Journal of Urban Health: Bulletin of the New York Academy of Medicine, Vol. 88, Suppl. 1
doi:10.1007/s11524-010-9480-2

Assessing Community-Based Approaches to Asthma Control: The Controlling Asthma in American Cities Project

Elizabeth J. Herman, Paul L. Garbe,
and Michael A. McGeehin

More than 30 million people in the USA have been diagnosed with asthma during their lifetime. Of the 20 million US residents who currently have asthma, 12 million have had an asthma episode or attack during the past year. Asthma affects people of all races, both sexes, and all ages, and in every region of the USA. However, asthma occurs more often among children, women and girls, African Americans, Puerto Ricans, people in the Northeast, those living below the federal poverty level, and those with particular work-related exposures. Asthma death rates rose between 1980 and 1996 among both sexes and most age and ethnic groups, but have declined since 2000. Women and girls account for nearly 64% of asthma deaths overall, although, among children, more boys than girls die each year. Many of the 4,000 asthma-related deaths that occur annually could be avoided with proper treatment and care.[1]

The burden of asthma in the USA has increased greatly over the last 25 years and affects our nation and health system in more ways than limited and lost lives. Asthma leads to almost 13 million outpatient physician visits and two million emergency department visits each year. Asthma is a leading cause of school absenteeism with children missing almost 14 million school days per year due to asthma.[2] Asthma is the fourth leading cause of work absenteeism and diminished work productivity among adults, resulting in nearly 12 million missed or less productive workdays each year.[2] The estimated annual cost of asthma for 2006 was over $32 billion, including nearly $28 billion in direct health care costs and $4.5 billion for indirect costs such as lost earnings due to illness or death.[3]

Although, with the exception of limited cases of work-related exposure to chemicals, the causes, prevention, and cure of asthma are unknown, asthma can be treated and controlled. In 2007, the National Asthma Education and Prevention Program of the National Heart, Lung, and Blood Institute issued revised guidelines, known as EPR-3, for the diagnosis and management of asthma.[4] These guidelines translate advances in scientific and clinical research into practical advice for people with asthma, the health care providers who look after them, and the communities where they live. The guidelines include the best scientific evidence for comprehensive, long-term strategies to prevent and reverse airway inflammation and manage

Herman and Garbe are with the Air Pollution and Respiratory Health Branch, National Center for Environmental Health, Centers for Disease Control and Prevention, Atlanta, GA, USA; McGeehin is with the Division of Environmental Hazards and Health Effects, National Center for Environmental Health, Centers for Disease Control and Prevention, Atlanta, GA, USA.

Correspondence: Elizabeth J. Herman, Air Pollution and Respiratory Health Branch, National Center for Environmental Health, Centers for Disease Control and Prevention, Atlanta, GA, USA. (E-mail: ehh9@cdc.gov)

asthma episodes. They provide standard methods for doctