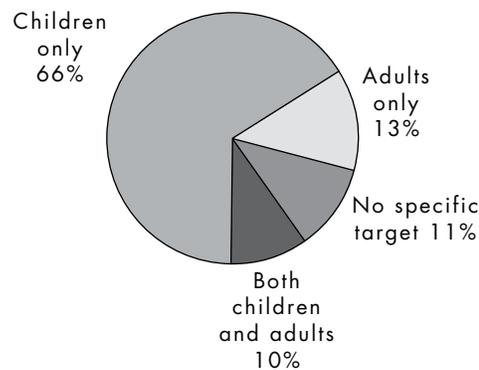
**Issues Examined in Needs/Resource Assessment**



All programs reported having established goals/mission, while only 18% reported having clear and measurable objectives. About half the programs reported use of theoretical models to design the program. Over 12 different theoretical models were used, including: social learning theory/social cognitive theory; health belief model; and self-regulation model. Nearly a third of programs reported using theories of behavior change.

The majority of programs targeted children only (66%), while far fewer targeted both children and adults (10%), adults only (13%), or had no specific age target (11%).

**Age of Target Population**



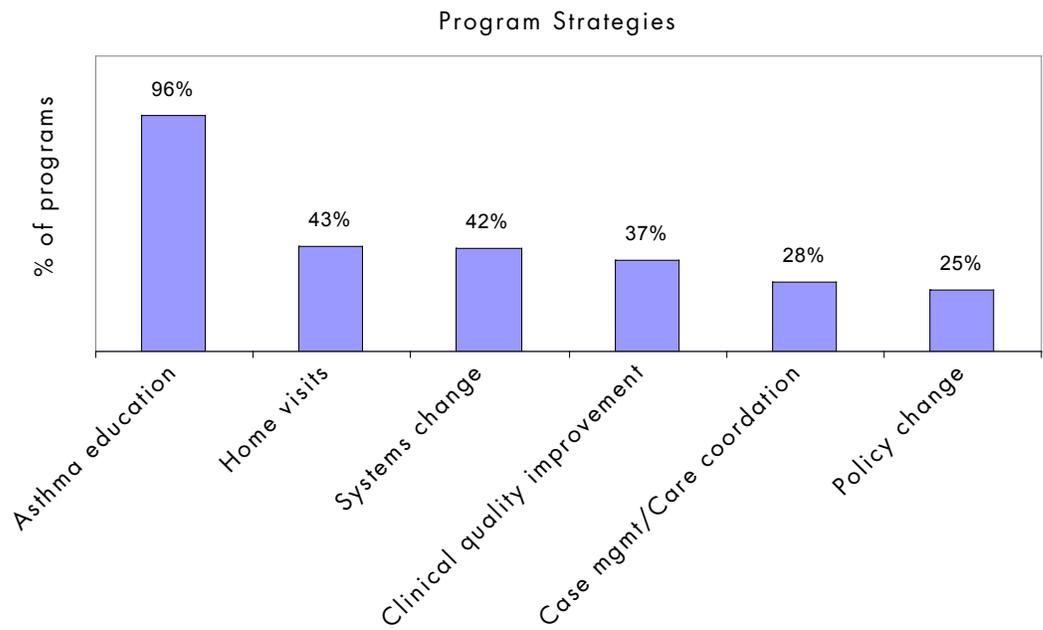
Less than half the programs reported targeting a specific geographic area, although of those that did, 74% targeted urban areas, with few programs targeting suburban or rural areas. Almost all programs (97%) did not target a particular sex. 80% did not target a particular ethnic group, but of those that did, the most commonly targeted groups were: Hispanic/Latino, Black/African American, and Asian. In regards to income level, 63% of programs had no specific target, while 37% targeted low income groups.

## Program Implementation

Education was by far the most commonly cited program strategy with 96% of programs using asthma education as a strategy. Other frequently cited program strategies were home visits (43%), systems change (42%), clinical quality improvement (37%), case management or care coordination (28%), and policy change (25%).

### PAANWM: PEDIATRIC AND ADULT ASTHMA NETWORK OF WEST MICHIGAN

*The Pediatric and Adult Asthma Network of West Michigan is an example of a community-based, multi-setting program designed to help both children and adults. The partnership includes managed care organizations, hospitals, county government, non-profit organizations, private practice and university resources. Services provided by the network include home visits, school in-services, written asthma management plans and the assistance of a medical social worker. The network's dual approach of education and intensive case management has provided a comprehensive "care continuum" for the management of asthma. This ongoing program has elicited great demand in the area and has shown a positive impact on hospital utilization and in medication use among children with asthma.*



Among programs that reported providing asthma education, the most commonly cited groups receiving asthma education were individuals with asthma (92%); family/caregivers of people with asthma (78%); and healthcare providers, including school nurses (51%). The most commonly cited teaching strategies were: one-on-one instruction (85%), skill demonstration with practice and feedback (77%), and open discussion (72%). All programs that employed education as a strategy had the goal of increasing knowledge. Other common goals included raising awareness (95%) and developing skills (90%).

Programs used a mix of materials in the program overall: newly developed (86%), adapted materials (79%), and previously existing materials that had not been adapted (73%). When asked how materials were tailored to meet the needs of participants, the top answers were: chosen to meet specific educational needs (67%), offered in languages other than English (66%), and written to match reading level (65%). 85% reported having a process to determine the quality and validity of the materials, and 90% reported that their materials were available for use by others.

The most commonly cited program settings were physician’s office or clinic (49%), home (43%), hospital (23%), and school (22%). Programs were primarily delivered by healthcare providers other than physicians (68%), physicians (39%), credentialed health educators (22%), and lay community workers or outreach workers (18%). Nearly all program deliverers (98%) were paid, not volunteers.

Programs reported that by and large, the composition of staff reflected the composition of the participants (87%), and in 86% of programs, at least one worker came from the community served.

Recipients of the intervention most frequently cited were children or students with asthma (72%), parents or caregivers of children with asthma (66%), adults with asthma (32%), and physicians (15%). When asked how program activities were tailored to meet the needs of participants, the top answers were: content or delivery method tailored based on individual health or educational needs (84%); offered in languages other than English (50%); and culturally tailored for certain racial/ethnic/geographic groups (30%).

Participants were recruited most frequently through health screenings, claims data, and/or utilization review (57%). Other methods included referrals, predefined group, volunteers, outreach, and word of mouth. Frequently cited retention strategies included stipends or free goods and/or services, relationship building, and food.

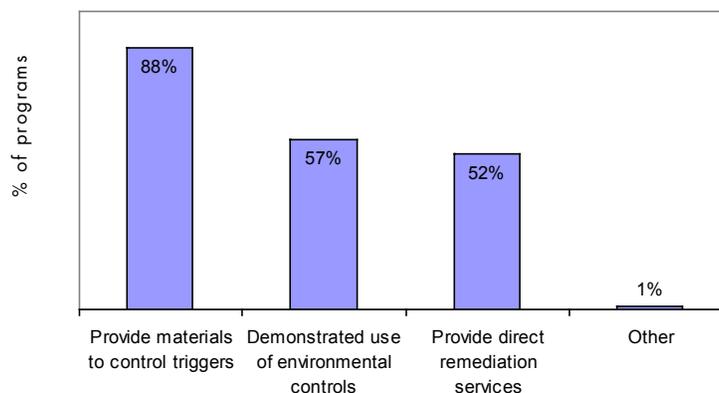
### Implementation of Environmental Strategies

Overall the top triggers addressed in programs were dust mites, cat/dog dander, tobacco smoke (first-hand or environmental), mold, and cockroach allergen. The most common strategies to address environmental topics or issues were education on asthma trigger identification, control or avoidance (96%); assessment of exposure to asthma triggers (74%); and actions to change the home environment (40%). Of the 164 programs that assessed exposure to triggers, exposure was measured by clinical interview (59%), visual assessment (56%), self-report (55%), and analysis of physical samples (19%).

Of those that assessed exposure, 37% assessed clinical sensitivity, most commonly by skin tests. Among programs that reported assessing sensitivity, 83% reported tailoring the intervention based on this assessment.

Of the 40% of programs that included “actions to change the home environment” as a strategy, most provided materials to control triggers (88%); while more than half also reported demonstrating use of environmental controls and providing direct remediation services.

Actions Taken to Change the Home Environment



#### A CONTROLLED TRIAL OF TWO FORMS OF SELF-MANAGEMENT EDUCATION FOR ADULTS WITH ASTHMA

*A Controlled Trial of Two Forms of Self-Management Education for Adults with Asthma is an example of a research study for adults in a clinical setting. Asthma self-management education for adults was the focus of the trial, conducted in 1988-9. It compared individual education and small-group education of similar content with a self-study manual and with usual care at four Northern California Kaiser Health Care Program medical centers. While both approaches resulted in significantly better control of asthma symptoms, MDI technique, and environmental control practices, the group program proved to be somewhat more cost-effective and was subsequently disseminated by the National Asthma Education and Prevention Program as “Breathe Easier.”*

## Program Evaluation

Programs measured over 20 different health outcomes in various combinations. Most frequently measured outcomes included hospitalizations, Emergency Department (ED) visits, symptoms and medication use. Of the programs that measured these outcomes, 76% reported improvements in hospitalizations, 79% in ED visits, 78% in symptoms, and 81% in medication use. The measured outcomes that were most likely to show improvement were work loss, use of an action plan, peak flow meter use, and self-management skills.

### OAKLAND KICKS ASTHMA

*Oakland Kicks Asthma, based in Oakland, CA, is an example of a large-scale, multi-setting research intervention for teens with asthma. Since 2003, Oakland Kicks Asthma has taken a broad approach to addressing asthma that includes operation of a teen asthma clinic, asthma camp, mass media campaigns, and policy change initiatives. Additionally, high risk adolescents participate in school-based monitoring and asthma education programs as well as home-based case management. A high priority of the program is to have their workers culturally and linguistically match the target population. Funded by the CDC Controlling Asthma in America Cities Project, the project is managed by the American Lung Association of California (formerly the American Lung Association of East Bay) and evaluated by UC Berkeley.*

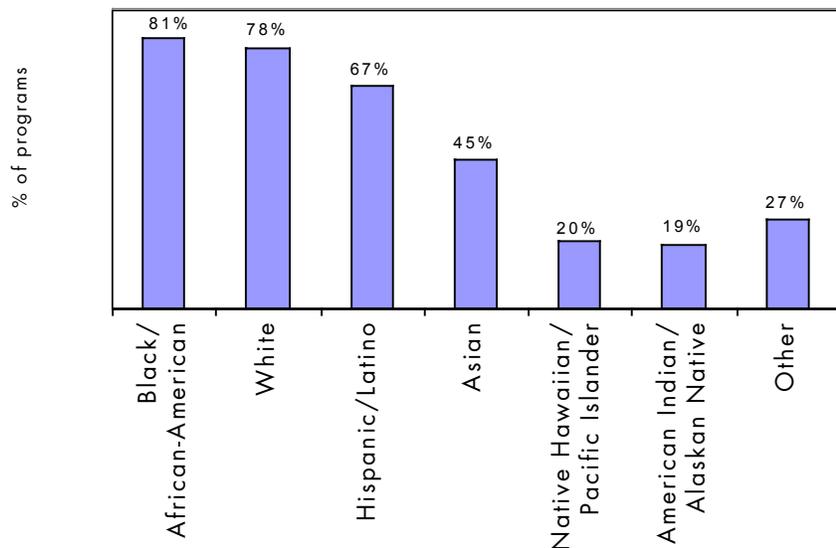
Health Outcomes Measured and Improved		
	Percent that measured each outcome (of all programs)	Percent that improved each outcome (of those that measured each outcome)
	(%)	(%)
Hospitalizations	64	76
Emergency department (ED) visits	59	79
Urgent care visits	12	82
Sick (unscheduled) office visits	23	81
Well (scheduled) office visits	14	69
Healthcare utilization (general)	15	73
Quality of life for children	22	85
Quality of life for parents	15	78
Quality of life for adults	14	72
Functional status	22	80
School absences	35	78
Work loss	18	90
School/work loss (general)	5	70
Symptoms	56	78
Lung function	24	59
Medication use	56	81
Self-management skills	31	87
Use of asthma action plan	22	90
Peak flow meter use	8	88
Change in clinical actions	26	86
Other	8	61

Only one third of programs measured changes in exposure to environmental triggers, either through direct physical measure or by tracking behaviors aimed at reducing exposure. The most commonly measured trigger-related outcomes were environmental tobacco smoke (54%), cat or dog dander (51%), and dust mites (50%). Of the programs that measured these outcomes, 58% reduced environmental tobacco smoke, 49% reduced cat or dog dander, and 82% reduced dust mites.

Environmental outcomes measured and improved		
Trigger Exposure	% Measured (n=70)	Of those that measured: % improved
Environmental tobacco smoke	54	58
Cat or dog dander	51	49
Dust mites	50	82
Cockroach allergen	37	63
Mold	26	71
Rodents	23	57
Unspecified triggers	17	69
Dampness	14	50
Outdoor allergens inside the home	10	29
Outdoor air quality	4	25
Other	21	73

Most programs included all participants in the evaluation (84%). Not surprisingly, the age of evaluation participants reflected the age of targeted participants; most (67%) were children only. The majority of programs reported including urban participants in the evaluation (88%), followed by suburban (41%) and rural (33%). All but one program reported both male and female evaluation participants. Most programs did not specifically target participants of a particular race or ethnicity, but Black/African American, White, and Hispanic/Latino participants were frequently included in the program evaluation.

Race/Ethnicity of Individuals Included in Evaluation



ASTHMA RESPONSE TEAM

*The Asthma Response Team is an example of a multi-faceted program for children and adults with asthma provided by a county health department. The Erie County Department of Health brought together a team of certified public health professionals including sanitarians, integrated pest management applicators, and asthma educators to provide physical intervention, education and care coordination in Erie, New York. Members of the Asthma Response Team visually inspected homes of people with asthma to identify potential asthma triggers and to design and implement a plan to eliminate or reduce the triggers. This assessment was followed by a six part asthma education program for the family, in their home. During a one year follow-up period, participants received referrals to various community agencies as needed. Program evaluation indicated a positive impact on health care utilization, quality of life, asthma severity and symptoms, and a decrease in work loss and school absences.*

The income level of evaluation participants reported by the greatest number of programs was low income (96%), with 39% of programs reporting the inclusion of including middle income evaluation participants and only 17% including high income evaluation participants.

Only 37% of programs calculated a sample size. Most responding programs (78%) reported use of validated evaluation materials, and most (80%) used statistical analysis to determine if outcomes were significant. Statistical methods most frequently cited were chi-square (50%), T-test (49%), and descriptive (37%). Other methods cited were ANOVA, logistic regression, and linear regression.

The most common designs used to determine the program's impact on health outcomes were: pre-post design without a comparison group (48%); randomized controlled trial (35%); and time series (12%). Nearly half of the programs had evaluation results published in a peer-reviewed journal.

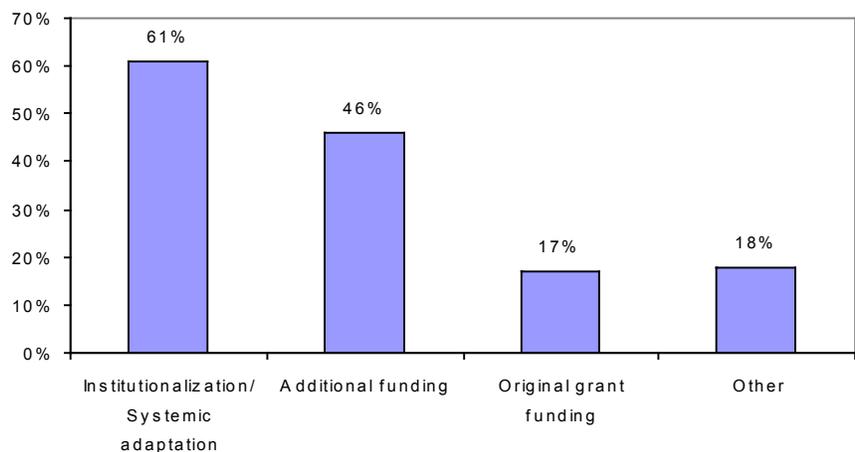
### Sustainability & Recognition

At the time of the survey, 66% of responding programs were ongoing. Programs reported continuing their efforts through systemic change or institutionalization, additional funding, and/or the original grant funding. 83% of programs have received recognition of some kind.

### Perceived Strengths

When asked what they perceived to be the factors that contributed most to the program's success, respondents most frequently described factors having to do with: staff dedication, enthusiasm, and diligence; collaboration, relationships and partnerships; community focus and involvement; program champions; educational components; program planning and design; and leadership.

Funding Source(s) of Ongoing Programs



## Perceived Barriers

When asked about the program's barriers to success, respondents overwhelmingly described difficulties related to insufficient resources, namely funding. Other commonly cited barriers related to: lack of provider buy-in; reaching and engaging participants, especially non-English speakers and people overburdened with other life challenges; weaknesses in the research design; lack of resources and/or expertise for evaluation; challenges working in the schools; and staff recruitment and attrition.

## Unintended Impacts

Over half (58%) of programs reported unintended impacts. Respondents described changes in the way they worked, having a better understanding of the community, new partnerships and collaborations, policy and other system changes, and impacts on other chronic diseases and issues not necessarily related to asthma. The next section of this report provides more detailed discussion of programs' unintended impacts.

# Unintended Impacts of Programs

The AHOP qualitative data revealed a number of unintended impacts observed through program efforts:

- Many of the programs reported changes in the ways they worked, including formation of new partnerships and modifications or programs that were newly created in response to observed needs. One program described organized efforts to extend physician offices hours in order to prevent after-hour ED visits. Programs described how overall self-management of asthma had improved in children and families with asthma, and how children learned to become “asthma experts,” taking responsibility for their condition across different settings.
- Other programs reported having a better understanding of their community and the ability to assist the community with needs not necessarily related to asthma. For example, one program described offering legal services to families enrolled in their asthma programs. Another program described the development of an after-school tutoring program in response to needs identified through their work with asthma.
- Several programs described ways that their work extended to other chronic diseases in addition to asthma. For example, case management programs were developed for other diseases and conditions, and spin-off programs were created to cover broader health concerns of children and families who participated in their asthma programs. One program observed weight loss in children with obesity learning how to cope with exercise-induced asthma and include exercise in their lives again.
- Many programs described increased partnerships and programs as an outgrowth of their overall recognition and the reputation they established in the community. They described their work in asthma as “opening doors” for stronger collaboration within the community and an increased willingness of health departments, hospitals, MCOs, and community and state-level partners to collaborate as a result of their program being perceived as a local resource.
- Programs reported policy and other system changes related to their work. One program reported efforts of their program that led to the addition of 20 asthma questions to their state Behavioral Risk Factor Surveillance Survey. Another reported work with their state Department of Education to develop school asthma guidelines. Another program reported changes in reimbursement for asthma education with primary care providers in their community. Respondents in general reported ways that their programs had become institutionalized and integrated into existing programs both within and outside of the healthcare system, for example, in one instance, through their community’s Public Housing Authority.

In addition to the intended and unintended successes reported by AHOP programs, insights were also provided to better understand why programs may not always see the changes in asthma-related outcomes in relation to their efforts. For example, one program observed an increase in asthma-related symptoms in their intervention group, speculating that this increase likely the result of an increased ability of parents to use their newfound knowledge to recognize asthma symptoms.

## Conclusion

Through analyses of AHOP data gathered from programs that included an environmental component, a range of programmatic factors have been identified that were associated with positive results. In the AHOP quantitative data analyses, different aspects of program processes were related to different outcomes. This observation suggests that the first decision of program implementers should be to determine the outcome(s) on which they wish to have an impact. If a goal is to reduce health care use, then data from this report suggests that they should pay attention to their relationships with clinical care providers, community based organizations, and to the relevant governmental agencies, each of whom no doubt plays an important role in ensuring quality of, access to and demand for asthma care. If a goal is to improve medication use, collaboration with community based and governmental organizations may be especially important, as such collaboration is likely to enhance access to and appreciation of asthma therapies. If reducing the frequency of symptoms in asthma patients and/or increasing patients' rating of the quality of their lives are desired outcomes, individualizing interventions might be an important component for success. In general, developing closer ties to the community (e.g., involvement in planning, a program office in the community, full collaborations) appears to increase the chances of success.

Particular program processes were also shown to be important in both qualitative and quantitative data analyses. For example, engaging in the accepted steps of program development was demonstrated by the AHOP data as very important to success. Achieving positive health outcomes were related to intentional and inclusive planning, getting buy-in from clinicians, and identifying champions to carry the program into the community. As noted, collaboration from the outset through the range of program activities was related to positive outcomes. These observations suggest that in addition to determining the desired goal of the project, program implementers should pay attention to the processes to be used to reach goals.

Common challenges, as well as strategies to address challenges, were seen across programs. This observation suggests that sharing strategies among programs could improve effectiveness and efficiency. For example, clinicians frequently perceived that they had insufficient time and/or did not see incentives for involvement in programs. On the other hand, virtually all surveyed programs achieved clinical involvement and clinicians frequently became asthma champions in their communities.

Particular aspects of asthma control were challenging. Reaching low income families proved challenging and required extra effort. For example, improvements in medicine use were more likely to be realized for middle-income patients, no doubt in part because of their greater ability to secure often costly therapies. Although respondents were overwhelmingly convinced that their efforts were improving the lives of individuals with asthma, they often expressed limitations in their ability to effectively measure their impact. These observations suggest that model programs, dissemination strategies, and technical assistance, particularly in evaluation, are needed to enhance the important asthma efforts occurring around the world.

If key phrases describing factors associated with successful programs were distilled from the large amount of data examined, they would be: community centered, clinically connected, continuously collaborative, and responsive to need.

An unexpected outcome of the project has been the opportunity for asthma programs to share information with one another. During the nomination and survey process, participants repeatedly asked for information about the other programs included in the study. In response, AHOP developed a list of all programs identified as well as a description of each program surveyed, available on the AHOP website, [AlliesAgainstAsthma.net/AHOP](http://AlliesAgainstAsthma.net/AHOP). Additional program documents, including the survey instrument utilized, have also been made available on the website with the hope they might be useful to others.

# APPENDIX A: ACKNOWLEDGEMENTS

The AHOP team gratefully acknowledges the contributions of the AHOP Expert Panel, a distinguished group of asthma experts and key leaders in the field who have made substantial contributions throughout the project. We thank the panel for the direction and expertise it provided.

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# APPENDIX B: OVERVIEWS OF 223 ASTHMA PROGRAMS

NOTE: Overviews are provided for 223 asthma programs on which AHOP collected program survey data through published literature, program documents, and/or detailed interviews with program staff. Programs are listed alphabetically according to the location where the program took place, by state or country, then by city, then by program name. Contact information, when available, was last updated in July 2007 unless otherwise noted. Please email [ahop@umich.edu](mailto:ahop@umich.edu) with any questions or comments.

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# Domestic Programs: Alabama

## 1. Asthma Agents: Patrolling and Controlling Asthma

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Blue Cross and Blue Shield of Alabama began the Asthma Agents: Patrolling and Controlling Asthma program in 2002 and it is overseen by the University of Alabama at Birmingham Lung Health Center.

Urban, low income school children aged 6-12 years with asthma interact with an in-school internet-based computer program that provides asthma education and monitors daily asthma control, with minimal oversight by teachers or school nurses trained in the use of the program. The first session covers basic asthma education including skills on peak flow meter use. Beginning the next day and every weekday at the same time daily, students log on to the internet monitoring system and report peak flow meter readings, symptoms and medication use. This daily reporting lasts about 5 minutes. Teachers and school nurses who received prior in-service on the program supervise the students' reporting through troubleshooting and send children to the office if peak flow meter readings are yellow or red.

Evaluation to date has indicated a positive impact on self-management skills and peak flow meter use. Asthma Agents is ongoing and will be expanding into additional schools in the fall of 2005.

## 2. Asthma Self-Management Program

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The prevalence and impact of adult asthma are substantial, and poor self-management practices, especially failures to adhere to treatment regimens, appear to be a significant problem. Desirable characteristics of an intervention program to improve self-management were identified through needs assessment and review of existing patient education resources. A comprehensive program was developed in Birmingham, AL that integrated a workbook with one-to-one counseling and adherence-enhancing strategies.

The self-management program included a one-hour one-on-one counseling session conducted by a health educator. The patient received a peak flow meter and was instructed on how to use it. The intervention focused on the self-care workbook that included information on the proper use of medications, self monitoring and self evaluation techniques, early detection of impending attacks, and attack management. Patients also took part in asthma support groups lead by the health educator. The support groups reviewed information from the individual sessions and encouraged patients to share their concerns. The health educator made phone calls two and four weeks post initial encounter to encourage self management.

A longitudinal one-year study compared patients receiving this self-management program with “usual care” patients receiving standard asthma pamphlets. Patients were randomly assigned to conditions. Baseline score and asthma severity were statistically controlled. After one-year self-management patients had substantially better adherence than usual care patients at follow-up, including symptoms, medication use, and inhaler technique. Hospital and emergency department visits decreased in both groups but did not differ between groups. The self-management program ended in 1994, but was approached by the American Lung Association to adapt the program to a community setting, and become a community asthma education program nationwide. The adapted program, Breathe Well Live Well, is currently being pilot tested at several community sites in Alabama.

## Domestic Programs: Arizona

### 3. Phoenix Children’s Hospital Breathmobile

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The Phoenix Breathmobile, implemented in January 2000, is a collaboration between the Arizona Asthma Coalition, Phoenix Children’s Hospital, Phoenix Elementary School District, Roosevelt School District, local business, and pharmaceutical companies.

The Phoenix Breathmobile provides community-based, culturally sensitive, bilingual services on school grounds in a self-contained mobile clinic. The program utilizes four successful asthma management techniques outlined in the NIH/NHLBI guidelines for care of asthma; 1) objective measurement of lung functions, 2) pharmacological therapy including maintenance and rescue medications, 3) environmental control of allergens and triggers, and 4) patient education in partnership with the child’s family and medical providers.

The program’s overall goals are to improve asthma diagnosis, management and awareness among elementary-aged children and their families in Maricopa County, AZ. Specific objectives for achieving these goals include 1) reduce asthma severity, 2) improve quality of life scores, 3) reduce asthma-related hospitalizations, 4) reduce asthma-related emergency room visits, 5) reduce school absenteeism due to asthma, 6) increase the number of eligible children enrolled in public or private insurance programs, 7) increase enrollment of children in medical homes, and 8) secure ongoing means for sustainable funding.

## Domestic Programs: Arkansas

### **4. Project A.I.R.: Asthma is Resolvable**

St. Joseph's Mercy Health Center  
Hot Springs, AR

St. Joseph's Mercy Health Center initiated Project A.I.R. (Asthma in Resolvable) in 2000 with the goal of combating pediatric asthma in Hot Springs, AR and 5 surrounding counties through in-school educational sessions and case management.

Low income, rural children identified as having asthma and their families receive a 1-3 hour case management visit from an RN in the home, school or clinic office, with brief follow-up phone calls to track peak flow readings and asthma management over the course of 6 months. During the visit, the nurse provides general asthma education and instruction on how to use inhalers and peak flow meters. Program nurses arrange physician appointments, transportation and medications, and the program pays for these services as necessary. The program communicates with physicians and nurses through written summaries of patient health status, phone calls to the office and by accompanying families to appointments when necessary. Program nurses also assist families in applying for state aid such as Medicaid and food stamps.

The educational sessions take place in the school with children identified as having asthma through an in-school asthma screening, and are taught by an RN during 45-minute classes once per week for 4 weeks. In these sessions, general asthma education on anatomy, triggers, medications and devices is given. The program also offers in-services by request to school personnel, daycare providers and school nurses using the ALA asthma in-service guidelines. The program incorporates elements of Open Airways for Schools, A is for Asthma and Power Breathing, and notes the ability to offer one-on-one case management in this area of Arkansas as a strength since these services are not offered through other programs.

Program evaluation indicated a positive impact on several health outcomes for children with asthma. The program ended in mid-2004.

## Domestic Programs: California

### **5. Improving Asthma Outcomes and Self-management Behaviors of Inner-city Children**

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“Improving Asthma Outcomes and Self-management Behaviors of Inner-city Children: A Randomized Trial of the Health Buddy Interactive Device and an Asthma Diary” was a study that assessed the effectiveness of an interactive device programmed for the management of pediatric asthma. The design was a randomized controlled trial (66 participants were in the intervention group and 68 were in the control group). Interventions were conducted at home and in an

outpatient hospital clinic. Participants included inner-city children aged 8 to 16 years diagnosed as having asthma by a physician.

The Health Buddy is a personal and interactive communication device that is connected to a home telephone and can be programmed to present questions and information on a screen and to record responses. The nurse coordinator sends a set of queries each day using a standard internet browser. The patient answers the queries by pressing one of four buttons. The device automatically telephones a data processing center at night, which processes the responses and publishes them to a secure Web site the next day, from which the nurse coordinator reviews the information. All children were asked to return for two follow-up visits at six- and 12-weeks. At these visits families were interviewed by the nurse coordinator and given a standardized teaching session that reinforced peak flow measurement, compliance with medications, and tracking of symptoms.

After adjusting for covariates, the odds of having any limitation in activity during the 90-day trial were significantly ( $P=.03$ ) lower for children randomized to the Health Buddy. The intervention group also was significantly ( $P=.01$ ) less likely to report peak flow readings in the yellow or red zone or to make urgent calls to the hospital ( $P=.05$ ). Self-care behaviors, which were important correlates of asthma outcomes, also improved far more for the intervention group.

Compared with the asthma diary, monitoring asthma symptoms and functional status with the Health Buddy increases self-management skills and improves asthma outcomes.

## **6. IAM: Improve Asthma Management Project**

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The Improve Asthma Management (IAM) Project in Chula Vista, CA was established in 2001 to address the increasing problem of asthma observed in the Chula Vista Elementary School District. An essential component of this project is the implementation of the American Lung Association's Open Airways for Schools program.

The school nurses facilitate the education sessions for the students with asthma. There are six sessions that focus on various asthma topics as triggers, medications, peak flow meter and spacer use, diaries, and asthma action plans. School nurses also work as a team with primary care providers to obtain asthma action plans, feedback on attendance or symptom changes and to respond to any nursing inquiries regarding the child's health.

Evaluations to date indicate that the program has had a positive impact on the following health outcomes: office visits, school absences, medication use, and self-management skills. This project ended in September, 2004, with the end of grant funding, although project staff continue to implement the Open Airways program as much as possible.

## **7. Community Medical Centers' Asthma Education and Management Program (AEMP)**

Community Medical Centers (CMC)  
Fresno, CA

The Community Medical Centers' Asthma Education and Management Program (AEMP) provides patient education and management services to people with asthma in Fresno County, California.

The stated goals of the AEMP are 1) to improve the health education of the community at large, 2) to decrease the morbidity and mortality due to asthma in the San Joaquin valley to below the national norm, and 3) to utilize a Multiphase Algorithmic Protocol (MAPc) -based program to accomplish these ends.

Patients with asthma of any age are accepted by referral into the program. Patients are seen at a clinic for an initial asthma education intervention which includes asthma education and clinical management. Findings, suggestions, and any treatment changes are communicated to the primary care provider. Patients return after one month to assess any medication and environmental changes and review PFM tracking and symptoms. If the patient has responded well to the interventions, an asthma action plan is developed and given to the patient. If the patient has not responded well, additional return visits are scheduled and further action may be taken as warranted, including home visits with intensive environmental interventions. All patients are contacted via phone (or by mail if not reached by phone) at three months, six months, and one year for assessment of asthma health and possible need for further follow-up and/or intervention.

AEMP also conducts community-wide asthma education initiatives, trains and places clinical staff throughout the region, and works to enact asthma-friendly policies.

Regular ongoing chart review is an important part of the program and is used to track health outcomes. To date improvement has been found in hospital utilization, emergency department visits, urgent care visits, unscheduled (sick) visits, school absences, work loss, symptoms, medication use, change in clinical actions, functional status, lung function and peak flows, self-management skills, and use of an asthma action plan.

## **8. ACT: Asthma Care Training for Kids**

UCLA  
Los Angeles, CA  
Charles Lewis, MD, MS, ScD

A randomized control trial of a curriculum, ACT (Asthma Care Training) for Kids, was conducted. Seventy-six children between the ages of 8 and 12 years, whose asthma required treatment with medications at least 25% of the days per month, were randomly assigned to control and experimental groups.

The control group received 4 1/2 hours of lecture presentations on asthma and its management. The experimental groups (consisting of 4-7 children and their parents) received five 1-hour sessions comprising "the treatment." Children and their parents were interviewed before the sessions and 3, 6, and 12 months after the completion of the experimental treatment.

Use of emergency rooms and hospital was determined by reviewing the records of these patients

(all members of the Los Angeles Kaiser Permanente health care system) for the period of 1 year before and 1 year after the treatment.

Results include (1) equivalent increases in knowledge and changes in beliefs in both groups, (2) significant changes in the self-reported compliance behaviors of the experimental group only, and (3) significant reductions in emergency room visits and days of hospitalization among those receiving the experimental treatment, compared with the control group. These changes represent an estimated savings of approximately \$180 per child per year for those in the experimental group.

## **9. ACT-PN: Organizing the Community to Target Poor Latino Children with Asthma**

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A community-university partnership that works to improve outcomes of care for poor Latino children (aged 7-14 years) with asthma in East Los Angeles was based on development of a community infrastructure. A family-centered 3-session educational program, ACT-PN, involved over 500 families. The Association of Latinos with Asthma and Allergy Symptoms (ALAAS) was formed. Parents report reductions in hospitalizations, emergency room, and acute care visits. Survival of the infrastructure following the end of grant funds is unlikely unless other resources offset the costs of volunteerism among poor families. Block grants to community agencies from established fund-raising groups might reduce dependency-producing practices currently employed to “help” the poor.

## **10. An Evaluation of a Self-Management Program for Adults with Asthma**

Los Angeles, CA  
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The purpose of this study was to evaluate the impact of a self-management program for adults with moderate to severe asthma on compliance with inhaled, prescribed, non-emergency medications; asthma symptoms; and airway obstruction.

In this controlled experimental study, 55 subjects from a rural community were randomized to one of two groups.

In addition to routine medical care the six-week asthma self-management program included two-hour nurse-led sessions. The sessions covered the following topics: self-management behaviors and skills, asthma medications, triggers, prevention of attacks, relaxation techniques, psychological responses, and problem solving skills.

Primary measures included the Metered Dose Inhaler Chronolog, a journal of daily asthma concerns, and a peak-flow meter to appraise airway obstruction. Secondary measures included the Asthma Self-Management Assessment Tool and the Self-Efficacy for Asthma Management

Scale. These measures were completed pre- and post-intervention. Data analysis using descriptive and inferential statistics revealed that after six weeks subjects receiving the self-management program increased compliance with inhaled medications ( $U = 271$ ,  $p = .043$ ).

## **11. Breathmobile: A Southern California Pediatric Asthma Disease Management Program**

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In 1995 the Southern California Chapter of the Asthma and Allergy Foundation of America initiated the Breathmobile®: A Southern California Pediatric Asthma Disease Management Program through a formal collaboration with the Los Angeles County Department of Health Services and the Los Angeles Unified School District. This collaboration led to a sustainable healthcare delivery program for low socioeconomic inner city children with asthma designed to overcome the complex social, economic, and care quality barriers associated with poorly controlled disease in this setting.

Children and their parents/caregivers are recruited to the program through physician referrals, school fliers to parents, and school nurses who have identified those children with uncontrolled asthma. The Breathmobile® goes to schools and comprehensive health centers (currently, there are five Breathmobiles® serving more than 100 schools and three Comprehensive Health Centers in Southern California). The Breathmobile® is a specially equipped mobile asthma clinic staffed with an allergist, registered nurse, respiratory therapist, and a patient service worker. The child enters the Breathmobile® and registers with the patient service worker. The child then is assessed by the registered nurse and respiratory therapist and receives interactive education. Finally, the child is examined by the physician and further educated. The child often receives a skin allergy test at the first follow-up visit. The amount of follow-up visits varies on severity and need.

The program has had a positive impact on the following health outcomes: hospitalization rates, emergency department visits, urgent care visits, unscheduled (sick) and scheduled (well) office visits, school absences, work loss, quality of life for children and quality of life for parents/caregivers, symptoms, medication use, change in clinical action (provider behavior), functional status, lung function, and self-management skills.

The concept of the Breathmobile® has spread across the country. There are now Breathmobiles® in Phoenix, Chicago, Baltimore and one soon to become operational in Mobile, Alabama.

## **12. Power Breathing**

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In response to school nurse concern in West Covina, CA, this pilot study evaluated an adolescent asthma education program, the Power Breathing Program, together with individual coaching sessions.

Thirteen high school students aged 15-18 in grades 9-11, predominantly female and African-American, participated over a 6-month period. The intervention consisted of the Power Breathing Program (three 90-minute group educational sessions) followed by three 15-minute individual coaching sessions. All sessions were delivered at school during the school day by a nurse trained in the Power Breathing program.

Evaluation tools included the Child Health Survey for Asthma, a focus group interview, and a Power Breathing Program evaluation questionnaire. Participants reported that knowledge gained improved trigger avoidance, increased medication adherence, and decreased the frequency of asthma episodes.

### **13. Mission Asthma Education Program**

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Mission Hospital's Mission Asthma Education Program was implemented in 2000 to improve the quality of life for children with asthma.

The Asthma Program helps children, their parents, and adults learn to control asthma through classes about asthma, allergies, triggers, and medications. Peak flow meters and spacers are distributed and proper technique is demonstrated. The program also works with school districts to educate and manage asthma within the school setting. A special, growing project for the low-income children and parents (predominately Latino) combines bilingual education and free medical care through a partner program, the Breathmobile.

Evaluation to date has indicated a positive impact on the following health outcomes: hospital utilization, emergency department visits, school absences, quality of life for children, symptoms, and medication use.

### **14. South Bay Asthma Advocacy Program**

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*(contact information last updated September 2005)*

Paradise Valley Hospital in National City, CA, began the South Bay Asthma Advocacy Program in 2002 with the goal of providing a sustainable solution that offers patients with asthma the information and tools to improve their quality of life. The program primarily targets children less

than 17 years, but the program also serves adults with asthma and has worked with patients up to 64 years old. The adult population makes up < 5% of total referrals.

Urban and suburban program participants and their families receive four in-home education sessions from either a respiratory therapist, certified asthma educator, physician or trained community health worker. At the initial visit, families receive general asthma education. Two weeks later, the second visit takes place where an environmental assessment of the home is done. Two additional visits occur at three- and six-months after the initial visit. At least one brief follow-up telephone call is placed between visits two and four. Case summaries for each patient are sent to the primary care physician after each visit.

Program evaluation to date demonstrated a positive impact on healthcare utilization, school absences, and quality of life for children.

A strength of the program is its self-sustaining model, in which insurance companies pay for the program's services. The program is ongoing due to this support.

### **15. Oakland Kicks Asthma**

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Oakland Kicks Asthma is a multi-year public health intervention to reduce morbidity due to asthma among adolescents age 11-18 in the city of Oakland, CA. Oakland is one of seven cities nationwide receiving funding as part of the CDC Controlling Asthma in American Cities Project. This intervention is managed by ALA of East Bay, while UC Berkeley coordinates the evaluation and serves as the fiscal organization. Oakland Kicks Asthma has been implementing project activities since 2003.

The project includes school-based surveillance and education, home-based case management program for high risk youth, and provider education, training, and systems change interventions. Oakland Kicks Asthma also operates a teen asthma clinic, an asthma camp, mass media campaigns, and policy change initiatives.

Evaluation results to date have shown a positive impact on hospital utilization, ED visits, urgent care visits, school absences, quality of life, symptoms, medication use, and lung function. Program activities and evaluation are ongoing at least through 2008.

## **16. Partnership for Children’s Respiratory Health: A Demonstration Project of Integrated Housing and Health Interventions**

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In 2002, the Alameda County Lead Poisoning Prevention Program (ACLPPP) conducted a childhood asthma demonstration project, Partnership for Children’s Respiratory Health: A demonstration project of integrated housing and health interventions.

Educational and environmental household interventions were used to attempt to reduce asthma severity in children residing in study homes. A total of 144 children diagnosed with asthma were recruited. Although the original intent was to limit subject ages to 5 years and under, the age of the recruited subjects ranged from 1 year to 12 years, with most subjects being over 6 years old.

The caregivers for all subject children received education by an ACLPPP health educator regarding environmental risk factors for childhood asthma, and all households received a free Healthy Homes kit. In addition, the households of 66 subject children (66/144, or 46%) were professionally cleaned to reduce the concentration of potential asthmogenic substances in the home. Some of the latter households (21 households) also received structural repairs related to moisture problems; repairs involved fixing plumbing and roof leaks, and installing exhaust ventilation fans in kitchens and bathrooms. Households in which caregivers received education and Healthy Homes kits, but which did not receive professional cleaning (or repairs), are termed the ‘education only’ group. Households which received professional cleaning (plus repairs in some units), and in which caregivers received education and Healthy Homes kits, are termed the ‘intervention’ group.

Program evaluations indicated a positive impact on the following health outcomes: healthcare utilization, quality of life, symptoms, functional status, self-management skills, and use of an asthma action plan. In addition, levels of dust mites and mouse urinary protein were reduced.

## **17. Controlled Trial of an Environmental Tobacco Smoke Reduction Intervention in Low-Income Children with Asthma**

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A Controlled Trial of an Environmental Tobacco Smoke Reduction Intervention in Low-Income Children with Asthma was a randomized controlled trial that was implemented in 1996 in California to determine the effectiveness of a cotinine-feedback, behaviorally based education intervention in reducing environmental tobacco smoke (ETS) exposure and health-care utilization of children with asthma.

Participants included 87 ETS-exposed, low-income, predominantly minority children who were 3-12 years old and who were seen for asthma in the hospital's emergency, inpatient, and outpatient services departments.

The intervention included three nurse-led sessions (over approximately a 5-week period) in a hospital setting that employed behavior-changing strategies and basic asthma education. The sessions also incorporated repeated feedback on the child's urinary cotinine level.

The intervention significantly reduced asthma health-care utilization. Effects sizes for urine cotinine and proportion prohibiting smoking were moderate to large, but not statistically significant.

## **18. A Controlled Trial of Two Forms of Self-Management Education for Adults with Asthma**

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In 1986 "A Controlled Trial of Two Forms of Self-Management Education for Adults with Asthma" was conducted with patients of the Kaiser Medical Centers in Santa Clara, Sacramento, San Francisco, Redwood City, and San Jost/Santa Teresa, CA. Individual and group asthma education programs were developed and evaluated to determine their cognitive, behavioral, and clinical effects.

The small group program provides instruction regarding asthma and asthma management; discussion and group exercises encourage participant sharing of concerns, problem-solving, and mutual support. The program allows tailoring behavioral contracts and at-home activities to meet the needs of individual members of the group (typically 6-8 people). There were four 90-minute weekly sessions.

The individual program uses a diagnostic interview and an education planning form to help the educator identify and focus on an individual patient's specific asthma management needs. The educator chooses among 18 instructional modules (covering the same content included in the group program) to develop a program tailored to the needs of an individual patient. Education is delivered in three to five 45-minute meetings between the nurse and patient held at 1-week intervals. The individualized program requires approximately 180 hours of nurse time per patient.

Compared with the usual control, the self-management education programs were associated with significant improvements in control of asthma symptoms, MDI technique, and environmental control practices. Small group education also was associated with significant improvements in patient's level of physical activity (functional status). Acute visits were significantly improved in the group education program.

Both small group education and individual education were associated with significant benefits, but the group program was simpler to administer, better received by patients and educators, and more cost-effective. In addition, the small group program was packaged and disseminated as Breathe Easier by NAEPP. It continues to be used.

## **19. Air Power**

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Air Power was implemented in 1977 in Santa Clara and San Jose, CA. Children ages 9-13 years and their parents were recruited to participate. Air Power consisted of four one-hour sessions that were conducted on a weekly basis with small groups of children, with four separate, but parallel sessions for their parents. Each children's session had three components: information giving, group discussion, and relaxation training. Integration of all three instructional approaches into each session provided a variety of learning experiences designed to sustain interest and promote behavior change. Developmentally appropriate instructional activities focused on teaching children to become competent in the day-to-day self-management of their asthma. The parents' program focused on helping parents become active supporters of their children's independent self-management efforts.

Self-management skills were significantly improved at a nine month post-treatment evaluation. Following this evaluation, Air Power was revised slightly and fully documented in the form in which it was published by the National Heart, Lung, and Blood Institute.

## **20. Air Wise**

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Air Wise was implemented in 1977. In the course of development of the Air Power program, it was noted that a subgroup of patients whose asthma had not been under adequate medical control continued to be high utilizers of medical services for asthma, especially for acute episodes requiring emergency treatment. It was concluded that these children needed more individualized instruction and a coordinated link of education and medical care. The patient, parents and health care providers were all involved in the program. The education followed a diagnostic/prescriptive approach. Specific educational needs and obstacles to self-management were identified for each patient through a brief diagnostic interview. Based on the results a prescriptive educational plan tailored to the patient's needs was developed.

A statistically and clinically significant decrease in the number of emergency room visits was noted. Air Wise was published by the National Heart, Lung, and Blood Institute.

## 21. Wee Wheezers

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A randomized control trial of the Wee Wheezers asthma education program was conducted with 76 children with asthma 0-6 years of age. Treatment children showed improved morbidity at 3-month follow-up relative to the changes in the controls: increased symptom-free days in the preceding 2 weeks and month, fewer nights of parental sleep interruption in a typical week, and although not significant there was a trend toward fewer asthma sick days. These improvements were accompanied by significantly better parental asthma management compared with controls.

The overall goals of the program are that parents gain the knowledge, skills, and motivation necessary to: (1) prevent asthma symptoms, (2) appropriately manage symptoms when they occur, (3) utilize medial, educational, and interpersonal resources appropriately for asthma care, (4) communicate effectively with all adults responsible for the child's care, and (5) promote the psychosocial well-being of the family visit.

Wee Wheezers consists of four small-group sessions of approximately two-hours each, conducted at one-week intervals by nurses experienced in the management of pediatric asthma. Parents of children 0-3 and 4-6 years of age meet in separate groups. The initials 45 minutes of the last two sessions for parents of 4-6 year old children are devoted to direct instruction of the children; no direct instruction of those under the age of four is attempted. Group discussion, skill demonstration, videos, handouts and charts are all utilized during the sessions.

The American Institutes for Research originally disseminated the program from 1995 to 2003. The program was then reviewed and repackaged by The Centers for Disease Control and Prevention and is currently being disseminated by the Allergy and Asthma Foundation of America, along with Spanish and Humong versions and the related Wee Wheezers at Home program.

## 22. PCAP: Pasadena Community Asthma Project

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The Pasadena Community Asthma Project (PCAP), managed by Huntington Memorial Hospital, began in 1997 in Pasadena, CA. The initial program was designed to provide education for school nurses who were challenged by the needs of school-aged children with asthma. Over the years, the program has evolved to encompass three main components.

Patient and family education is offered via three different classes for pediatric and adult patients, adapted from NIH guidelines. Provider education is also offered, to primary care providers and school nurses, through lectures on various topics of interest. A third component of PCAP is a free

asthma clinic for children and adults, staffed by pediatric and adult asthma specialists.

Pre-post program evaluation with a sample of 186 patients indicated a positive impact on school absences and medication use. Program activities and further evaluation are ongoing.

### **23. CAP: Childhood Asthma Program**

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The Childhood Asthma Program (CAP) of the County of Riverside Community Health Agency Department of Public Health has been implemented since 2001 in Riverside County, CA. The program was developed primarily through grant funding provided by the Riverside County Commission on Children and Families and The University of California, San Francisco, Childhood Asthma Among the School Aged Project.

CAP strives through education to improve quality of life for children with asthma from birth to age 18 and their families. The program offers one-on-one education for parents and children through home visits by a caseworker at the families' convenience. Asthma education is provided regarding how to monitor and successfully self-manage asthma including use of medications and asthma aids. A home assessment is conducted to identify potential triggers and a remediation plan is developed in partnership with the family. The caseworker follows up by phone after 2 weeks and again at 3 months to offer continuing education and problem-solving support.

CAP also supports the improvement of asthma diagnosis, patient education and treatment services by clinicians and other medical support staff. CAP provides ongoing asthma education to health care providers through regularly held Continuous Quality Improvement (CQI) team meetings with staff at nine participating clinics. CAP has developed and distributed standard charting, education, and action plan documents for providers that are reflective of NIH guidelines for asthma care. Medical in-services are provided to update clinic staff on the NIH guidelines.

In conjunction with this program, CAP created and maintains a countywide asthma coalition. The Riverside County Asthma Coalition works to reduce asthma incidence and improve quality of life for people with asthma through the efforts of its four subcommittees that focus on the environment, schools, patient care, and patient/community education.

## **24. California Childhood Asthma Initiative**

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In 2000, the Department of Health Services received funding from First 5 California to establish a statewide asthma project (funded through June 30, 2005). The goals of the Childhood Asthma Initiative (CAI) are to decrease asthma morbidity and to improve the quality of life for children aged 0 to 5 years with asthma and their families. These goals have been accomplished by improving the delivery, quality, and coordination of preventive, educational, and medical care services directed toward childhood asthma.

CAI supported community asthma intervention projects, asthma treatment services for uninsured and underinsured children, provider education about quality asthma care, and an assessment of childcare facilities concerning practices and policies that impact children with asthma. CDHS partners in the CAI included the Chronic Disease Control, Environmental Health Investigation, and Children's Medical Services Branches. Through the Chronic Disease Control Branch, eight California communities received funding for community asthma intervention projects that supported community asthma coalitions, clinical asthma quality improvement activities, and the use of trained asthma coordinators to provide patient/family education, self-management training, and home asthma trigger assessment.

CAI had a positive impact on the following outcomes: hospitalization rates, emergency department visits, unscheduled (sick) office visits, pre-school/daycare absences, work loss, quality of life, symptoms, medication use, change in clinical actions, and use of an asthma action plan.

State funding for CAI community projects ended in 2004, but some of the sites continue program activities through local funding. CDHS has received additional one-time State funding in 2005-06 to start the program again and to include more sites in conjunction with the California Asthma Among the School-Aged (CAASA).

## **25. Evaluation of a School-Based Asthma Education Program for Inner-City Children**

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The authors' objective of this study was to assess the impact of a school-based education program on asthma outcomes.

In cooperation with the San Diego Unified Schools, the authors developed and implemented a school-based asthma education program. Based on the National Heart, Lung, and Blood Institute consensus guidelines for asthma, the five-session bilingual, interactive curriculum was conducted in 20-minute segments. Asthma knowledge was tested before and after the education program, and asthma severity was prospectively assessed at monthly intervals.

Outcome parameters were compared in educated and control (non-educated) fourth grade students with asthma by using nonparametric techniques.

After asthma education, students demonstrated improvement with increases in mean scores for: asthma knowledge quiz from 9.9 (SEM = 0.44, n = 34) to 13.7 (SEM = 0.30); peak flow meter technique from 3.9 (SEM = 0.33, n = 32) to 6.4 (SEM = 0.29); and inhaler technique from 2.3 (SEM = 0.26, n = 32) to 4.3 (SEM = 0.26). All changes were highly significant (p = 0.00001 as determined by Wilcoxon matched-pairs signed-rank test). Mean score comparisons for asthmatic control students given paired examinations after a time interval matched with the educated students, did not reach statistical significance: quiz score of 11.3 (SEM = 0.80, n = 11) versus 10.9 (SEM = 0.68), peak flow meter technique score of 2.6 (SEM = 0.50, n = 18) versus 3.1 (SEM = 0.37), and inhaler technique score of 2.5 (SEM = 0.37, n = 18) versus 2.2 (SEM = 0.31). Prospective monthly data were collected on 27 educated and 15 control asthmatic subjects. Severity of asthma was not significantly different between groups at entry to the study. Symptom questionnaires, validated for functional asthma severity, revealed a significant reduction in mean symptom scores at 180 days for the educated (2.87, SEM = 0.447) versus the control (4.36, SEM = 0.573) groups (p = 0.0188 as determined by the Mann-Whitney U test).

In conclusion child-centered asthma education can be successfully conducted in the school setting, resulting in increased asthma knowledge, improved skills for peak flow meter and inhaler use, and a reduction in the severity of asthma symptoms.

## **26. Hijos Sanos: Reducing ETS Exposure in Latino Asthmatics**

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Hijos Sanos: Reducing ETS Exposure in Latino Asthmatics was an asthma education program implemented by the Center for Behavioral Epidemiology and Community Health at San Diego State University. The program was piloted on 204 underserved Latino families with asthmatic children. The education program consisted of one or two sessions delivered in each family's home in the targeted participant's preferred language by a bilingual, bicultural educator. Attendance by the child was encouraged, but not required. The curriculum was culturally-tailored, and all participants received education on understanding asthma, preventing asthma attacks, and managing asthma. Outcomes included change in asthma knowledge and change in home environment asthma management procedure. Asthma knowledge increased significantly (39 to 50% correct from pre- to post-test,  $P < 0.010$ ) and participants made significant change to the child's bedroom environment (mean number of triggers decreased from 2.4 to 1.8,  $P < 0.001$ ; mean number of controllers increased from 0.7 to 0.9,  $P < 0.001$ ).

## **27. San Diego Childhood Asthma Initiative**

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The San Diego Childhood Asthma Initiative is managed by the American Lung Association of San Diego and Imperial Counties. Started in 2001, the Initiative is a collaborative project targeting children under the age of 5 with asthma and their families.

The initiative addresses many aspects of asthma including 1) asthma education to children and families to increase asthma knowledge, 2) in home environmental assessment to reduce indoor asthma triggers, 3) care coordination to increase asthma management, and 4) access to funding for uninsured children to increase access to asthma care, medication, and supplies. The initiative also offers asthma education workshops for parents, child care providers in targeted geographic areas. The initiative is linked with asthma projects and asthma coalitions in San Diego and across California to provide a comprehensive, community based approach to asthma management.

The goals of the San Diego Childhood Asthma Initiative are 1) improve the quality of life for children with asthma under the age of 5 and their families in the targeted areas, 2) decrease the number of hospitalizations and ED visits due to asthma in the target group, 3) target communities with high rates of asthma hospitalizations and ED visits, 4) improve asthma management, healthcare delivery, asthma education, physical environment, outreach, and coordination of services for children with asthma, and 5) expand the treatment resources available to low-income children with persistent asthma who are uninsured, and inform patients and their healthcare providers of the Initiative's free services.

Pre-post test evaluation with a sample of approximately 500 children and their families showed the program had a positive impact on healthcare utilization, school absences and work loss, quality of life for children, symptoms, medication use, and self-management skills, as well as an increase in actions to reduce environmental triggers in the home. The program is ongoing.

## **28. Breathe Easy (formerly Little Lungs)**

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In 2001, the Northeast Valley Health Corporation (NEVHC) partnered with the American Lung Association of Los Angeles County (ALALAC) to implement a community asthma intervention project entitled "Little Lungs: A Coordinated Approach to Asthma Management." The project targets children with asthma aged 0-5 years and their families in the San Fernando Valley.

The overall goal of the program was to improve the management of asthma and the quality of life for children 0-5 years with asthma and their families, by implementing a coordinated approach to asthma-related services. To meet the overall goal and objectives, ALALAC and NEVHC worked

together to implement collaboration, coordination and quality improvement activities, including 1) utilization of Asthma Coordinators to improve the quality, availability and effectiveness of clinic-based pediatric asthma management interventions at two NEVHC clinics and 2) development and implementation of a quality improvement protocol to assist NEVHC primary care providers in improving asthma care and education for families in accordance with national and state asthma management guidelines.

Evaluation results indicated that participating children with asthma 0-5 experienced more symptom-free days, and parents of children with asthma missed fewer workdays and expressed an improvement in overall quality of life due to better management of their child's disease.

NEVHC's partnership with ALALAC ended in 2004. NEVHC is now partnering with LACare and Kaiser Permanente to continue the program under a new title, "Breathe Easy", and expand the target population to all children up to their 18th birthday.

## **29. Childhood Asthma Initiative, San Francisco**

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The goals of the Childhood Asthma Initiative (San Francisco, CA) were to decrease asthma morbidity and to improve the quality of life of children less than five years with asthma and their families. These goals were to be accomplished by improving delivery, quality, and coordination of preventive, educational, and medical care services directed toward childhood asthma.

The program's three main components were the following: I. Community-based interventions for all ages, including an asthma coalition called the Asthma Task Force, which focused on strategic planning and policy development, asthma education and outreach, childcare provider training, and a parent advocacy project.

II. A Clinical Quality Improvement initiative focused on improving medical care for children with asthma who are under age five. This was a National Initiative for Children's Healthcare Quality-led learning collaborative that involved three clinics in an institutional change model using chronic disease management research findings.

III. Asthma Coordinator Direct Services, in which clinic-based and Department of Public Health-based health workers provided medical and environmental trigger education, home environmental assessments, and advocacy referrals through repeated home visits and follow-up phone calls.

Program evaluation revealed the program had a positive impact on hospital utilization, emergency department visits, urgent care visits, school absences, quality of life for parents, symptoms, and use of an asthma action plan.

The program ended its activities in June 2004.

### **30. Effects of Individual Self-management Education on Clinical, Biological, and Adherence Outcomes in Asthma**

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In a prospective, randomized controlled trial of 65 adults with mild-to-moderate asthma, researchers from the University of California San Francisco examined whether an educational self-management intervention would improve adherence to inhaled corticosteroid therapy, decrease markers of airway inflammation, and improve clinical control. Peak flow, symptoms, and adherence were monitored for 7 weeks. After a 1-week run-in, subjects were assigned randomly to either the educational intervention or control group. The 30-minute intervention was delivered and reinforced at biweekly intervals.

Compared with the control group, the intervention group had improvements in adherence to inhaled corticosteroid therapy (by 30% vs. -5%,  $P=0.01$ ), self-reported control of asthma (by 14% vs. 5%,  $P=0.04$ ), and perhaps quality of life (by 37% vs. 21%,  $P=0.06$ ). The direction of change for all other clinical outcomes was more favorable in the intervention group, but not significantly so. Markers of inflammation in sputum decreased more in the intervention group, with sputum eosinophils declining significantly ( $P=0.02$ ).

In asthmatic patients treated with inhaled corticosteroids, education and training in self-management improves adherence with inhaled therapy, perceived control of asthma, and sputum eosinophilia.

### **31. UCSF-SFGH Pediatric Asthma Clinic**

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In 1997, the Pediatric Asthma Clinic (PAC) at San Francisco General was created with the goal of improving the quality of asthma management in a predominantly underserved population. The PAC targets children ages 0-18 with asthma who live in San Francisco. The majority of patients are low-income, African-American and Latino children who participate in Medicaid and other public insurance programs or are uninsured.

The PAC provides clinical care and education according to current guidelines of the National Institutes of Health/National Heart, Lung, and Blood Institute (NIH/NHLBI) and partners with families to gain control over the patient's asthma within three clinic visits over a six to twelve month period and additional home visits to reinforce asthma education, environmental controls, and medication usage. Following this evaluation period, patients return to their primary care medical providers for ongoing management visit and then return to the PAC on an annual basis or as desired by their primary care medical providers.

### **32. Yes We Can: Children's Asthma Management Program and Toolkit**

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YES WE CAN is managed by Community Health Works, a partnership of San Francisco State University and City College of San Francisco, CA.

YES WE CAN uses a medical/social team model that aims to scale-up best practices and reduce medical system barriers for low-income children with asthma. The distinguishing feature is a multi-disciplinary team combining the clinician, a nurse care coordinator, and a community health worker from the families' own community. This assures early intervention, close follow-up, cultural competence, and real support for home self-management. The approach has been developed by and for community-based and public health clinics serving culturally and linguistically diverse, low-income communities.

YES WE CAN is a blend of best practices, combining three effective approaches: 1) a community health team model from the community health center movement, 2) risk stratification and care management strategies from Kaiser Permanente Northern California, and 3) quality improvement strategies from NICHQ. The program was developed and tested under real-world conditions at community clinics with outstanding asthma programs: 1) the Pediatric Asthma Clinic at San Francisco General Hospital/UCSF, 2) the Odessa Brown Children's Clinic in Seattle, WA, and 3) Mission Neighborhood Health Center/Excelsior Clinic in San Francisco, CA.

Pre-post evaluation results from three demonstration sites during the period 1999-2004 showed a positive impact on healthcare utilization, school absences and work loss, symptoms, medication use, and use of an asthma action plan.

The YES WE CAN Toolkit is available for widespread dissemination as a guide to implement the program and contains over 1000 pages of protocols, forms, tools, training materials, patient handouts in English and Spanish, job descriptions, a database, a clinician cue poster, performance exams and more.

### **33. Preschool Asthma Outreach Program**

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The American Lung Association of Orange County, California has conducted the Preschool Asthma Outreach Program since 1995. The program targets primarily urban, low income children with asthma age 0-5 as well as their parents and childcare providers.

Asthma education and training sessions are provided to childcare providers and to parents of preschool children. Sessions for childcare providers include training on how to teach preschool children about asthma and all providers are given a curriculum workbook. Sessions for parents focus on how to manage the child's asthma. Training session topics include recognizing asthma signs, preventing asthma symptoms, asthma management, access to health care, action plans for asthma emergencies, hands-on training on the use of nebulizers and MDIs, and viewing of the Sesame Street video "A is for Asthma."

Evaluation to date has indicated a positive impact on quality of life for children and parents/caregivers, asthma symptoms, medication use, and self-management skills. The program is ongoing.

### **34. Effectiveness of a Multicomponent Self-management Program in At-risk, School-aged Children with Asthma**

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Effectiveness of a Multicomponent Self-Management Program in At-Risk, School-aged Children with Asthma was a randomized controlled study to determine the effectiveness of an asthma education video game in reducing morbidity among high-risk, school-aged children with asthma.

One hundred and nineteen children aged 5-12 years from low-income, urban areas in and around San Francisco and San Jose, CA were enrolled. Children with moderate to severe asthma and parental reports of significant asthma health care utilization were randomized to participate in the disease management intervention or to receive their usual care.

The intervention consisted of three education sessions about self-management with a case manager. Children were given a Nintendo Asthma Video Game ("Bronkie the Bronchosaurus") that taught self-management strategies and provided feedback on performance. Children also visited the allergist/immunologist twice for allergen skin testing and to create an asthma management plan. These children and their families had access to an 18-hr/day toll-free hot line for questions or concerns.

Patients were evaluated for clinical and quality-of-life outcomes at weeks eight, 32, and 52 of the study. Significant improvements were found in quality of life and functional status (physical domain).

### **35. Peak Performance**

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Despite the availability of the National Asthma Education Program (NAEP) guidelines since 1991, asthma remains inadequately managed. To improve quality of life, functional status, and self-management behavior of asthma patients, a large health maintenance organization (HMO) in California implemented the asthma management program, Peak Performance, in 1996.

To evaluate the effectiveness of the asthma program, researchers used a prospective study. Survey data from members who participated in the intervention program and data from members who received usual care were analyzed using propensity score technique.

A total of 1,043 asthma patients who responded both baseline and follow-up survey were included in the analysis. From baseline to follow-up, participants in the in-home intervention program reported significant improvement in functional status (improvements range from 0.2 to 7.2), daily use of steroid inhaler (+4.1%), daily peak flow meter use (+6.4%), self-reported knowledge of what to do for an asthma attack (+12.4%), and feeling that their asthma was under control (+10.8%). Absenteeism (-11.8%) and hospitalization due to asthma (-3.5%) were significantly reduced from baseline to follow-up. Participants did not report significant changes in overuse of beta2-agonists and emergency room visits due to asthma. In comparison with the asthmatic patients who received usual care (non-participants), participants had significantly greater improvement on daily use of steroid inhaler (+4.0% versus -6.0%), daily use of home peak flow meter (+6.4% versus 1.9%) and self-reported knowledge on what to do for an asthma attack (+12.4% versus +5.4%).

Researchers concluded that findings suggest population-based programs can improve functional status, increase self-monitoring and knowledge about asthma, and decrease absenteeism and hospitalization for asthma by directly providing asthmatic patients with educational materials and self-monitoring tools. Such “direct-to-consumer” outreach programs may help bridge the gap between NAEP’s 1991 practice guidelines and the reality of current asthma management.

## Domestic Programs: Colorado

### **36. CAPS: Childhood Asthma Prevention Study**

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The Childhood Asthma Prevention Study (CAPS) of the National Jewish Medical and Research Center started in 1997 in Denver, CO.

Infants aged 9 to 24 months with 3 or more physician-documented wheezing episodes were randomly assigned to environmental support intervention (ES) (n=90) or control (n=91) groups. Nurse home visitors intervened for 1 year to decrease allergen and environmental tobacco smoke exposure and improve symptom perception and management. Assessments at baseline and 12 months included allergens in house dust, infant urinary cotinine levels, caregivers’ symptom reports, quality of life, illness management, and quality of care giving. Medical records were coded for hospitalizations, emergency department visits, and corticosteroid bursts.

Analysis of the 12 month follow-up data showed that within the ES group, cockroach allergen levels were significantly reduced and there was a trend toward reduction in dog dander levels. Among infants with detectable urinary cotinine, levels were significantly reduced in the ES group. Caregiver psychological resources modified the impact, and low-resource ES caregivers were the most strongly affected. Asthma knowledge and provider collaboration improved significantly in the ES group. Neither reports of infant symptoms nor emergency department visits or hospitalizations showed positive intervention effects. Number of corticosteroid bursts for infants was significantly higher for the ES group.

Study investigators concluded that the CAPS intervention was effective in reducing several environmental exposures and improving illness management. However, even with an intensive home-based intervention, they failed to reduce respiratory symptoms or medical use in the ES group relative to the control group, illustrating the difficulty of changing the course of early asthma development among low-income infants.

The CAPS intervention is complete, but data collection and analysis is ongoing. As of June 2005, CAPS is analyzing 4-year follow up data and collecting 7-year follow up data.

### **37. Disease Management Program (DMP): Asthma**

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The National Jewish Medical and Research Center in Denver, CO, developed the Disease Management Program: Asthma (DMP: Asthma) to address continuity of care by integrating traditional treatment methods with a disease management program that focuses on creating a partnership between the patient and the healthcare team.

DMP: Asthma provides patients with the knowledge, skills, and resources necessary to control symptoms or seek help during more extreme disease exacerbations. Program components include physician education, care management, home healthcare, and data management.

A managed care plan in western Pennsylvania purchased the DMP: Asthma for use with a specific high-risk Medicaid population that were high utilizers of healthcare services. The one-year implementation of DMP: Asthma in this study population was evaluated. Both quality-of-life and healthcare utilization data showed statistically significant improvements at six and 12 months

Evaluators concluded that a collaborative, proactive approach to asthma management improves patients' quality of life and reduces use of costly medical services.

### **38. Impact of a Multidisciplinary Day Program on Disease and Healthcare Costs in Children and Adolescents with Severe Asthma: A two-year follow-up study**

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For patients whose asthma remains in poor control necessitating high utilization of medical services, a referral to a specialized “center of excellence” is often considered. A decade ago, the authors evaluated their pediatric asthma program (Denver, CO) of long-term hospitalization (median stay of 75 days) and found significant decreases in subjects’ medical utilization following this intervention. In an effort to contain treatment costs, the former program was markedly altered to one of abbreviated stay with emphasis on family management of asthma. The purpose of the present study was to determine the outcome of children treated in the revised program with regard to disease severity, quality of life, and subsequent utilization of medical resources.

Children with severe asthma who were admitted to the program and fulfilled study criteria were consecutively enrolled. Ninety-eight children, aged 9 months to 18 years (mean age, 10.9 years), were enrolled. They participated in the program for a mean of 15.6 ( +/- 8 SD), median of 15.0, and range of 2-51 treatment days.

Patients and their families participated in a day treatment program. Medical and psychosocial education was provided. Patients attended three educational classes in addition to receiving feedback through one-on-one contact with nursing staff to improve information base, medications, and self-assessment. The program included a psychosocial component, group therapy meetings, 3-4 times weekly. Rehabilitation needs, such as functional endurance, overall physical fitness, ADLs, etc., were addressed. The individualized therapeutic program was developed with written recommendations for home implementation.

The group showed significant improvement ( $P < 0.0001$ ) from admission to 1- and 2-year follow-up in median corticosteroid use, asthma functional severity, perceived competence in asthma management, and quality of life for both caregiver and child. Medical record data showed significant improvement ( $P < 0.0001$ ) at both 1- and 2-year follow-up in median number of corticosteroid bursts, emergency department visits, hospital days, and overall utilization of medical care encounters. A median total medical encounter cost/patient of \$16,250 (\$6,972-\$25,714 inter-quartile range (IQR)) for the year prior to program participation was reduced to \$1,902 (\$505-\$6,524 IQR) at 1-year and \$690 (\$185-\$3,550 IQR) at 2- year follow-up ( $P < 0.0001$ ).

The authors concluded that multidisciplinary care in a short-term, outpatient, day treatment program can significantly contribute to improvement in asthma severity, quality of life, and reduction in healthcare costs.

### **39. NE Denver Healthy Homes Initiative**

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The NE Denver Healthy Homes Initiative of the NE Denver Housing Center was implemented from 2001-2004. The Initiative aimed to identify children (0-14 years) with inadequately controlled asthma who were living in home environments provocative of airway inflammation and poor asthma control.

Environmental specialists and housing professionals (architects and engineers) worked closely with families and homeowners to improve home living conditions and asthma severity. Staff conducted several home visits over a 6-9 month period that included a thorough inspection, contracted work to improve the home's condition, and education about asthma, triggers, and maintaining a healthy home.

The Initiative brought together a working partnership of housing, weatherization, code enforcement, health, and environmental health organizations. These partnerships were a major strength of the program and contributed to its success in the NE Denver community.

#### **40. Asthma/COPD Case Management**

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In 1999 the Asthma/COPD Case Management Program was developed by Parkview Medical Center in Pueblo, Colorado to improve the lives of people with asthma.

A respiratory therapist meets with a participant (all ages) four to five times in person for one-on-one sessions to discuss basic facts about asthma, medications, equipment and use, environmental control measures and identifying and avoiding triggers, and when and how to take rescue actions. Sessions occur in the participant's home or at the program office in the hospital. After the in person one-on-one sessions are complete the respiratory therapist follows-up with the participant every three months by phone to discuss the topics noted above and to report on the participant's progress. The respiratory therapist manages each participant for approximately one year.

The Asthma/COPD Case Management Program also conducts smoking cessation classes, one time group sessions (one for any age and another for ages four to 10 years), and one-time educational sessions in schools for students with asthma, teachers and school nurses.

The 2004 health outcomes evaluation showed improvement in hospitalizations, emergency department visits and use of an asthma action plan.

#### **41. Putting on AIRS**

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The Putting on AIRS (AIRS) program serves a diverse ten-town region in southeastern Connecticut. The AIRS program began in 2002 as the result of a pilot project developed and tested by the New London Department of Health and Social Services in collaboration with Lawrence & Memorial Hospital. The goal of this voluntary program is to reduce acute asthma episodes through

recognition and elimination/reduction of environmental and other asthma triggers leading to improved asthma control.

The AIRS program is centered around home visits that provide the patient, family, caregiver with one or more one-on-one, interactive, health education session(s) focusing on patient education and asthma self-management. A registered nurse and registered environmental sanitarian collaborate as a team. The registered nurse is experienced in home visitation and is knowledgeable of the home environmental assessment and the importance of asthma triggers. The nurse conducts the education session, reviews medications and conducts ongoing asthma case management. Both the nurse and the sanitarian conduct environmental assessments of the home and/or caregiver locations. Follow-up is conducted with the patient/family/caregiver at two-weeks and three-months.

The 2003 health outcomes evaluation revealed that participation in the program improved emergency department visits, unscheduled (sick) office visits, school absences, and work loss.

#### **42. ACE: Asthma Control and Education Program**

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The Asthma Control and Education Program (ACE) in Hartford, CT was established in 1997. It is a unique collaborative partnership between Hartford Hospital's primary care providers, local community agencies and the City of Hartford Health Department to provide a multi-disciplinary approach to adult asthma management. ACE emphasizes prevention and health maintenance through education that fosters partnerships among the patient, their family and clinicians, rather than disease treatment alone.

A Nurse Education Coordinator oversees the education of patients. Every patient referred to ACE will have an intake visit lasting one-hour which includes demographic data, asthma specific history, current medication use, smoking history, severity assessment, environmental assessment, immunization/testing information, knowledge assessment, goal setting, referrals, and plan for follow-up. In addition, spirometry and functional status is assessed. There are follow-up educational sessions that focus on understanding asthma as a chronic inflammatory disease, trigger identification, medication and spacer use, and zone management.

Since the ACE program began the following has been reserved: significantly lower emergency resource utilization, lower inpatient admission rate, improved functional status, and an overall improvement in quality of life.

#### **43. Easy Breathing**

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Easy Breathing, a copyrighted asthma management program for primary care clinicians who care for children, was developed in 1998 in Hartford, CT. The goals of Easy Breathing are to improve the diagnosis, determination of disease severity, and treatment of asthma for disadvantaged, urban, primarily minority children.

The program consists of a validated survey that parents of children (6 months to 18 years) who present for care, for any reason, at any of the six primary care clinics in Hartford. The survey addresses asthma symptoms, triggers, previous diagnosis of and treatment for asthma, family history, demographics, and environmental exposure. Once a physician diagnoses a child with asthma (using information from the survey, medical record, and additional testing) the physician determines the severity of asthma with the aid of a separate written instrument. A comprehensive management plan is then developed using a severity-specific treatment selection guide and color-coded (by severity) tabs. This plan helps parents know what medications to use, when to use the sick plan, and who and when to call.

A pre/post intervention study was done to determine whether Easy Breathing improves adherence to national asthma guidelines in the six urban primary care clinics in Hartford. Thirty-four primary care physicians, 37 midlevel practitioners, 32 nurses, and 69 pediatric and family practice residents and medical students participated. Before implementation of Easy Breathing clinicians at each site participated in four hours of training. Knowledge was assessed before (pretest) and after (posttest) the training program and 12 to 18 months after (follow-up) implementing Easy Breathing. Questions were divided into factual, guideline recommendation, and guideline application.

After implementing Easy Breathing adherence to prescribing guidelines was 93% to 99% and was associated with a 3-fold increase in inhaled corticosteroid prescriptions. Physicians reported that they had integrated Easy Breathing into practice but did not think this represented a substantial change. Easy Breathing has also been associated with improved healthcare utilization outcomes for children with asthma.

#### **44. AIR Middlesex**

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AIR Middlesex began in 1999 under the direction of Middlesex Hospital and a private contractor. Working with a case manager, patients (children and adults) learn to monitor and treat their asthma appropriately and avoid unnecessary and costly hospital visits.

In the case management component, patients are referred to a case manager who conducts a 1-2 hour initial consultation including medical history, asthma education, review of medications and equipment, and questions about the home environment. A detailed summary of this visit is sent to the patient's provider. Follow-up visits are made depending on the patient's needs.

Patients with severe asthma are always offered a home visit, conducted by an RN from the hospital's home care department. The initial home visit lasts 1-2 hours and includes a visual

assessment, review of medications and equipment, asthma education, and a physical exam. Follow-up visits are conducted if deemed appropriate by the RN and, ultimately, the patient's insurance provider.

An evaluation of the case management component from 4/99-6/02 indicated several positive health outcomes: hospitalization rates, ED visits, unscheduled office visits, school absences, work loss, quality of life for children and adults, symptoms, medication use, change in medical treatment plan, functional status, self-management skills, and use of an asthma action plan.

#### **45. Breath of Fresh Air Program**

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The Stamford Department of Health and Social Services Healthy Homes program, Breath of Fresh Air Program, focused on reducing environmental conditions within the home that exacerbate asthma. The program targets low-income children 2-18 years old with asthma and their families.

The primary component of the program addresses medical and environmental management. Community nurses and a housing code inspector conduct the activities. The family receives asthma education and home assessments four times over a year. There is much emphasis on environmental triggers of asthma and indoor air quality enhancement. Education also covers environmental and safety hazards. Participants receive incentives throughout their participation in the program, including mattress and pillow covers, dusters, a vacuum and air filter, as well as a tote bag and doormat.

Other program activities include booths and presentations at community fairs and events. Participants have the opportunity to participate in the Open Airways program conducted in participating schools.

The outcomes evaluation included an improvement in asthma severity. Regarding the environment there was an improvement in asthma triggers and housing violations.

The program ended in March 2005, but some of the activities continue. Program materials have also been adopted by others and are still in use.

#### **Domestic Programs: Washington, DC**

#### **46. IMPACT DC: Improving Pediatric Asthma Care in the District of Columbia**

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IMPACT DC: Improving Pediatric Asthma Care in the District of Columbia began in 2001 and is managed by the Children's Research Institute in Washington, DC. The program aims to perform ongoing surveillance of pediatric asthma and emergency department (ED) visits, decrease asthma-related ED visits, increase scheduled office visits and reduce morbidity and improve quality of life for children with asthma.

Urban, low-income children aged one to 18 years who present at an ED return to the ED for a non-emergency follow-up visit with the physician. The doctor who saw the patient at the prior ED visit, with both the child and the family, conducts the follow-up visit which lasts 60-90 minutes. During the visit, doctors provide medical care including an asthma action plan, environmental trigger control recommendations and care coordination.

ED doctors receive training by a physician in order to improve the asthma care offered in the initial and non-emergency follow-up visits. These education sessions last one-hour and occur once yearly.

The evaluation for the period of April 2002- September 2004 revealed that IMPACT DC had a positive impact on the following health outcomes: hospitalizations, ED visits, urgent care visits, unscheduled (sick) visits, scheduled (well) visits, school absences, quality of life for children, symptoms, medication use, change in clinical action (provider behavior), functional status, lung function, self-management skills, and use of an asthma action plan.

An unintended impact of the program has been improved asthma care by community doctors through modeling. The program is ongoing and replication efforts are in progress.

#### **47. OAS: Open Airways For Schools**

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The American Lung Association (ALA) Open Airways for Schools program was originally developed by Columbia University's College of Physicians and Surgeons. The Lung Association has implemented Open Airways for Schools since 1996. The program is implemented nationwide via independent local ALA organizations. In its first five years, Open Airways for Schools reached more than 400,000 children in more than 30,000 elementary schools.

The Open Airways for Schools program focuses on children with asthma in grades 3-6, aged 8-11. It consists of six, 40-minute group lessons for children held during the school day. The curriculum incorporates an interactive teaching approach, utilizing group discussion, stories, games, and role-play. To promote students' involvement in the learning process. In addition to the curriculum, the classroom kits distributed by ALA contain other easy-to-use teaching materials including posters and handouts that the children take home to share with parents or caregivers.

The goal of the Open Airways for Schools program is to enable children with asthma to take care of their asthma on a daily basis.

## **48. Senior Citizen Asthma Education and In-home Environmental Assessment Program**

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The Greater Washington Urban League Division of Aging & Health's Senior Citizen Asthma Education and In-Home Environment Assessment Pilot Project's purpose was to demonstrate and document the benefits of a community/government partnership to increase asthma awareness and promote self-care practices among urban seniors clinically diagnosed with asthma.

The main component of the project was home visits conducted by a case manager. During the home visits the case manager educated the participant on asthma, triggers, self-management, and medications. A home assessment was also performed using a checklist and survey to identify triggers. Mattress and pillow covers, an Asthma Kit and fanny pack were provided.

The project had a positive impact on peak flow meter use, as well as knowledge of asthma and self-care practices, confidence in managing asthma, use of strategies to improve communication with the provider, and satisfaction with the program.

The project ended in 2004, but the Department of Health's Asthma Program is currently providing funding to develop asthma educational materials and educational outreach programs for seniors based on the information, experience and lessons learned from the Pilot Project.

## **49. You Can Control Asthma**

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You Can Control Asthma was originally developed in the late 1980's by researchers at Georgetown University, Washington, DC.

The program was evaluated as a self-management education program offered to inner-city children while they received medical care for asthma in the hospital. The program used videotapes, written activity books, and nurse discussion with the patient. Pre- and post- tests of 40 children aged 6-12 years revealed an increased use of asthma self-management techniques for acute episodes of asthma. Medical record review for a 15-month pre- and post-period indicated reductions in emergency room use.

Since 1991, the You Can Control Asthma educational materials have been published and distributed by the Allergy and Asthma Foundation of America (AAFA). The materials have been updated several times to reflect current asthma management guidelines. Thousands of individuals have been educated by groups nationwide using the You Can Control Asthma program. AAFA is collaborating with the Centers for Disease Control and Prevention and AAFA Chapters to implement the program with children and parents in community and clinical sites in Tampa, FL and Boston, MA.

The current version of the You Can Control Asthma program is designed to give children ages 6-12 and their families more self-confidence and the necessary knowledge and skills to manage asthma, cope with the challenges associated with asthma, and provide a healthy home environment. The program consists of a set of parallel booklets for children and their parents, which teach principles of asthma management through pictures, captions, and activities. These low-literacy, culturally appropriate booklets, are available in English or Spanish and the illustrations, messages, vocabulary, and layout have been extensively tested with children and adults who have reading limitation. Also included is an Implementation Guide designed to provide successful strategies for educating families in clinical, community, school, and home settings using the You Can Control Asthma booklets.

## Domestic Programs: Florida

### **50. GAP: Glades Asthma Project**

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The American Lung Association of Southeast Florida implemented the Glades Asthma Project (GAP) in 2001 to improve asthma management of children 0-18 years (as of July 2004 GAP serves all ages) with asthma residing in rural communities of Western Palm Beach County. The Project's aims are to identify asthma in children, prevent asthma-related hospitalizations and improve asthma symptoms, thereby resulting in increased physical activity, reducing emergency visits and improving quality of life.

The primary component of GAP is Home Trigger Assessments. During a home visits, an assessment is done of the home environment to identify asthma triggers. The program provides dust mite-proof pillow and mattress covers, environmental control handouts, peak flow meters and spacers, and cleaning kits. The patient then receives individualized teaching regarding asthma management, proper use of medications and asthma equipment. Specific recommendations are made to decrease triggers in the home. There is ongoing follow-up and formal re-evaluations at 3 and 6 months.

GAP's other activities include healthcare provider and community education, as well as education to daycare, Head Start, and school personnel.

Evaluations to date indicate that GAP has had a positive impact on hospitalization rates, ED visits, emergency visits to the school clinic and/or physician's office, school absences, QOL for children, symptoms, and functional status.

### **51. Promoting adherence: effects of theory-based asthma education**

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This study, conducted by the University of Florida College of Nursing in Gainesville, FL, compared the effects of a theoretically focused audiotape and a standard educational booklet on asthma preventive medication adherence and other asthma outcomes.

Forty-six adult asthmatics were randomly assigned to receive either a 30 minute audiotape (Bob's Lung Story, Lelko, 1999, contains a character story and songs, incorporating components of Protection Motivation Theory to address asthma self-management), a standard asthma management booklet (by NIH), both, or no educational materials. Participants reviewed the materials in the research office, then took a knowledge post-test. No further education occurred.

Outcomes were assessed at baseline, 3 months, and 6 months, and included medication adherence (both self-reported and pharmacy-verified), asthma knowledge, asthma control, and asthma quality of life. Evaluation results indicated that a minimal educational intervention can have a beneficial effect on asthma medication adherence that persists at least 6 months.

## **52. Blueprint for Health Asthma Program**

Blue Cross and Blue Shield of Florida  
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The Blueprint for Health Asthma Program is a voluntary program available for Blue Cross Blue Shield members 5-56 years enrolled in Health Options, Inc. (an HMO of Blue Cross Blue Shield of Florida) and Medicare Advantage. The program began in 1994 as a partnership with a local Jacksonville hospital. In January 2002 the program expanded statewide. The purpose of the program is to reduce asthma related morbidity and mortality by improving the management of asthma through member and provider education and care.

In addition to numerous educational mailings, program participants receive telephonic education from a nurse. These phone conversations included education on asthma, triggers, medication use, and healthcare utilization, as well as any other topics important to the member with asthma. The program also includes provider education through mailings every other month. These mailings include member profiles who are outliers, specifically for increased quick-relief medication use

The 2004 program evaluation demonstrated a positive impact on hospital utilization, emergency department visits and medication use among members with asthma. The program is ongoing.

## **53. Influence of an Interventional Program on Resource Use and Cost in Pediatric Asthma**

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The objective of this prospective pilot study was to determine whether patient education and assignment to a primary care provider improve outcomes and cost in the management of pediatric asthma. The study was conducted with a retrospective review of health and pharmacy records.

Sixty-one unassigned pediatric asthma patients who were noted to be frequent users of emergency department services and who had no primary care provider were identified. This cohort received asthma education and was assigned a provider trained in the national asthma guidelines.

Hospital admissions, Emergency Department and clinic visits, use of beta 2 agonists and anti-inflammatory drugs, number of chest radiographs, and continuity of care were recorded for a mean of 58.1 months before and 11.2 months after the intervention. A cost analysis was done.

All measured parameters showed favorable changes after intervention, with the decrease in the number of prescriptions of monthly inhaled anti-inflammatory drugs and chest radiographs ordered being statistically significant ( $P = 0.007$  and  $P = 0.040$ , respectively). Monthly admissions, Emergency Department visits, and clinic visits declined after intervention when evaluated after 22.8 months of follow up. Annual resource savings after intervention was estimated to be \$4845.29 per patient for this military hospital.

In conclusion a combined intervention consisting of provider and patient education and assignment to a primary care provider was associated with improved care and economic outcomes in this group.

#### **54. Pharmacist-managed, Physician-directed Asthma Management Program**

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The objective of this study was to determine whether the number of emergency department (ED) visits for acute asthma exacerbations could be decreased by providing patients with a comprehensive program of asthma management delivered by a pharmacist and a physician.

Patients were selected from the ED of a university-affiliated urban teaching hospital in Jacksonville, FL. and asked to attend a special asthma clinic that provided education about asthma and proper use of asthma medications, regular telephone contact between the pharmacist and patient, and an open-door clinic policy.

The study population consisted of 25 asthma patients who were at least 18 years of age and who were seen in the ED a minimum of 3 times in a 12-month period.

The number of visits to the ED for acute exacerbations of asthma was measured. Patients served as their own controls. The number of ED visits for asthma during the 6-month study period was compared with two 6-month periods prior to the study period for each patient.

The total number of ED visits for the 25 enrolled patients six months prior to their enrollment into the study was 92; the number of ED visits during the same months of the study in the prior year was 47. During the study period, there were only 6 ED visits for asthma exacerbations.

In conclusion the comprehensive asthma management program reduced the number of ED visits for acute exacerbations of asthma.

## Domestic Programs: Georgia

### **55. Improving Asthma Outcomes in Safety Net Practices**

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Improving Asthma Outcomes in Safety Net Practices is a program begun in 2000 through the partnership of the Southeast Regional Clinicians Network and the National Center for Primary Care at Morehouse School of Medicine. The program, initially funded by the National Health Lung Blood Institute, was designed to increase compliance with national asthma care guidelines in primary care safety net health centers serving high-disparity patient populations (children and adults). The program serves federally qualified health centers in the Southern US.

Health teams consisting of a physician and a health educator spend a single half-day at selected health centers instructing the clinic staff on asthma guidelines, and tools or templates for practice-level systems change (i.e., asthma flow sheets and standing orders). Resource kits are provided to the health centers including a peak flow meter, metered-dose inhaler spacer device, and educational materials.

A group-randomized controlled trial was done to assess the effectiveness of the intervention in federally funded community health centers in eight southeastern states. There were seven intervention and nine control sites. Chart reviews were performed to determine practitioners' compliance with national guidelines for asthma care.

Clinicians practicing in intervention health centers showed significantly greater improvement in provider behavior/compliance than did the control centers. The authors note that the post-intervention compliance with guidelines was still sub-optimal.

The authors conclude that dissemination of national guidelines is not enough; providers need training and guideline-specific resources, in combination with tools for practice change. The program is currently ongoing.

### **56. Wee Wheezers at Home**

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Wee Wheezers at Home was adapted from Wee Wheezers in 1997. One significant change was the target population: low-income, low literate, African-American population. In addition, the Wee Wheezers at Home program involved individual instruction and much adaptation to the educational materials.

Participants (1-6.9 years) in the 1997 study were randomized to treatment -eight weekly asthma education sessions adapted from the Wee Wheezers program -or usual care. Baseline and 3- and

12-month follow-up data were gathered from caregivers and from children's medical records. This home-based asthma education program was most effective with younger children for symptoms and quality of life for parents/caregivers.

The Asthma and Allergy Foundation of America currently distributes the program.

## Domestic Programs: Hawaii

### **57. Managing Pediatric Asthma: Emergency Department Demonstration Program: Hawaii CARES (Child Asthma Research to Elevate Standards)**

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“Managing Pediatric Asthma: Emergency Department Demonstration Program: Hawaii CARES (Child Asthma Research to Elevate Standards)” is a Robert Wood Johnson Foundation program that seeks to reduce asthma-related visits to emergency departments, increase reliance on primary care providers, improve adherence to clinical protocols, and improve patient knowledge of and compliance with therapeutic regimens. The program targets children one to 17 years at-risk for severe asthma and poor asthma care. The Hawaii CARES program is one of four sites nationwide (including DC, Texas, and Wisconsin). Hawaii CARES is comprised of four hospitals on Oahu.

Hawaii CARES emphasizes a multi-pronged approach to asthma care including: (1) prospective tracking of ED asthma patients; (2) an ED-based educational intervention for asthma patients and families; and (3) an asthma education program for ED staff and community-based healthcare providers.

A team of ED and community-based healthcare professionals developed strategies for building an integrated asthma care system throughout the island of Oahu. The project delivered ED staff asthma training and conducted continuing medical education programs for community-based healthcare providers. The fundamental learning objectives included the importance of compliance with NAEPP asthma care guidelines, the asthma chronic severity classification system and its use for treating patients, and the importance of long-term controller medications and written asthma action plans.

After providing community-based education sessions and integrating recommendations and input into ED-based asthma care from community providers, the Hawaii CARES program deployed the multi-center, ED-based educational intervention for patients with asthma and their families. The education component was intended to accommodate or appeal to children and families that have an assortment of learning styles.

ED staff provided community physicians with tools to facilitate a patient's ED follow-up visit. Following an ED visit, the patient's physician was provided with information regarding the asthma ED visit, including information on the medications and type(s) of asthma education the

patient received, the patient's chronic asthma severity classification, and a copy of the patient's recommended discharge plan.

The program has had a positive impact on quality of life, symptoms, medication use, and use of an asthma action plan. Hawaii CARES continues with additional grant funding and dissemination of the program is in progress.

## **58. MilCAP**

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A coordinated, multidisciplinary program for managing asthma in children was initiated in November 1997 at a U.S. Army medical center. The program (MilCAP), designed to improve care and decrease hospitalizations for asthma, was pharmacist managed and pulmonologist directed and was implemented by pediatricians.

Patient education was provided by a pediatric clinical pharmacist or a nurse case manager; providers also received intensive education. Follow-up occurred at predetermined intervals and included asthma education, discussion of expectations and goals, analysis of metered-dose-inhaler and spacer technique, and assessment of compliance.

Between November 1997 and January 1999, 210 inpatients were screened for asthma. One hundred seven were believed to have asthma and received inpatient asthma counseling and teaching. Of these 107 patients, 79 were enrolled in the program and monitored in the ambulatory care setting. Seventy-one (90%) of the 79 program enrollees were not re-hospitalized during the ensuing two years. The number of children admitted to the hospital for asthma decreased from 147 in 1997 (a rate of 3.2 per 1000 population) to 93 in 1998 (2.1 per 1000) and to 87 in 1999 (1.9 per 1000).

In conclusion a multidisciplinary approach to the management of children with asthma may reduce hospitalizations of such patients.

## **59. Community Based Asthma Management Project**

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In 1999 the Waianae Coast Comprehensive Health Center (WCCHC) in Oahu, Hawaii implemented a community-based asthma management project for Native Hawaiian children between the ages 3 and 14 years. The objective was to reduce inappropriate medical utilization and improve quality of life.

Children (and their parents/caregivers) were recruited primarily through referrals from their primary care provider or through the WCCHC's tracking database. A community health educator, who is also a community member, visited the child a minimum of three times at the child's home or at the community health educator's office at the WCCHC. The initial visit focused on building rapport with the child and his/her parent/caregiver, evaluating the family and their social supports, assessment of environmental triggers, and identifying barriers. In addition, an asthma intervention plan was developed with emphasis on medication management. Subsequent visits reiterated the educational information and medication management. Visits lasted about one hour and a child participated in the case management for one year.

An evaluation of the program indicated a positive impact on emergency department visits, unscheduled office visits, quality of life for children, and asthma symptoms.

## Domestic Programs: Idaho

### **60. Healthy Homes, Head Start**

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The Healthy Homes, Head Start Project is a product of a collaborative effort between the Idaho Asthma Prevention and Control Program (IAPCP) and the Western Idaho Community Action Partnership Head Start (WICAP). The project started in 2003 and serves low-income children ages 3-5 years and their families.

The goal of the Healthy Homes, Head Start intervention, an in-home environmental assessment, is to reduce environmental exposures to triggers of asthma and allergies in the homes of WICAP Head Start families. The intervention is based on the American Lung Association of Washington's Master Home Environmentalist program. The intervention and materials were tailored to meet the needs of the WICAP Head Start families.

The in-home environmental assessment was incorporated in home visits already conducted by the WICAP family service worker. The family service worker does a visual assessment of the home's condition. At the end of the assessment, the family service worker works with the family to outline three no/low cost alternative actions to address the high-level concerns of the home. In addition, general asthma education is discussed. Follow-up visits at one and three months are made to assess whether the actions were performed.

The intervention has improved asthma and allergy symptoms significantly. As a result of the project's effect and positive feedback from families, more Head Start centers across the state are starting Healthy Homes, Head Start Projects in their areas.

## Domestic Programs: Illinois

### **61. System Redesign at a Community Health Center**

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System Redesign at a Community Center asthma program was implemented in August of 2001 by Rural Health Inc. in Anna, IL. The goals of the program are: 1) to provide better care, with improved health outcomes for its patients with asthma; 2) to learn how to implement the Chronic Care Model, using asthma as the disease focus; 3) to expand the asthma Chronic Care Model beyond the initial population of focus to all asthma patients at Rural Health; 4) to experience change through the work of an interdisciplinary team within the health center and to use that team model and experience to affect change in other areas of the health center; and 5) to use the asthma chronic care process as a model to provide better care for its patients with other chronic medical conditions.

The system of care at Rural Health Inc. was changed by establishing a registry, encouraging routine visits, developing effective patient education and goal development, expanding the nurses' roles, and following the National Institutes of Health (NIH) Guidelines very closely. All providers from Rural Health, Inc. are required to participate in the program. There was initially one intensive half-day education session for the providers and nurses. Sessions included education on proper assessment of asthma patients, treatment according to NIH Guidelines, encouraging regular follow-up, and how to educate patients about asthma and help them develop their own self-management plan. Each new provider is also educated on the asthma program, the NIH guidelines, and the Chronic Care Model as part of their orientation. On-going asthma education and updates are provided at medical staff meetings. Each participating provider is also given quarterly feedback about their performance. There are periodic creative and playful training sessions for the nursing and medical staff. Lastly, an asthma team reviews and evaluates aspects of the program monthly.

Program evaluation to date demonstrated a positive impact on lost days (school and work), symptom-free days and anti-inflammatory medication use for patients with chronic asthma. The program is ongoing.

### **62. Chicago Community-Based Asthma Intervention Trial**

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The Chicago Community-Based Asthma Intervention Trial was a peer education program for inner-city families of children with asthma, implemented in Chicago by the University of Illinois at Chicago School of Public Health from 1996-1998.

The project was designed as a randomized trial of 60 families residing in a low-income neighborhood on the West Side of Chicago. Half of the families received intensive intervention during the first 6 months of the study and half during the second 6 months of the study. The intervention consisted of a minimum of four visits, each with clearly delineated goals. During the course of these visits, trained peer educators delivered general asthma education and provided educational materials to the family. The peer educator also conducted a detailed home assessment of environmental triggers and, in collaboration with a nurse, developed and presented a management plan tailored for each family. The peer educators were also parents of children with asthma, who were recruited from the same community and who completed extensive training.

As part of the study evaluation, air and dust samples were collected at baseline, 6 and 12 months. Families were also asked to report on health outcomes at baseline, 6 and 12 months.

The intervention was found to reduce hospitalization rates and symptoms among children with asthma as well as decrease the levels of dust mite allergens and cat dander within the home.

### **63. FirstAir Asthma Education Program**

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Non-occupational asthma is a common disease affecting approximately 6% of the US population. Asthma accounts for an estimated 3 million workdays lost each year in the United States and for reduced employee job productivity. Although asthma disease management programs are relatively common in managed care organizations, they generally have not been offered at the workplace.

A total of 168 employees with asthma were identified, and 76 participated in Bank One's (now a JPMorgan Chase company) FirstAir Asthma Education Program in Chicago, IL. Participants attended five one-hour educational classes during lunch. Classes were conducted by a nurse asthma specialist. Topics of discussion include triggers, warning signs of attacks, use and care of equipment, medications, handling emergencies, and keeping an asthma diary.

Health outcomes data was collected at baseline, post-program (2 months), 4 months, and 12 months. After the program, significantly more employees reported using controller medications (the desired behavior) rather than reliever medications, change in clinical actions (provider behavior) improved, and school/work loss declined.

Bank One's FirstAir Asthma Education Program ended in 1999.

### **64. The Infant Welfare Society's Asthma Management Project**

The Infant Welfare Society of Chicago  
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The Infant Welfare Society of Chicago's Asthma Management Project for At-Risk Children screens patients 0-19 years for asthma (targeting primarily Hispanics), provides comprehensive medical treatment to those diagnosed with the condition, and educates patients and their parents. Before symptoms arise, parents receive information about preventing them by eliminating triggers in the home. When a child is diagnosed the program provides medication for both maintenance and relief, supplies to help the family monitor the severity of symptoms, and thorough education. The aim is to diminish the impact of this chronic condition on the daily lives of young patients and enable them to participate in all activities.

As of April 2005 the program has improved attendance to scheduled (well) office visits, medication use, and change in clinical actions (healthcare provider). In addition, the program has improved patient and caregiver knowledge of asthma.

The program attributes its success to the nurse educators that work with the families to effectively manage the child's asthma.

### **65. Focused Health Solution's Asthma Disease State Management Program**

Focused Health Solutions, Inc.  
Northbrook, IL

Focused Health Solutions is a national provider of customized health services, including disease management, dedicated to reducing employers' healthcare costs, improving the lives of employees and their families and creating a healthier, productive workforce. Combining comprehensive data analysis, innovative technology, nursing expertise, and leading edge health information and education, Focused Health Solutions delivers highly interactive programs of care to support individuals actively living with chronic health conditions, including asthma.

The FocusCare for Asthma Program is delivered to employees of large self-insured employers that volunteer to participate. Employees are offered the program through their employer as a free, value-added service to all their eligible employees, retirees and covered family members.

Enrollees in the FocusCare for Asthma Program are assigned a nurse manager and receive the following comprehensive one-on-one education about asthma with emphasis on self-management; ongoing telephonic patient monitoring and additional support when needed; self-monitoring telehealth program where peak flow data are reviewed by clinical staff for early intervention and lifestyle management; 24-hour access to Focused Health Solutions' professional nursing staff to address questions and concerns; review of medications and promotion of compliance with a physician prescribed regimen; and care coordination through communication with the patient's physician.

Clinical outcomes and self-reports are evaluated by Focused Health Solutions. Certain outcomes are reported back to the employer to demonstrate reduced health care costs and improved employee health. The FocusCare for Asthma Program has had a positive impact on hospitalization utilization, emergency department visits, urgent care visits, unscheduled (sick) visits, school absences, work loss, asthma severity, self-management skills, and use of asthma action plans.

## 66. Advocate Health Care Asthma Initiative

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Advocate Health Care (Advocate), a faith based health care system, is based in Oak Brook, Illinois, and serves all of the metropolitan Chicago area. Advocate is the largest fully integrated, not-for-profit health care delivery system in metropolitan Chicago and is recognized as one of the top 10 systems in the country.

Advocate consists of eight acute care hospitals, a large privately held full-service home health care company, three large physician hospital organizations, and more than 4600 affiliated physicians.

Advocate Health Care's Asthma Initiative, uses Wagner's Chronic Care model as its framework. There is a system-wide infrastructure in place to provide a standard of care based on the NHLBI guidelines, including: educational materials, asthma action plan, admission orders, discharge orders, asthma flow sheet for documentation, annual education for care providers, etc. The program allows for enough flexibility for each site to meet the unique needs of their individual communities.

The goals of the asthma initiative include: 1) Decrease hospital admission and 30-day readmission for patients with asthma; 2) decrease emergency department visits and repeat emergency department visits within 3 days; and 3) increase percent of asthma in-patients receiving steroids on Day 0 or 1.

The asthma initiative's primary component is education to all asthma patients. An asthma patient is referred to a nurse (RN) or respiratory care practitioner (RCP) at one of the Advocate sites where the RCP or RN will educate the patient on asthma, symptoms, medications, equipment, triggers, asthma action plan, and resources. An asthma booklet with the above topics is provided to each patient; an asthma-coloring book is provided to young children. An asthma coordinator (one at each site) will follow-up with the patient at one-week, one-month and three-months after the initial visit.

The health outcomes evaluation for the period of January 2003 to November 2004 showed the program had a positive impact on the following health outcomes: hospitalizations, emergency department visits, scheduled (well) office visits, quality of life for children (missed days of activity), quality of life for adults (waking at night), symptoms, medication use, change in clinical action (prescriptions for Beta agonists and inhaled corticosteroids), use of asthma action plan, and peak flow meter use.

Program success is attributed to the commitment and support of all the participating sites.

## **67. Asthma Care Program**

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*(contact information last updated September 2005)*

The Asthma Care Program of Central DuPage Hospital in Winfield, IL was implemented in 1996 to optimize care for all asthmatics (5-18 years) and their families served by Central DuPage Health. The program's vision is to become the model organization in creating and sustaining a comprehensive community-focused chronic illness management program for asthma in Illinois.

The program has two components. The first is asthma education and case management in the inpatient and outpatient settings (for both children and adults) by an asthma educator and respiratory therapist. Education sessions are comprehensive and include asthma pathophysiology, triggers, activity level, peak flow monitoring, medications, and asthma action plan. Each patient receives mailings inviting them to attend outpatient asthma classes and events. The second program component is provider education. These education lectures cover the same topics as the patient sessions. Providers are also provided a skills competency/validation class.

Evaluations to date indicate a positive impact on the following health outcomes: hospital utilization, emergency department visits, urgent care visits, medication use, and peak flow meter use. Other positive findings include decreased missed work and school days, increase sense of control, and increased symptom-free days.

## **Domestic Programs: Indiana**

### **68. Indiana University Medical Group Asthma Program**

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The Indiana University Medical Group Asthma Program, managed by Wishard Hospital in Indianapolis, IN, was started in 1996.

Patients are referred to the asthma coordinator and an initial appointment is scheduled for a complete asthma assessment and any necessary medication changes. Comprehensive asthma education is provided to the patient including basic physiology, first signs and symptoms, controlling allergens and triggers, medications and medication delivery devices. Patient is trained how to use medication delivery devices and is asked to demonstrate proper technique. A peak flow meter is provided, if applicable. A written asthma action plan is developed for each patient.

The patient is called within 7-14 days for follow up to see if medication changes have improved their condition, and these follow ups continue once or twice per month as long as needed. Patients are encouraged to call the coordinator with any questions. Patients with asthma that is

not responding to treatment are asked to come in for a follow up clinic visit. Outreach classes are provided once per month at the hospital and are free of charge.

Ongoing evaluation with a sample of over 30,000 patients seen to date shows a positive impact on healthcare utilization and medication use. The program is ongoing.

## Domestic Programs: Iowa

### **69. Partners for Asthma Management Planning & Educational Resources (PAMPER)**

Linn County Asthma Reduction Coalition & Healthy Linn Care Network  
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The Partners for Asthma Management Planning and Education Resources (PAMPER) program was implemented from 2000-2001 and was overseen by the Linn County Asthma Reduction Coalition in conjunction with the Healthy Linn Care Network in Cedar Rapids, IA. The goals of the program included empowering patients and parents to better manage asthma; developing medication provider and community education programs to ensure common disease management protocol; and maintaining student health during school days.

Children from 6 months to 16 years with asthma and their parents or caregivers received 8 hour-long sessions over six months with a nurse in the home or school setting that covered daily adherence to the patients' asthma management plan and family practice of home/school management and intervention strategies including trigger reduction and avoidance.

Evaluations indicated a positive impact on several health outcomes for children with asthma, including healthcare utilization, school absences, symptoms, medication use, and use of an asthma action plan.

### **70. Asthma Home Care Program**

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Recognizing that asthma remains a major cause of morbidity for children despite national guidelines the authors sought to evaluate outcomes from a structured specialty-based care program.

They compared the previous and subsequent years for children ranging from infancy to adolescence who entered a specialty clinic program at a university hospital serving a widely dispersed patient population. One hundred fifty-seven patients previously receiving primary care for their respiratory symptoms were seen during the study period; 23 were lost to follow-

up, 15 were excluded because of other serious concurrent medical problems, and 119 were available for outcome analysis. Evaluation included historical data base from a structured interview, evaluation of pulmonary physiology, and allergy skin testing. Treatment decisions were evidence-based. Patient and/or family education was targeted at decision-making. Toll-free telephone access to the specialty service was provided around the clock. Frequency of unscheduled medical care, hospitalizations, sleep disturbance, activity interference, attainment of defined criteria for control, and medication use were quantified.

Seven hundred thirty-five acute care visits were reduced to 47, and 99 hospitalizations were decreased to 10 ( $P < 0.001$  for both). Nocturnal symptoms and exercise limitation decreased significantly ( $P < 0.001$  for both). All criteria for control of asthma were met in 89% of 75 without tobacco smoke exposure and 50% of 44 with exposure ( $P < 0.0001$  for the difference in outcome). Frequent antibiotic use for respiratory symptoms were eliminated after entering the program. Maintenance medications were not used in 72 with an intermittent pattern of viral respiratory infection-induced asthma. Inhaled corticosteroid use increased from 38 to 68% among 47 subjects with a chronic pattern.

The authors concluded that morbidity from asthma is largely prevented with often less, but better selected, medication than had been occurring in previous primary care. These data have implications for revised guidelines directed at primary care physicians.

## **71. Cerro Gordo County Pediatric Asthma Case Management Program**

Cerro Gordo County Pediatric Asthma Case Management Program  
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The Cerro Gordo County Pediatric Asthma Case Management Program began in 1999 and was overseen by the Cerro Gordo County Department of Health in Mason City, Iowa. The program sought to empower identified patients and parents to deal with acute episodes of asthma so that the need for urgent medical care is prevented and to develop ongoing medical provider education to ensure common disease management protocol and diagnosis.

Families of children with asthma received 10 home visits over 1 year, each lasting 1 hour, where topic-specific asthma education was given, instruction and monitoring of a telehealth peak flow meter was done, and case management plans were reviewed. The program paid for an initial visit to a primary care provider prior to the first home visit to develop a care and medication management plan and sent a memo to the PCP at six months into the program with an update of the child's health status.

Program evaluation indicated a positive impact on healthcare utilization, school absences, symptoms, medication use, and lung function. The program ended in 2002, but has been replicated in other areas of Iowa.

## Domestic Programs: Kansas

### **72. Counting on You**

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The Kansas Asthma Coalition, with the American Lung Association (ALA) of Kansas, partnered with the Johnson County Health Department Health Education Division to implement an in-home daycare provider asthma education project called “Counting on You”.

The project served a total of 23 in-home daycare providers during the grant period of September 2002 to September 2003, and reached 46 children with asthma aged one month to nine years. The goal was to have an asthma action plan from a healthcare provider on file for each asthmatic child and to have the daycare provider initiate at least 3 actions to improve indoor air quality by the end of the program period.

The program was delivered by a nurse and health educator on the county health department staff, who attended an intensive two-day Asthma Educator workshop. They visited each daycare home three times to provide asthma education, deliver asthma educational materials for staff, parents, and children, encourage providers to take action to get an asthma action plan on file for each child with asthma, complete a detailed indoor air quality assessment using the ALA “Counting on You” trigger checklist, and provide free asthma-safe cleaning kits and furnace air filters. The program also provided three asthma in-service trainings for daycare staff and developed educational resource kits for loan by daycare.

By the end of the project period, 82% of the daycare homes had asthma care plans on file for their children with asthma, up from 9% at the beginning of the intervention.

## Domestic Programs: Kentucky

### **73. SKIPA: Southeast Kentucky Initiative for Pediatric Asthma**

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The Southeast Kentucky Initiative for Pediatric Asthma (SKIPA) was implemented in 2001 as a collaborative program utilizing community resources to promote asthma awareness and asthma management. The program targets children (0-18 years) in rural areas.

SKIPA’s main component is educational training sessions for caregivers of children with asthma. This includes not only parents/guardians, but also daycare providers and school staff. Caregivers are referred to the program from health care providers and health department nurses.

The educational training sessions are conducted by nurses who are state certified in respiratory therapy. The sessions are approximately one hour in length and occur on average 2-3 times, depending on the need of the caregiver. The sessions are individual except for the daycare and school personnel which are group-oriented. Educational topics include asthma physiology, signs and symptoms, triggers and ways to eliminate them, spirometry, and medication use.

SKIPA also conducts numerous asthma awareness and outreach activities, a survey concerning the mode of treatment for physicians who care for pediatric asthma patients, activities that provide CME and CEU, a support group for parents, and policy efforts for asthma.

An evaluation of the caregiver education training sessions indicated a positive impact on several health outcomes, including healthcare utilization, school absences, quality of life, symptoms, medication use, functional status, lung function, and self-management skills.

#### **74. Asthma Disease Management Program**

Passport Health Plan  
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Passport Health Plan's Asthma Disease Management Program was implemented in 2001 to improve the health status and quality of life while decreasing unnecessary hospitalizations and emergency room visits by members (2-56 years) with asthma through improved compliance of both members and providers with the National Institutes of Health (NIH) standards of care.

Program activities include member education, provider education, case management, and home visits. Member education includes mailings to all members with persistent asthma, individual member education, and presentations at community events in partnership with a variety of organizations such as, the American Lung Association, Northwest Area Health Education Center, Kosair Children's Hospital, and the public school systems. The asthma disease manager works with providers and their office staff to encourage compliance with the NIH asthma guidelines. Providers receive feedback regarding their patients' utilization of medical services for asthma such as emergency department visits, hospitalizations, and medication refills. Providers and/or their office staff are offered training on the use of asthma devices, such as peak flow meters and spacers. The asthma disease managers conduct case management for eligible members. This includes asthma education, referrals, and support. The member is generally followed for six months. Home visits involve the home health nurse visiting the eligible member at least twice to assess the home environment and educate the member on asthma, triggers, home remediation, etc.

The program has improved the following health outcomes: hospital utilization, emergency department visits, urgent care visits, and medication use.

## Domestic Programs: Louisiana

### **75. SBAMP: School-Based Asthma Management Program**

Louisiana State University Health Sciences Center (LSUHSC)  
New Orleans, LA

The School-Based Asthma Management Program (SBAMP) is managed by the Louisiana State University Health Sciences Center in New Orleans, LA and has been implemented since 2000. The mission of SBAMP is to determine the prevalence of asthma in New Orleans school children and to put in place an asthma management program based upon evidence-based interventions.

SBAMP targets all elementary, middle, and high school students (predominately African-American, inner city, and from low income families) in seven parochial and public Orleans Parish school in New Orleans. The intervention includes: the use of NIH asthma diagnosis and management guidelines, the use of school-based clinical sites to enhance student access to asthma medical care, asthma self-management education, the use of asthma medical specialists as needed, and the use of nurse case-management for the most severe asthmatics.

A pre-post test evaluation with a sample of 106 children showed a positive impact on hospital and ED utilization, school absences, quality of life for children, symptoms, medication use, use of an asthma action plan, and use of a peak flow meter. The program is ongoing.

## Domestic Programs: Maine

### **76. AH! Asthma Health Program**

MaineHealth  
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The MaineHealth AH! Asthma Health Program was implemented in 1998 to respond to the growing asthma epidemic in Maine. The AH! Program is a systematic, coordinated approach to asthma care that involves community asthma specialists, healthcare providers, school nurses and coaches, day care providers, and others to improve the health of children and adults with asthma. The goals of the program fall under four major categories: 1) awareness; 2) professional education and awareness; 3) community interventions; 4) and policy.

The main component of the program is asthma education. Community asthma specialists provide inpatient and outpatient asthma education services to children and adults. They also educate the community at community fairs/events, providers at physician office practices, and pharmacists and school nurses.

The program has improved the following health outcomes: hospital utilization, emergency department visits, school absences, work loss, medication use, change in clinical actions, functional status, and self-management skills.

The program attributes its success to being involved at all levels within the community, the community asthma specialists get involved in the community, and the support from its physician champions.

## Domestic Programs: Maryland

### **77. Asthma and Allergy Essentials for Child Care Providers**

Asthma and Allergy Foundation of America, Maryland and Greater Washington, DC Chapter  
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*(contact information last updated September 2005)*

Asthma and Allergy Essentials for Child Care Providers is an asthma education program managed by the Asthma and Allergy Foundation of America, MD- Greater Washington DC chapter. The program is designed to educate child care providers about how to care for children with asthma and allergic diseases and how to provide a safe and healthy environment for children with these chronic conditions.

During this three-hour interactive course, a trained health professional teaches providers how to recognize the signs and symptoms of an asthma or allergy episode, how to institute environmental control measures to prevent these episodes, and appropriate use of medications and the tools for asthma management such as inhalers and peak flow meters to keep these diseases under control. Participants receive a certificate of attendance and a folder containing various educational handouts and tools for both providers and for parents of children with asthma or allergies.

A pre-post evaluation of the program indicated a positive impact on asthma management skills, use of asthma action plans, as well as an increase in actions taken to reduce environmental triggers in the childcare setting.

This program has been implemented since 1984 and has been offered through AAFA chapters nationwide.

### **78. First East Coast Breathmobile**

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*(contact information last updated September 2005)*

The First East Coast Breathmobile, managed by the University of Maryland Hospital for Children, was established in 2003.

The Breathmobile is an asthma clinic on wheels capable of providing ongoing treatment of asthma to children who do not have access to medical care. This custom-built motor home allows healthcare providers to diagnose children with asthma, provide treatment, and dispense medication directly to the child at his or her school. This program targets children 5-12 years in

approximately 24 participating schools in Baltimore, MD.

The school nurse, primary care physician, or parent refers a child with signs and symptoms of asthma to the program. At each visit, the child is examined by the asthma specialist and the nurse provides education and support. The Breathmobile visits each school every seven weeks. Some schools make the Breathmobile visit a regular school activity to encourage participation.

Evaluations to date indicate a positive impact on the following health outcomes: hospital utilization, emergency department visits, school absences, and medication use.

## Domestic Programs: Massachusetts

### **79. A Randomized Controlled Trial of a Pediatric Asthma Outreach Program**

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Previous studies have shown that asthma education and case management may reduce asthma emergency care, hospitalizations, and expenditures.

Researchers sought to study the effect of an asthma outreach program (AOP), a team-based, case-management intervention, on emergency ward (EW) and hospital use.

Fifty-seven patients aged 1 to 15 years with the diagnosis of asthma based on the usual clinical practice criteria who were continuously enrolled in a staff-model health maintenance organization for a period of at least 2 consecutive years were randomized into 2 intervention groups. The control group received a single intensive asthma education intervention, and the AOP group received the same initial education but then was followed-up by an asthma case management nurse throughout the intervention period.

EW visits, hospitalizations, and total outside-of-health-plan expenditures (consisting of EW and hospital expenses, as well as miscellaneous costs, such as ambulance, durable medical equipment, tertiary referrals, and home care) were assessed from claims filed for a year before and after enrollment. Control group patients experienced significant reductions in EW visits (39%), hospitalizations (43%), and outside-of-health-plan costs (28%), possibly as a result of the baseline educational intervention received by all enrolled patients, in conjunction with regression to the mean. AOP group patients experienced significant reductions in EW visits, (73%,  $P = .0002$ ), hospitalizations (84%,  $P = .0012$ ), and outside-of-health-plan use (82%,  $P < .0001$ ). When compared with the control group, AOP group patients demonstrated additional significant reductions in EW visits (57%,  $P < .05$ ), hospitalizations (75%,  $P < .05$ ), and outside-of-health-plan use (71%,  $P < .001$ ). Estimates of direct savings to the health plan ranged from \$7.69 to \$11.67 for every dollar spent on the AOP nurse's salary, depending on assumptions.

Asthma patients in a staff-model health maintenance organization decreased their resource use between 57% to 75% by participation in an AOP as compared with a randomized control group receiving only an educational intervention. Substantial savings were achieved compared with the cost of the AOP nurse. (J Allergy Clin Immunol 1999;103:436-40.)

## **80. Asthma Among Inner City Minorities - A Controlled Trial**

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The “Asthma Among Inner City Minorities - A Controlled Trial” was a study implemented by Brigham and Women's Hospital in 1990 in Boston, MA. The study targeted low-income adults, 18-54 years, living in inner-city Boston. Most of these adults were minorities. Two components of the study were patient education with home visits, and provider education sessions.

The patient education and home visits were conducted by a health educator. The health educator conducted an initial 1 1/2 hour home visit that included a visual assessment of the patient's home and asthma education (e.g., pathophysiology, medication use, and triggers). The health educator would also review the patient's medical chart for additional information. Follow-up visits were conducted at 6mos, 12mos, and 24mos.

The provider education component were center-based seminars held at participating neighborhood centers (where the patients were recruited). The principal investigator provided healthcare updates regarding asthma, mediations, and the Guidelines during the sessions. The Health Educator would then provide information regarding what the patients were receiving in the patient education visits, feedback and information on chart documentation, deficiencies in care, medications, and treatment of asthma patients at different severity levels. These sessions occurred initially and then annually. The sessions were 1-1 1/2 hours in length.

Preliminary data revealed positive impacts on emergency department visits, medication use (inhaled corticosteroids), change in medical treatment plan (corticosteroid prescriptions), lung function (spirometry), and use of a PFM at home (results recorded in a diary). The program also improved knowledge, confidence in self management skills, and self efficacy. Environmental triggers were measured via self report, observation, and chart review. Improved triggers were dust mites, outdoor allergens inside the home, mold, and ETS.

The trial (completed in 1999) has evolved into BWH Community Asthma Program (CAP), a broad community-based, asthma awareness program. CAP is co-managed by Jacqueline Rodriguez-Louis, MPH, M.Ed. and Christopher Fanta, M.D. at BWH Pulmonary Division. CAP is oriented toward increasing community awareness and, through this increased awareness, affect norms regarding asthma, motivate community action for social and physical environmental changes, and bring more people onto asthma care.

Currently CAP conducts asthma education programs and trainings on an individual and community level, provides collegial support and medical updates on asthma for physician and nurses at Brigham-affiliated Neighborhood Health Centers, and develops culturally appropriate educational materials.

## **81. Boston Healthy Homes Initiative**

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The Boston Healthy Homes Initiative began in 2000 and is overseen by the Boston Public Health Commission in Massachusetts. It was created with the hypothesis that a package of home assessments and modifications and repairs to the home would improve the health of Boston children with asthma.

Low-income urban families that have at least one child with asthma receive two home visits from an inspector and a health educator. During these visits, a visual inspection of the home and collection of physical samples is completed. Families are given asthma education on the reduction of asthma triggers, Integrated Pest Management services and low cost IPM supplies, air conditioners, allergy blocking mattress and pillow covers and house cleaning, and when necessary duct cleaning, HEPA filter vacuums and, for a subset of participants, \$2500 worth of remediation such as improving kitchen and bathroom ventilation, repairing leaks, removing mold and removing carpeting. Follow up phone calls are made every two months for a year, and last about 15 minutes. The timing of the second home visit varies greatly among participating families depending on the intensity of the work being done in the home.

Evaluations to date have indicated a positive impact on several health outcomes for children with asthma. The program is ongoing.

## **82. CHAMP: The Chelsea Asthma Program**

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The Chelsea Asthma Program (CHAMP) was initiated in 1997 in Chelsea, MA by Massachusetts General Hospital/ Partners HealthCare Institute for Health Policy.

CHAMP is a community-based intervention that was designed to improve asthma care for inner-city minorities through home visits, physician-directed care management plans, and community collaborations. The program was developed to: 1) identify patients with asthma, 2) conduct home visits, 3) systematically assess personal, social, and environmental risk, 4) assess and apply optimal medication plans, 5) provide asthma education to patients and their families, 6) conduct individual follow-up, 7) provide public education campaigns, 8) provide assistance with home and workplace environmental remediation, and 9) provide feedback to practitioners on patient use of emergent healthcare services, medication compliance, and whether pharmacological treatment conformed to the National Heart, Lung, and Blood Institute Guidelines for Clinical Treatment of Asthma. The program also encourages regular interaction between physicians and school nurses, and performs occupational exposure inspections of local industrial sites. The program targets both adults and children in a primarily low-income, urban, Hispanic population. CHAMP is low-cost

and is staffed by a bilingual lay asthma care coordinator and two consulting physicians (0.1 MD FTE total).

Three methods were used to test the hypothesis that the intervention improved care for residents with asthma including a case-control design to assess the impact of the intervention on enrolled subjects, community level asthma hospitalization rates to assess impact at the community level, and a pre/post design to assess changes in care processes, asthma symptoms, and quality of life. There were significant improvements in clinical management of asthma and reductions in hospitalizations among the study cohort. Community level effects could not be determined.

Based on this evaluation, investigators concluded that inexpensive, low-intensity community-based programs can improve asthma outcomes, though effectiveness on a population basis may require additional resources.

### **83. Healthy Public Housing Initiative**

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The Healthy Public Housing Initiative (HPhi) is a multi-year program to improve the health of Boston public housing residents, especially children with asthma (4-17 years old). The Healthy Public Housing Initiative operates as a collaborative organization, partnering with Boston Housing Authority, universities, and community-based organizations.

The project's primary component was a set of health and housing interventions targeting 60 children with asthma. Activities included education to children and their families about asthma management and environmental trigger control, as well as direct actions to change the home environment. These actions included the use of new dust mite-resistant mattresses, commercial cleaning, and, as part of a comprehensive Integration Pest Management (IPM) program, the use of low-toxicity pest control applications.

Evaluation results indicate that the project improved quality of life for children and caregivers and reduced asthma symptoms, as well as reducing levels of several environmental triggers, including cockroach and dust mite allergens.

### **84. Planned Care: Childhood Asthma**

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The Cambridge Health Alliance (CHA) of Cambridge, MA has implemented its Planned Care: Childhood Asthma program since 2002, as one of seven health systems in the nation chosen by

the Robert Wood Johnson Foundation to participate in the Pursuing Perfection program aiming to help transform the delivery of healthcare.

The objective of the childhood asthma program is to perfect asthma care for patients age 3-18 through the use of an electronic patient registry, redesigned process and new approaches to partnering with patients. In addition to the registry and other systems changes, program activities include patient education, provider training, and the Healthy Homes home-based environmental intervention. The program reaches patients of CHA in Cambridge, Somerville, and Boston's metro-north region.

Evaluations based on approximately 1200 patients and their families have shown a positive impact on hospital utilization, ED and urgent care visits, and office visits. The program is ongoing.

### **85. Asthma Chronic Care Team**

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The Asthma Chronic Care Team of the Holyoke Health Center in Holyoke, MA originated in 2001 as part of the Health Disparities Collaborative of the Bureau of Primary Health Care.

Patients with asthma of any age are referred to the program by their primary care provider upon diagnosis of asthma. At the clinic, a primary assessment is completed, a severity score is assigned, and the patient receives asthma education either on site or at home. Individual patient education is offered as needed as well as family groups and support sessions. Education is culturally and linguistically appropriate for the mainly low-income, Hispanic target population. Following the chronic care model, continuous quality improvement efforts are implemented to ensure all patients receive appropriate asthma treatment. A physician champion works to get the latest asthma treatment guidelines to all providers, experts provide quarterly trainings, and a decision support team creates documentation and systems to support care.

Ongoing program evaluation indicates a positive impact on symptoms and medication use, as well as a reduction in exposure to environmental tobacco smoke. This program is ongoing, and has been fully integrated into clinic operations.

### **86. Affiliated Pediatric Practices (APP) Asthma Disease Management Program**

Affiliated Pediatric Practices (APP)/ Partners Community Healthcare, Inc. (PCHI)  
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Affiliated Pediatric Practices (APP) is an independent pediatric practice organization based in Needham, MA that is part of the physician network Partners Community Health Care, Inc. (PCHI).

In 2002, APP collaborated with PCHI to launch an Asthma Disease Management Program in their

15 pediatric practices in Boston and Southeastern Massachusetts. The goals of the APP Asthma Disease Management Program were to improve the care of patients with asthma within APP, improve their quality of life by improving healthcare delivery, create a sustainable prevention-based program that reduces the cost of asthma, and improve provider satisfaction in their delivery of such care.

The program followed a disease management process that included identification and outreach to all patients with asthma, risk assessment and stratification, patient education, monitoring adherence to treatment plans between visits, and measuring, tracking, and reporting outcomes.

Early evaluations indicate that the program has had a positive impact on health care utilization, school absences, medication use, and use of an asthma action plan. The program and its evaluation are ongoing, and PCHI may replicate the program to other pediatric sites.

## Domestic Programs: Michigan

### **87. CAP: Comprehensive Asthma Program**

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*(contact information last updated September 2005)*

The Comprehensive Asthma Program (CAP), an educational program targeting high-risk children (7-15 years) with asthma has been implemented into several of the Ypsilanti, Lincoln Consolidated, and Ann Arbor elementary and middle schools in Michigan.

The asthma education program is modeled after the American Lung Association's Open Airways for Schools Program. Children with asthma are self-identified or identified by their school emergency medical card and invited to participate in the program. The children are taken out of their regular classroom activities one hour per week for six weeks to participate. There are group sessions discussing general information about asthma and triggers/exposures. Children bring home a packet for their parents to review. A follow-up phone call is made to the parents regarding the information in the packet. Data is collected before the program begins, after the program ends and at six months post. A nurse and social worker conduct the classes.

The goal of this study was to determine if a coordinated interactive school-based program focusing on asthma education could help improve overall quality of life of children with asthma and their caregivers. Quality of life for children was positively impacted and there was a trend toward improvement for the quality of life for caregivers.

### **88. Community Action Against Asthma (CAAA)**

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Community Action Against Asthma (CAAA) was implemented in Detroit, MI from 1999 to 2003 and was managed by the University of Michigan School of Public Health. CAAA was a community-based participatory research (CBPR) community health worker (CHW) intervention designed to improve children's asthma-related health by reducing household environmental triggers for asthma. 328 households in Detroit with a child aged 7-11 with persistent asthma symptoms were randomized to an intervention or a control group.

The intervention consisted of a planned minimum of 9 household visits over a one-year period by community health workers called Community Environmental Specialist (CESs). The initial home visit included general information on asthma and the role of environmental triggers. Subsequent visits were organized into separate modules on the remediation of specific triggers. Based on information gathered during the baseline interview, skin testing, and analysis of bedroom dust, the CESs and caregivers together refined a prioritized list of environmental triggers to focus on. The overall aim was to facilitate the family in making environmental changes in the home to reduce the child's exposure to common asthma triggers.

The intervention was effective in increasing lung function (daily nadir Forced Expiratory Volume at one second and daily nadir Peak Flow); reducing the frequency of two symptoms (cough that won't go away, coughing with exercise); reducing the proportion of children requiring unscheduled medical visits and reporting inadequate use of asthma controller medication; reducing caregiver report of depressive symptoms; reducing concentrations of cat and dog allergen in the dust; and increasing some behaviors related to reducing indoor environmental triggers. The results suggest a CHW environmental intervention can improve children's asthma-related health although the pathway for improvement is complex.

## **89. Michigan Asthma Airways**

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Michigan Asthma Airways is managed by the University of Michigan in Ann Arbor, MI and was begun in 1995. The program seeks to decrease hospitalizations, emergency department visits, unscheduled (sick) office visits, days ill and work loss in adult patients through use of the Patient Self-Management model.

Referred patients receive four in-hospital visits with a healthcare team consisting of a nurse, asthma educator, allergist and/or pulmonologist over the course of one year that offers assessment, education, and a peak flow meter. At each visit, patients receive a written pulmonology care plan tailored to their individual health needs. Patients' primary care physician also receive identical copies of the plan. Over the course of the year in the program, patients receive telephone calls from the nurse or asthma educator one- and three-weeks post and prior to six- and 12-month visits to assess healthcare and medication utilization, metered-dose inhaler technique, patient satisfaction and medication side-effects. The telephone calls have been shown to predict actual outcomes one year post.

The program's evaluation revealed program activities had a positive impact on hospitalization use, emergency department visits, unscheduled (sick) office visits, work loss, and functional status.

## **90. OAS+: Comprehensive School-based Asthma Program**

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OAS+: Comprehensive School-based Asthma Program began in 1995 and was administered through the University of Michigan. Fourteen elementary schools in Detroit, Michigan were selected to receive the program to assess the impact of a comprehensive school-based asthma program on symptoms, grades, and school absences in children, and parents' asthma management practices. Low income, urban, African-American children and their parents participated in the study.

The two main components of the program were "Open Airways for Schools (OAS)", disease management training for children with asthma, and "Environmental Detectives", asthma education classroom sessions for classmates of children with asthma. OAS involved a 50-minute lesson in the school once per week for 7 weeks, taught by trained health educators, to children determined as having asthma. The OAS curriculum was adapted for reading level and with updated content.

Environmental Detectives was taught to all 3rd, 4th and 5th graders in the schools through a 50-minute lesson, once per week for 3 weeks. Trained health educators gave asthma education to enhance students' understanding of factors that may influence respiratory health in general and to help them develop empathy for children with asthma in particular.

Other program elements included: orientation to asthma and control strategies for school principals and counselors; briefings and building walk-throughs for custodial personnel regarding potential environmental triggers to asthma symptoms and practical means of remediation; school fairs for children and their caretakers, including asthma care question-and-answer sessions for the adults; and written communication on behalf of the family with the child's clinician.

Participation in the program resulted in a positive impact on school absences, symptoms, and self-management skills (parent and children). Improvement was also seen in school performance for math, science, reading, and physical education.

The program was part of the larger initiative, School-based Approaches to Managing Asthma. A strength of the program was the enthusiastic support it received from Detroit Public Schools.

The program ended in 2000. The American Lung Association is seeking to disseminate a version of OAS nationwide, with some of the modifications a result of this program.

## **91. Open Airways - Clinic**

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Open Airways was first developed and implemented in the pediatric allergy clinics of four New York City hospitals. This parent-child health education program's basic hypothesis was that participation would increase parents' and children's ability to manage asthma and would result in a decrease in emergency room visits, hospitalizations, school absences, and disruption of family life due to asthma. Open Airways focused on an inner city, low socioeconomic, minority population.

Two hundred sixty-nine families enrolled in the clinic program; 55% were Hispanic and 38% were non-Hispanic black. Sixty percent of the children were male and the mean age of children participation was 9.2 years (eligible age group was 4-17 years). Sixty-three percent of the families received public assistance and/or Medicaid.

To foster high attendance and to make constructive use of waiting time, health education sessions were conducted at the clinic while families were waiting for medical appointments. The program, presented in Spanish and English by bilingual health educators, consisted of six separate sessions each for parents and children which incorporated self-management skills and solutions to common obstacles encountered in achieving satisfactory asthma control. The goal of the sessions was to help parents and children communicate and work together in managing the child's asthma more effectively.

The program was evaluated using a randomized control study design. After one year the program had a significant impact on self management skills and school grades, as well as on reduction of emergency room visits and hospitalizations due to asthma.

## **92. PACE: Impact of Education for Physicians on Patient Outcomes**

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"PACE: Impact of Education for Physicians on Patient Outcomes" was conducted by the University of Michigan to assess the impact of an interactive seminar based on self-regulation theory on 1) treatment practices and communications and education behavior of physicians, 2) the health status and medical care utilization of their pediatric patients with asthma, and 3) the satisfaction with care of the subjects' parents.

A total of 74 general practice pediatricians were assigned to either a program or a control group in a randomized controlled study. Data were collected from physicians at baseline, and 69 provided follow-up data 5 months after the program. Data were also collected from 637 of their patients at baseline, and in 22-month window after the intervention, 472 of this number provided follow-up data.

After the seminar, physicians in the program group were more likely than were control group physicians to address patients' fears about medicines, review written instructions, provide a sequence of educational messages, write down how to adjust the medicines at home when symptoms change, and report that they spent less time with their patients. Parents of the children treated by program physicians were significantly more likely than were control group parents to report that the physician had been reassuring, described as a goal that the child be fully active, and gave information to relive specific worries. These parents were also more likely to report that they knew how to make management decisions at home. Patients of physicians in the program group were more likely to have received a prescription for inhaled anti-inflammatory medicine and to have been asked by the physician to demonstrate how to use a metered-dose inhaler. Children seen by program physicians made significantly fewer non-emergency office visits and visits for follow-up of an episode of symptoms. Among children placed on inhaled corticosteroids during this study, children treated by physicians who had received education had significantly fewer symptoms and fewer follow-up office visits, non-emergency physician office visits, emergency department visits, and hospitalizations.

### **93. The Cost and Effectiveness of an Educational Program for Adults Who Have Asthma**

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This randomized controlled trial of an educational program for adults with asthma was delivered at two sites: an urban emergency room and a suburban emergency room. The objective of the study was to determine whether a self-management training program decreases emergency department visits and reduces costs for patients with asthma.

241 asthma patients between the ages of 18 and 70 years were enrolled in the program, with 119 in the intervention group and 122 in the control group, and a total of 185 available for follow up.

All patients seen in the emergency departments were given usual medical care and follow-up. Patients in the intervention group were asked to attend three educational sessions on asthma conducted by a specially trained RN. The program stressed importance of medication compliance, methods to control and prevent attacks, effects of drugs and rationale for their use, relaxation exercises, and smoking cessation.

All patients received telephone interviews 4, 8, and 12 months after entry into the study. Reports based on hospital admissions and emergency room utilization were verified by billing records. The intervention group had significantly fewer asthma-related emergency visits than did the control group over the 12 months of follow-up. This effect was strongest during the initial four months post intervention.

The study authors concluded that education enables patients with asthma to decrease utilization of emergency services.

## 94. Pediatric Asthma Disease Management

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A pre/post study was done to investigate whether implementing an asthma disease management program that involved the interplay of a physician in an asthma clinic, and periodic home visits by non-physician members of this program, could reduce asthma morbidity in disadvantaged inner-city children with moderate to severe asthma in Flint, MI.

Participants were identified for acute asthma from inpatient pediatric floors at the time of admission. The asthma disease management team evaluated the homes of families of children with asthma for the presence of, and avoidance of, potential allergens. The team also provided continuous education and support to the child and family as part of comprehensive asthma management. The team worked together to conduct the initial and subsequent (every 3 months) home evaluations as well as child and family asthma education. The team was a continuous link between the child's family and a physician in the asthma clinic.

Records of 142 children (aged  $6 \pm 4$  years) enrolled into the program for at least one year were reviewed. There was a significant reduction in the number of hospital admissions:  $1.2 \pm 0.11$  (mean  $\pm$  SEM) vs.  $0.5 \pm 0.1$  episodes ( $p < 0.05$ ), length of stay on pediatric floors:  $3.2 \pm 0.5$  vs.  $1.4 \pm 0.38$  days ( $p < 0.05$ ) and in the pediatric critical care unit:  $0.8 \pm 0.2$  vs.  $0.2 \pm 0.09$  days ( $p < 0.05$ ) 1 year after enrollment into the program. There was also a reduction in the proportion of the number of missed school days (35% vs. 12%,  $p < 0.01$ ) and days with restricted activities (35% vs. 13%,  $p < 0.001$ ) one year after enrollment into the program compared to the previous year.

The authors concluded that introduction of an asthma disease management program to disadvantaged inner-city children with moderate to severe asthma may reduce resource utilization and improve quality of life in this high-risk group of children with asthma.

## 95. PAANWM: Pediatric and Adult Asthma Network of West Michigan

Pediatric and Adult Asthma Network of West Michigan (PAANWM)  
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The Pediatric and Adult Asthma Network of West Michigan (PAANWM) was established in 1994 as a West-Michigan based, multi-organizational community partnership that brings together the wisdom and experience of many disciplines involved with pediatric and adult asthma. PAANWM consists of individuals from all three acute care hospitals in Grand Rapids as well as the American Lung Association of Michigan, the Kent County Health Department, Grand Valley State University, Priority Health, Community Care Plan, private practices, and Visiting Nurse Services.

The program's two major goals are to educate those caring for children with asthma (the

physicians, nurses, school personnel, parents and the children themselves) using National Institutes of Health materials, and to intensively case-manage low-income children and adults with moderate to severe asthma. PAANWM's unique services include: home visits, school in-services, physician care conference to elicit a written asthma management plan for each case management patient, and a medical social worker to assist with psychosocial barriers.

Priority Health is a managed care organization established in 1986 with 290,000 members. Since April 1999, PAANWM and Priority Health have partnered to provide case management services to Priority Health's managed Medicaid pediatric population with moderate to severe asthma on a fee-for-service basis. Priority Health has extended this relationship to include select commercial patients as well as adults with asthma who are served either in an adult asthma clinic setting or through case management services.

PAANWM has had a positive impact on hospital utilization, emergency department visits, and medication use among children with asthma.

## **96. Asthma Resource Center**

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The Asthma Resource Center of Foote Health System in Jackson, MI was established in 1999 to improve the lives of people with asthma. The main goals of the center is to help to educate people with asthma, (i.e., parents/caregivers of infants, children and adults) about how to manage their asthma so that they may improve their quality of life.

The main component of the program consists of two or three respiratory therapist-led education sessions covering basic anatomy, medication purpose and use, peak flow meter use, triggers, and asthma signs and symptoms. Participants also receive a peak flow meter, medication devices, and an asthma action plan, and use an asthma diary to record peak

Evaluations to date indicate a positive effect on healthcare utilization, school absences, and work loss.

## **97. Washtenaw County Asthma Home Visiting Program**

Washtenaw County Health Department  
Ypsilanti, MI

The Washtenaw County Asthma Home Visiting Program of the Washtenaw County Health Department was implemented in 2001 to decrease acute care visits and hospitalizations for clients with asthma. The program aims to improve the quality of life for the client and their family, reconnect the client with their primary care provider, increase compliance, and decrease other psychosocial or situational crises that could impact successful asthma management.

There are two main components of the program. The first is home assessment. A nurse conducts a home assessment for triggers and provides resources to rid the triggers. During the home visit the nurse provides general asthma education. The nurse follows-up with the client by phone

as needed. Clients receive on average 1-2 visits. The second component is provider education. Providers in the hospital attend required lectures and meetings where asthma education is conducted by an asthma specialist. Other education messages are provided in reports sent to providers in offices. These messages include suggestions for treatment, references to the NHLBI guidelines, cues for referrals to a specialist, etc.

The program has improved the following health outcomes: hospital utilization, emergency department visits, urgent care visits, school absences, quality of life for children, symptoms, change in clinical actions, functional status, and self management skills.

Program success is attributed to asthma champions and the strength of the outcomes data.

## Domestic Programs: Minnesota

### **98. Children's Hospitals and Clinics Asthma Education Clinic**

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The Asthma Education Clinic at Children's Hospitals and Clinics (CHC) in St. Paul and Minneapolis, MN began in 2002. The clinic is highly skilled in evaluation of asthma patients with regard to long term management, re-evaluation and stabilization post acute episodes, and training of the patient/family in managing their asthma. Patients are referred to the clinic by Children's Inpatient and ED departments, providers internal and external to Children's, and by self-referral.

The specific objectives of the Asthma Education Clinics are to improve the quality of life for the patient, improve adherence to recommended medications and environmental changes, reduce the incidence of readmission to the ED or hospital, increase the number of patients seen in the asthma clinic from the ED and Inpatient lists, expand the provider referral network, and communicate to the patient's providers and school the patient's asthma status

Evaluations to date have indicated a positive impact on several health outcomes for children with asthma, including decreased symptoms and increased use of preventive and controller medication.

## Domestic Programs: Missouri

### **99. Kansas City Childhood Asthma Management Program: KC CAMP**

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The Kansas City Children's Asthma Management Program (KC CAMP) of the Children's Mercy Hospital in partnership with Family Health Partners (HMO) developed a unique new approach to health management. The goal is to develop a model of care delivery that coordinates healthcare by placing patient goals first and setting the patient as the source of control; and improving the overall health of patients and their communities as measured by clinical, humanistic and economic outcomes. Members less than 17 years of age with asthma were targeted. Provider education, case management, home visits and remediation, and community activities were components of KC CAMP.

The primary component was provider education. Asthma educators visited provider offices that served the most members and conducted eight learning sessions covering the following topics: Asthma 101, patient evaluation, spirometry, asthma action plans, case management, devices, environmental and outcomes.

To date KC CAMP has had a positive impact on hospital utilization, emergency department visits, quality of life for children and parents/caregivers, and change in clinical actions (increased prescriptions and asthma action plans).

KC CAMP has demonstrated its effectiveness as a new model for delivering high-quality care. The savings far outweigh program costs ensuring its sustainability and improving the likelihood that it will be adopted by additional health plans for management of asthma and other diseases.

### **100. Truman Medical Center Asthma Program**

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The Truman Medical Center Asthma Program in Kansas City, MO has been operating since 2001. The goal of the program is to provide superior and consistent care for the adult patient with asthma whether it is in the emergency department (ED), inpatient unit, clinic setting, research or the community. All of these systems strive together to assure that patients suffering from this frightening disease receive optimal care, support and education based on nationally and internationally accepted guidelines for the care of patients with asthma.

The program implemented protocols hospital-wide for healthcare providers to follow who treat adult patients with asthma. Patients are educated about peak flow use (given a peak flow if they don't have one), an asthma action plan, and given asthma education materials. Referrals are made to those patients who are "high utilizers". Almost all patients are referred to the medical center's Asthma Clinic for follow-up and assessment.

The program also has user-friendly database for asthma management consistent with the asthma national guidelines. The database was designed to create asthma action plans that are shared between providers caring for patients with asthma. This new process has improved documentation of asthma action plans which are increasingly being used to assess appropriateness of care. These action plans can be queried to document compliance with accepted best practices.

Since the program was implemented, hospital admission rates have decreased, and there has been improved medication use, change in clinical action (provider behavior), and self-management skills.

The program is now expanding the current ED protocol to include a secondary protocol for continued evaluation in the ED while patients await admission. The goal is to further decrease admission rates through this secondary protocol and continued treatment, assessment and evaluation pending transfer to inpatient status.

### **101. Barnes-Jewish Hospital Asthma Intervention Program**

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From 1996 to 1999 a study was done of the Barnes-Jewish Hospital Asthma Intervention Program in St. Louis, MO. The aim was to decrease rates of readmissions within six months of hospital discharge, to reduce cost, and to improve health-related quality of life.

Participants included 96 adult subjects (predominantly young African-American women) who were hospitalized with an asthma exacerbation and had a history of frequent healthcare use. Patients were randomized to an asthma nurse specialist intervention (n = 50) or a usual care group (n = 46) for six months.

Activities were conducted by nurse specialists during patients' hospital stay for asthma. In addition to providing asthma education and establishing an individualized self management plan the nurse specialist provided psychosocial support, screening of patients for professional counseling and consultation with social services for discharge planning. After discharge from the hospital patients followed-up with their primary care physician, and received phone contact and home visits as needed for the subsequent six months. Home visits were done if the patient was not available by phone, to establish trust, and/or to evaluate for potential environmental or social factors which might contribute to poor asthma control.

The randomized, controlled, prospective trial demonstrated a 60% reduction in total hospitalizations (31 readmissions in the intervention group and 71 in the control group,  $p = 0.04$ ), with no significant change in emergency department visits. Readmissions for asthma were reduced by 54% (21 vs. 42 in the control group;  $p = 0.04$ ). There was also a marked reduction in lost work or school days: 246 versus 1,040 days in the control group ( $p = 0.02$ ). The intervention resulted in a substantial reduction in direct and indirect healthcare costs, saving \$6,462 per patient ( $p = 0.03$ ).

The authors concluded that a brief intervention program focusing on high healthcare users with asthma can result in improved asthma control and reduced hospital use with substantial cost savings.

## **102. IMPACT: Interactive Multimedia Program for Asthma Control and Tracking**

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The Interactive Multimedia Program for Asthma Control and Tracking (IMPACT) intervention was managed by the University of Missouri-Columbia. The purpose of this intervention was to determine whether health outcomes of children who have asthma can be improved through the use of an Internet-enabled interactive multimedia asthma education program.

Two hundred twenty-eight children with asthma visiting a pediatric pulmonary clinic were randomly assigned to control and intervention groups. Children and caregivers in both groups received traditional patient education based on the National Asthma Education and Prevention Program. Intervention group participants received additional self-management education through the Interactive Multimedia Program for Asthma Control and Tracking. Pediatric Asthma Care Knowledge Survey, Pediatric Asthma Caregiver's Quality of Life Questionnaire, asthma symptom history, spirometry, and health services utilization data were collected at the initial visit and at 3 and 12 months.

Interactive Multimedia Program for Asthma Control and Tracking significantly increased asthma knowledge of children and caregivers, decreased asthma symptom days (81 vs. 51 per year), and decreased number of emergency department visits (1.93 vs. 0.62 per year) among the intervention group participants. The intervention group children were also using a significantly lower average daily dose of inhaled corticosteroids (434 vs. 754 µg [beclomethasone equivalents] at visit 3. Asthma knowledge of all 7- to 17- year-old children correlated with fewer urgent physician visits and less frequent use of quick-relief medicines. The program was found to be acceptable to both children and caregivers.

Investigators concluded that supplementing conventional asthma care with interactive multimedia education can significantly improve asthma knowledge and reduce the burden of childhood asthma.

## **103. Neighborhood Organization for Pediatric Asthma Management in the Neighborhood Asthma Coalition**

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The Neighborhood Asthma Coalition (NAC) was implemented in 1991 to emphasize neighbor-to-neighbor support and encouragement of asthma management through the Grace Hill Wellness Initiative, which includes neighbor involvement in governance through neighborhood-based Wellness Councils. Grace Hill Neighborhood Services is a health and social service agency that has been active in low-income neighborhoods of St. Louis, MO for more than 95 years.

NAC was conducted in four separate neighborhoods in St. Louis, with populations that were predominantly low income and African American.

The objective of NAC was to determine if such a community-based intervention, conducted through a well-established neighborhood organization in St. Louis could improve awareness of asthma, change attitudes about its care, improve asthma management practices, and reduce the need for acute care (hospitalizations and emergency room visits) for asthma.

NAC included promotional campaigns to increase awareness and asthma management courses (based on the American Lung Association Open Airways program) in schools and neighborhood settings. The program also involves neighborhood residents in a number of activities including planning programs, being trained to implement asthma management classes, assisting in coalition activities, and acting as Change Asthma With Social Support (CASS) workers to provide basic education and support to parents and children.

In its three years of existence NAC reached its intended audience, brought about changes in management practices, and was associated with promising reductions in acute care rates among active participants in the program.

#### **104. Project Concern**

Asthma and Allergy Foundation of America St. Louis Chapter  
St. Louis, MO

Project Concern is managed by the Asthma & Allergy Foundation of America (AAFA), St. Louis Chapter, in St. Louis, MO. The goal of this safety-net program is to eliminate the barriers that underserved children have that prevent them from managing their asthma and leading normal lives. Since 1981, the project has provided prescription assistance to uninsured/underinsured children and life-saving asthma/allergy resources such as medicines and equipment for children and adults up to age 21. It is the only program of its kind in the St. Louis area.

Clients are referred to Project Concern via a simple application which is reviewed to ensure the client meets the eligibility criteria: diagnosis of asthma, age 0-21, low income, and living in the area of service. If eligible, the client is registered into the program and immediately receives any assistance needed to obtain medications and medical equipment including prescriptions, peak flow meters, nebulizers, etc. Project Concern works with a network of pharmacies to establish an account for the child and maintain it as long as needed. The project staff also work to secure long-term insurance for the family through any available programs offered by the state or other agencies.

In addition to this assistance, clients complete a survey to identify specific educational needs or topics of interest, and tailored asthma educational materials are provided. As part of AAFA, Project Concern staff also conduct ongoing asthma education sessions for school children and the community at large, as well as trainings for staff of hospitals, daycares, and schools.

Pre-post program evaluation with a sample of approximately 100 clients showed a positive impact on ED visits, school absences, medication use, and functional status. The program is ongoing.

## Domestic Programs: New Jersey

### **105. MyAsthma.com**

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MyAsthma.com is a World Wide Web-enabled asthma self-management intervention implemented in 1999. Participants include people with asthma 14 years of age or older, but many parents participate on behalf of their young children with asthma.

The program provides self-care tools to track peak flow, symptoms, triggers, and medication usage. Participants are able to review their progress with graphs and reports that they can share with their healthcare provider. Participants also receive personalized education and answers to questions about asthma and allergies from the MyAsthma health team. The program provides an online community to share personal stories, make friends, and gain support and advice from their forums on asthma, allergies, and general health. The program also provides up to date information to help participants learn more about their condition, including lifestyle issues, treatment options; and devices such as peak-flow meters and spacers.

MyAsthma.com was evaluated in 2000 and was found to have a clinically and statistically significant positive impact on quality of life for the adult patient. The program attributes its success to the good use of technology and the program being convenient and easy to use.

### **106. The Pediatric Asthma Center: A Comprehensive Inner-City Asthma Program Reduces Hospital and Emergency Room Utilization**

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“A Comprehensive Inner-City Asthma Program Reduces Hospital and Emergency Room Utilization” was a study implemented in 1994 to evaluate the efficacy of a comprehensive asthma program on emergency department visits and hospital admission rates in a pediatric population in Bronx, NY. The study was a 12-month prospective randomized trial.

Three hundred asthma patients, aged 2-17 years, were recruited and randomized in an inner-city pediatric emergency department, to obtain asthma care in a specialty clinic or to continue receiving care by other health resources. The specialty clinic provided intensive medical and environmental control, education, close monitoring, and 24-hour availability. Home visits were done for most of the participants. For the prospective study, monthly questionnaires were

sent to the caregivers of these children to evaluate use of hospital facilities for asthma care. For the retrospective study, use of hospital resources by the study participants was analyzed using a hospital database.

One hundred twenty-nine patients (60 in the treatment group and 69 in the control group) were included in the final analysis. Emergency department visits and hospitalizations were decreased significantly.

### **107. Asthma Health Management Intervention**

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*(contact information last updated September 2005)*

A disease management program encompassing children with asthma and their caregivers was developed through the collaboration of United Healthcare, a national health care organization, and Integrated Therapeutics Group, a subsidiary of Schering-Plough. Members within 17 regional United Healthcare markets were offered the Asthma Health Management Intervention as part of their core services for themselves or their family.

The program was designed with the goals of maintaining compliance with nationally recognized asthma management guidelines, improving clinical outcomes for asthmatic members, reducing healthcare costs associated with asthma, and modifying member and physician behavior with regard to asthma care. All asthmatic plan members received an educational booklet, asthma treatment guides, and seasonal and quarterly asthma-related mailings. Members also received an asthma control tool set, which contained a peak flow meter and an educational video. According to risk and need status, members also received opportunities for one-on-one education and telephonic care management. Physicians received reports on their patients with asthma, and physicians of high-risk members received detailed letters and were offered training regarding current asthma treatment guidelines.

A longitudinal study was conducted to determine the impact of the program on pediatric asthma patients (age 5-13) and their caregivers over a 12-month period. Statistically significant post-program outcomes were observed in various domains, including a reduction in adverse utilization, symptomatology, quality of life for children, and lost work days for adult caretakers.

These findings demonstrate that a large-scale population-based intervention program can produce measurable clinical and economic benefits, thereby lessening the burden of asthma on the family unit.

### **108. The Effectiveness of One-on-One Nurse Education on the Outcomes of High-Risk Adult and Pediatric Patients with Asthma**

Integrated Therapeutics Group  
Kenilworth, NJ  
Elisabeth B. Whalen, MPH

The effects of an asthma self-management program on asthma outcomes were evaluated in adult and pediatric patients with asthma who were considered at high risk (i.e., those who were not in control of their disease as determined by resource utilization, medication use, or lack of use).

The program consisted of one-on-one nurse-to-patient (“nurse champion”) education and subsequent assessment of asthma outcomes using the Asthma Quality Assessment System (AQAS) questionnaire, which measured asthma severity, patient quality of life, asthma awareness and knowledge, confidence in managing asthma, use of peak flow meters, asthma symptoms, medication use, lost work or school days, and affect of asthma. Over the course of six months, nurse champions educated 201 patients from four managed care plans and collected data at baseline and during four follow-up sessions.

Adult patients and pediatric patient caregivers reported significant improvements in quality of life, and clinical and process measures. Significant increases in asthma knowledge were observed immediately after patient education, including greater than 89% increase in the proportion of patients who reported that they know “a lot” about the “things that cause asthma symptoms.” Significant decreases were also found in work days missed, urgent care utilization, and hospital admission rates. Appropriate preventive care visits increased by more than 40%.

These results indicate that the nurse champion program was associated with an improvement in asthma outcomes in high-risk adult and pediatric patients and warrant further evaluation in controlled studies. Incorporating one-on-one education programs into asthma management is an effective and rapid means of improving asthma outcomes.

### **109. Economic Impact of an Asthma Education Programme on Medical Care Utilisation**

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Researchers at Rutgers University in Piscataway, NJ looked at the economic impact of an asthma education program on medical care utilization.

The study was population-based and used claims data to determine changes in the resources used by identified patients with asthma 9 months before (January 1997 to September 1997) and 9 months after (January 1998 to September 1998) the implementation of the asthma education program. Direct medical costs and frequency of use of services for asthma treatment before and after implementation of the asthma intervention program were compared to evaluate the impact of the program on medical treatment costs.

Patients who were diagnosed with asthma at least 12 months prior to the implementation of the intervention were included; all patients were members of a union health and welfare fund, located in the northeastern part of the US. Of the 5527 patients, 2235 were included in the intervention group and 3292 patients served as the control group.

The asthma education focused on asthma prevention and treatment, recognition and elimination of asthma triggers, and compliance with asthma medications. The program also included therapy management intervention with physicians, drug product selection and compliance intervention when needed.

The total asthma treatment cost decreased from \$US499 to \$US415 per patient (a 17% reduction;  $p = 0.0142$ ) in the intervention group and decreased from \$US227 to \$US217 in the control group (a 4% decrease;  $p = 0.6172$ ) [1997 values]. The decrease in the intervention group was significantly greater than that in the control group after controlling for the differences in treatment costs before the intervention ( $p = 0.0001$ ). The average cost per patient associated with hospitalization, emergency room visits, physician visits and asthma medications decreased by 13%, 29%, 36% and 18%, respectively, after the intervention in the study group. There was a 9% reduction in the frequency of hospitalizations, a 27% reduction in emergency room usage, a 27% reduction in physician office visits and a 6% reduction in the number of prescriptions per patient for asthma medications after the intervention in the study group.

Researchers concluded that significant reductions in overall asthma treatment costs were observed after the implementation of the asthma education program.

### **110. Asthma and Your Family / El Asma y Su Familia**

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The American Lung Association of New Jersey implemented Asthma and Your Family/El Asma y Su Familia in 2002 to improve the health of Latino children (5-13 years) with asthma in New Jersey.

Asthma and Your Family/El Asma y Su Familia is a bilingual asthma education video for families who have children with asthma. The program is an excellent adjunct to medical care or health education programs, and is designed to work in conjunction with a physician or health care provider visit. The video is directed to the Latino population and includes up-to-date information on pathophysiology, triggers, environmental controls, medications and treatment/management. The video is used as a learning tool in physician's offices, pediatric clinics and schools.

An evaluation of the Asthma and Your Family/El Asma y Su Familia video in New Jersey demonstrated an improvement in self management skills for children and their families six months after viewing the video. Copies of the video are available from local offices of the American Lung Association.

### **111. Asthma Management in the School Setting**

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The Pediatric Asthma Coalition of New Jersey (PACNJ) developed the Asthma Management in the School Setting program as an educational course for school nurses statewide to provide an update on the state-of-the-art in asthma management based on the NHLBI guidelines. This course was

a response to an April 2001 statewide law concerning the self-administration of medication by pupils with asthma that required all school nurses to receive asthma education.

In September 2001, the four-hour program was conducted via satellite at 16 sites statewide. Topics included: asthma surveillance in NJ, basic facts of asthma, a stepwise approach to asthma management, psychological aspects of asthma, managing indoor asthma triggers, asthma management and NJ school policy, and equipment and delivery conducted a live demonstration of “gadgets and gizmos”, asthma medication delivery systems such as nebulizers and spacers. Participants faxed in questions for a live Q&A session. A light meal was provided, door prizes were offered, and participants received handouts and tools for use in their school, including the EPA Indoor Air Quality Tools for Schools kit.

400 school nurses attended the satellite broadcast. The program was evaluated via a pre and post test and a 12 month follow-up, which showed an increase in the number of student Asthma Action Plans on file at school as well as an increase in the percentage of schools implementing an indoor air quality improvement plan.

The satellite broadcast was taped and packaged as a video kit for widespread dissemination. School nurses can view the entire course on video independently or participate in a group session with a live respiratory therapist. Approximately 1000 school nurses have received the training as of June 2005, and it continues to be implemented statewide by request from schools.

## Domestic Programs: New Mexico

### **112. Improving Pediatric Asthma Patient Outcomes by Incorporation of Effective Interventions**

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*(contact information last updated September 2005)*

Asthma affects approximately five million children in the United States. This disease results in billions of dollars of expenditures for hospitalizations, emergency admissions, medications, equipment, and indirect costs such as lost work productivity. This article describes how children with asthma received in-depth evaluations and education, long-term control medications, and Air Watch monitoring to improve treatment adherence, asthma control, and asthma severity.

Study patients (n = 99) received patient care and education according to the protocols of the Pediatric Asthma Clinic, Lovelace Health Systems (Albuquerque, NM). An education nurse specialist provided an individualized educational plan and one-on-one instructions to each patient and family. Topics included normal lung anatomy, the asthma disease process, warning signs and symptoms of acute exacerbation, triggers, medications, equipment skills (including AirWatch peak expiratory flow monitor), and self management. Follow-up visits occurred at one, three and six months post to assess knowledge and skills, adherence to therapy, medications, and symptom control. Between visits the nurse called patients to proactively answer questions and resolve adherence difficulties.

Patients (n = 80) who participated in the study for six months demonstrated overall improved

adherence to prescribed medications and better control of asthma. Adherence to the AirWatch system decreased over time, most likely due to improvements in the way the patients felt.

In conclusion, treatment adherence, asthma control, and asthma severity can be improved with comprehensive patient education, long-term control medications, and objective home pulmonary function monitoring.

## Domestic Programs: New York

### 113. Asthma Quality Improvement Project

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In October 2000, the Office of Medicaid Management of the New York State Department of Health, in conjunction with its contractor the Island Peer Review Organization, launched an Asthma Quality Improvement project, which is in its fifth year of operation. The main objective of this project is to improve the quality of asthma care rendered to New York State Medicaid fee-for-service recipients. The project is based on the Chronic Care Model to promote improvement in patient care (children and adults).

A major goal of this project is to facilitate productive interactions between an informed, activated patient and their prepared, proactive health care team. The component of greatest emphasis is provider education and feedback using peer report cards. Educational sessions, led by an RN, PA and MD are conducted at the 15 participating practices (usually 1-2 sessions per practice). An Asthma Toolkit is used in the educational sessions that consist of guidelines, flowcharts, reminder and severity stickers, asthma severity templates, treatment algorithms, and teaching tools on what to say to patients regarding the disease, treatment and triggers. Patient asthma self-management educational materials are provided to practices, as well as updates on asthma care in adult and pediatric populations. Teleconferences on disease management were also conducted among all the practices and are available online for providers (statewide) to obtain continuing medical education credits.

Of particular interest, areas in New York State known to have high prevalence rates of asthma are targeted. Clinics within a large provider group or practice in these areas are sought out in hopes that the providers will collaborate and share with each other the information provided in the quality improvement project. All the practices are volunteer participants.

Thirteen out of the original 15 practices were included in the 2002-2003 evaluation. The project yielded positive outcomes in medication use (long-term anti-inflammatory controller use), change in clinical action, and self-management skills.

This project has been recognized locally and nationally for its innovativeness and ability to forge relationships between public health staff, providers and patients. The staff's commitment and vision contributed to the project's initial and ongoing success. The current project has been expanded to include 20 downstate clinics and 5 upstate clinic sites. The project has been enhanced to include: 1) onsite asthma disease management training to clinic/health center staff; 2) onsite

communication skills training; 3) office flow design and patient self-management training to staff; and 4) to assist with population of patient registries.

In conclusion, this project has been successful at achieving positive clinical outcomes and promoting overall health quality for Medicaid recipients known to have asthma.

#### **114. AIR: Asthma Is Relieved**

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The Asthma Is Relieved (AIR) program of Affinity Health Plan in New York was implemented in 2000 to identify plan members with asthma and improve their self-management skills through case management and home visits.

Once a member with asthma is identified they are contacted and a severity assessment is completed and the member is assigned an asthma case manager. The asthma case manager provides education to the member over the phone, and follows-up with the member periodically for three months for assessment. Members are also offered a home visit by a respiratory therapist who assesses the home environment for triggers. A second visit is provided for reassessment. Members keep an asthma diary and have an asthma action plan.

The health plan also offers education to its providers who serve the most members with asthma regarding NHLBI Guidelines, general asthma education, AIR program information, and medication prescription and use. Providers receive incentives for participation.

Program evaluation has indicated a positive impact on several health outcomes, including healthcare utilization, medication use, lung function, self-management skills, and use of an asthma action plan.

#### **115. Urban Health Plan Asthma Relief Street**

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*(contact information last updated September 2005)*

The Urban Health Plan Asthma Relief Street program in New York was implemented in 2001 to standardize asthma treatment and education services to ensure that all patients with asthma receive a full range of integrated services with a focus on applying evidence based guidelines while emphasizing patient self management. The program began as a performance improvement project and has developed into one of the organization's ongoing programs.

The asthma management program focuses on an integrated approach in working with patients, their families, providers, and community agencies. A strong health education component serves to highlight and reinforce self-management skills and goals. Strategic partnerships with

community agencies are fostered in order to integrate the organization's work with other agencies in the community.

Highlights of the program include adherence to evidence based clinical guidelines, asthma education curriculum, individual educational sessions, strategic community partnerships, Pedrito and Patty (Asthma Pump Mascots) learning materials, asthma management celebrations, and home environmental assessments.

The program has improved the following health outcomes: hospital utilization, emergency department visits, urgent care visits, school absences, work loss, symptoms, medication compliance, and self-management skills.

The program attributes success to the asthma team's enthusiasm and the senior leadership.

### **116. Superior Clinical Outcomes of Inner City Asthma Patients Treated in an Allergy Clinic**

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Asthma morbidity and mortality continue to increase especially in the inner cities despite medical advances in disease management. The objective of this study was to investigate the clinical outcomes of inner city asthma patients treated in an allergy and asthma clinic in Brooklyn, NY.

Phase 1 involved random review of medical records of 100 asthma patients treated in an allergy clinic for two consecutive years, assessing the frequency of hospitalizations, emergency room visits and asthma severity during three periods; one year prior to initial visit (year 0) and during the first (year one) and second (year two) years of intervention. Phase 2 involved administration of a quality of life survey to 23 patients volunteered from the allergy clinic (group I), and 21 patients volunteered from the emergency room (group II), treated by primary care or emergency room physicians during the previous year.

Study subjects attended clinic visits every 1-8weeks. During the clinic visits subjects received education and instruction on peak flow meter use and home monitoring, metered-dose inhaler and spacer proper use, medication dosages, environmental control measures, and immunotherapy when indicated.

The frequency of hospitalizations and emergency room visits significantly declined in compliers and non-compliers over time ( $P < .001$ ) with greatest declines during year one. Disease severity of all patients significantly declined over time ( $P < .001$ ); good compliers had significant improvement over poor compliers ( $P < .023$ ). Quality of life scores were significantly lower for both groups than for the general population; and although the scores were higher in the allergy clinic group than in the non-allergy clinic group, significant differences were achieved only in mental health and social functioning domains.

The authors concluded that patients treated in an allergy clinic demonstrate superior clinical outcomes.

## **117. Erie County Asthma Response Team (ART)**

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In 2002 the Erie County Asthma Response Team (ART) was initiated by the Erie County Department of Health in Erie, NY.

The goals of ART were to identify and ameliorate environmental triggers in homes of people with asthma; to reinforce and/or provide basic asthma education one-on-one to people with asthma in the comfort and privacy of their homes; to take a care coordination approach in the follow-up with people with asthma and their families to encourage continuing management/control of their disease; and to provide a conduit to community resources through a social service referral network.

ART participants were identified by a health care provider referral or through outreach. An Investigating Public Health Sanitarian completed a visual inspection of each home to identify environmental asthma triggers and design an individualized intervention to ameliorate or eliminate them, including direct remediation, working with landlords, and providing trigger control materials.

Following the physical intervention, an ART Asthma Educator delivered basic asthma education to the families. The education session was comprised of six modules, including a knowledge test and quality of life survey, a review of medications, inhaler technique, peak flow meter use, asthma management plan, and trigger identification/avoidance strategies.

Families were followed over the course of one year with follow-up visits at least every six months. As needed, referrals were made to various community agencies to address family needs.

Program evaluation to date demonstrated a positive impact on healthcare utilization, school absences, work loss, quality of life for parents, asthma severity and symptoms, and functional status. ART ended in October 2004.

## **118. Evaluation of a Family Asthma Program**

State University of NY  
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A family asthma program targeted for children 6-14 years and their family was initiated in 1977 in Buffalo, NY with the following objectives: (1) increase the participants' knowledge and understanding of asthma, its treatment, and its prognosis; (2) increase self management and coping skills; (3) decrease morbidity; and (4) encourage more responsibility for one's own health care.

This family asthma program consisted of a six-week, 12-hour program that reviewed the clinical features, pathophysiology, psychosocial aspects, prognosis, and treatment of asthma. Specific drug actions and interactions, behavior modification, self-management, and relaxation skills were discussed. Special attention was devoted to the recognition of early warning signs of

asthma, triggers, pretreatment, and what to do in the event of an acute attack. The children were involved in an activity program that included games, swimming, calisthenics, and relaxation training.

Total activities were increased ( $p < 0.001$ ), unscheduled (sick) health care visits were decreased ( $p < 0.005$ ), and school absences were decreased ( $p < 0.005$ ). Four variables did not reach statistical significance but did change in the expected direction: medication use, emergency treatments, hospital admissions, and school activities.

### **119. Helping Girls Breathe Easier: An Asthma Awareness Patch Program for Girl Scouts**

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The Asthma Coalition of Long Island in partnership with Girl Scouts of the USA has launched a national Girl Scouts bilingual patch program “Helping Girls Breathe Easier: An Asthma Awareness Patch Program for Girl Scouts.” Girl Scouts of all age levels will develop knowledge of asthma triggers, making healthy choices such as avoiding cigarette smoke and eating healthy foods and practicing relaxation techniques. By completing activities and earning the patch, girls can help create asthma awareness by reaching out to their community.

In 2002 the project began locally in Nassau and Suffolk Counties in New York and evaluation indicated that the program results in an increase in knowledge and improved self-management and healthy lifestyle choice skills. Three-thousand Girl Scouts have earned patches to date.

### **120. Impact of Concurrent Patient and Physician Education on Morbidity in Children Suffering from Asthma**

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www.nsasthmacoalition.org

The Asthma Coalition of Long Island implemented an asthma education program from 2001 to 2004 in Nassau and Suffolk Counties in New York. The main objective of the program was to assess the impact of concurrent education of parents and children as well as their pediatricians on reducing hospital admissions and emergency department (ED) visits in children suffering from asthma.

Practicing physicians were educated about early diagnosis of asthma, prevention, early intervention, and the latest advances in asthma management through several interactive discussions in the pediatricians’ offices by a team consisting of a pediatric pulmonologist/allergist and an

asthma specialist nurse practitioner (ASNP). Evaluation and education was provided for children and parents through interactive sessions, follow-up visits and monthly telephone contact.

In this project, pediatric practices with the highest morbidity from asthma were targeted, and the physicians were educated in an environment familiar to them. In combination with intensive education, evaluation and support of patients by an ASNP and pulmonologist/allergist, program developers hypothesized that the project would help to reduce the ED visits and hospital admission for children.

Five health maintenance organizations agreed to collaborate and ten large pediatric practices were chosen to participate in the study. From July 2001 to June 2002, eight educational visits were made to each practice by a team consisted of an asthma specialist MD and a ASNP. Sixty patients were recruited and received one one-hour session with the asthma specialist MD and one one-hour session with the ASNP. Monthly follow-up phone calls were made to the patients for continued education and assessment.

An evaluation showed that ED visits in the intervention group showed a marked reduction from 110 to 66 in the first year ( $p=0.023$ ) and 77 in the second year ( $p=0.024$ ). There was a significant reduction in hospital admissions from 62 to 28 in the first year ( $p=0.002$ ), and 27 in the second year ( $p=0.002$ ).

## **121. United Health Services Hospitals Asthma Coalition**

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The United Health Services Hospitals Asthma Coalition's pediatric asthma intervention was implemented in 1997 to improve the asthma severity and self-management skills of youth (8-11 years). The coalition provides a number of asthma activities that involve children, their parents, and healthcare providers.

The two main components are the Open Airways for Schools (OAS) program and disease management. OAS is implemented in 28 schools and provides asthma education to children 8-11 years with asthma at school. Disease management involves six telephonic sessions over a one year period. Asthma education is provided during the telephonic sessions. Materials are sent after each phone call covering the information that was already discussed. Topics include asthma physiology, medication use, equipment use, signs and symptoms of asthma, and triggers; content is based on the participants' needs).

The program also provides a home visit on referral from a provider at no charge to the patient. The home visit is provided by an RT to do an environmental assessment and education, and is followed by six phone calls from an RN asthma educator to continue education and provide support. The program also provides the CAP program, a pre school program developed by the American Lung Association, which is offered to day care providers and preschool teachers. Other program activities include an asthma resource center, educational sessions for parents/caregivers, and trainings for health care providers including a Pulmonary Teaching Day.

The program has improved the following health outcomes: emergency department visits, school absences, work loss, symptoms, medication use, functional status, use of an asthma action plan, and peak flow meter use.

### **122. Asthma Self-Regulation in Families**

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Asthma Self-Regulation in Families was developed by the Center for Urban Epidemiologic Studies of the New York Academy of Medicine. Researchers hypothesized that an educational intervention based on a readiness model would lead to improved health outcomes among patients with asthma. Within a randomized control design in an urban Latino and African-American community, researchers conducted an intensive three-month pediatric intervention.

A Family Coordinator provided patient education based on a readiness-to-learn model, and facilitated improved interactions between the patient and the doctor. Family education addressed the most based learning needs of patients with asthma by improving their perception of asthma symptom persistence using asthma diaries and peak flow measures.

The physician intervention focused clinicians' attention on patients' diary records and peak flow measures, and encouraged physicians to use stepped action plans. Patients were also tested for allergic sensitization and provided strategies to reduce contact with allergens and other asthma triggers.

The results showed significant improvements by intervention group families on measures of knowledge, health beliefs, self-efficacy, self-regulatory skill, and adherence; decreases in symptom persistence and activity restriction; and increased prescription of anti-inflammatory medication by the physicians of the intervention group families.

### **123. Creating a Medical Home for Asthma**

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In 1991, Columbia University implemented the "Creating a Medical Home for Asthma" project in New York City. The project trained staff of New York City Bureau of Child Health (BCH) pediatric clinics to provide continuing, preventive care for asthma among the low-income children they serve. Training was based on NAEPP guidelines and included screening to identify new cases and health education to improve family management. Training consisted of five 3-hour group in-service sessions over a five-month period, tutorial observations of Columbia physicians treating

asthma, and ongoing clinic support from a nurse-educator to resolve problems and continue staff education as needed. The intervention included strong administrative support by the BCH to promote staff behavior change.

The project was evaluated over a 2-year period in a controlled study of 22 BCH clinics. Control clinics were provided with current NAEPP guidelines but received no staff training. In both the first and second follow-up years, the intervention clinics had greater positive changes than control clinics on measures of access, continuity, and quality of care. The intervention substantially increased the BCH staff's ability to identify children with asthma, involve them in continuing care, and provide them with state-of-the-art care for asthma.

#### **124. Evaluating Home/Environmental and Clinical Interventions for Asthma in HRSA-Funded Community/Migrant Health Centers**

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Evaluating Home/Environmental and Clinical Interventions for Asthma in HRSA-funded Community/Migrant Health Centers(C/MHCs) was a randomized, controlled trial in pediatric patients of C/MHCs to test the feasibility and effectiveness of a combination of interventions that have been shown to reduce symptoms and improve outcomes in previous studies. The project was managed by Clinical Directors Network (CDN – [www.CDNetwork.org](http://www.CDNetwork.org) ), a non-profit practice-based research network of C/MHCs and clinical leaders.

Participants included 220 children, aged 6-19 years, who had mild persistent to severe asthma, documented use of beta-agonist and two or more visits to the C/MHC in the previous year. Thirteen C/MHCs and one managed care organization located in NY, NJ, MO, PA, Puerto Rico and the US Virgin Islands participated in the project. The project was funded by the Environmental Protection Agency – Radiation and Indoor Air Branch - Region II, HRSA Region II and NJ Department of Environmental Protection.

Prior to implementation of activities to children, clinicians were trained on the components of the program and its guidelines. Once providers were trained and patients were recruited and randomized, a trained outreach worker visited the patient's home and performed a visual trigger assessment. Allergen reduction recommendations were given based on the assessment. A product package was provided to the family, which included mattress and pillow covers, pest management products, and hypoallergenic laundering and cleaning products. An education session was provided regarding correct use of inhalers, asthma medications, asthma management plans, and physical activity. An RN administered telephone surveys every two weeks to patients and provided feedback to the patients' providers regarding emergency room visits, hospitalizations, change in medication, and other outcomes.

Evaluation results revealed significant improvements in the following health outcomes: hospitalizations, emergency department visits, unscheduled office visits, school absences, symptoms (asthma morbidity), change in medical treatment plan (providing an AAP), and self-

management skills. Increased behaviors aimed at reducing exposure to cockroach allergen and dust mites were also observed.

A more detailed summary of the results is available at:

[www.CDNetwork.org/PDFS/EPA%20Asthma%20.pdf](http://www.CDNetwork.org/PDFS/EPA%20Asthma%20.pdf)

Sustainable resources include free online materials: Online CME-accredited Courses in English & Spanish - [www.CDNetwork.org/webcast\\_library.htm](http://www.CDNetwork.org/webcast_library.htm)

Clinical decision-support tools - [www.eClinician.org/etools.htm](http://www.eClinician.org/etools.htm)

Patient education materials and patient self-management tools are available on a CD-rom at:

[www.CDNetwork.org/Asthma%20CD-ROM.htm](http://www.CDNetwork.org/Asthma%20CD-ROM.htm)

## **125. HCZAI: The Harlem Children's Zone Asthma Initiative**

Columbia University Harlem Hospital Center

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The Harlem Children's Zone Asthma Initiative (HCZAI) was established in 2001 to reduce asthma-related morbidity through improved surveillance, health-care use, and health-care service delivery for children aged 0-12 years living in a 60-block radius of Central Harlem known as the Harlem Children's Zone Project ([www.hcz.org](http://www.hcz.org)). HCZAI is managed by Columbia University-Harlem Hospital Center and is mainly supported by funding from a private foundation.

Potential participants are identified through a health screening of all children aged <12 years who live or attend school in the Harlem Children's Zone Project or participate in any Harlem Children's Zone, Inc., program. As part of HCZAI, a pediatric asthma team (including four community workers, a social worker, a nurse, and three physicians) offers medical, educational, environmental, social, and legal services to families of enrolled children via an individualized, home-based, comprehensive asthma intervention.

HCZAI community outreach workers from Harlem Hospital Center conduct comprehensive home visits. The initial home visit includes an assessment existing primary care and asthma medication use, a visual environmental trigger assessment, and asthma education. HCZAI provides free PFM, spacers, and asthma trigger control materials as needed. Follow-up home visits are conducted every 3-4 months and include a brief health outcomes survey, another environmental inspection, and continued asthma education as needed. The outreach workers also arrange for social or legal services as needed. After each home visit, a letter summarizing the content of the visit is mailed to the child's health care provider. Other activities include education of school and daycare personnel by a physician and nurse team. This team also works to ensure that schools have procedures in place so that students with asthma can receive necessary medications at school. HCZAI has also collaborated with the EPA to implement its IAQ Tools for Schools program and enact policy changes.

The HCZ Asthma Initiative seeks to improve day-to-day health, reduce school absenteeism, emergency room visits and asthma-related hospitalizations. As of 2004, program evaluation had indicated a significant impact on several health outcomes. HCZAI continues to enroll participants and complete follow-up evaluations.



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CHRONIC DISEASE

Putting People at the Center of Solutions

## **126. Little Sisters of the Assumption Family Health Services Asthma Program**

Little Sisters of the Assumption Family Health Services

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*(contact information last updated September 2005)*

Little Sisters of the Assumption Family Health Service's (LSAFHS) Asthma Program was piloted in December of 1997. The goal was to reduce the need for children to visit hospital emergency rooms or to be hospitalized due to asthma, and to reduce school absences due to asthma for school aged children.

LSAFHS hired a part-time community environmental worker who was teamed with a visiting nurse to provide the in-home intervention. Referrals were accepted from hospitals, clinics, other LSAFHS programs, schools, families, and friends. Children who were having difficulties with asthma management ranging from reported poor compliance with medical regimens to excessive number of hospitalizations were targeted.

Home nursing visits focused on teaching the children and family about asthma, the importance of following the prescribed treatment, healthy nutrition and how to manage an asthma emergency. The environmental worker conducted an assessment of the home looking for conditions that are known to trigger an allergic response and an asthma attack.

The 1997-2003 evaluation of program activities revealed a positive impact on hospital utilization and emergency room visits.

## **127. New York City Childhood Asthma Initiative**

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The New York City Childhood Asthma Initiative (NYCCAI), begun in 1997, is overseen by the New York City Department of Health and Mental Hygiene. It is a comprehensive effort intended to improve the management and treatment of childhood asthma through three strategies: the development of community partnerships to design an intervention plan to increase awareness of asthma and address system issues among community institutions; home-based education provided by community health workers to targeted families; and a medical provider education program. The target population consists of urban, low income, Hispanic/Latino and Black/African-American residents in New York.

The home based education component takes place over six months, with an average of 4 visits per home by a trained community health worker (CHW). The initial visit lasts 2 hours; subsequent visits last at least 1 hour. During visits, the CHWs educate clients on asthma management, review current asthma care, assist in obtaining primary care and assess and remediate in-home asthma triggers as necessary.

Evaluations to date of the home based education component of the program have indicated a positive impact on several health outcomes. The other components of the NYCCAI have not yet been evaluated. The program is ongoing.

### **128. Northern Manhattan Asthma Basics for Children**

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The Northern Manhattan Asthma Basics for Children program was begun by Columbia University Mailman School of Public Health in 2001 to serve low-income, Black/African-American and Hispanic/Latino children with asthma in New York, NY. The program aims to achieve better asthma management and a reduction in the burden of acute asthma for families in Northern Manhattan through system, community and individual level change.

Northern Manhattan Asthma Basics for Children (ABC) conducts trainings with early childhood educators on-site at schools, daycares and Head Start, homeless shelters, faith-based organizations and with families using tailored comprehensive ABC Handbooks. These handbooks offer basic asthma education and as appropriate, information on creating asthma action plans, communication with physicians, and a guide to conducting similar trainings within the organization. The program also offers a modified version of PACE to clinic staff and community physicians.

Through screenings, ABC has identified over 4000 children with asthma or asthma symptoms in the area. Program evaluation has demonstrated a positive impact on emergency room visits and symptoms. The program is ongoing.

### **129. Primary Instead of Emergency Care for Childhood Asthma**

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An asthma study, Primary Instead of Emergency Care for Childhood Asthma, was designed and implemented by Columbia University in New York City. The goal of the study was to evaluate the effectiveness of an educational intervention designed to improve the health status of inner-city children who make frequent emergency department visits and who rely mainly on episodic care for asthma.

142 children between the ages of 2 and 18 were randomly assigned to a treatment or control group. The control group received usual emergency department care without the intervention, whereas the experimental group received an intervention by a case manager/health educator.

The case manager/health educator worked with the families to help them maintain continuing care relationships with primary care providers, including attended medical appointments with the families, and following up to make sure the family understood and could follow the treatment plan provided by the physician. The case manager/health educator also provided asthma education to enhance self-management skills and conducted home visits to address environmental trigger

control and help resolve problems related to asthma management.

Families without primary care or who were dissatisfied with their primary care were offered medical care at low or no cost at an existing network of primary care clinics. Staff of these clinics were oriented to the study and also received training to review NHLBI treatment guidelines and strategies for fostering patient partnerships.

### **130. Asthma Care Coordination**

Regional Community Asthma Network (RCAN) of the Finger Lakes  
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The Regional Community Asthma Network of the Finger Lakes' Asthma Care Coordination program was implemented in 2000 to promote partnerships to reduce the social, medical and economic impact of asthma on children (5-14 years) in the Finger Lakes Region. Program goals include decreasing school absenteeism, emergency room visits, and hospital admissions; providing a forum for communication and collaboration for stakeholders in the asthma community to share and disseminate information; promoting professional and general public awareness and educational programs; developing a surveillance and data collection plan for an accurate assessment of asthma; and acting as a catalyst for change to facilitate improvement in asthma care and management.

The main components of the program is telephonic asthma care coordination and home visits. Once a child is referred to the program a nurse contacts the family for assessment. Four to six phone calls are made to educate the child and family and one last phone call is made for follow-up. Educational topics include triggers, medications, and the importance of seeing a primary care provider regularly. If a family is found to be in great need (poor control of asthma, have little resources or many triggers in the home, etc.) the family is referred to the environmental component of the program for a home visit and trigger assessment. There are approximately two home visits where the nurse conducts and assessment for triggers in the home. More education is provided and demonstrations are given to teach the family how to clean and mitigate triggers in the home. Follow-up phone calls are made to these families six to eight weeks after the home visits.

The program had a positive impact on the following health outcomes: hospital utilization, emergency department visits, school absences, quality of life for children, medication use, change in clinical actions, self-management skills, and use of an asthma action plan.

Program success is attributed to the nurses' dedication to the target population, and continued funding.

### **131. Monroe Plan and ViaHealth Partnership for Improving Asthma Care for Children**

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The Monroe Plan and ViaHealth Partnership: Improving Asthma Care for Children program began in 2001 in Rochester, NY and is still ongoing.

The goal of the program is to improve the identification and diagnosis of children with asthma within the Monroe Plan-ViaHealth population, help patients and their families better manage their disease, and through outreach, coordinate their care in primary care, specialty, and school settings. Patients served are Monroe Plan managed care enrollees with ViaHealth primary care physicians in ViaHealth's three Community Health Center pediatric practices and three School Based Health Centers.

Upon enrollment in the program, each patient receives a formal clinical evaluation, including pulmonary function tests, allergy skin testing, and asthma education. An Outreach Worker makes home visits to conduct visual trigger assessments and provide asthma education. Meanwhile, a Care Coordinator works to communicate with the primary care provider and specialists as well as the outreach worker and family to ensure the patient receives appropriate medical care and services. All program activities are tailored to individual patient needs. The program also includes a Clinical Quality Improvement component. Each practice has a quality team made up of MDs, RNs, and practice administrators that meets every other week and follows a formal CQI process to address clinical quality issues.

The ongoing evaluation on the program has shown a positive impact on several health outcomes over time and in comparison to patients within another local healthcare delivery system. In light of this success, the Monroe Plan is in the process of rolling the program out to all its sites throughout 13 counties in New York.

### **132. Case Management of the Asthmatic Child**

American Lung Association of Central New York  
Syracuse, NY

Since 2001, the Regional Asthma Coalition of the American Lung Association of central New York has conducted Case Management of the Asthmatic Child, a case management program for children with asthma age 3-13, as an integral part of their approach to increase quality of life for people with asthma.

Children are referred to the program by physicians, school nurses, or parents. After obtaining consent and completion of a brief parent questionnaire, this information is faxed to one of four contracted home health care companies. The home health care companies send an RN or RT to the child's home for a one hour visit that includes a home assessment and tailored asthma education. Topics addressed include medications, medical devices, triggers, and asthma self-management. Environmental control techniques are demonstrated and free materials are distributed.

A report is forwarded to the case management program coordinator, who then sends an informative letter to the child's physician along with forms for use during any subsequent office visit. The physician submits updated forms regarding medications, symptoms, treatment plan, and asthma action plan to the case manager on a regular basis. Ongoing follow up is provided through monthly telephone calls to the child and parent from the RN/RT as well as a repeat home visit every 3 months for one year and a final visit six months later.

A pre-post evaluation of the program based on responses from 74 children and their parents indicated a positive impact on hospital utilization, ED visits, urgent care visits, school absences, work loss, medication use, and the use of an asthma action plan.

The program is ongoing.

### **133. Healthy Neighborhoods Program**

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The Healthy Neighborhoods Program (HNP) began in New York State in 1985 with the initiation of block grants by the federal government. HNP is designed to provide preventive environmental health services to targeted geographic areas with a high rate of documented unmet environmental health needs which often result in adverse health outcomes for residents. The programs emphasize the adverse health outcomes of carbon monoxide poisoning and poor indoor air quality, childhood lead poisoning, burn injuries occurring in the home, and hospitalizations and emergency department visits due to asthma. The unique aspect of this program is the door to door home assessments, which enable personnel to identify and assess hazards, educate the residents about these hazards and provide products or actions that may control or eliminate the hazards all in the person's home environment.

The program target population groups, usually low-income people and often minorities, live in neighborhoods with a disproportionate number of environmental hazards. During field investigations, homes are inspected to identify problems or factors that will result in adverse health outcomes. Often issues arise that warrant referrals to community agencies and services to meet specific needs.

### **134. School-Based Asthma Partnership**

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In 1998, the Yonkers, New York school district and St. John's Riverside Hospital created a School Based Asthma Partnership to address the impact of asthma on the district's school children. The hospital and the school's Health Services office collaborated to implement a

process that allowed nurses to treat students experiencing asthma exacerbations on-site. The hospital attained funding and donated equipment for nebulized albuterol treatment to 55 Yonkers schools. The equipment was widely used and proved extremely effective in keeping children in school and out of emergency departments. This success brought subsequent funding from government, business and private foundations that enabled the program to grow. At the end of school year 2004-2005, the asthma program expanded to 249 schools from 40 school districts and a major preschool/day care organization with 28 centers in Westchester and Putnam counties.

Evaluations to date have shown that providing school nurses with the appropriate equipment and training, and the authorization from the physician to administer nebulizer treatments, can dramatically reduce the number of children sent from school due to asthma exacerbations. Partnerships between external institutions within the community, i.e. schools, hospitals, government, and the business and philanthropic communities, can effectively collaborate in confronting a major health care problem such as asthma to improve children's health and welfare.

## Domestic Programs: North Carolina

### **135. ICAS: Inner-City Asthma Study**

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The Inner-City Asthma Study was conducted by the Inner-City Asthma Study Group, a collaboration of several institutions and investigators including NIAID and NIEHS as well as several universities, medical schools, and medical centers nationwide. The study was implemented in seven US cities: Tucson, AZ, Chicago, IL, Boston, MA, Bronx, NY, New York, NY, Dallas, TX, and Seattle, WA.

937 children with atopic asthma, aged 5-11 years, from all seven cities were enrolled in a randomized, controlled trial of an environmental intervention that lasted one year and included education and remediation for exposure to both allergens and environmental tobacco smoke. Home environmental exposures were assessed every six months, and asthma-related complications were assessed every two months during the intervention and for one year after the intervention.

The study concluded that among inner-city children with atopic asthma, an individualized, home-based, comprehensive environmental intervention decreases exposure to indoor allergens, including cockroach and dust-mite allergens, resulting in reduced asthma-associated morbidity.

### **136. NCICAS: National Cooperative Inner-City Asthma Study**

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The National Cooperative Inner-City Asthma Study phase II intervention was a comprehensive, individualized, multifactor intervention implemented in 1991 and based on the NCICAS Phase I broad-based epidemiology study. The intervention was designed to reduce asthma symptoms

to improve the quality of life for inner-city children with asthma, age 5-11, in 8 Asthma Study Units (Baltimore, MD, Bronx, NY, Chicago, IL, Cleveland, OH, Detroit, MI, New York, NY, St. Louis, MO, and Washington, DC).

The intervention was family-focused and tailored to each family's individual asthma risk profile assessed at baseline. The intervention was delivered by Masters-level social workers, called Asthma Counselors (AC's). The AC's worked with the child's caretaker to encourage improved communication between the family and physician. Physicians were provided with materials to encourage quality asthma management. Caretakers were invited to attend two adult group asthma education sessions based on the A+ Asthma program. Two group sessions for children were also conducted. All families were given environmental trigger control materials and instructed on ways to reduce environmental triggers. After the group sessions, the AC's and families met in person and spoke on the phone at least every two months for follow up.

The intervention was successful in reducing asthma symptoms among the study population.

### **137. Partnership for Health Management (P4HM) Asthma Management Initiative**

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The Partnership for Health Management is a part of North Carolina's ACCESS II/III program. The goal of the program is to work with local providers to better manage the Medicaid population and ensure consistent quality, medically appropriate and cost-effective health care services. Its mission is to identify and minimize barriers to healthcare, to provide education and advocacy for the client, the family and the community, and to utilize cost containment measures.

The system is community-based and encourages the coordination of resources. The Partnership for Health Management utilizes case managers to 1) assist local medical providers to emphasize continuity of care; 2) provide case management for patients (transportation needs, adult and child services, health education and promotion); 3) match assessed needs to valuable services; and 4) increase patient compliance and communication between providers and patients. The case managers also conduct home visits to assess environmental conditions/exposures in the patient's home, as well as to demonstrate how to avoid exposure to triggers.

Program evaluation to date demonstrated a positive impact on healthcare utilization, asthma severity, medication use, and use of an asthma action plan. The program is ongoing.

### **138. Pediatric Asthma Services**

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Pitt County Memorial Hospital (PCMH) of North Carolina partnered with private, hospital, and ECU physicians as well as Pitt County Schools, the American Lung Association, other health care providers, and various community representatives to form Pediatric Asthma Steering Committee. After a successful twelve week pilot program, a comprehensive Pediatric Asthma Services program was developed in September 1996.

This program provides services that range from basic asthma education to intensive case management in an effort to maximize children's asthma management and assist with their continuity of care. Three case managers provide services for children with asthma throughout the continuum of care to include home, school, hospital and primary care provider visits.

Many advancements have been made in pediatric asthma management in Pitt County, including reductions in inpatient admissions, inpatient costs, 12 month inpatient recidivism rates, emergency department utilization, school absences for moderate asthmatics, and school absences for severe asthmatics.

### **139. Onslow County Pediatric Asthma Coalition**

Onslow Memorial Hospital  
Jacksonville, NC

The Onslow County Pediatric Asthma Coalition, managed by Onslow Memorial Hospital, was established in 2001 to enrich the quality of life for all children (0-17 years) with asthma and their families, linking community based resources in Onslow County, NC.

Services provided range from basic asthma education to intensive case management throughout the continuum of care to include home, school, hospital and physician office settings. Children are referred to the program through their physician or school nurse, or hospitalization due to asthma, or numerous emergency department visits. Services are provided from a healthcare provider and case manager.

The 2001-2003 health outcomes evaluation revealed that program participation improved hospital utilization, emergency department visits, symptoms, medication use, change in clinical action, functional status, and use of an asthma action plan.

### **140. Duplin County Asthma Coalition**

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The purpose of the Duplin General Hospital Pediatric Asthma Program (Kenansville, NC) is to educate and provide support services for children with asthma, their families, local school systems, physicians, and civic groups based on the National Asthma Education and Prevention Program Guidelines for Diagnosis and Management of Asthma.

The goal is to provide patient and families with tools, skills and information that empower them to control this disease. The objectives of the program are to decrease the need for emergency care and hospitalizations, to decrease school and childcare absences, and to improve the quality of life by allowing play and exercise without asthma symptoms.

The Pediatric Asthma Program educates children with asthma and their families about ways to control and prevent asthma episodes from occurring. The asthma case manager educates and follows up with patients in their homes, schools and childcare centers, hospital and physician offices. The program encourages a close partnership between patients and physicians. The asthma case manager works closely with physicians to develop an individual, written asthma action plan for each child.

The 2003 evaluation showed that participation in the program improved hospitalizations, emergency department visits, change in clinical action (provider behavior), and use of an asthma action plan.

### **141. The Asthma Course**

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The Asthma Course began in 1986 in the UK and has been offered in the US since 1997. Globally there are more than 14,000 graduates of the Asthma Course, including more than 600 US health professionals from a wide variety of roles and licensures. (The focus was on the US program only and how it is run to date).

The Asthma Course is an accredited training program offered by the National Respiratory Training Center (NRTC). The NRTC is an independent, 501(c)3 non-profit educational organization committed to improving the health of patients with respiratory and allergic disease by enhancing the knowledge and skills of the health professionals who care for them.

Successful Asthma Course students have demonstrated in-depth understanding of assessment, classification of severity, and management of asthma patients. Sound knowledge and essential practical skills enable them either to share or take responsibility for the care of asthma patients in the community.

The Asthma Course is a comprehensive, workbook-based, three- month course, supported by two in-person mid-course study days, and evaluated by oral and written examinations. During the first half of the course, students work through units covering asthma facts, history, physical examination, diagnosis and classification of severity, and medications and devices. During the second half of the course, students continue working with the course materials, concentrating on application to practice and clinical decision-making. The Asthma Course is held in many locations across the US.

The Asthma Course reported having a positive impact on “change in medical treatment plan.” This includes improved prescribing and treatment practices among the graduates of the course.

Participation in an educational intervention such as the Asthma Course has a positive effect on knowledge, attitudes, and practice.

#### **142. WE CAN: Wake Educators Controlling Asthma Now**

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WE CAN (Wake Educators Controlling Asthma Now) is a program developed by the Rex Lung Center in Raleigh, NC to help Wake County schools achieve the following five goals for school health set forth by the National Asthma Education Prevention Program: 1) Healthy school environment, 2) Health services in school, 3) Asthma education, 4) Supportive policies, and 5) Sound communication.

Twenty-four Wake County Schools have been identified as the initial target population for the program. WE CAN instructors, a respiratory therapist and a nurse, provide interested teachers, secretaries, and the eight school nurses that cover these 24 schools a one-hour training on asthma basics so that these staff members can support the program and its student participants.

WE CAN uses the Starbright “Quest for the Code” CD-ROM game, played both as part of a group and individually by each student with asthma. The game consists of seven sessions (one session per week) that address goals, signs and symptoms, identifying and removing asthma triggers, asthma myths, peak flow monitoring, medications, equipment, and several psychosocial situations (e.g., a parent smoking in the home).

Evaluation to date demonstrated a positive impact on healthcare utilization, school absences, quality of life for children, medication use, provider behavior, and self-management skills. The WE CAN program is ongoing.

#### **143. Asthma Self-Management Program (ASMP)**

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*(contact information last updated September 2005)*

The Asthma Self-Management Program (ASMP) for adults with asthma was developed with support from Glaxo Wellcome, Inc., in Research Triangle Park, NC. The program was evaluated in 1996.

Participants in a variety of health plans, clinics, and employer groups were invited to participate in the ASMP, an education program designed to improve self-management skills and daily functioning in individuals with asthma. The ASMP is an eight-week classroom program that provides information on the respiratory system, trigger avoidance, use of monitoring techniques and asthma medications. After program completion, graduates were contacted at scheduled

intervals to reinforce performance of behaviors that are important to asthma self-management and to collect outcomes data.

The two-year follow-up data showed that the ASMP had a positive impact on emergency department visits, unscheduled (sick) office visits, work loss, symptoms (such as sleep loss), and functional status.

## Domestic Programs: Ohio

### **144. Smoke-Free Family Pledge Project**

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The Smoke-Free Family Pledge Project was implemented in 2003 to impact children with respiratory illness, including asthma, by educating families on reducing their children's exposure to environmental tobacco smoke. There are two main components: family education sessions and provider education sessions.

At-risk respiratory pediatric patients who present in a clinic or as in-patients in the hospital are assessed by a nurse or the community health educator. The family is provided education on health effects of secondhand smoke, in addition to the nurse providing asthma education. Sessions occur in a group classroom setting or one-on-one at the bedside. Smoke-free pledge cards are signed and collected. Demographic and smoking habit information is collected from the family. Follow up calls are made at 2 and 4 weeks to check the progress of the pledge to provide a smoke-free home and car.

The goal of the provider education session is to help health care providers educate families about the health effects of second hand smoke. The community health educator conducts educational presentations with 50 providers per year to stress the importance of tobacco counseling with at-risk pediatric pts. Written smoke-free family materials, adult and youth smoking program information, and information on motivational interviewing techniques are provided.

Evaluation to date indicates that the program has improved children's quality of life and has reduced environmental tobacco smoke through changes made in caregiver/family behavior. The program is ongoing and affiliated with the Ohio Tobacco Use Prevention and Control Foundation.

### **145. QualChoice KNOW Asthma Program**

QualChoice  
Cleveland, OH

In 1999, QualChoice health plan of Cleveland, OH implemented the Knowledge and New Opportunities for Wellness (KNOW) asthma program, a comprehensive disease management program designed to help members with asthma gain the knowledge, skills, and support

necessary to feel and function their best every day. The program involves interventions directed at both the member and the practitioner, and is available to all QualChoice members who have asthma, regardless of a member's age. Annual participation rates of members who are offered enrollment in the program and opt to participate range from 95-99 percent.

The KNOW program formed an alliance with the Cleveland Municipal School System to identify children with asthma for enrollment in an asthma education program during school hours. Asthma education is provided to patients hospitalized with asthma and age-appropriate educational materials and newsletters are mailed to all members enrolled in the program. Ongoing education and asthma self-management support is provided through periodic nurse phone calls to the patient's home. An intervention that aims to improve medication compliance allows parents to order prescriptions for free home delivery. Interventions for practitioners include patient-specific treatment improvement suggestions supported by evidence-based clinical standards, as well as patient-specific updates.

As a result of this program, QualChoice members with a primary diagnosis of asthma (over 17000 identified to date) have seen reductions in emergency department visits and inpatient admissions, an increase in the number of patients on appropriate medications, and documented increases in primary care physician referrals to specialists for patients who had an inpatient or emergency visit. The program is ongoing.

#### **146. Measurement of Outcomes in Adults Receiving Pharmaceutical Care in a Comprehensive Asthma Outpatient Clinic**

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The authors of this study hypothesized that a pharmacist-provided comprehensive education program in conjunction with care provided by a pulmonologist would lead to improved economic, clinical, and humanistic outcomes in adults with asthma, compared with similar patients receiving care from a pulmonologist alone.

The pulmonologist evaluated the patient and then consulted with the pharmacist regarding interventions and education provided to the patient. The pharmacist introduced a self management plan and educated the patient about general information on asthma, medications, and triggers. The pharmacist conferred again with the pulmonologist regarding modification to original plan of care. There were at least two sessions during the 45-day study.

The experimental group reported receiving more information about asthma self-management ( $p=0.001$ ), were more likely to monitor peak flow readings ( $p=0.004$ ), and had increased satisfaction with care, and perceived higher quality of care. Both groups had reduced lost productivity, fewer emergency department visits, fewer hospitalizations, and fewer physician visits, as well as improvement in symptoms scores within 45 days. Both groups improved in all functional status domains except the mental component score of the SF-12. The results showed a positive impact on outcomes in adults with asthma who received pharmaceutical care.

## **147. Good Samaritan Hospital Adult Asthma and COPD Education Program**

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The Good Samaritan Hospital Adult Asthma and COPD Education Program was established in 1996 in Dayton, OH and serves adult patients with asthma.

The program offers a four-session program called “Living with Adult Asthma”, a four-hour adult asthma quick class, and one-on-one education sessions with an asthma educator. The program also offers asthma retreats twice a year. In customizing the program to meet patient needs, the quick class and one-on-one education have become the program’s cornerstones. An asthma educator provides education to adult patients about medication and equipment use, triggers, asthma pathophysiology and anatomy, and self-management skills.

Evaluations to date indicate that the program has had a positive impact on the following health outcomes: healthcare utilization, work loss, quality of life, and functional status.

## **Domestic Programs: Oregon**

### **148. Implementation of “Open Airways” as an Educational Intervention for Children with Asthma in an HMO**

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“Implementation of ‘Open Airways’ as an Educational Intervention for Children with Asthma in an HMO” was conducted by Kaiser Permanente in Portland, Oregon. This study describes the adaptation and implementation of an existing pediatric asthma-management educational program, Open Airways, for members of a large group practice health maintenance organization. The study was one arm of a larger study. The study was implemented from 1989-1992.

Seventy-four children ages 4-14 years and their families participated. The Open Airways program was modified to increase the emphasis on behavioral change and medication information and to reflect the different sociodemographic makeup of the population, compared with that for which the program was developed. Families attended six sessions covering a certain asthma topic at each session (i.e., self-management, triggers, medications). Parents and children attended separate sessions.

Evaluations after the classes suggested an increase in parental confidence in managing their child’s asthma and an earlier use of medications, and their child’s improved adherence to the medication regimen.

## Domestic Programs: Pennsylvania

### 149. The Asthma Club

Bethlehem Partnership for a Healthy Community/St. Luke's Hospital  
Bethlehem, PA

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*(contact information last updated September 2005)*

In 1996, the Bethlehem Partnership for A Healthy Community was formed, consisting of over 60 representatives from health-care, business, community, education and service organizations. This group collectively develops programs to accurately identify the most prevailing health care needs of residents and base program development and delivery of services on these needs.

The Asthma Club was implemented in four elementary schools within the Bethlehem Area School District (BASD). The program was offered to students in grades three through five and their parents. The Asthma Club includes the American Lung Association's Open Airways Program. Other activities include asthma education to the participating students and families on a monthly basis, monthly (Spanish/English) newsletters to the parents to update on lesson plans with periodic phone calls to the families to review teachings, communication with the primary care provider to discuss the child's asthma treatments and classification, and frequent communication and visits to school nurses, Family Center specialists and Project ASPIRE personnel to discuss each participating child's needs. In addition to the above, each family with a severely asthmatic child is offered an asthma home assessment.

The program also educates providers with the most up-to-date asthma information available. The program offers one-on-one sessions with the providers of the children participating in the program. Topics of discussion include adherence to the NIH Guidelines, medication use, and specific needs of the child. Other program interventions include asthma camp and various public awareness activities.

Program evaluation of The Asthma Club has indicated a positive impact on emergency room visits, medication use, and asthma action plan and peak flow meter use.

### 150. Asthma Safe Kids

National Nursing Centers Consortium

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In 2001 the National Nurses Centers Consortium began the Asthma Safe Kids (ASK) program in eight of its member nurse-managed health centers throughout the greater Philadelphia area. ASK serves low-income families of children with asthma aged 0-10 years.

Specially trained outreach workers visit families twice in their homes to conduct a visual environmental assessment, demonstrate how to clean, and offer recommendations to reduce asthma

triggers. Families also provide cleaning supplies and mattress and pillow covers. In addition, outreach workers discuss with families proper health care use and basic asthma education as needed. The second visit occurs 1-2 months after the initial assessment.

Program evaluation has revealed decreased hospital utilization and emergency room visits; increased trigger reduction activities (i.e., use of mattress/pillow covers); and improved parents' knowledge about asthma. The ASK program is ongoing.

### **151. CAPP: Community Asthma Prevention Program**

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The Community Asthma Prevention Program is a comprehensive self-sustaining community-based asthma prevention program that involves the partnership of The Children's Hospital of Philadelphia's CAPP, CSI Family Centers, and the Department of Earth and Environmental Sciences, with its included Institute of Environmental Studies. The program was initially implemented by the Children's Hospital of Philadelphia in September of 2001.

The specific aims of the program are to: 1) create a comprehensive asthma prevention program by combining home asthma education with home asthma trigger removal into one comprehensive asthma prevention program to be offered to members of CSI Family Centers and CHOP primary care families who live in West and Southwest Philadelphia, 2) evaluate 300 families enrolled into this comprehensive asthma prevention program over the course of four years for decreased hospitalizations, decreased emergency room visits, and improved quality of life, 3) increase asthma educational activities offered within the Family Centers, 4) train Parent Asthma Scholars to conduct asthma classes within the CSI Family Centers through the train-the-trainer model which has proven successful for CAPP

To demonstrate the effectiveness of the program, a convenience sample of 267 self-referred, primarily African-American parents or primary caregivers of asthmatic children aged 18 months to 16 years completed a 5-session education program. Program efficacy was evaluated at baseline, immediately post instruction, and at 3-, 6-, and 12-months retention. Outcomes included 3 questionnaires measuring asthma self-management knowledge, control and quality of life.

Immediately following program completion, participants demonstrated improvements in asthma knowledge, ability to control their child's asthma, and asthma quality of life. Retention of knowledge with steady improvement of control and quality of life was observed up to one year post instruction, as compared with immediate post program scores.

## **152. Comprehensive Asthma Program**

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The Comprehensive Asthma Program was begun in 1991 at the Hospital of the University of Pennsylvania in Philadelphia, PA.

A randomized trial of the program was conducted to determine if patients who are admitted to the hospital with acute asthma and receive inpatient education would have improved outpatient follow-up and clinical outcome measures compared with those receiving conventional care. 77 urban, minority patients between the ages of 18-45 were enrolled in the study.

Patients randomized to the Inpatient Educational Program received asthma education, bedside spirometry, a telephone call 24 hours after discharge, and scheduled follow-up in an outpatient asthma program within 1 week of discharge. Social workers also worked with the patients as needed to remove obstacles to care. Patients in the routine care group received conventional inpatient asthma care and routine follow-up.

Evaluation results indicated that an inpatient educational program in the treatment of indigent, inner-city patients hospitalized with asthma reduces the need for subsequent emergency care and improves patient follow-up in a cost-effective manner. The Comprehensive Asthma Program is ongoing.

## **Domestic Programs: South Carolina**

### **153. Carolina Asthma Surveillance and Emergency Department-Based Intervention**

University of South Carolina (USC) and Centers for Disease Control and Prevention (CDC)  
Columbia, SC

The Carolina Asthma Surveillance and Emergency Department-based Intervention project, managed under a cooperative agreement between the CDC and University of South Carolina, was implemented from 2002-2003 in seven counties from Columbia to Charlotte, SC.

The project aimed to develop an effective intervention to reduce preventable ED visits for asthma attacks among a target population that is rural, Southern, poor, and disproportionately African-American. The study took place in three EDs ranging from nationally recognized asthma research centers to small rural facilities. Children age 6-16 presenting to the participating EDs were invited to participate in the study.

Home visits were conducted which included face-to-face counseling regarding symptom management, trigger recognition, and appropriate medication use, as well as in-home training to teach self-monitoring and personal responsibility for care. An in-depth assessment of indoor and outdoor local environments was conducted to identify asthma triggers. Written educational materials and the Starbright asthma education CD-ROM were provided to all participants.

Along with the emergency department-based intervention, a major focus of the project was to develop a statewide asthma surveillance system and collect survey data to assess emotional and psychological co-morbidities for asthma.

Pre-post evaluation results on a sample of 51 participating children showed that the ED-based intervention resulted in a reduction in ED visits and an improvement in quality of life for both children and parents.

#### **154. Project Breathe Easy**

Family Connection of SC, Inc.  
Columbia, SC  
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Project Breathe Easy is an asthma education program developed by Family Connection of South Carolina, Inc in 1997. Project Breathe Easy targets parents of children with asthma in Columbia, Charleston, Florence, Greenville, and surrounding areas. The primary goal of the program is to provide parent-to-parent support around the child's asthma to empower the parent to be the child's best advocate.

Parents of children with asthma are hired to act as Community Parents, both a peer and role model for the parents they support. Community Parents are trained to make successful home visits and telephone contacts. These visits provide the opportunity to offer emotional support and assurance- unique in parent-to-parent relationships to discuss the needs of the parent concerning the child and to provide basic educational information on asthma.

Each family who participates in Project Breathe Easy receives individualized emotional support and assurance from another parent, asthma education information through a notebook on asthma management, allergy proof mattress and pillow encasements for each child with asthma, and ongoing resource information on asthma management.

The September 2003 - October 2004 evaluation showed that the program had a positive impact on hospital utilization; emergency room visits and urgent care visits (combined); school absences; work loss; functional status; self-management skills; and use of an asthma action plan.

#### **155. Chronic Care Model of Care/Improvement**

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CareSouth Carolina, Inc.'s Chronic Care Model of Care/Improvement's asthma program was implemented in 2001 to improve the health of members with asthma.

Members with asthma are identified and contacted by a Care Manager. The Care Manager with other health providers provide education in individual and group sessions. Topics include general asthma education, medication and peak flow meter use, triggers, and self-management skills. If

the member is not improving then he/she is referred to a social worker and receives a home visit.

Evaluations to date indicate that the program has had a positive impact on several health outcomes, including healthcare utilization, school absences, work loss, symptoms, medication use, lung function, self-management skills, and use of an asthma action plan. The program is ongoing.

## Domestic Programs: Tennessee

### **156. Comprehensive Long-Term Management Program for Asthma**

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“Comprehensive Long-Term Management Program for Asthma” was conducted in Memphis, TN by the University of Tennessee Health Science Center from 1992-1996. The goal of the study was to determine if a comprehensive long-term management program, emphasizing inhaled corticosteroids and patient education, would improve outcomes in adult African-American asthmatics.

The study was a nonrandomized controlled trial with a 2-year intervention performed in a university-based clinic. Intervention patients were volunteers, and a comparable control group was identified via chart review at hospitals. The intervention consisted of individualized pharmacological therapies and detailed individual asthma education. Environmental control, peak flow monitoring, and a partnership with the patient were emphasized. Control patients received usual care from physicians.

ED visits and hospitalizations for 2 years before and 2 years during the intervention period were compared. QOL measurements were made at baseline and every 6 months in the intervention group.

The study concluded that a comprehensive long-term management program emphasizing inhaled corticosteroids combined with other state-of-the-art management, including intensive patient education, improves outcomes in adult African-American asthmatics.

## Domestic Programs: Texas

### **157. A Randomized Study of the Management of School-Aged Children with Asthma Treated at Home and in a Large Urban School District**

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“A Randomized Study of the Management of School-Aged Children with Asthma Treated at Home and in a Large Urban School District” was a collaborative study that targeted 3500 fourth, fifth and sixth grade students within 19 Dallas Independent School District elementary schools. These schools represented a predominantly lower socioeconomic Hispanic and African-American urban population.

The objective was to maximize educational opportunities for students with asthma through effective asthma management strategies.

Children were screened for asthma using a Respiratory Questionnaire and the standard Health History form used by the district. School nurses facilitated the process by sending forms home for parent completion within a week. Collaborating with Baylor Asthma and Pulmonary Rehabilitation Center, parents of the children who screened positive for asthma were asked for permission to establish a definitive diagnosis using an Exercise Challenge Test that evaluated FEV1 and Peak Flow values before a 10 minute run/jog. The parents of the students diagnosed with asthma were then invited to a series of after school meetings to discuss enrollment into 1 of 4 randomized treatment arms. Asthma education followed using the American Lung Association’s “Open Airways” curriculum with the students diagnosed with asthma and their families. Children were followed for five months and the school nurse collected data once monthly for the five months.

Of the 157 students who tested positive for asthma, 83 enrolled in the study. The outcome that reached significance was school absences. The program noted the rate of absenteeism to be the same for the student with asthma as compared to the student without asthma.

The study ended in 2003, but the program activities continue in the school district.

### **158. Asthma Management Program of Presbyterian Hospital of Dallas**

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The Asthma Management Program (AMP) at Presbyterian Hospital of Dallas was opened in November of 1997. The program works in concert with the asthma patient’s primary care physician to compliment and supplement the education and monitoring of the patient. Three full-time respiratory therapists staff the program to provide 24/7 availability. The program targets children and adult with asthma.

Patients are typically referred through the emergency department, primary care physicians, and local schools involved in the outreach component of the program. At the initial visit the patient experiences an intensive one-on-one education specific to the patient’s needs including definition of asthma, triggers and symptoms, asthma action plan, and use of medications, supplies and equipment. There is a two-week follow-up visit and then as needed visits based upon severity, need for medications and/or learning reinforcement. Most patients choose to continue to follow-up with the program for continued/ongoing support.

The 2000 evaluation resulted in improved hospital utilization, emergency department visits, unscheduled (sick) office visits, school absences, and work loss.

### **159. Camp Airways**

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Camp Airways is a free one-day asthma camp offered to children with asthma age 8-12 years old by the Baylor Martha Foster Lung Care Center in Dallas, TX.

The camp is offered on six camp days throughout the year, from 7:30am to 4:00 pm and can serve up to 45 children per day. The camp is staffed mainly by RNs and RTs who are respiratory care specialists at the hospital.

During a typical camp day, children register upon arrival with their parents/caregivers, who receive a brief asthma education session before they leave. Staff measure each child's height and do a PFM assessment, following up as needed if the child needs medication or medical attention. Each child receives a free peak flow meter, symptom diary, aero chamber, camp t-shirt, and colored vision. Children are divided into 4 color-coded "teams" for camp activities and each team is assigned to an RN/RT "captain".

First, children learn how to use the PFM and symptom diary. They use these tools throughout the day to monitor and record symptoms and engage in ongoing discussion of this self-management process. Children participate in 4 rotating asthma education sessions covering triggers and environmental control, the "rule of 2", how to use asthma medication, and signs and symptoms of asthma. They take a field trip to a sports facility and are exposed to various sports and encouraged to be physically active. After lunch, they participate in various games to reinforce and check their asthma knowledge, and have an opportunity for more sports and physical activity. The camp day ends with a graduation ceremony.

Pre-post evaluations show that the program has had a positive impact on self-management skills as well as the medications and/or treatment plans in effect for participating children. The camp has been offered since 1998 and is ongoing through the support of various donors.

### **160. The Asthma Management Program**

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Children's Medical Center of Dallas developed and implemented a comprehensive outpatient Asthma Management Program in 2001. The program was designed to support the physician-

patient relationship and plan of care through an orchestrated program including environmental assessment and intervention, patient and family education, and ongoing family contact and educational reinforcement. The goal of the program is for the patient to achieve a significant reduction in symptoms and exacerbations through proactive self-management. Patients were identified by community physician and insurance provider referrals, as well as internal utilization reports. Eligibility criteria include residence in a six county radius, ages 0-17, and diagnosis of asthma. An evaluation of the program showed that asthma-related ER visits significantly declined from pre-enrollment through the course of enrollment. Other program evaluations have shown that the program reduced the number of missed school or day care days, asthma-related inpatient admissions, unscheduled PCP visits related to asthma, days of caregiver missed work due to patient's asthma, and has increased quality of life for the patient after program entry.

The Children's Medical Center Asthma Management Program has been awarded certification by the Joint Commission of Healthcare Accreditation in Disease Specific Care for the pediatric asthma initiative. This program is the third in the nation to receive this designation, and the first in the state of Texas.

### **161. Camp RAD**

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Camp RAD (Reactive Airway Disease) is a one-week day camp developed at the University of Texas Medical Branch at Galveston, in response to high rates of hospital admission for children with asthma. The purpose of the camp is to provide opportunities for school age children with asthma to learn asthma management skills. The camp setting combines fun filled interactive learning with opportunities to apply asthma management concepts in normal daily activities. Creative strategies are used to engage parents in asthma education and measurement of program outcomes is a critical component of the program.

Camp RAD has documented consistently stable and significant outcomes since its inception in 1994. Outcomes include: significant reductions in emergency room visits and missed school days, decreased hospitalization rates, asthma symptoms, increased self-management skills, child asthma knowledge and self-efficacy, and increased parent and child satisfaction. The Fraternal Order of Eagles has funded a project to animate the Camp RAD asthma curriculum for distribution in CD or DVD format to health professionals in the State of Texas. This project is currently in progress.

### **162. Watch, Discover, Think and Act (WDTA): Computer-assisted asthma self-management education**

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Watch, Discover, Think, and Act is an interactive multimedia computer game to enhance self-management skills and thereby improve asthma outcomes in inner-city children. An evaluation was conducted at pediatric clinics in Houston, TX by researchers from the Center for Health Promotion Research and Development at the University of Texas Health Science Center, Texas Children's Hospital, and the University of Houston.

Subjects age 6-17 were recruited from four pediatric practices and randomly assigned to the computer intervention condition or the usual-care comparison. The main character in the game could match the subject on gender and ethnicity. Characteristics of the protagonist's asthma were tailored to be like those of the subject. Subjects played on the computer game as part of regular asthma visits.

Time between pre- and post-test varied from 4 to 16 months (mean 7.6 months). Analysis of covariance, with pre-test scores, age, and asthma severity as covariates, found that the intervention was associated with fewer hospitalizations, better symptoms scores, increased functional status, greater knowledge of asthma management, and better child self-management behavior for those in the intervention condition.

### **163. A Randomized, Controlled Study to Evaluate the Role of an In-Home Asthma Disease Management Program Provided by Respiratory Therapists in Improving Outcomes and Reducing Cost of Care**

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*(contact information last updated September 2005)*

Researchers at the University of Texas Health Science Center at San Antonio conducted a study from 1999 to 2004 titled "A Randomized, Controlled Study to Evaluate the Role of an In-Home Asthma Disease Management Program Provided by Respiratory Therapists in Improving Outcomes and Reducing Cost of Care." The primary objective of this study was to determine if an in-home asthma disease management program provided by respiratory therapists (RT) could improve patient outcomes and reduce the cost of care when compared to home care provided by nurses (RN) or standard care provided in the physician's office.

Eligible patients, 18-64 years who received ED or inpatient treatment for an asthma exacerbation, were randomized upon discharge to a standard care group, a group receiving post-discharge home health visits from RNs, or a respiratory care asthma disease management intervention program group receiving post-discharge home visits from RTs. The three groups were followed prospectively in a blinded fashion for six months.

Positive outcomes were as follows: emergency department visits, physician office visits (sick/unscheduled), quality of life, and symptoms.

## Domestic Programs: Utah

### **164. Asthma Care Management System**

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The Asthma Care Management System was implemented in 2000 by the IHC Health Plans as part of Intermountain Health Care's integrated delivery system clinical quality improvement initiative, located in Salt Lake City, Utah. The program aims to improve clinical and service quality outcomes while reducing overall costs of asthma care by providing physicians with tools to track the progress of patients with asthma and providing patients with asthma education.

Patients identified through claims data are offered 3 weekly education sessions, or individual one-on-one sessions, taught by a certified asthma educator which take place in the hospital setting. They are educated using NHBLI guidelines on trigger identification and avoidance and use of their Asthma Action Plan.

Physicians that participate in the IHC Health Plans take part in Clinical Learning Days in which they learn how to use an asthma registry of their patients, decipher performance reports, and get updates on the asthma care model website. The website offers resources on asthma management for clinicians and is self-directed. Through the asthma registry, IHC Health Plans tracks medication use, prescription refills, pulmonary function test and ER visits by patients. Physicians receive performance monitoring reports that provide feedback regarding controller usage, ER and inpatient use rates and high beta-agonist usage, as well as data for personal comparisons with clinic, region and IHC system data.

A financial incentive program encourages physicians to achieve at least an 80% controller prescription rate as tracked through the asthma registry. The program attributes its success to the availability of the data and being able to provide it as feedback to physicians.

## Domestic Programs: Vermont

### **165. Rutland Regional Medical Center Asthma Clinic**

Rutland Regional Medical Center  
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The Rutland Regional Medical Center Asthma Clinic was established in 2002 to improve the health of children with asthma age 2-15 years in Rutland, VT.

Asthma patients are referred to the clinic by the primary care physician. An asthma care plan is developed by the clinic's respiratory therapists with the primary care physician's agreement and signature. This care plan is then communicated to the area school nurses via the state of Vermont's Asthma Action Plan form.

The main component of the program includes patient education sessions. Patients meet with a respiratory therapist for a one-on-one education session and physical examination. Various teaching tools such as videos, web site tools, and a CD-ROM game are used to maintain interest and obtain the best response from the participants. Follow-up is done at one month, six months to one year, and then two years to review educational topics and assess retention and understanding. Patients use a daily diary to record symptoms and peak flow readings.

Evaluation results to date indicate that the program has had a positive impact on the following health outcomes: emergency department visits, office visits, school absences, work loss, medication use, and use of an asthma action plan.

## Domestic Programs: Virginia

### **166. Asthma Outcomes at an Inner-City School-Based Health Center**

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The University of Minnesota conducted a study entitled Asthma Outcomes at an Inner-City School-Based Health Center from 1996 to 1999. This study measured asthma outcomes after initiation of an inner-city elementary school health center with a school wide focus on asthma detection and treatment. The site was an inner-city elementary school in Minneapolis, MN.

The study design incorporated a pre and post comparison with a longitudinal cohort of children (n=67) and a cross-sectional cohort of children before (n=156) and after (n=114) the intervention. Hospitalization rates for asthma decreased 75% to 80% over the study period. Outpatient visits for care in the absence of asthma symptoms doubled ( $p < .01$ ), and the percentage of students seeing a specialist for asthma increased. Use of peak flow meters, use of asthma care plans, and use of inhalers also improved. While no change occurred in school absenteeism, parents reported that their children had less awakening with asthma and that asthma was less disruptive to family plans.

This school wide intervention that included identification of children with asthma, education, family support, and clinical care using an elementary school health center was effective in improving asthma outcomes for children.

### **167. Dust Mite Allergen Avoidance in the Treatment of Hospitalized Children with Asthma**

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The objective of this study was to evaluate the practicality and effects of dust mite (*D. farinae* and *D. pteronyssinus*) allergen avoidance in homes of children hospitalized with acute asthma in Atlanta, GA.

Children 5 to 18 years of age who were admitted with asthma to a suburban Atlanta hospital were randomly assigned, without knowledge of allergen sensitization or exposure in their houses, to active (n = 13) or placebo (n = 10) treatment group. Active treatment included encasing the mattress, box springs, and pillows in allergen impermeable covers; weekly hot water washing of bed linens; replacement of bedroom carpet with polished flooring; and 3% tannic acid spray to living room carpet. Placebo treatment included permeable encasings for bedding, cold water wash, and water spray for carpet. Dust samples were analyzed for dust mite, cockroach, and cat allergens, while serum samples were analyzed for IgE antibodies to the same allergens. Outcome measures included daily peak expiratory flow rates, spirometry, methacholine inhalation challenge, and hospital readmission.

Children in both groups were similar by demographics, sensitization, and exposure to dust mite allergen. Allergen levels fell > 3-fold in many active and placebo homes. Children in the active group had improved PEFR at three- and six-months after intervention ( $P < .04$ ,  $P < .05$ , respectively). Six of seven children in the study who were sensitized and exposed to dust mite allergen demonstrated improved PEFR at three-months when allergen levels fell in both bedding and bedroom floor. There was no difference in FEV1 or methacholine challenge, although few children in either group could tolerate methacholine because of bronchial hyper reactivity. Six children (four active and two placebo) were readmitted to hospital during the study.

Increases in PEFR were recorded among children in the active treatment group and also among sensitized patients whose dust mite allergens fell. These results support the hypothesis that avoidance can be effective even among children admitted to hospital.

### **168. Home Intervention in the Treatment of Asthma Among Inner-City Children**

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The study, “A home intervention in the treatment of asthma among inner-city children”, was done in the Northwest Grady Clinic in Atlanta, GA to investigate whether implementing low-cost measures for indoor allergen avoidance could reduce the number of acute care visits for asthma.

Physicians visited the homes of children with asthma at enrollment, three, eight and 12 months. During the sessions, trigger reduction education was given to families as well as mattress and pillow covers, cockroach traps and peak flow monitoring materials. Dust samples were also taken from the bed, bedroom floor, kitchen and living room.

After one year there was a significant impact on reducing acute care visits and reduced levels of cockroach allergen in treatment homes.

### **169. Pediatric Asthma Quality Improvement Team**

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Since 1998, the Pediatric Asthma Quality Improvement Team of the Inova Fairfax Hospital for Children in Falls Church, VA has promoted a comprehensive, evidence-based approach to the management of asthma for children aged 2-17.

To address the continuum of care and to emphasize disease education and self-management, the team uses the pediatric asthma disease management framework which includes identification of patients at risk, use of evidence-based practice guidelines and pathways, patient/family disease education, and monitoring and reporting of measurable outcomes. The project actively participates in other asthma programs which partner with healthcare members, outpatient providers, and the community.

The program and the evaluation of its impact on health outcomes is ongoing. Results to date indicate a positive impact on healthcare utilization, medication use, and self-management skills.

### **170. Camp Wheeze-B-Gone: Outcomes Analysis of a Summer Asthma Camp**

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Forty children with moderate to severe asthma between the ages of eight and 13 years participated in Camp Wheeze-B-Gone in 1994, sponsored by Children's Hospital of the King's Daughters in Norfolk, VA.

The week-long camp included educational, athletic, and social activities. Campers participated in instructive teaching sessions in the form of scavenger hunts and didactic sessions with peer interaction for an average of four-hours a day. The curriculum included discussion of asthma triggers, early warning signs, medication usage and side effects, peak flow meter and metered-dose inhaler techniques, and personal action plans. Campers were expected to participate in athletic activities to the best of their ability, including swimming, hiking, canoeing, basketball, and "asthma olympics".

Changes in peak flow meter and metered-dose inhaler technique, health care utilization, and school absenteeism were evaluated in a pre-/post- study design, and a statistically significant improvement was seen across all outcomes. Emergency room visits decreased by 59%, hospitalizations decreased by 83%, and school absenteeism decreased from 266 to 188 days.

### **171. Improved Outcomes for Hospitalized Asthmatic Children Using a Clinical Pathway**

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Eastern Virginia Medical School sponsored the Improved Outcomes for Hospitalized Asthmatic Children Using a Clinical Pathway intervention. The purpose was to evaluate the effect of an inpatient asthma clinical pathway on cost and quality of care for children with asthma

One hundred forty-nine children were treated for status asthmaticus using an asthma clinical pathway in a children's hospital between September and December 1997. Thirty-four of 149 children treated with the clinical pathway were randomly selected. A retrospective cohort control group of non-pathway patients (N=34) was matched with each pathway patient by age, race, gender, co-morbidities, asthma severity score, ICU admission, and time of year admitted. Differences between the two groups in length of stay, total costs, readmission rate, inpatient management, and discharge medications were compared.

Length of stay was significantly lower in the clinical pathway group compared with the control group (36 hours versus 71 hours,  $P < .001$ ) and total costs decreased significantly (\$1685 versus \$2829,  $P < .001$ ) as a result of the pathway. Asthmatic children on the clinical pathway were significantly more likely than the control group to complete asthma teaching while hospitalized (65% versus 18%,  $P < .001$ ), to be discharged with a prescription for a controller medication (88% versus 53%,  $P < .01$ ), and to have a peak flow meter (57% versus 23%,  $P < .05$ ) and a spacer device (100% versus 71%,  $P < .001$ ) for home use.

Implementation of this inpatient clinical pathway led to a decrease in length of stay and a reduction in total cost while improving quality of care for hospitalized asthmatic children.

### **172. Outcomes Evaluation of a Comprehensive Intervention Program for Asthmatic Children Enrolled in Medicaid**

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Researchers at Eastern Virginia Medical School conducted an outcomes evaluation of a comprehensive intervention program for asthmatic children enrolled in Medicaid. The objective of the study was to evaluate health care and financial outcomes in a population of Medicaid-insured asthmatic children after a comprehensive asthma intervention program.

Eighty children, 2 to 16 years old, with a history of frequent use of emergent health care services for asthma participated. Children in the intervention group received asthma education and medical treatment in the setting of a tertiary care pediatric allergy clinic. An asthma outreach nurse maintained monthly contact with the families enrolled in the intervention group.

Baseline demographics did not differ significantly between the two groups. In the year before the study, there were no significant differences between intervention and control children in ED visits, hospitalizations, or health care charges. During the study year, ED visits decreased to a mean of 1.7 per patient in the intervention group and 2.4 in controls, while hospitalizations decreased to a mean of .2 per patient in the intervention group and .5 in the controls. Average asthma health care charges decreased by \$721/child/year in the intervention group and by \$178/patient/year in the control group.

### **173. Sentara's Asthma Disease Management Program: Utilizing "Life Coaches" for Children with Asthma**

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*(contact information last updated September 2005)*

Sentara Health Management implemented an asthma disease management program beginning in 1997 in the Hampton Roads region of Virginia.

The program objective was to help children achieve and maintain control of asthma-related symptoms and to reduce resource use and associated costs. The program used "life coaches" and home-based strategies to assess, teach, and monitor asthma self-management by children and their caregivers. Life coaches were registered nurses who were certified in asthma disease management and knowledgeable about community and family resources.

The goal of asthma education was to increase compliance with use of appropriate asthma medications and to encourage children and their caregivers to make comprehensive behavior and lifestyle changes. Life coaches made home visits and conducted routine monthly telephone calls to monitor the children and to provide early intervention as needed to prevent complications. Both the child and the caregiver were trained to use the Asthma Program Treatment Plan, including when to call the life coach when symptoms intensified or current treatment did not work. Life coaches were available 24 hours a day, seven days a week, to intervene and assist the child. Children were followed for one year or until self-management was achieved.

Program evaluation using a sample of 294 participating children showed a positive impact on medication use, hospitalizations, and emergency visits.

### **Domestic Programs: Washington**

#### **174. A Multisite Randomized Trial of the Effects of Physician Education and Organizational Change in Chronic-Asthma Care**

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The Pediatric Asthma Care Patient Outcomes Research Team II evaluated two asthma care strategies: a peer leader-based physician behavior change intervention (PLE) and a practice-based redesign called the planned asthma care intervention (PACI). The interventions were intended to improve the care provided to children with asthma and their health outcomes.

This was a three-arm, cluster randomized trial conducted in 42 primary care practices in the Seattle, Chicago, and eastern Massachusetts regions. A total of 638 children age 3-17 years with mild to moderate persistent asthma were followed for two years. Practices were randomized to PLE, PACI, or usual care.

The Peer Leader Education intervention consisted of training one physician per practice in asthma guidelines and peer teaching methods. Planned care combined the peer leader program with nurse-mediated organizational change through planned visits with assessments, care planning, and self-management support, in collaboration with physicians.

Analyses compared each intervention with usual care. There was a positive impact on symptom days, medication use, and functional status. The study authors concluded that planned care (nurse-mediated organizational change plus peer leader education) is an effective model for improving asthma care in the primary care setting.

### **175. House Dust Mite Avoidance for Children with Asthma in Homes of Low-Income Families**

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“House Dust Mite Avoidance for Children with Asthma in Homes of Low-Income Families” was conducted in Seattle, WA, in 1995 by A.S.T.H.M.A., Inc., a non-profit clinical research organization. The purpose of the study was to determine whether specific house dust mite control measures could reduce exposure levels and asthma severity among children aged 6-16 from low-income inner city homes.

This double-blinded, randomized trial compared asthma progression over one year in children with asthma whose homes received standard environmental control intervention with those whose homes received aggressive intervention for dust mite elimination.

The standard intervention included general discussion of trigger control methods, vacuuming of pillows and mattresses, and the application of tannic acid placebo to the child’s bedroom carpet. The aggressive intervention included distribution of mattress, boxspring, and pillow covers, laundry service delivery of clean bed linens, application of tannic acid to bedroom and living room carpets, and instruction to dust and vacuum weekly and avoid clutter.

The study concluded that the aggressive dust mite intervention decreased dust mite levels and improved bronchial hyper responsiveness. (Supported by National Institute of Allergy and Infectious Diseases grant #1 UO1 AI34578-01, AI/ES-34607, AI-20565)

### **176. Indian Health Service Portland Area Childhood Asthma Quality Improvement Project**

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Funded by the NIH/NIAID minority grant supplement in 1998, the Indian Health Service Portland Area Childhood Asthma Quality Improvement Project was a collaborative effort with

the National Initiative for Children's Healthcare Quality. In 1999 the program recruited nine American Indian/Alaskan Native practices interested in improving asthma care.

The program included four learning sessions approximately six months apart. The learning sessions focused on training providers and giving them the tools needed to improve current asthma clinical care. After each learning session the providers were expected to go back to their practices and make the changes learned in the session. During the time between sessions program staff provided support through conference calls, e-mails, mailings and site visits.

The program evaluation yielded positive change in the way clinical care was provided (i.e., increased use of severity assessments, appropriate medication prescriptions, management plan use and assessment).

The program ended in 2001, but as evidenced by anecdotal reports many of the practices continue to implement the processes learned in the trainings and use the tools provided during the program.

### **177. Seattle-King County Healthy Homes I**

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The Seattle-King County Healthy Homes Project I, implemented in 1997, was a randomized controlled trial of a community health worker intervention to decrease exposure to indoor asthma triggers.

Community health workers provided in-home environmental assessments, an action plan based on the assessment, education, support for behavior change, and resources. Families received additional visits to encourage completion of the action plan and provide continued support and education. Participants were assigned to either a high-intensity group, receiving seven home visits and a full set of resources; or a low-intensity group, receiving a single home visit and limited resources.

The study population consisted of 274 low-income households with a child aged 4-12 years who had asthma. The study population was followed for one year. Evaluation results indicated that community health workers reduced asthma symptom days and urgent health services use while improving caregiver quality-of-life scores. Improvement was greater with the higher-intensity intervention.

### **178. The Asthma Outreach Project**

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Since 1995, the Asthma Outreach Project in Seattle, WA, has delivered planned, population-based coordinated asthma care based on the best available clinical evidence.

The Asthma Outreach Project serves children with asthma and their families who attend the Odessa Brown Children's Clinic, an urban satellite clinic of Children's Hospital and Medical Center that serves a predominately low-income, African-American population. The project emphasizes home visits by a community-based, lay outreach worker in collaboration with an interdisciplinary clinic-based team. In the clinic setting, the community health worker functions as a case manager. The clinic uses a process of asthma care involving an asthma registry with periodic assessment and monitoring at routinely scheduled visits.

Through these activities, the Asthma Outreach Project addresses the following asthma risk factors: 1) poor coordination and follow-up between hospitals, emergency rooms, and primary care, 2) inadequate access to comprehensive and high quality medical care and poor adherence to current guidelines by medical providers, 3) patients belief and understanding regarding asthma that are inconsistent with current best management practices, 4) suboptimal family function and living circumstances that undermine adherence to organized home asthma management, and 5) patient exposure to indoor environmental allergens and irritants.

Among a study population of low income children with moderate to severe asthma, this model of care has been shown to reduce hospitalizations, emergency department use, and unscheduled clinic visits, and to increase follow-up visits.

### **179. Clean Air for Kids (including the Master Home Environmentalist Program)**

American Lung Association of Washington

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[http://www.alaw.org/asthma/healthy\\_home\\_programs/clean\\_air\\_for\\_kids.html](http://www.alaw.org/asthma/healthy_home_programs/clean_air_for_kids.html)

Since 1997, Clean Air for Kids (CAFK) has served Tacoma, WA. CAFK is a community coalition providing outreach and education to improve asthma-related health by reducing exposure to home allergens and irritants.

CAFK has multiple activities including the American Lung Association of Washington's Master Home Environmentalist (MHE) Training Program, a program that trains volunteers who visit families upon request and assists them in identifying and minimizing home allergens and triggers. In addition to the MHE program, coalition activities include continuing education sessions for childcare providers, school nurses, and other health care providers; health fairs; and as asthma outreach worker (AOW). The purpose of this presentation is to describe the AOW model and findings from research designed to evaluate program effectiveness.

Baseline and follow-up surveys were used to determine use of asthma management plans, child health outcomes, medication use, health care utilization, school absences due to asthma, home environmental behavior changes to reduce triggers, satisfaction with AOW services, and quality of life.

Results suggest that the AOW is effective in helping families change behaviors. At follow-up, 80% of families had asthma management plans for their children as compared with 28% at

baseline. Ninety percent of families felt that the home environmental assessment conducted by the AOW helped improve their child's asthma. All of the families made changes to improve the home environment (less toxic cleaning agents, smoking outside, cleaning up mold, changing furnace filters, increasing ventilation). Families reported high satisfaction with the AOW suggesting that community-based models can be effective in helping families improve their child's asthma.

### **180. The Childhood Asthma Project**

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The Yakima Valley Farm Workers Clinic Childhood Asthma Project in Yakima County, Washington was established in May 2001 to improve the health status of children with asthma, improve access to health resources for families of children with asthma, and improve the environmental health of the community.

Project activities included education to children with asthma during clinic and home visits. Education included asthma definition, identifying triggers, symptoms, avoiding triggers, self-management, and medications. Demonstration and feedback was included in the education sessions. The project also provided asthma training (Little Lungs Breathing) to daycare workers.

The August 2004 evaluation reported improved hospital utilization, emergency room visits, and medication use. Also reported was increased trigger reduction activities (e.g., use of dust permeable covers, pets removed from the child's bedroom, washing with hot water) that decreased exposure to environmental asthma triggers.

The Yakima Valley Farm Workers Clinic Childhood Asthma Project grant ended in April of 2004; however, the success of the project convinced the corporation to continue the program in three of its Yakima County clinics.

## International Programs: Australia

### **181. Development, Implementation, and Evaluation of a Community Pharmacy-Based Asthma Care Model**

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The objective of this study was to measure the impact of a specialized asthma service provided through community pharmacies in terms of objective patient clinical, humanistic, and economic outcomes. A parallel controlled design, where 52 intervention patients and 50 control patients with

asthma were recruited in two distinct locations, was used. In the intervention area, pharmacists were trained and delivered an asthma care model, with three follow-up visits over six months. This model was evaluated based on clinical, humanistic, and economic outcomes compared between and within groups.

Pharmacists are trained through self study manuals at a two-day workshop. The pharmacists then see patients on an appointment basis. They conduct an individualized needs analysis framed around the Australian Six-Step Asthma Management Plan. The pharmacists document the interventions delivered and outcomes measured. The pharmacists and their patients collaboratively set goals for the next office visit. Patients are monitored at one month, three months, and six months after the initial intervention visit.

There was significant improvement in hospitalization rates, quality of life, asthma severity, medication use, change in clinical action (provider behavior), inhaler technique, peak flow index, and risk of non-adherence. Perceived control of asthma and asthma-related knowledge scores were also improved.

Although the study ended in 2001 several participating pharmacists have continued to use modified versions in their own practices. The Australian government is also interested in doing further research on the subject.

## **182. Evaluation of a Community-based Asthma Management Program in a Population Sample of Schoolchildren**

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The objective of the “Evaluation of a community-based asthma management program” was to assess the effect of a community-based management program in Sydney, Australia, incorporating both education and treatment directed at children, parents, doctors, pharmacists, community nurses and school teachers.

In order to study the effect of the program the authors looked at a population sample of 65 children with a wide range of morbidity due to asthma and compared them with a control group of 55 children living in a different area. Both groups were re-evaluated concurrently after three and six months.

Children and their parents attended two education sessions (two hours, one-week apart) at the child’s school. The first session provided information on the mechanisms of asthma, the possible triggers of an asthma attack, the mode of action of medications, and assessing inhalation technique. Session two covered monitoring airway function, Airflometer use and readings, and using an asthma action plan based on readings.

At three months, the intervention group had a significant improvement in FEV1 and symptoms which limit activity. However, the largest improvements were recorded at the six-month follow up. In the intervention group, bronchial responsiveness and night cough were reduced significantly and FEV1 was improved, compared with both baseline measurements and the control group.

The authors concluded that these improvements in this group of children, many of whom had mild asthma, verify that community-based management programs can be effective in treating childhood asthma.

### **183. Randomized Controlled Trial of Unflued Gas Heater Replacement on Respiratory Health of Asthmatic Schoolchildren**

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Previous studies do not provide a clear picture of the relationship between nitrogen dioxide (NO<sub>2</sub>) exposure and asthma; therefore, a randomized controlled trial of unflued gas heater replacement on respiratory health of school children with asthma was conducted in Adelaide, Australia.

Eighteen schools using unflued gas heating in winter were randomly allocated to either retain their heaters (10 control flued gas or electric heaters installed at the beginning of winter (8 intervention schools). Fortnightly telephone interviews were used to record daily individual asthma symptoms that occurred over 12 weeks (including winter). Lung function and histamine challenge tests were performed at baseline and the end of the study. NO<sub>2</sub> was measured in each school classroom on nine days and in each household on three days spread over the study period.

From 199 primary school children that met the eligibility criteria, 45 intervention and 73 control children agreed to participate. Baseline characteristics were similar between groups. Difficulty breathing during the day (Relative Risk [RR] = 0.41; 95% CI: 0.07, 0.98) and night (RR = 0.32; 95% CI: 0.14, 0.69), chest tightness during the day (RR = 0.45; 95% CI: 0.25, 0.81), and daytime asthma attacks (RR = 0.39; 95% CI: 0.17, 0.93) were significantly reduced in the intervention group. Percentage predicted forced expiratory volume in one second (FEV<sub>1</sub>), the concentration of histamine inducing a 20% fall in FEV<sub>1</sub> (PD<sub>20</sub>), and the dose–response slope (DRS) were similar between groups at follow-up. Mean (standard deviation) NO<sub>2</sub> levels were 15.5 (6.6) parts per billion (ppb) and 47.0 (26.8) ppb in the intervention and control schools respectively (P < 0.001).

Asthma symptoms were reduced following a replacement intervention that removed high exposure to NO<sub>2</sub>. Such replacement should be considered a public health priority for schools using unflued gas heating during winter.

### **184. AAA: Triple A Adolescent Asthma Action Program**

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The Adolescent Asthma Action (Triple A) Program, developed in Australia, is the first successful peer-led asthma education intervention to improve management of asthma in young people at secondary schools. It is designed to empower students to take responsible action for their health.

Using an innovative model of peer education, the Triple A Program has promoted a non-smoking culture in school and has provided significant opportunities for leadership within the school community.

The program is divided into three steps. Step one is the Training Workshop. Triple A Educators train volunteer Year 11 students as Asthma Peer Leaders during a 1-day workshop. Students learn about asthma and its management and acquire skills in group facilitation. At the conclusion of the training, each student receives an Asthma Peer Leader manual.

Step two is the Peer-led Education. Year 10 students learn about asthma in three 40-minute health lessons led by teams of 3-4 Asthma Peer Leaders. Peer Leaders use videos, discussions and games as educational tools. Students critically analyze the problems encountered by young people with asthma.

Finally, step three is Student Presentations. Dissemination of asthma information occurs when Year 10 students relay to the school community what they have learned from the peer-led education sessions by presenting creative entertaining performances, in the form of songs, music, debates, and drama, to the entire school community.

Over the past ten years, the project team has developed, evaluated and disseminated the Triple A Program widely and has reached over 12,000 students. Rigorous evaluation has shown that the Triple A Program improves quality of life in students with asthma and results in fewer school absences due to asthma and fewer asthma attacks at school.

### **185. Proactive Asthma Care in Childhood: General Practice Based Randomised Controlled Trial**

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The objectives of the “Proactive Asthma Care in Childhood: General Practice Based Randomised Controlled Trial” were to assess the feasibility and effectiveness of a general practice based, proactive system of asthma care in children.

Researchers at the University of Sydney implemented a randomized controlled trial design with cluster sampling by general practice. The setting was a general practice in the northern region of the Australian Capital Territory. One-hundred seventy-four children with moderate to severe asthma who attended 24 general practitioners participated in the study.

The intervention consisted of a system of structured asthma care (the 3+ visit plan). The Chief Investigator gave a one-on-one academic detailing session to all general practitioners. The intervention group was asked to administer care according to the 3+Plan. The Chief Investigator instructed them in the plan and gave them a 3+Plan patient and practitioner resource kit. Intervention practitioners were prompted when a child’s next 3+ visit was due. They were offered a supplementary trial information evening.

Evaluation results indicated that intervention group children had significantly more asthma related consultations, written asthma plans, and completed 3+ visit plans than control children.

Intervention group children also had a mean reduction in measurements of forced expiratory volume in one second after cold air challenge of 2.6% less than control children. Intervention group children had lower emergency department attendance rates for asthma, less speech limiting wheeze than control children, were more likely to use a spacer, and had an asthma action plan. No differences occurred in number of days absent from school or symptom-free day scores.

Researchers concluded that proactive care with active recall for children with moderate to severe asthma is feasible in general practice and seems to be beneficial.

## International Programs: Belgium

### **186. UZ Leuven Asthma Programme**

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The UZ Leuven Asthma Programme was evaluated in a study, “Evaluation of an Individualised asthma programme directed at behavioural change”. In 2001 the program was implemented in Leuven, Belgium and targeted adults with asthma 18-65 years who complained of symptoms and impairment despite adequate medical therapy.

The program consisted of six one-on-one sessions conducted by a psychologist at the hospital. At the onset the patient received a workbook containing asthma information, exercises and homework assignments. Psycho education, behavioral and cognitive techniques were introduced during these sessions. The sessions were individually tailored for health and educational needs.

In the study, compared with controls the program group reported less symptoms, better quality of life, decreased negative affectivity, and increased adherence. All three cognitive variables (knowledge, attitude toward asthma, self-efficacy) and day and night peak flow ratings improved in the program group.

The authors concluded that participation in an individualized program resulted in improvement of asthma morbidity, and asthma-related behavior and cognitions.

## International Programs: Brazil

### **187. Evaluation of an Educational Programme for Socially Deprived Asthma**

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An Educational Programme for Socially Deprived Asthma was conducted at the outpatient Asthma Clinic of the Lung Division, Federal University of Sao Paulo, Brazil in 1996. The aim of the evaluation was to evaluate the effectiveness of the asthma education program in moderate and

severe asthma patients in a randomized study with a control group.

Fifty-three asthmatic patients were studied, 26 of whom were assigned to the educational group and 27 to the control group. The patient population was urban, low-income, predominately female, and had a high illiteracy rate. The educational group attended the program regularly for a period of 6 months. The program included information about asthma, instruction on the appropriate use of medication, training in metered dose inhaler (MDI) technique, information about the identification and control of asthma attacks and the recognition of early signs of exacerbation. Education was delivered by healthcare providers in both group and individual sessions and included the use of videos, posters, and other visual aids. The control group was submitted to the routine care provided at the Asthma Clinic, with no formal instruction regarding asthma control.

At the end of the study, the education group showed significant differences when compared with the control group with respect to emergency room visits, asthma symptoms, quality of life, MDI technique, and medication compliance.

The investigators concluded that the educational program led to a significant improvement in asthma morbidity. Furthermore, they concluded that the implementation of educational programs is possible for special populations when these programs are adapted to the socioeconomic profile of the patients, with a significant gain in terms of the reduction of symptoms and improved pulmonary function and quality of life of asthmatics.

This educational program continues to be implemented at the Asthma Clinic and a replication of the program is in progress at another site in Brazil.

## International Programs: Canada

### **188. Controlled Trial of a Home and Ambulatory Program**

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The Izaak Walton Killam Children Hospital undertook the study, A Controlled Trial of a Home and Ambulatory Program for Asthmatic Children, in Nova Scotia, Canada in the late eighties. The study sought to measure the impact of a program of home and ambulatory asthma management on various objective outcome measures on children aged 06-16 with asthma.

The study consisted of both home and clinic visits for the treatment group. The initial intake clinic visit was conducted by a nurse who gathered information about family history, asthma knowledge, medication use and inhaler technique and did a skin test. Subsequent visits took place every three months for a year with a pediatric respirologist and a nurse coordinator. Each visit was tailored to the individual family's needs and covered trigger avoidance, medication use, inhaler technique and promotion of exercise.

The home visits were conducted by the nurse coordinator. He/she went into the family home after school at least twice in the 1 year period to discuss the results of the skin test and suspected allergens. Trigger remediation, asthma management and inhaler technique were also reviewed.

The program ended prior to 1991.

### **189. Influence of Asthma Education on Asthma Severity, Quality of Life and Environmental Control**

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“Influence of Asthma Education on Asthma Severity, Quality of Life and Environmental Control” was implemented by Centre de Pneumologie de l'Hospital Laval of Sainte Foy, Canada. The program's main objectives were to assess the influence of an asthma education program on airway responsiveness, asthma symptoms, patients' quality of life and environmental control. The study design was a prospective randomized, controlled study with parallel groups. The intervention took place in three tertiary care hospitals in Quebec. One hundred and eighty-eight adult patients with moderate to severe asthma participated. After optimization of asthma treatment with inhaled corticosteroids, patients were randomly assigned to receive either an education program based on self-management (one group based on symptoms and another based on peak flow monitoring) or usual care.

One year after the intervention, there was a significant decrease in the number of days per month without daytime asthma symptoms in the intervention group only. Asthma daily symptom scores decreased significantly in the intervention group in comparison with the control group. QOL scores also improved markedly in both groups after treatment optimization during the run-in period, but after the intervention, the QOL scores increased further in the intervention group. Those patients sensitized to house dust mites adopted the specific measures recommended to reduce their exposure to house dust mites, while none of the pts in the control group did. One year after the educational intervention, it was observed that the program had added value over and above that of optimization of medication and regular clinical follow-ups.

### **190. Evaluation of an Asthma Self-Management Education Program**

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The study, “Evaluation of an Asthma Self-Management Education Program”, was undertaken in 1990 at Laval Hospital, in Quebec City, Canada. The case control study sought to evaluate a self-management education program for people with asthma aged 15 and over. The intervention, including three 2.5 hour teaching sessions were administered to patients with asthma and a close relative covering general asthma education and self management. The study ended in 1992 and was found to reduce emergency department visits, work loss and improve quality of life for patients.

### **191. The British Columbia Community Pharmacy Asthma Study**

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The British Columbia Community Pharmacy Asthma Study examined the failures and recommendations of past studies and introduced a new milieu for asthma care - the community pharmacy. The study incorporated a care protocol with the important ingredients of asthma education on medications, triggers, self-monitoring and an asthma action plan. Emphasis was put on pharmacies taking responsibility for outcomes, assessment of patients' readiness to change and tailoring education to that readiness, compliance monitoring and physician consultation to achieve asthma prescribing guidelines.

Thirty-three pharmacists in British Columbia, specially trained and certified in asthma care, agreed to participate in a study in which experienced pharmacists would have asthma patients (7-65 years old) allocated to enhanced (pharmaceutical) care (EC) or usual care (UC). Six hundred thirty-one patients provided consent, of which 225 in EC or UC were analyzed for all outcomes. Patients were followed for one year.

Before the intervention began the pharmacist assessed the participants' readiness to change following the Stages of Change theory. Participants in the EC group received instruction from a pharmacist on basic concepts of asthma, medications, trigger identification and avoidance, development of an asthma action plan, and use of a peak flow meter. Participants met with the pharmacist at the community pharmacy in a private counseling area for one-hour every two to three weeks for at least three appointments, and then followed-up at least every three months for one year.

The EC group had a significant impact (significant between group differences) on the following health outcomes: peak expiratory flow rate, symptoms, beta-agonist utilization, quality of life, and unscheduled (sick) office and emergency room visits. The EC group also had a positive impact on knowledge scores. EC group also had less than half the direct health care costs of the UC group.

Specially trained community pharmacists in Canada, using a pharmaceutical care-based protocol, can produce impressive improvements in clinical, economic and humanistic outcome measures in patients with asthma.

## **192. Community Asthma Care Education Centre (AEC) Program**

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Community asthma care centers have been introduced to meet the increasing need for community-based assessment, management, and education of patients with asthma. The Asthma Education Centre at Oakville-Trafalgar Hospital, in Ontario, Canada, has implemented a comprehensive assessment, treatment, and education program with a collection of relevant

patient data. Asthma patients of all ages are eligible.

In both the initial and one-year follow-up visit, 121 patients were seen. The patient population was assessed by age cohorts: 43 patients were aged 0-5 years, 47 were aged 6-16 years, and 31 were aged greater than 16 years. (There was a 24-month follow-up also carried out for a subset of 113 patients).

At an initial visit patient data was collected and education was provided. After two weeks, the patient returned to the Asthma Education Centre for reassessment visits to build on the assessment and educational topics and to determine additional needs. Visits continued until the patient's asthma was controlled. An asthma action plan was developed and reviewed by the patient's physician who was also updated on the patient's progress. Patients were then seen at three- and six- month intervals.

Results measured from baseline to one year and 24 months post include a decrease in night awakenings in the previous four weeks, a decrease in emergency visits in the previous six months, and a decrease in hospitalizations in the previous six months, and a decrease in missed school/work days. All the differences were statistically significant.

The findings presented in this article suggest that these specific education and treatment programs are associated with not only significant reductions in the use of health services, but improvements in health outcomes as well.

### **193. The Effect of a Peak Flow-Based Action Plan in the Prevention of Exacerbations of Asthma**

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“The Effect of a Peak Flow-Based Action Plan in the Prevention of Exacerbations of Asthma” was a randomized controlled trial conducted in 1994 by the Calgary Asthma Program of the University of Calgary, Alberta, Canada. The goal of the study was to determine the effect of a symptom-based and a peak flow-based action plan in preventing acute exacerbations in adult and adolescent subjects with poorly controlled asthma (age 16-60).

150 subjects who had required urgent treatment for their asthma received an evaluation and 30-60 minutes of basic asthma education from a nurse-clinician before being randomly allocated to receive no action plan, a symptom-based plan, or a peak flow-based action plan. Subjects were assessed by questionnaire at 3 and 6 months after enrollment with questions relating to their asthma control and their need for urgent treatment or hospital admission for asthma.

Evaluation results revealed that a peak flow-based action plan is effective, at least in the short term, in protecting patients with asthma against severe exacerbations, in those subjects with a history of severe asthma exacerbations.

### **194. A Randomized Controlled Study on the Effectiveness of a Multifaceted Intervention**

## **Program in the Primary Prevention of Asthma in High-Risk Infants**

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A Randomized Controlled Study on the Effectiveness of a Multifaceted Intervention Program in the Primary Prevention of Asthma in High-Risk Infants was a prospective, prenatally randomized, controlled study with follow-up through the age of one year. The study was conducted by the Universities of British Columbia and Manitoba Winnipeg.

The objective was to assess the effectiveness of a multifaceted intervention program in the primary prevention of asthma in high-risk infants (in this study, infants are defined as persons from birth to the age of one year). The study used University hospital-based settings at two Canadian centers: Vancouver, British Columbia, and Winnipeg, Manitoba. A total of 545 high-risk infants (at least one first-degree relative with asthma or two first-degree relatives with other IgE-mediated allergic diseases) identified before birth participated.

Interventions included avoidance of house dust mite and pet allergens and environmental tobacco smoke, encouragement of breastfeeding, and supplementation with a partially hydrolyzed formula. Main Outcome Measures were probable or possible asthma, rhinitis without apparent colds, and a prick skin test result positive for common inhalant allergens.

Thirty-eight (15.1%) of the 251 infants available for assessment in the intervention group and 49 (20.2%) of the 242 infants available for assessment in the control group fulfilled the criteria for possible or probable asthma. Also, 16.7% of the infants in the intervention group and 27.3% of the infants in the control group developed rhinitis without colds. The incidence of positive skin test results to 1 or more inhalant allergens was similar in both groups (4.4% in the intervention group and 4.6% in the control group).

The multifaceted intervention program resulted in a modest but significant reduction in the risk of possible or probable asthma and rhinitis without apparent colds at the age of 12 months in high-risk infants.

## **International Programs: China**

### **195. OAS in China: Asthma Self-Management: A Model for Controlling and Preventing Diseases in Schools in Beijing, China**

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The objective of this study was to examine the effectiveness of an asthma education program, Open Airways, adapted for children in China. Six-hundred-thirty-nine children in 21 elementary schools in one agricultural and one industrial

area participated in a randomized controlled trial. Data was collected at baseline and one year subsequently.

At the end of the class day specially trained teachers conducted five educational sessions to students identified with asthma. The sessions were separately provided for two groups of children (grade 1-3 and 4-5) over a 5-week period with an average of 20-25 children/session. Topics addressed during the sessions included preventing and managing symptoms, using medicines, identifying and controlling triggers.

Positive effect on treatment children versus control was noted in symptoms, school absences, school performance and home environment. Industrial area children additionally benefited from fewer hospitalizations and quality of life for parents/caregivers. Agricultural area parents showed greater improvement in self management skills.

The program provided overall benefits related to school performance, absences, and home environment. In the agricultural area where fewer resources were available, benefits were fewer and concerns greater. In the industrial area where education and income was higher, additional benefits related to health care use and parents' quality of life were realized.

### **196. Evaluation of an Asthma Management Program for Chinese Children with Mild-to-Moderate Asthma in Hong Kong**

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“Evaluation of an Asthma Management Program for Chinese Children with Mild-to-Moderate Asthma in Hong Kong” was implemented in 1996. The study involved an outpatient clinic-based prospective cohort of Chinese children with asthma. Each patient received one 2-hr session of AMP which was conducted by a pediatric nurse specialist. Asthma outcomes were measured at baseline and at 6 and 12 months after completion of the AMP.

A total of 106 asthmatic children were enrolled and they showed a significant decrease in nocturnal cough, wheezing attacks, and subjective assessment of severity at 6 and 12 months post intervention. Acute asthmatic attacks, unscheduled outpatient attendance, emergency room visits, school absenteeism, and number and duration of hospitalizations were also reduced during the follow-up period. Significantly more children were reported to use inhaled beclomethasone at the end of the study.

In conclusion, the cohort of Chinese children with mild-to-moderate asthma used significantly more inhaled corticosteroids and practiced more measures to control house dust mites at the end of the 1year treatment period.

## **197. Evaluation of the Efficacy of a Hospital-Based Asthma Education Programme in Patients of Low Socioeconomic Status in Hong Kong**

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Good asthma control requires optimal medical treatment in conjunction with appropriate self-management. In the West, the effectiveness of patient education on improving self-management has been well documented. However, data amongst Asian populations are lacking. The authors performed a pilot study to evaluate the efficacy of a hospital-based education program aimed at improving self-management skills and reducing morbidity in a Chinese population with low socioeconomic status and education level.

The education program was a low-cost program conducted by respiratory nurse specialists. Patients attending the asthma clinic were instructed during a two-hour educational session on asthma pathophysiology, its potential triggers, the appropriate use of medications including proper inhaler techniques, and the self-management of their disease. These instructions were reinforced by video sessions at subsequent outpatient clinic visits when patients' inhaler and peak flow techniques were checked by the same nurses and their self-management plan re-examined by the attending physicians. Asthma knowledge, inhaler technique, FEV1 and peak expiratory flow (PEF), and patients' self-rating of their asthma were determined at baseline, 6 months and 1 year after the intervention. Morbidity was assessed by the numbers of hospitalizations, unscheduled visits to family physicians and accident and emergency department attendance, courses of oral steroid used and days off work or school at and 1 year.

Two hundred and thirty patients were recruited for the study, 83% completing the entire assessment period. The group demonstrated significant improvements in lung function: the mean FEV1 +/- SD increased from 63.6 +/- 20.6% of predicted values at baseline to 68.5 +/- 22.3% at 6 months and 68.6 +/- 22.8% at 1 year ( $P < 0.05$ ), and the mean PEF +/- SD increased from 64.6 +/- 23.0% of predicted values at baseline to 75.4 +/- 27.0% at 6 months and 76.8 +/- 24.5% at 1 year ( $P < 0.001$ ). There were also significant improvements in inhaler technique ( $P < 0.01$ ), asthma knowledge ( $P < 0.001$ ), patients' self-rating of their asthma ( $P < 0.05$ ), and reductions in the numbers of hospitalizations ( $P < 0.01$ ), visits to family physicians ( $P < 0.001$ ) and accident and emergency department attendance ( $P < 0.001$ ) during the study period. Patients with moderate to severe asthma as defined by an FEV1 of  $< 80\%$  of predicted values were most likely to benefit from the program.

In conclusion patient education is likely to be an essential component in the holistic approach to the asthma management even amongst Asian populations of low socioeconomic status and education level. Further studies using randomized controlled trials are necessary to consolidate these findings.

## International Programs: Finland

### **198. Asthma Programme in Finland 1994-2004**

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In 1993 the Ministry of Social Affairs and Health in Finland recognized asthma as an important public health issue by appointing a working group to design a national program for the prevention and alleviation of problems caused by asthma and for reduction of the relevant costs. The group decided to create an action program emphasizing guideline implementation and follow up, which are often neglected in consensus reports on asthma treatment. The 10-year program was launched in 1994.

A steering committee was formed to decide the strategic choices, set goals and measures, and agreed upon activities which were considered to have the best impact. The committee recommended a revision of asthma care in order to increase the role of primary health care. One solution was to train one general practitioner and one nurse in each municipal health center to work as coordinators of local activities and to take part in the counseling and follow up to patients. In 1997 a further step was taken to strengthen the local activities by including more than 600 Finnish pharmacies in the program. The steering committee recommended all pharmacies and health centers to contact each other in order to improve collaboration in the guidance and education of patients with asthma. The pharmacies were also recommended to nominate one of the pharmacists to act as an asthma contact person.

Participation in the program yielded improved hospitalization rates, work loss, medication use, and change in clinical action (health care provider behavior) as evidenced by change in medical treatment plans for patients with asthma. The program has also decreased health care costs and disability pensions for asthma.

## International Programs: India

### **199. Reductions in Hospital Use from Self Management Training**

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“Reductions in Hospital Use from Self Management Training” was conducted in India by the Medical College in Thiruvananthapuram from 1991-1994 to assess the impact of asthma Self-Management Training on the health status and resource use of patients with chronic asthma age 10-45.

The study consisted of a randomized controlled design of chronic asthmatic patients in a tertiary care center in India. The intervention group (153 patients) received four training sessions of two hours each over one month, in addition to the regular care provided to the control group (150 patients). During these sessions, patients were trained to adjust treatment promptly, appropriately, and safely depending on the severity of the disease.

Health status and resource use were measured at baseline and over a one-year follow up period. The intervention group had significantly better health status (measured by breathing ability), fewer productive days lost, and lower resource use (hospitalizations and emergency room visits) than the control group.

The study concluded that incorporation of asthma Self Management Training as part of clinical management of asthma can result in improvements in health status and reductions in hospital use.

## International Programs: Israel

### **200. Outcomes of an Intervention Programme for Treatment of Asthma in a Primary Care Clinic for Bedouins in Southern Israel**

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Asthma is one of the most common disorders affecting children and adults. There is a large variation in the theoretical and practical knowledge and skills of physicians, and patients often do not receive optimal treatment. Thus, asthma represents a great challenge to the primary health care system.

The authors' aimed to evaluate an intervention program for the optimization of treatment of asthma in a primary care clinic in the Muslim Bedouin sector in southern Israel.

Activities focused on improving living conditions, cleanliness and hygiene. Topics included use of medication and space chambers, general information on asthma, allergens/triggers, and use of nebulizers. There was also a health fair for patients and families and ongoing instruction by the clinic staff. The health fair included education on the above topics and viewing an asthma video.

Of 3428 children registered in the clinic, 267 were diagnosed with asthma (7.8%). During the 3-month period before the intervention, 73 children had home inhalation equipment, 61 referrals to the emergency room were documented and six children were hospitalized for exacerbation or complications of the disease. Over this time period, 5.54 nebulizer treatments were conducted in the clinic per month per 100 children and adults. Following the intervention, the number of referrals to the emergency was reduced to six children, none of whom was hospitalized. The number of children with home nebulizers was doubled. The number of nebulizer treatments in the clinic dropped to 4.7 per month per 100, a reduction of 15%.

The authors concluded that an intervention including asthma self-management with an emphasis on the proper use of inhalers and medications, together with improved disease management at the clinic itself, led to a reduction in the episodes of asthma and its complications.

## International Programs: Italy

### **201. Short-term Effectiveness of an Asthma Educational Program: Results of a Randomized Controlled Trial**

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This prospective randomized control trial in Perugia, Italy evaluated the effectiveness of a patient education program in 77 asthmatics according to “Teach Your Patients About Asthma: A Clinicians Guide” (1992).

Forty asthmatic patients were randomly allocated to Group A (usual treatment) and 37 to Group B (usual treatment plus a patient education program). Subjects in Group B participated in three two-hour education sessions. These sessions included general information on asthma, medications, use of inhalers and peak flows, identifying warning signs, avoidance and reduction of trigger exposure, and developing asthma action plans. Subjects were followed every three months during the first year and every six months in the second and third year for educational reinforcement.

The effectiveness of the educational program was evaluated by comparing morbidity outcomes at baseline and three months after initial evaluation. At enrollment, the two groups were not different with regard to age, sex, smoking, asthma severity atopy, FEV1, symptom-free days, use of rescue salbutamol and quality of life. Three months later, subjects in Group B showed a significant improvement in overall quality of life ( $p < 0.01$ ).

In conclusion, the educational program improved the quality of life in subjects with asthma, mainly in patients with moderate-to-severe asthma.

## International Programs: New Zealand

### **202. Breathe Easy Schools**

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Asthma Auckland started the “Breathe Easy Schools” program in 2003. The program is loosely based on The Australian 3+ Plan for asthma education. The program’s vision is to be the leading provider of evidence based asthma education for school students (12-19 years) in New Zealand; and to create education of a high standard that is suitable to all children with asthma.

An Asthma Nurse Educator contacts school nurses at secondary colleges to recruit their schools to be participants in the Breathe Easy Schools program. A mobile unit visits participating schools and students with asthma meet with the Asthma Nurse Educator on the mobile unit. One-on-one education sessions are undertaken, giving students information on asthma, prevention measures for triggers, encouraging correct use of inhalers and devices and use of asthma action plans. Two further sessions are arranged at later visits to the school to re-enforce information already given, check inhaler technique and to further educate students with asthma as necessary.

The program has had a positive impact on hospital utilization, emergency/urgent care visits, school absences, quality of life for children, symptoms, medication use, change in clinical action (provider behavior), functional status, self-management skills, use of asthma action plan, and peak flow meter use.

### **203. The 3+ Home Visit Plan**

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The 3+ Home Visit Plan is an initiative of Asthma Auckland in New Zealand. The program began in 2003 in response to the high hospital admission rates of children with asthma exacerbations. The 3+ Home Visit Plan, based on the 3+ Visit Plan implemented widely in Australia, is delivered in the greater Auckland area to children who have had 2 or more hospitalizations for acute asthma, and their families.

Registered Nurses from Auckland Asthma Society provide three free home visits to all referred children and whanau (family) for ongoing care and education in asthma. The home visits include an assessment of environmental triggers as well as education, demonstrations, and distribution of materials to control these triggers. Trigger reduction efforts are tailored for each family based on skin testing to determine the child's sensitivities. Nurses communicate the home visit findings and actions taken via a letter to the referring healthcare provider. To meet the needs of various cultural groups in the greater Auckland area, asthma educational materials are available in six languages and a translator is part of the program staff.

The goals of the Asthma Auckland 3+ Home Visit Plan are to reduce the hospital admission rate, increase quality of life, reduce the use of reliever medication, reduce steroid intake due to good asthma management, and ensure all children have a current management plan. Outcomes are evaluated using a client questionnaire at baseline and every 6 months.

The January 2004-July 2004 evaluation revealed a positive impact on hospital utilization, urgent care visits, school absences, work loss, symptoms, medication use, functional status, self-management skills, and use of an asthma action plan.

## International Programs: Northern Ireland

### **204. Community-based Pharmaceutical Care Program in Malta**

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Researchers from the University of Malta and Queen's University of Belfast schools of pharmacy collaborated in 1993 to implement and assess a community-based pharmaceutical care program for patients with asthma aged 14 years and older.

The study was a prospective, randomized, controlled trial and took place in 22 community pharmacies (11 control, 11 intervention) in Malta.

A comprehensive asthma education and monitoring program was implemented. Intervention patients received verbal counseling, an educational video, an information leaflet, and subsequent monitoring with reinforcement; control patients received routine dispensing services.

Over 12 months, symptoms and inhaler technique significantly improved in the intervention group. There were also significantly fewer self-reported hospitalizations in intervention patients.

## International Programs: Norway

### **205. Impact of Patient Education and Self-Management on Morbidity in Asthmatics and Patients with Chronic Obstructive Pulmonary Disease**

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The Effects of Patient Education in Asthma and COPD was a randomized controlled trial aimed to explore the effects and health economic consequences of patient education in patients with asthma and patients with COPD. The study was carried out by Central Hospital of Vest-Agder in Kristiansand, Norway.

One hundred and forty patients aged 18-70 with mild to moderate asthma or COPD were randomly allocated to an intervention group or a control group after the patients in both groups had received ordinary consultation care. The intervention group participated in two two-hour group educational sessions, followed by one to two individual nurse and physiotherapist consultations. Self-management was emphasized following a stepwise treatment plan for exacerbations.

Follow-up assessments were performed after 12 months.

The patient education in asthmatics compared with no education at a 12-month follow-up

improved health-related quality of life and FEV1, improved steroid inhaler compliance, reduced the number of days off work, and was cost-effective by improving health outcomes and reducing costs. For both patients with asthma and those with COPD, patient education reduced the need for GP visits in the 12-month follow-up. For patients with COPD rescue medication was reduced and education was cost-beneficial with 5 dollars saved in the societal perspective (total costs) for every dollar spent on education.

## International Programs: Spain

### **206. Outpatient Asthma Clinic Self-Management Program**

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An asthma self-management education program was conducted beginning in 1996 at the General Hospital of Serrania in Ronda, Spain.

Patients received medical assessments, a tailored medical regimen, written asthma action plans, written education materials, training on the use of inhalers, peak flow meter, and other devices, and comprehensive one-on-one asthma self-management education from a physician during seven visits to the asthma outpatient clinic over a period of three years.

The benefits at three years of the asthma self-management education program coupled with educational reinforcement were assessed at follow-up visits in 63 adults with chronic asthma (age 15-64). Significant improvements were found in the number of days off work or school, unscheduled general practitioner consultations, admissions to emergency services, hospital admissions, and nocturnal awakenings, as well as lung function.

Study authors concluded that in adults with chronic asthma, an asthma self-management education program coupled with educational reinforcement was effective at decreasing asthma morbidity, improving lung function and decreasing consumption of oral steroids.

## International Programs: Sweden

### **207. The Are Clinic**

Arekliniken (The Are Clinic)  
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The Are Clinic's asthma program in Are, Sweden is an inpatient rehabilitation program for people with asthma. The overall aim is to lower the number of sick leave days for people with asthma. Participants are referred to the program by their providers. Participants come from all areas of Sweden. The following describes the program's two intervention activities.

The main intervention, a 2-4 week inpatient program, serves adults with asthma. Activities include education, pharmacological optimization, physical training, and coping skill acquisition. Staff include members of a multidisciplinary team: a physician, a nurse, a physiotherapist, a vocational therapist, a dietitian, a psychologist, and a laboratory technician. Upon discharge from the program the patient receives a self-management plan. Personnel from the multidisciplinary team keeps regular contact with the patient by mail, e-mail or phone up to one year in order to support the patient and make small adjustments to the self-management plan.

The second intervention is a week long camp for teenagers, aged 13-18 years, with asthma. The camp follows the same curriculum as the adult program, but the activities are made more fun and tailored for the teenagers.

The program's data collection is ongoing and analysis occurs two times per year. The 2004 evaluation yielded the following positive health outcomes: hospitalization rates, emergency department visits, urgent care visits, unscheduled/sick office visits, work loss, quality of life for children, quality of life for adults, symptoms, medication use, change in clinical action (provider behavior), functional status, lung function (spirometry), self-management skills, use of an asthma action plan, peak flow meter use, and depression and anxiety.

## International Programs: Switzerland

### **208. Self-Management Education Interdisciplinary Program**

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Asthma has generated very high costs for Switzerland. Self-management education (SME) is effective and recommended as an integral part of management in the most recent guidelines on asthma treatment. Its aim is to reduce morbidity and improve quality of life in these patients.

Education was provided to 66 patients by a multidisciplinary health care team in Montana, Switzerland. The patient took a diary to each medical visit and the provider recorded in the diary the education provided and the individualized objectives discussed during the visit. Data was collected three, six, nine and 12 months post the initial visit.

After 12 months hospitalizations fell from 35 to 8%\*, emergency department visits 88 to 53%\*. and lost work days 39 to 14%\* (\*p <0.001). Overall, SME resulted in a health care cost savings. Quality of life improved as well.

SME is effective and brings a steep fall in costs for asthma treatment by cutting back

hospitalizations and lost workdays and by improving quality of life for those with asthma. It should be recognized and better supported by the health system.

## International Programs: The Netherlands

### **209. Clinical Effectiveness of a Mite Allergen-Impermeable Bed Covering System in Asthmatic Mite-Sensitive Patients**

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The “Clinical Effectiveness of a Mite Allergen-Impermeable Bed-Covering System in Asthmatic Mite-Sensitive Patients” pilot study was implemented in 1998-1999. The objective was to measure the effect of house dust mite (HDM)- impermeable covers on HDM allergen levels, peak flow values, and asthma symptoms. A randomized clinical trial was carried out on asthma patients 12-60 years.

Fifty-two allergic asthmatic patients were randomly allocated to use the HDM-impermeable or placebo covers. During the study period, daily peak flow and asthma symptom scores were recorded. Dust samples were taken from the mattresses.

A significant reduction in HDM allergen levels on the mattresses after encasing them with HDM-impermeable covers was observed. Baseline symptoms were so low that no improvement could be established. Morning peak expiratory flow was significantly higher in the intervention group compared with that seen in the placebo group during the study period.

### **210. Self-management of Asthma in General Practice, Asthma Control and Quality of Life: A Randomised Controlled Trial**

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This randomized controlled trial was conducted in Nijmegen and Eindhoven, The Netherlands to determine the effectiveness of asthma self-management with tailored asthma education in general practice.

Nineteen general practices were randomly allocated to “usual care” or “self-management”. Two-hundred and fourteen asthma patients age 16-60 years were included and followed for two years.

Patients in the self-management group received four individually tailored asthma education sessions over three months delivered by their general practitioner. The sessions were conducted according to a written protocol and incorporated patients’ self-reported needs using a feedback form. Patients kept asthma diaries and visited a lung function laboratory every six months.

Participation in the trial resulted in improvement of quality of life for adult patients, symptoms, medication use, and functional status (lost activity days).

The study concluded that self-management lowers the burden of illness as perceived by patients with asthma and is at least as effective as treatment usually provided in Dutch primary care.

### **211. Behavioural Effect of Self-Treatment Guidelines in a Self-Management Program for Adults with Asthma**

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“Behavioural Effect of Self-Treatment Guidelines in a Self-Management Program for Adults with Asthma” was an asthma study that was conducted from 1996 to 1998. This study, conducted in Enschede, The Netherlands, assessed the long-term efficacy of adding self-treatment guidelines to a self-management program for adults with asthma.

245 adult patients with stable, moderate to severe asthma were included in this prospective randomized controlled trial. They were randomized into a self-treatment group and a control group. Both groups received self-management education delivered by a specialized asthma nurse in three consecutive weekly 90-minute small group sessions for the patients and their partners. Additionally, the self-treatment group received self-treatment guidelines based on peak expiratory flow (PEF) and symptoms.

### **212. Allergen-Avoidance Measure in Homes of House-dust-mite-allergic Asthmatic Patients: Effects of Acaricides and Mattress Encasings**

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This double-blind, placebo-controlled study investigated whether the application of an acaricide on mattresses and on textile floor coverings in living rooms and bedrooms could contribute to improvement in lung function and airway hyper responsiveness in 40 adult patients with asthma sensitized to house-dust mites. In a second group of 19 patients who refused chemical intervention, the clinical effects of application of allergen-impermeable mattress encasings were studied.

In all three treatment groups, Der p 1 levels in mattress dust were statistically significantly decreased after 12 months. Treatment of textile floors with either Acaroson or placebo chemical caused a statistically significant decrease in the level of the house-dust-mite allergen Der p 1 in floor dust. In the group with mattress encasings, no significant changes of floor dust Der p 1 were found. Airway hyper responsiveness improved significantly in the mattress cover group after 6 and 12 months. The Acaroson group also showed a small but statistically significant improvement after 12 months compared to baseline, but not between Active and Placebo treatment.

### **213. Clinical Effects of Air Cleaners in Homes of Asthmatic Children Sensitized to Pet Allergens**

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The objective of the study, “Clinical Effects of Air Cleaners in Homes of Asthmatic Children Sensitized to Pet Allergens”, was to investigate the clinical effects of air cleaners in living rooms and bedrooms of children with asthma sensitized to cat or dog allergens.

Twenty children with asthma sensitized to pet allergens (cat/dog) and with an animal at home participated in a double-blind, placebo-controlled, cross-over study in which the effects of air cleaners placed in the living room and bedroom for three months were compared with the effects of placebo air cleaners. Before and after each study period, lung function, airway hyper responsiveness, and peak flow variation were recorded. Cat and dog allergen levels were assessed in the filters of the air cleaners.

After a three-month intervention with active air cleaners, airway hyper responsiveness decreased significantly. Peak flow amplitude also significantly decreased. Substantial amounts of airborne cat and dog allergen were captured by the air cleaners in living rooms and bedrooms as well.

## International Programs: Turkey

### **214. Evaluation of Long-term Efficacy of an Asthma Education Programme in an Outpatient Clinic**

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*(contact information last updated September 2005)*

The aim of this study was to evaluate long-term efficacy of a patient education program in an asthma out-patient clinic in Istanbul, Turkey. The study included two groups of adult patients (>16 years); patients were randomized to either the educational group (n=25) or the usual care group (n=27).

The educational group received six education seminars bimonthly for 12 months at the out-patient clinic. A lung physician with prior experience in counseling and teaching asthma patients conducted the seminars. The education seminars included education on signs and symptoms, triggering factors, medications, and inhalation technique.

The study found improvement in emergency department visits, quality of life, and symptoms.

The study concluded that proper drug use and usual care of patients are not sufficient for asthma treatment. Patient education is an important component of therapy in asthma patients.

## International Programs: United Kingdom

### **215. The Respiratory Effects of Reduction of Mite Allergen in the Bedrooms of Asthmatic Children - A Double-Blind Controlled Trial**

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Dr. F. Carswell

The objective of the study was to investigate whether a double-blind randomized placebo-controlled community based study aimed at reducing the HDM allergens in the bedrooms of HDM sensitive asthmatic children using the best methods available would prove beneficial to the children's health. Seventy children aged 7-10 years in Bristol, United Kingdom were recruited based on criteria and then randomized to the active or placebo group. In the active group, the children's bedrooms were treated with an acaricide (Acarosan) and the mattresses, pillows and duvets were encased in exclusion covers. The control group received placebo treatments. Data was collected at baseline and 2, 6 and 24 weeks post treatment. The study period was 1992-1993.

Applying bedding covers and Acarosan led to a reduction in mite allergen on the mattress by 6 weeks. By 24 weeks, the active group had improved forced expiratory volume and fewer required bronchodilator therapy.

### **216. Project for the Evaluation of Asthma in Tipton Schools (PEATS)**

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The Project for the Evaluation of Asthma in Tipton Schools (PEATS) began in 2000 under the management of the Tipton Care Organisation in West Midlands, UK. The goal of the program was to evaluate an education project on childhood asthma designed to enable young asthmatic children aged 5-10 living in urban areas to better understand their condition and manage it more effectively.

School nurses, with the assistance of contracted child education experts, taught children with asthma general asthma education during two sessions, one session per school day. The education sessions included physical aspects of asthma, symptoms, triggers and management, and culminated in a participant-led school-wide assembly.

Program participation resulted in a positive impact on medication use among children with asthma.

Program staff experienced challenges in administering the quality of life tool to young children, but noted that the confidence boost provided to the asthmatic children was a strength of the program.

The program ended in late 2003 and is not planning any dissemination or replication.

### **217. ELECTRA: Specialist Nurse Intervention to Reduce Unscheduled Asthma Care in a Deprived Multiethnic Area: The East London Randomised Controlled Trial for High Risk Asthma**

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*(contact information last updated September 2005)*

The study “ELECTRA: Specialist nurse intervention to reduce unscheduled asthma care in a deprived multiethnic area: the east London randomized controlled trial for high risk asthma” was implemented from 1998-2000. The objective of the study was to determine whether asthma specialist nurses, using a liaison model of care, reduce unscheduled care in a deprived multiethnic area.

The study was implemented in 44 general practices within two boroughs in east London. The study population consisted of 324 people aged 4-60 years who were admitted to or were attending the hospital or the general practitioner out-of-hours service with acute asthma. Intervention practices received patient review in a nurse-led clinic and liaison with general practitioners and practice nurses to provide educational outreach, promotion of guidelines for high risk asthma, and ongoing clinical support. Control practices received a visit promoting standard asthma guidelines, and control patients were checked for proper inhaler technique.

Evaluation results show that the Intervention delayed time to first attendance with acute asthma and reduced the percentage of participants attending with acute asthma.

### **218. Structured Discharge Procedure for Children Admitted to Hospital with Acute Asthma: A Randomised Controlled Trial of Nursing Practice**

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The “Structured Discharge Procedure for Children Admitted to Hospital with Acute Asthma: A Randomised Controlled Trial of Nursing Practice” was a study implemented in 1996 at a children’s hospital in Leicester, United Kingdom. The study aimed to examine the impact of a structured, nurse-led discharge package for children (2-16 years) admitted to the hospital with acute asthma on readmission to the hospital, emergency room use, and general practitioner office visits for asthma (excluded repeat prescriptions and planned check ups).

The intervention, delivered by a nurse, consisted of an interview during which information was provided about the nature of asthma, the recognition of risk factors and how to avoid them, and on drugs and devices. The educational component emphasized guided self management and an individual written home management plan was devised for each child. In addition, a short booklet for parents and children was provided to reinforce verbal information, as well as provide information about asthma resources (i.e., National Asthma Campaign Helpline and a local asthma support group). The intervention took no longer than 20 minutes.

The evaluation showed a positive impact on hospitalization rates, emergency department visits, unscheduled office visits, and symptoms.

The intervention is conducted within the short time-frame available for health professionals to implement and is routine in clinical practice in the United Kingdom.

### **219. Eradication of House Dust Mite from Homes of Atopic Asthmatic Subjects: A Double-Blind Trial**

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The study, “Eradication of House Dust Mite from Homes of Atopic Asthmatic Subjects”, was undertaken by the University of Sheffield in the UK in 1996. The randomized controlled trial sought to determine whether combined steam and heat treatment of home furnishings reduced asthmatic patients’ bronchial hyper-reactivity and lowered house dust mite antigen loads in the homes of adults aged 18-45 years.

Trained mite eradication technicians performed the heat-steam-heat treatment on the carpets and upholstery, including mattresses, in the homes of study participants. New pillows were given and bed linens were washed in hot water. Some participants received a positive ventilation system installed in the attic above the bedrooms.

The study has ended, and found a reduction in bronchial hyper-reactivity and a reduction in house dust mite antigen load.

### **220. The Effect of High-Efficiency and Standard Vacuum-cleaners on Mite, Cat, and Dog Allergen Levels and Clinical Progress**

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The major triggers for allergic asthma are exposure to allergens of the house dust mite, *Dermatophagoides pteronyssinus*, and of pets. Unfortunately studies of techniques designed to reduce house dust mite and pet allergens have had mixed results. However, new so-called ‘improved’ products continue to appear on the market and require subjective evaluation. A randomized controlled trial was done to study the effect of high-efficiency and standard vacuum-cleaners on mite, cat and dog allergen levels and clinical progress.

The homes of 60 house dust mite-allergic patients were studied. Der p 1 (house dust mite), Fel d 1 (cat) and Can f 1 (dog) allergens were measured in four separate locations in each home. Clinical analysis was by lung function, bronchodilator usage and histamine challenge techniques.

There was a significant reduction in Fel d 1 (ng/m<sup>2</sup>) in dust samples from the living-room carpet (p = 0.046), bedroom carpet (p = 0.003) and mattress (p = 0.013) and living-room sofa (p = 0.005) after 12 months of using the high-efficiency cleaners, but only in the mattress sample using the standard cleaners (p = 0.014). Can f 1 (ng/g dust) was reduced in the mattress sample after using the high-efficiency vacuum-cleaners (p = 0.028), but not at other sites. Der p 1 levels were not significantly changed over this period. Clinically, patients in the high-efficiency group showed improvements in peak expiratory flow rate (PEFR) (p = 0.004), FEV<sub>1</sub> (p = 0.026) and bronchodilator usage (p = 0.005) after 12 months. When the cat-sensitive patients were analyzed separately, improvements in histamine PC<sub>20</sub> (p = 0.039) were also seen.

The authors concluded that reducing Fel d 1 concentrations, in the absence of any change in Der p 1 concentrations, can produce significant improvements in the lung function of atopic, asthmatic patients. This effect was primarily achieved in those patients with cat sensitivity, but who did not possess a cat themselves.

### **221. Primary Prevention of Asthma and Atopy During Childhood by Allergen Avoidance in Infancy: A Randomised Controlled Study**

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Primary Prevention of Asthma and Atopy During Childhood by Allergen Avoidance in Infancy: A Randomised Controlled Study was implemented from 1990 to 1999 in the United Kingdom. The study was designed as a 'proof of concept' study to find out whether there was 'a window of opportunity' in infancy when the avoidance of food and inhaled allergens protects against the development of allergic disorders in high-risk infants.

One-hundred and twenty infants with family history of atopy and high cord-blood concentrations of total IgE were allocated randomly to prophylactic and control groups. In the prophylactic group (n=58), lactating mothers avoided allergenic foods and avoided feeding their infants these and soya, wheat, and orange up to the age of 12 months. Formula fed infants were given a soya based protein hydrolysate. The infants' bedrooms and living rooms were treated with an acarididal powder and foam every 3 months, and concentrations of Der p 1 in dust samples were measured. Mattress covers were given as well. In the control group (n=62), the diet of mothers and infants was unrestricted; no acarididal treatment was done and Der p 1 concentrations were measured at birth and at 9 months. A pediatric allergy specialist examined the children at 1, 2, 4 and 8 years of age. Questionnaire, medical examination and skin prick tests were carried out at all visits. At age 8 spirometry and methacholine and exercise challenges were performed and blood was taken for total IgE and inhalant screen.

Symptoms and bronchial hyper responsiveness significantly improved. It was concluded that strict allergen avoidance in infancy in high risk children reduces the development of allergic sensitization to house dust mites.

## **222. Asthma Education and Quality of Life in the Community**

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Dr. Harmesh Moudgil

The authors of this study investigated whether asthma morbidity in minority groups can be reduced by preventative health care measures delivered in the relevant ethnic dialects. This study reports clinical outcomes and quality of life from a community-based project investigating white European (W/E) and Indian subcontinent (ISC) ethnic groups with asthma living in deprived inner city areas of Birmingham, United Kingdom.

Six hundred and eighty nine subjects with asthma (345 W/E, 344 ISC) of mean (SD) age 34.5 (15) years (range 11-59) and mean forced expiratory volume in one second (FEV1) of 80% predicted were interviewed in English, Punjabi, Hindi, or Urdu. Subjects randomized to the active limb of a prospective, open, randomized, controlled, parallel group, 12 month follow up study underwent individually-based asthma education and optimization of drug therapy with four monthly follow up (active intervention) visits. Control groups were seen only at the beginning and end of the study. Urgent or emergency interactions with primary and secondary health care (clinical outcomes) and both cross sectional and longitudinal data from an Asthma Quality of Life Questionnaire (AQLQ) were analyzed.

Clinical outcomes were available for 593 subjects. Fewer of the active intervention group consulted their general practitioner (41.8% versus 57.8%, odds ratio (OR) 0.52 (95% CI 0.37 to 0.74)) or were prescribed antibiotics (34.9% versus 51.2%, OR 0.51 (95% CI 0.36 to 0.72)), but by ethnicity statistically significant changes occurred only in the W/E group with fewer also attending A&E departments and requiring urgent home visits. Active intervention reduced the number of hospital admissions (10 versus 30), GP consultations (341 versus 476), prescriptions of rescue oral steroids (92 versus 177), and antibiotics (220 versus 340), but again significant improvements by ethnicity only occurred in the active W/E group. AQLQ scores were negatively skewed to the higher values; regression analysis showed that lower values were associated with ISC ethnicity. Longitudinal changes (for 522 subjects) in the mean AQLQ scores were small but statistically significant for both ethnic groups, with scores improving in the active and worsening in the control groups.

Active intervention only improved clinical outcomes in the W/E group. AQLQ scores, although lower in the ISC group, were improved by active intervention in both ethnic groups.

## **International Programs: Venezuela**

### **223. Effects of a Self-Management Educational Program for the Control of Childhood Asthma**

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Caracas Venezuela  
Maria Gabriela Perez

Universidad Simon Bolivar in Caracas, Venezuela conducted an asthma study entitled, "Effects of a Self-Management Educational Program for the Control of Childhood Asthma." The objective of

the study was to evaluate the effects of a self-management educational program on 29 children between 6 and 14 years old and their parents implemented in an office setting in Venezuela.

Children were randomly assigned to experimental and control group. Children's asthma knowledge, self-management abilities, index morbidity, parents' asthma knowledge and management abilities were measured. The program consisted of six sessions of asthma education and cognitive-behavioral strategies for the children. The parents received two lectures and an informative brochure.

T-test results indicate that the experimental group experienced statistical significant effects on children's asthma knowledge and practice of self-management abilities and in parents' knowledge compared to the control group. The educational self-management program had a significant impact on the Morbidity Index of the study group at post-test. Younger children benefited more from the program compared to older ones. Children's age is highlighted as a critical variable in designing asthma educational programs.

Results suggest the effectiveness on these types of self-management programs independent of the cultural context.

# Appendix C: Descriptive Data

The following tables provide a descriptive overview of the 223 asthma programs included in the AHOP study. Most of these programs were surveyed via a telephone survey and follow-up correspondence with people involved with the program (n=169, 76%). If contact with someone was not possible, data were extracted from published literature (n=54, 24%).

Data were gathered on program background, planning and design, administration and implementation, and evaluation design and findings. Most questions in the program survey were closed-ended with response options presented in a *check all that apply* format.

For data analysis, each response option was coded as *yes* or *no*. *Missing*, *don't know*, and *not applicable* responses were counted as missing data and are not included in percentage calculations. Therefore the response rates often vary across response options. In the tables that follow, percentages will not always sum to 100 because programs may have reported *yes* to more than one option within these questions. In other question formats, percents may not sum to 100 due to rounding.

## **RESPONDENT DATA**

### **What was your role with this asthma program?**

Respondent Role	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Program Administrator	24	40	60	82	75	109	106	63	169
Principal Investigator	32	53	60	12	11	109	44	26	169
Evaluator	10	17	60	31	28	109	41	24	169
Field Staff	8	13	60	33	30	109	41	24	169
Other	10	17	60	16	15	109	26	15	169

### **Did you work with this asthma program from its inception?**

Respondent worked with program from inception	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	53	88	60	81	74	109	134	79	169
No	7	12	60	28	26	109	35	21	169

## **PROGRAM BACKGROUND**

### **What type of agency is the managing organization?**

Type of Managing Organization	Peer-reviewed programs (n=111)			Programs not peer reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Hospital/Health System	47	43	109	36	32	112	83	38	221
University/Academic Institution	51	47	109	18	16	112	69	31	221
Governmental Agency	2	2	109	17	15	112	19	9	221
Voluntary Organization (e.g., ALA, AAFA, etc.)	1	1	109	13	12	112	14	6	221
Community Clinic	2	2	109	10	9	112	12	5	221
Health Plan	5	5	109	6	5	112	11	5	221
Non-clinical community-based organization (CBO)	1	1	109	9	8	112	10	5	221
School/School System	0	0	109	2	2	112	2	1	221
Other	15	14	109	11	10	112	26	12	221

Examples of "other" organizations include non-profit research institutes and coalitions.

### **Has this program published its evaluation results in any peer-reviewed journal articles?**

Produced peer-reviewed articles or abstracts	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	111	100	111	0	0	112	111	50	223
No	0	0	111	112	100	112	112	50	223

### **Approximately when did the funding for this program begin?**

Year funding began	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
1975-1979	1	2	58	0	0	100	1	1	158
1980-1984	0	0	58	2	2	100	2	1	158
1985-1989	4	7	58	1	1	100	5	3	158
1990-1994	11	19	58	3	3	100	14	9	158
1995-1999	37	64	58	36	36	100	73	46	158
2000-2004	5	9	58	58	58	100	63	40	158

### **Approximately when did the implementation of activities begin?**

Year implementation began	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
1975-1979	4	5	89	0	0	112	4	2	201
1980-1984	0	0	89	2	2	112	2	1	201
1985-1989	4	5	89	2	2	112	6	3	201
1990-1994	21	24	89	5	5	112	26	13	201
1995-1999	52	58	89	36	32	112	88	44	201
2000-2004	9	10	89	67	60	112	76	38	201

### What type of agency was responsible for starting this program?

Type of Managing Organization	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Hospital/Health System	57	52	109	47	42	112	104	47	221
University/Academic Institution	55	50	109	17	15	112	72	33	221
Governmental Agency	11	10	109	32	29	112	43	19	221
Health Plan	13	12	109	10	9	112	23	10	221
Voluntary Organization (e.g., ALA, AAFA, etc.)	2	2	109	16	14	112	18	8	221
Community Clinic	3	3	109	11	10	112	14	6	221
Non-clinical community-based organization (CBO)	3	3	109	7	6	112	10	5	221
School/School System	1	1	109	7	6	112	8	4	221
Other	18	17	109	15	13	112	33	15	221

### Was the program part of a larger initiative?

Part of a larger initiative	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	13	13	101	54	49	111	67	32	212
No	88	87	101	57	51	111	145	68	212

### Was this program part of a coalition?

Part of a coalition	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	11	11	98	50	45	111	61	29	209
No	87	89	98	56	50	111	143	69	209
Managing organization is a coalition	0	0	98	5	5	111	5	2	209

### Was the program based on any other programs that have been evaluated and proven to work?

Based on other program	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Based on formally evaluated and published program	27	26	102	32	30	106	59	28	208
Based on model program that was not formally evaluated	3	3	102	17	16	106	20	10	208
Not based on other program	72	71	102	57	54	106	129	62	208

### Is this asthma program part of a replication project or dissemination of a prepackaged program?

Part of a replication or prepackaged program	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	7	6	109	16	14	112	23	10	221
No	102	94	109	96	86	112	198	90	221

## **PROGRAM PLANNING & DESIGN**

### Was a needs assessment or resource assessment conducted as part of the planning or design of this program?

Needs/resource assessment conducted	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	46	61	75	84	79	106	130	72	181
No	29	39	75	22	21	106	51	28	181

### What issues were examined in the needs or resource assessment? (of those programs that conducted a needs or resource assessment)

Issues Examined	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Needs of the community	37	82	45	80	95	84	117	91	129
Organizational capacity	25	56	45	59	70	84	84	65	129
Strengths of the community	20	45	44	52	62	84	72	56	128
Environmental conditions	18	40	45	50	60	84	68	53	129
Political context	8	18	44	25	30	83	33	26	127
Other issues	6	13	45	7	8	84	13	10	129

### What activities were part of the needs or resource assessment? (of those programs that conducted a needs or resource assessment)

Activities conducted for needs/resource assessment	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Reviewed health outcomes data	38	83	46	75	91	82	113	88	128
Involved key stakeholders	32	71	45	64	79	81	96	76	126
Conducted focus groups	14	31	45	25	32	79	39	31	124
Other activities	12	26	46	4	5	82	16	13	128

## Was a pilot study conducted?

Pilot study	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Pilot study conducted	36	46	79	48	45	106	84	45	185
Program was a pilot study	15	19	79	10	9	106	25	14	185
No pilot study conducted	28	35	79	48	45	106	76	41	185

## Was the program adapted based on the results of the pilot study?

Program adapted based on results of pilot study	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	35	100	35	48	100	48	83	100	83
No	0	0	35	0	0	48	0	0	83

## Which groups were involved in planning this asthma program?

Groups Involved in Planning	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Healthcare Providers	57	95	60	103	98	105	160	97	165
Academic Researchers	52	90	58	70	68	103	122	76	161
Health Educators	33	66	50	79	77	102	112	74	152
Community-based Organizations (CBOs)	22	43	51	82	80	103	104	68	154
Individuals with Asthma	31	61	51	69	67	103	100	65	154
Families of Individuals with Asthma	26	51	51	60	58	103	86	56	154
Environmental Specialists	19	38	50	64	62	103	83	54	153
School Personnel	19	37	52	61	60	102	80	52	154
Other groups	11	100	11	39	100	39	50	100	50

## Does the program have established goals/mission?

Established goals/mission	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	111	100	111	110	100	110	221	100	221
No	0	0	111	0	0	110	0	0	221

### Does the program have clear and measurable objectives?

Clear and measurable objectives	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	3	3	105	35	32	108	38	18	213
No	102	97	105	73	68	108	175	82	213

### Were any theoretical models used to design this program?

Theoretical model(s) used	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	54	82	66	34	35	98	88	54	164
No	12	18	66	64	65	98	76	46	164

### Which theoretical models were used? (of those programs that used any theoretical models to design the program)

Theoretical Model	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	N	%	Responses
Social Learning Theory/Social Cognitive Theory	31	57	54	8	26	31	39	46	85
Health Belief Model	10	19	54	13	42	31	23	27	85
Self-Regulation Model	13	24	54	8	26	31	21	25	85
Models of the Physician-Patient Relationship	7	13	54	4	13	31	11	13	85
Transtheoretical Model (TTM)/Stages of Change	3	6	54	8	26	31	11	13	85
Family and Social Systems Theory	5	9	54	4	13	31	9	11	85
Communication Theory	4	7	54	1	3	31	5	6	85
Models of Health, Illness, and Sick Role Behavior	1	2	54	3	10	31	4	5	85
Theory of Reasoned Action/Planned Behavior	1	2	54	3	10	31	4	5	85
Ecological Theory	2	4	54	1	3	31	3	4	85
Attribution, Control, and Decision-Making Theory	1	2	54	2	6	31	3	4	85
Other theoretical model(s)*	19	35	54	10	32	31	29	34	85

\*Examples of "other" theoretical models cited include the Chronic Care Model, the Theory of Cognitive Development, and Motivational Interviewing Principles.

### Were any theories of behavioral change used to design this program?

Theories of behavioral change used	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	4	29	14	20	29	68	24	29	82
No	10	71	14	48	71	68	58	71	82

### Which theories of behavior change were used? (of those programs that used theories of behavior change to design the program)

Theoretical Model Used	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	N	%	Responses
Social Learning Theory/Social Cognitive Theory	2	50	4	3	15	20	5	21	24
Health Belief Model	0	0	4	2	10	20	2	8	24
Transtheoretical Model (TTM)/Stages of Change	1	25	4	1	5	20	2	8	24
Other theoretical model(s)	1	25	4	14	70	20	15	63	24

### What was the age range of the targeted population?

Age of Target Population	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	N	%	Responses
Children only	65	65	111	81	72	112	146	65	223
Adults only	23	21	111	7	6	112	30	13	223
No specific target	7	6	111	17	15	112	24	11	223
Both children and adults	15	14	111	7	6	112	22	10	223

### Was the program intentionally designed to target an urban, suburban, or rural area?

Geographic area of target population	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	N	%	Responses
No specific target	63	58	109	51	46	112	114	52	221
Urban	43	39	109	46	41	112	89	40	221
Rural	4	4	109	13	12	112	17	8	221
Suburban	3	3	109	11	10	112	14	6	221

### Was the program intentionally designed to target a certain sex? If so, which one?

Sex of target population	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	N	%	Responses
No specific target	107	97	110	109	97	112	216	97	222
Female Only	3	3	110	3	3	112	6	3	222
Male Only	3	3	110	2	2	112	5	2	222

**Was the program intentionally designed to target a certain race or ethnic group? If yes, which ones?**

Race/Ethnicity of target population	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	N	%	Responses
No specific target	84	77	109	92	82	112	176	80	221
Hispanic/Latino	13	12	109	15	13	112	28	13	221
Black/African-American	15	14	109	9	8	112	24	11	221
Asian	7	6	109	3	3	112	10	5	221
White	6	6	109	2	2	112	8	4	221
American Indian/ Alaskan Native	1	1	109	1	1	112	2	1	221
Native Hawaiian	1	1	109	0	0	112	1	0	221
Other	0	0	109	1	1	112	1	0	221

**Was the program intentionally designed to target a certain socioeconomic group? If yes, what income level?**

Income level of target population	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	N	%	Responses
No specific target	75	69	108	64	57	112	139	63	220
Low income	33	31	108	48	43	112	81	37	220
Middle income	1	1	108	1	1	112	2	1	220
High income	0	0	108	0	0	112	0	0	220

**PROGRAM IMPLEMENTATION**

**What types of strategies were used in the program overall?**

Program Strategies	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	N	%	Responses
Asthma education	102	92	111	112	100	112	214	96	223
Home visits	34	31	100	62	56	111	96	43	221
Systems change	24	22	111	70	63	112	94	42	223
Clinical quality improvement	13	12	111	70	63	112	83	37	223
Case management/Care coordination	12	11	111	50	45	110	62	28	221
Policy change	7	6	111	49	44	112	56	25	223
Other	1	1	111	0	0	112	1	0	223

### Who received the asthma education? (of those programs that used asthma education)

Asthma Education Recipients	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	N	%	Responses
Individuals with asthma	93	91	102	103	92	112	196	92	214
Family/Caregivers of people with asthma	62	61	102	104	93	112	166	78	214
Healthcare providers, including school nurses	27	26	102	83	74	112	110	51	214
Members of the general population	7	7	102	57	51	112	64	30	214
School personnel, NOT including school nurses	11	11	102	52	46	112	63	29	214
Daycare workers	6	6	102	45	40	112	51	24	214
Other	4	4	102	8	7	112	12	6	214

### What teaching strategies were used in the asthma education? (of those programs that used asthma education)

Teaching Strategies	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	N	%	Responses
One-on-one instruction	78	77	101	103	92	112	181	85	213
Skill demonstration with practice and feedback	66	66	100	98	88	112	164	77	212
Open discussion	56	56	100	97	87	112	153	72	212
Group presentations or lectures	53	52	101	87	78	112	140	66	213
Problem-solving exercises	40	42	96	72	75	111	112	54	207
Videos	24	24	99	73	66	111	97	46	210
Computer-based exercises	7	7	100	27	24	111	34	16	211
Other	29	28	102	26	23	112	55	26	214

### What were the behavioral goals of the asthma education? (of those programs that used asthma education)

Behavioral Goals	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	N	%	Responses
Increasing knowledge	96	99	97	112	100	112	208	100	209
Raising awareness	88	91	97	110	98	112	198	95	209
Developing skills	82	85	97	107	96	112	189	90	209
Other	8	8	97	31	28	112	39	19	209

**Were the materials used in the program overall previously existing and not adapted, adapted for use in this program, and/or newly created for the program?**

Types of Materials	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	N	%	Responses
Newly developed for use in this program	51	82	62	94	88	107	145	86	169
Adapted materials	34	63	54	92	87	106	126	79	160
Previously existing materials, not adapted	37	63	59	84	79	106	121	73	165

**How were the materials tailored to meet the needs of the participants?**

Tailoring of materials	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	N	%	Responses
Chosen to meet specific educational needs	42	59	71	77	72	107	119	67	178
Offered in languages other than English	31	44	71	87	81	107	118	66	178
Written to match reading level of participants	31	43	72	86	80	107	117	65	179
Culturally tailored for certain racial, ethnic, & geographic groups	21	30	71	39	36	107	60	34	178
Other	4	6	72	7	7	107	11	6	179

**Was there a process to determine the quality and validity of the materials used?**

Process to determine quality/validity of materials	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	42	86	49	80	77	104	122	80	153
No	7	14	49	24	23	104	31	20	153

**Are any of the materials currently available for use by others?**

Materials available for use by others	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	39	83	47	98	93	105	137	90	152
No	8	17	47	7	7	105	15	10	152

**Which environmental asthma triggers were addressed in the program overall, in any way, including educational topics?**

Environmental triggers addressed	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	N	%	Responses
Dust mites	71	65	110	110	98	112	181	82	222
Cat/Dog dander	70	64	109	111	99	112	181	82	221
Environmental tobacco smoke/ tobacco smoke	70	63	111	111	99	112	181	81	223
Mold	47	44	108	110	98	112	157	71	220
Cockroach allergen	49	45	109	101	90	112	150	68	221
Outdoor allergens inside the home (e.g., pollen)	50	46	109	98	88	112	148	67	221
Dampness	40	37	109	97	87	111	137	62	220
Outdoor air quality	27	25	108	85	76	112	112	51	220
Rodents (rats/mice)	31	29	108	79	72	110	110	50	218
Unspecified/ General triggers	42	38	111	3	3	112	45	20	223
Other	21	19	110	55	49	112	76	34	222

**What strategies were used to address environmental issues or topics?**

Environmental strategies used	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	N	%	Responses
Education on asthma trigger identification, control, or avoidance	102	93	110	112	100	112	214	96	222
Assessment of exposure to asthma triggers	67	61	110	97	87	112	164	74	222
Actions to change the home environment	30	27	111	60	54	112	90	40	223
Environmental policy interventions	5	5	111	22	20	112	27	12	223
Actions to change the environment in an institution	2	2	111	14	13	112	16	7	223
Other	1	1	111	0	0	112	1	0	223

**How was exposure measured? (of those programs that included an assessment of exposure to asthma triggers)**

How exposure measured	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	N	%	Responses
Clinical interview	36	57	63	59	61	97	95	59	160
Visual assessment	24	37	65	66	68	97	90	56	162
Self-report	24	37	65	65	67	97	89	55	162
Analysis of physical samples	19	29	65	12	12	97	31	19	162
Other	0	0	65	0	0	97	0	0	162

**Did the program clinically assess whether participants were sensitive to environmental triggers? (of those programs that included an assessment of exposure to asthma triggers)**

Program clinically assessed trigger sensitivity	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	34	54	63	25	26	97	59	37	160
No	29	46	63	72	74	97	101	63	160

**How was this done? (of those programs that clinically assessed sensitivity to asthma triggers)**

Method of clinically assessing sensitivity	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Skin test	31	94	33	18	75	24	49	86	57
Blood test	5	15	33	11	46	24	16	28	57
Other	0	0	33	0	0	24	0	0	57

**Was the intervention tailored based on this assessment of sensitivity to environmental asthma triggers?**

Intervention tailored based on trigger sensitivity	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	23	79	29	21	88	24	44	83	53
No	6	21	29	3	12	24	9	17	53

**What kinds of actions were taken to change the home environment? (of those programs that took actions to change the home environment)**

Actions to change home environment	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	N	%	Responses
Provide materials to control triggers	26	87	30	53	88	60	79	88	90
Demonstrated use of environmental controls	15	50	30	36	60	60	51	57	90
Provide direct remediation services	17	57	30	30	50	60	47	52	90
Other	1	3	30	0	0	60	1	1	90

**What kinds of actions were taken to change the environment in an institution? (of those programs that took actions to change the environment in an institution)**

Actions to change institutional environment	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	N	%	Responses
Provide materials to control triggers	0	0	2	4	29	14	4	25	16
Provide direct remediation services	2	100	2	2	14	14	4	25	16
Demonstrated use of environmental controls	0	0	2	3	21	14	3	19	16
Other	0	0	2	8	57	14	8	50	16

## Where did the program take place?

Program setting(s)	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	N	%	Responses
Physician's Office/Clinic	55	51	108	52	46	112	107	49	220
Home	35	32	108	60	54	112	95	43	220
Hospital	18	17	108	32	29	112	50	23	220
School/School system	12	11	108	37	33	112	49	22	220
Community	8	7	108	13	12	112	21	10	220
Daycare/Preschool	2	2	108	15	13	112	17	8	220
Other	11	10	108	22	20	112	33	15	220

## Who delivered the program? In other words, who conducted trainings, performed assessments, or offered other services in order to change the behavior of others?

Who delivered program?	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	N	%	Responses
Other healthcare providers (RN, RT, others)	63	62	101	82	73	112	145	68	213
Physicians	42	42	101	42	38	112	84	39	213
Certified Asthma Educators/Other credentialed health educators	13	13	101	33	29	112	46	22	213
Lay community workers/Community educators/ Outreach workers	11	11	101	28	25	112	39	18	213
Social workers	6	6	101	12	11	112	18	8	213
Case managers	4	4	101	13	12	112	17	8	213
Research Staff	12	12	101	3	3	112	15	7	213
School Nurses	3	3	101	11	10	112	14	7	213
Environmental specialists	2	2	101	8	7	112	10	5	213
Parents/Caregivers of children with asthma	3	3	101	2	2	112	5	2	213
School Teachers	3	3	101	2	2	112	5	2	213
Community volunteers	2	2	101	3	3	112	5	2	213
Staff of managed care plans or health insurers	1	1	101	3	3	112	4	2	213
Children/Students in general	2	2	101	1	1	112	3	1	213
Other school personnel	1	1	101	1	1	112	2	1	213
Daycare Providers	0	0	101	2	2	112	2	1	213
Children/Students with asthma	1	1	101	0	0	112	1	0	213
Adults with asthma	0	0	101	0	0	112	0	0	213
Church Personnel	0	0	101	0	0	112	0	0	213
Others	11	11	101	12	11	112	23	11	213

**Were these workers who delivered the program paid staff, volunteers, or both?**

Who delivered program	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	N	%	Responses
Paid staff	80	98	82	109	98	111	189	98	193
Volunteers	11	13	82	16	14	111	27	14	193

**What qualifications, if any, were the workers required to have in order to conduct the program activities?**

Worker qualifications	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	N	%	Responses
Special training	74	84	88	100	91	110	174	88	198
Academic degree	71	81	88	87	79	110	158	80	198
Prior experience	27	31	88	38	35	110	65	33	198
Relationship to target population	11	13	88	22	20	110	33	17	198
Other	8	9	88	8	7	110	16	8	198

**Were ongoing training opportunities available for the workers?**

Ongoing worker training available	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	31	63	49	95	90	105	126	82	154
No	18	37	49	10	10	105	28	18	154

**Did the composition of staff reflect composition of participants?**

Workers reflected participant demographics	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	34	83	41	65	89	73	99	87	114
No	7	17	41	8	11	73	15	13	114

**Did any of the workers live in or come from the community they serve?**

Workers from target community	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	43	83	52	91	88	103	134	86	155
No	9	17	52	12	12	103	21	14	155

**Who participated in the program? In other words, who actually received the intervention, whose behavior the program was trying to change?**

Program participants	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	N	%	Responses
Children/Students with asthma	68	65	104	80	78	102	148	72	206
Parents/Caregivers of children with asthma	57	54	105	79	78	101	136	66	206
Adults with asthma	42	39	108	27	26	105	69	32	213
Physicians	9	8	110	23	22	106	32	15	216
Other healthcare providers	5	5	109	15	14	107	20	9	216
Daycare Providers	1	1	111	9	8	110	10	5	221
School Nurses	1	1	111	7	6	110	8	4	221
Children/Students in general	2	2	111	2	2	111	4	2	222
School Teachers	1	1	111	3	3	107	4	2	218
Other school personnel	0	0	111	3	3	108	3	1	219
Lay community workers/Community educators/ Outreach workers	0	0	111	3	3	111	3	1	222
Community volunteers	1	1	110	1	1	111	2	1	221
Social workers	0	0	111	1	1	110	1	0	221
Case managers	0	0	111	1	1	111	1	0	222
Certified Asthma Educators/Other credentialed health educators	1	1	111	0	0	111	1	0	222
Staff of managed care plans or health insurers	1	1	111	0	0	111	1	0	222
Church personnel	0	0	110	1	1	112	1	0	222
Environmental specialists	0	0	111	0	0	111	0	0	222
Other	4	4	110	3	3	111	7	3	221

**How were the program activities tailored to meet the needs of the participants?**

Types of tailoring	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	N	%	Responses
Content or delivery method tailored based on individual health or educational needs	70	78	90	98	89	110	168	84	200
Offered in languages other than English	28	31	89	72	65	110	100	50	199
Culturally tailored for certain racial, ethnic, and geographic groups	18	20	89	42	38	110	60	30	199
Other	7	8	90	18	16	110	25	13	200

## How were participants recruited?

Participant recruitment strategies	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	N	%	Responses
Health screening/Claims data/Utilization review	69	63	109	57	51	112	126	57	221
Referrals	22	20	109	65	58	112	87	39	221
Predefined group	38	35	109	40	36	112	78	35	221
Volunteers	34	31	109	40	36	112	74	33	221
Outreach	28	26	109	46	41	112	74	33	221
Word of mouth	3	3	109	20	18	112	23	10	221
Other	3	3	109	4	4	112	7	3	221

## What retention strategies were used to keep participants involved?

Participant retention strategies	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	N	%	Responses
Stipends/ Free goods or services	33	52	64	63	60	106	96	56	170
Relationship building	32	50	64	59	56	106	91	54	170
Food	4	6	64	20	19	106	24	14	170
Addressing other social needs	4	6	64	18	17	106	22	13	170
CME credits	2	3	64	15	14	106	17	10	170
Peer influence	4	6	64	9	8	106	13	8	170
Other	8	13	64	6	6	106	14	8	170

## Did the program include a structured way for participants to celebrate success?

Participants celebrated success	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	24	42	57	55	51	108	79	48	165
No	33	58	57	53	49	108	86	52	165

## Were the activities in the program monitored to make sure they were being conducted as planned?

Activities monitored	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	45	94	48	100	93	107	145	94	155
No	3	6	48	7	7	107	10	6	155

**Were any changes made based on the results of the monitoring? (of those programs whose activities were monitored)**

Changes made based on results of monitoring	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	28	68	41	84	85	99	112	80	140
No	13	32	41	15	15	99	28	20	140

**PROGRAM EVALUATION**

**Is the evaluation ongoing or was it repeated?**

Program evaluation ongoing/ repeated	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	11	10	109	75	70	107	86	40	216
No	98	90	109	32	30	107	130	60	216

**Percentage of programs that measured each health outcome**

	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Hospitalizations	69	62	111	73	65	112	142	64	223
Emergency department (ED) visits	58	52	111	73	65	112	131	59	223
Urgent care visits	4	4	111	23	21	112	27	12	223
Sick (unscheduled) office visits	25	23	111	27	24	112	52	23	223
Well (scheduled) office visits	14	13	111	18	16	112	32	14	223
Healthcare utilization general	23	21	111	11	10	112	34	15	223
Quality of life for children	16	14	111	33	29	112	49	22	223
Quality of life for parents	16	14	111	17	15	112	33	15	223
Quality of life for adults	25	23	111	7	6	112	32	14	223
Functional status	22	20	111	27	24	112	49	22	223
School absences	26	23	111	52	46	112	78	35	223
Work loss	10	9	111	30	27	112	40	18	223
School/work loss general	8	7	110	2	2	112	10	5	222
Symptoms	66	59	111	58	52	112	124	56	223
Lung function	36	32	111	18	16	112	54	24	223
Medication use	53	48	111	71	63	112	124	56	223
Self-management skills	35	32	111	34	30	112	69	31	223
Use of asthma action plan	8	7	111	40	36	112	48	22	223
Peak flow meter use	6	5	111	11	10	112	17	8	223
Change in clinical actions	16	14	111	43	38	112	59	26	223
Other	16	14	111	1	1	112	17	8	223

*Criteria for inclusion in this study included the requirement that all programs reported completing a health outcomes evaluation that demonstrated a positive impact on at least one health outcome.*

## Percentage of programs that improved each health outcome

	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Hospitalizations	42	61	69	66	90	73	108	76	142
Emergency department (ED) visits	38	66	58	65	90	73	103	79	131
Urgent care visits	1	25	4	21	91	23	22	82	27
Sick (unscheduled) office visits	17	71	25	25	89	27	42	81	52
Well (scheduled) office visits	10	71	14	12	67	18	22	69	32
Healthcare utilization general	15	65	23	9	90	11	24	73	34
Quality of life for children	12	75	16	29	91	33	41	85	49
Quality of life for parents	11	69	16	14	88	17	25	78	33
Quality of life for adults	18	72	25	5	71	7	23	72	32
Functional status	16	73	22	23	85	27	39	80	49
School absences	15	58	26	45	88	52	60	78	78
Work loss	8	80	10	27	93	30	35	90	40
School/work loss general	5	63	8	2	100	2	7	70	10
Symptoms	47	71	66	50	86	58	97	78	124
Lung function	19	53	36	12	71	18	31	59	54
Medication use	34	64	53	65	93	71	99	81	124
Self-management skills	29	83	35	31	91	34	60	87	69
Use of asthma action plan	6	75	8	37	93	40	43	90	48
Peak flow meter use	5	83	6	10	91	11	15	88	17
Change in clinical actions	13	81	16	38	88	43	51	86	59
Other	10	59	16	1	100	1	11	61	17

**Did the evaluation include any measurement of changes in environmental triggers or exposures, either through direct physical measures OR by tracking behaviors aimed at reducing environmental triggers?**

Environmental evaluation	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	34	31	110	36	32	112	70	32	222
No	76	69	110	76	68	112	152	68	222

## Percentage of programs that measured each environmental outcome

Environmental outcomes measured and improved	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Environmental tobacco smoke	16	47	34	22	61	36	38	54	70
Cat or dog dander	16	47	34	20	56	36	36	51	70
Dust mites	16	47	34	19	53	36	35	50	70
Cockroach allergen	9	26	34	17	47	36	26	37	70
Mold	2	6	34	16	44	36	18	26	70
Rodents	3	9	34	13	36	36	16	23	70
Unspecified triggers	7	21	34	5	14	35	12	17	69
Dampness	2	6	34	8	22	36	10	14	70
Outdoor allergens inside the home	1	3	34	6	17	36	7	10	70
Outdoor air quality	0	0	34	3	8	38	3	4	70
Other	4	12	34	11	31	36	15	21	70

## Percentage of programs that improved each environmental outcome

Environmental outcomes measured and improved	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Environmental tobacco smoke	6	40	16	15	71	21	21	58	36
Cat or dog dander	5	33	15	11	61	18	16	49	33
Dust mites	12	75	16	15	88	17	27	82	33
Cockroach allergen	7	78	9	8	53	15	15	63	24
Mold	1	50	2	11	73	15	12	71	17
Rodents	3	100	3	5	45	11	8	57	14
Unspecified triggers	5	71	7	4	67	6	9	69	13
Dampness	0	0	1	4	57	7	4	50	8
Outdoor allergens inside the home	0	0	1	2	33	6	2	29	7
Outdoor air quality	0	0	0	1	25	4	1	25	4
Other	3	75	4	8	73	11	11	73	15

## What population was included in the outcomes evaluation?

Participants of outcome evaluation	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
All program participants	100	90	111	86	78	110	186	84	221
A subset of program participants	12	11	111	17	15	110	29	13	221
Entire community or geographic area	1	1	111	6	5	110	7	3	221
Some other population	0	0	111	4	4	110	4	2	221

### What was the age range of the participants of the outcomes evaluation?

Age of evaluation participants	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Children only	63	62	102	72	71	101	135	67	203
Both children and adults	18	18	102	23	23	101	41	20	203
Adults only	21	21	102	6	6	101	27	13	203
No specific target	0	0	111	0	0	101	0	0	203

### What geographic area did the participants of the outcomes evaluation come from-- urban, suburban, or rural?

Geographic area of evaluation participants	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Urban	69	88	78	89	87	102	158	88	180
Suburban	25	32	78	48	47	102	73	41	180
Rural	16	21	78	44	43	102	60	33	180

### Were the participants of the outcomes evaluation male, female, or both?

Sex of evaluation participants	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Female only	0	0	101	1	1	93	1	1	194
Male only	0	0	101	0	0	100	0	0	201
Both female and male	101	100	101	92	99	93	193	99	194

### What was the race or ethnicity of the participants of the outcomes evaluation?

Race/Ethnicity of evaluation participants	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Black/African-American	52	71	73	74	90	82	126	81	155
White	53	73	73	68	82	83	121	78	156
Hispanic/Latino	34	47	73	70	85	82	104	67	155
Asian	26	36	73	44	54	82	70	45	155
Native Hawaiian/Pacific Islander	7	10	73	24	29	82	31	20	155
American Indian/Alaskan Native	8	11	73	21	26	82	29	19	155
Other	19	26	73	23	28	82	42	27	155

**What was the socioeconomic status of the participants of the outcomes evaluation -- low income, middle income, or high income?**

Income level of evaluation participants	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Low income	61	94	65	73	99	74	134	96	139
Middle income	27	42	64	27	36	74	54	39	138
High income	7	11	64	17	23	74	24	17	138

**Was a sample size calculation performed?**

	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	42	66	64	19	19	101	61	37	165
No	22	34	64	82	91	101	104	63	165

**Were data collection tools newly created for use in the evaluation, adapted from previously existing tools, or used without adaptation?**

Evaluation data collection instruments	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Newly developed for use in this evaluation	50	83	60	79	77	102	129	80	162
Previously existing, not adapted	53	75	71	42	43	98	95	56	169
Adapted for use in this evaluation	29	48	60	41	42	98	70	44	158

**Were the evaluation materials validated?**

Evaluation materials evaluated	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	64	91	70	58	67	86	122	78	156
No	6	9	70	28	33	86	34	22	156

**Was a statistical analysis used to determine if the outcomes were significant?**

Statistical analysis used	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	111	100	111	64	60	106	175	81	217
No	0	0	111	42	40	106	42	19	217

### What statistical methods were used to analyze the data? (of those programs that used statistical analysis)

Statistical analysis methods	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Chi-square	57	55	104	24	41	58	81	50	162
T-test	55	53	104	24	41	58	79	49	162
Descriptive	28	27	104	32	54	59	60	37	163
ANOVA	25	24	104	8	14	58	33	20	162
Logistic regression	15	14	104	5	9	58	20	12	162
Linear regression	9	9	104	3	5	58	12	7	162
Other	71	68	104	21	36	58	92	57	162

### What was the design of the evaluation used to determine the program's impact on health outcomes?

Evaluation design	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Pre-post design, without a comparison group	33	30	111	72	66	109	105	48	220
Randomized Controlled Trial	65	59	111	11	10	109	76	35	220
Time Series	4	4	111	22	20	109	26	12	220
Comparison Group, without randomization or matching	9	8	111	6	6	109	15	7	220
Case Studies/ Case Series	0	0	111	5	5	109	5	2	220
Matched Comparison	2	2	111	1	1	109	3	1	220
Other	0	0	111	3	3	109	3	1	220

### Who conducted the evaluation?

Who conducted the evaluation	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Staff	100	97	103	77	76	101	177	87	204
Contractor/Consultant	6	6	103	27	27	101	33	16	204
Other	2	2	103	6	6	101	8	4	204

**What types of data were collected to allow comparison of the groups to control for bias(es)? (of those programs that used *randomized control trial* for its evaluation design)**

Comparison data collected	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Age	54	87	62	7	88	8	61	87	70
Race	32	52	62	6	75	8	38	54	70
Asthma Severity	28	45	62	5	63	8	33	47	70
Income	19	31	62	2	25	8	21	30	70
Retention	13	21	62	2	25	8	15	21	70
Community/Geographic Area	7	11	62	3	38	8	10	14	70
Other	59	95	62	8	100	8	67	96	70

**On which characteristics was matching based? (of those programs that used *matched comparison* for its evaluation design)**

Matching characteristics	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Age	2	100	2	2	100	2	4	100	4
Race	1	50	2	2	100	2	3	75	4
Asthma Severity	1	50	2	2	100	2	3	75	4
Income	0	0	2	1	50	2	1	25	4
Other	2	100	2	2	100	2	4	100	4

**Were there any differences between groups? (of those programs that used *matched comparison* for its evaluation design)**

Differences between matched comparison groups	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	0	0	1	2	100	2	2	67	3
No	1	100	1	0	0	2	1	33	3

**What types of data were collected to allow comparison of the intervention vs. control groups to control for bias(es)? (of those programs that used *comparison group without randomization or matching* for its evaluation design)**

Comparison data collected	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Age	8	89	9	4	80	5	12	86	14
Race	3	33	9	2	40	5	5	36	14
Asthma Severity	3	33	9	2	40	5	5	36	14
Income	0	0	9	2	40	5	2	14	14
Community/ Geographic Area	1	11	9	1	20	5	2	14	14
Other	8	89	9	1	20	5	9	64	14

**Were there any differences between groups? (of those programs that used *comparison group without randomization or matching* for its evaluation design)**

Differences between groups	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	5	56	9	2	67	3	7	58	12
No	4	44	9	1	33	3	5	42	12

**Were the same measures used at both pre and post? (of those programs that used *pre-post design without a comparison group* for its evaluation design)**

Same set of measures used pre and post	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	32	100	32	68	100	68	100	100	100
No	0	0	32	0	0	68	0	0	100

**Were the same measures used at each data collection point? (of those programs that used *time series* for its evaluation design)**

Same set of measures used at each data collection point	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	3	100	3	20	100	20	23	100	23
No	0	0	3	0	0	20	0	0	23

## **PROGRAM ADMINISTRATION**

**What is the total amount of funding required to support this program per year?**

Annual Funding	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Less than \$25,000	4	11	38	9	11	82	13	11	120
\$25,000 – \$49,999	2	5	38	10	12	82	12	10	120
\$50,000 – \$99,999	8	21	38	12	15	82	20	17	120
\$100,000 - \$149,999	4	11	38	11	13	82	15	13	120
\$150,000 - \$199,999	2	5	38	10	12	82	12	11	120
\$200,000 - \$499,999	10	26	38	15	18	82	25	21	120
\$500,000 – \$999,999	6	16	38	9	11	82	15	13	120
\$1,000,000 and above	2	5	38	6	7	82	8	7	120

### Does the funding amount include evaluation costs?

Funding includes evaluation costs	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	35	78	45	76	82	93	111	80	138
No	10	22	45	17	18	93	27	20	138

### Is/was the program supported through grants or other external funding?

Supported through external funding	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	78	90	87	89	82	108	167	86	195
No	9	10	87	19	18	108	28	14	195

### What were the sources of external funding for this program? (of those programs that were supported through external funding)

External funding source(s)	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Federal Government	41	52	79	37	42	89	78	46	168
Foundation	26	33	79	35	40	89	61	36	168
Pharmaceutical Company	15	19	79	12	13	89	27	16	168
State Government	5	6	79	18	20	89	23	14	168
Local Government	3	4	79	10	11	89	13	8	168
Hospital	5	6	79	6	7	89	11	7	168
Other	26	33	79	28	31	89	54	32	168

Examples of "other" funding sources cited include health plans, voluntary organizations, and corporations.

### Approximately how many people were on the program staff *overall*, including administrative, field, and evaluation staff, paid and volunteer?

Number of staff	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
1 - 4	16	31	52	25	24	104	41	26	156
5 - 9	20	38	52	37	36	104	57	37	156
10 - 14	7	13	52	19	18	104	26	17	156
15 - 19	0	0	52	7	7	104	7	5	156
20 - 24	3	6	52	4	4	104	7	5	156
25-29	3	6	52	3	3	104	6	4	156
30 and above	3	6	52	9	9	104	12	8	156

**Approximately how many *paid full time equivalents* were on the program staff overall, including administrative, field, and evaluation staff?**

Number paid FTE	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
none	1	2	47	5	5	99	6	4	146
Less than one	4	9	47	5	5	99	9	6	146
1 – 4	27	60	47	58	56	99	85	58	146
5 - 9	10	21	47	17	17	99	27	18	146
10 – 19	3	6	47	7	7	99	10	7	146
20 and above	2	4	47	7	7	99	9	6	146

**Approximately how many *volunteer full time equivalents* were on the program staff, including administrative, field, and evaluation staff?**

Number volunteer FTE	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
none	40	82	49	76	75	101	116	77	150
Less than one	3	6	49	7	7	101	10	7	150
1	1	2	49	8	8	101	9	6	150
2	1	2	49	1	1	101	2	1	150
3	1	2	49	3	3	101	4	3	150
4	0	0	49	1	1	101	1	1	150
5 and above	3	6	49	5	5	101	8	5	150

**Were the field staff supervised on a regular basis?**

Field staff supervised on regular basis	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	41	93	44	93	92	101	134	92	145
No	3	7	44	8	8	101	11	8	145

**Did the program staff regularly celebrate success?**

Staff celebrated success	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	30	61	49	75	73	103	105	69	152
No	19	39	49	28	27	103	47	31	152

### Did the program have an office located within the target community?

Program office in target community	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	71	92	77	92	94	98	163	93	175
No	6	8	77	6	6	98	12	7	175

### Please rate the strength of operational leadership for this asthma program on a scale from 1 to 5.

“Operational leadership,” means the overall direction and management of day-to-day program activities.

Strength of operational leadership	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
1 Very weak	0	0	49	1	1	105	1	1	154
2 2 <sup>nd</sup> degree weak	0	0	49	2	2	105	2	1	154
3 Neither weak nor strong	0	0	49	12	11	105	12	8	154
4 4 <sup>th</sup> degree strong	14	29	49	33	31	105	47	31	154
5 Very strong	35	71	49	57	54	105	92	60	154

### Please rate the strength of the visionary leadership within the program on a scale of 1 to 5. “Visionary leadership,” means leadership that builds momentum, support, and enthusiasm for the program internally.

Strength of visionary leadership	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Very weak	0	0	49	0	0	104	0	0	153
2 <sup>nd</sup> degree weak	0	0	49	0	0	104	0	0	153
Neither weak nor strong	2	4	49	12	12	104	14	9	153
4 <sup>th</sup> degree strong	14	29	49	27	26	104	41	27	153
Very strong	33	67	49	65	63	104	98	64	153

## **PROGRAM CONTEXT**

### Did this asthma program collaborate with any other agencies or institutions?

Collaborated with other agencies or institutions	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	56	80	70	107	96	111	163	90	181
No	14	20	70	4	4	111	18	10	181

**With what types of agencies or institutions did the program collaborate? (of those programs that collaborated with other agencies or institutions)**

Types of collaborators	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Hospital/Health system	32	57	56	72	67	107	104	64	163
Governmental agency	20	36	56	71	66	107	91	56	163
School/School system	22	39	56	53	50	107	75	46	163
University/Academic institution	29	52	56	45	42	107	74	45	163
Voluntary organization (e.g., ALA, AAFA)	17	30	56	52	49	107	69	42	163
Non-clinical community-based organization (CBO)	16	29	56	50	47	107	66	40	163
Community clinic	11	20	56	42	39	107	53	33	163
Health plan/Health insurer	14	25	56	37	35	107	51	31	163
Other	24	43	56	49	46	107	73	45	163

**What kinds of collaboration took place? (of those programs that collaborated with other agencies or institutions)**

Types of collaboration	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Sharing resources or materials	42	76	55	97	92	106	139	86	161
Joint program planning	40	71	56	95	90	106	135	83	162
Making cross referrals of participants	22	40	55	75	71	105	97	61	160
Technical assistance	27	50	54	68	64	106	95	59	160
Collaboration on policy action	14	26	54	55	52	105	69	43	159
Memorandum of agreement	10	19	54	43	41	104	53	34	158
Other	6	11	56	9	8	106	15	9	162

**Was there a history of collaboration among any of these groups before this asthma program started? (of those programs that collaborated with other agencies or institutions)**

History of collaboration existed	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	30	71	42	63	63	100	93	65	142
No	12	29	42	37	37	100	49	35	142

**Was there someone who worked to build political and community support and enthusiasm for the program? In other words, was there someone acting as a “champion” for the program?**

Program champion existed	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	41	82	50	90	84	107	131	83	157
No	9	18	50	17	16	107	26	17	157

**Did the asthma program experience any change in political situation?**

Program experienced change in political situation	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	20	41	49	52	49	107	72	46	156
No	29	59	49	55	51	107	84	84	156

**Rate on a scale from 1 to 5 how well the asthma program dealt with the change in political situation. (of those programs that experienced a change in political situation)**

Quality of response to political change	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Very poorly	0	0	20	1	2	50	1	1	70
2 <sup>nd</sup> degree poorly	0	0	20	3	6	50	3	4	70
Neither poorly nor well	3	15	20	9	18	50	12	17	70
4 <sup>th</sup> degree very well	9	45	20	13	26	50	22	31	70
Very well	8	40	20	24	48	50	32	46	70

**Did the asthma program experience any change in financial situation?**

Program experienced change in financial situation	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	20	42	48	66	62	106	86	56	154
No	28	58	48	40	38	106	68	44	154

**Rate on a scale from 1 to 5 how well the asthma program dealt with the change in financial situation. (of those programs that experienced a change in financial situation)**

Quality of response to financial change	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Very poorly	0	0	20	0	0	66	0	0	86
2 <sup>nd</sup> degree poorly	1	5	20	5	8	66	6	7	86
Neither poorly nor well	3	15	20	12	18	66	15	17	86
4 <sup>th</sup> degree very well	8	40	20	18	27	66	26	30	86
Very well	8	40	20	31	47	66	39	45	86

## **PROGRAM IMPACT AND SUSTAINABILITY**

### **Is the program still ongoing? (at time of survey)**

Program ongoing (at time of survey)	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	31	30	102	84	75	112	115	54	214
No	71	70	102	28	25	112	99	46	214

### **How is the continuation of the program supported? (of those programs that were ongoing at time of survey)**

Funding source(s) for continuation	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Institutionalization/ Systemic adaptation	22	73	30	48	57	84	70	61	114
Additional funding	12	40	30	40	48	84	52	46	114
Original grant funding	4	13	30	15	18	84	19	17	114
Other	6	20	30	15	18	84	21	18	114

### **Are there any plans for dissemination or replication of the program?**

Dissemination/replication status	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Dissemination or replication in progress	36	58	62	47	44	108	83	49	170
No plans for dissemination or replication	17	27	62	37	34	108	54	32	170
Dissemination or replication planned for the future	9	15	62	24	22	108	33	19	170

### **Has the program received any recognition?**

Program received recognition	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	55	92	60	85	79	108	140	83	168
No	5	8	60	23	21	108	28	17	168

### **Has the program had any unintended impacts?**

Program had unintended impacts	Peer-reviewed programs (n=111)			Programs not peer-reviewed (n=112)			Total Programs (n=223)		
	n	%	Responses	n	%	Responses	n	%	Responses
Yes	32	59	54	62	58	107	94	58	161
No	22	41	54	45	42	107	67	42	161

# Appendix D: Bibliography

*Publications related to the 111 peer-reviewed programs included in the quantitative analyses of programmatic factors and health outcomes.*

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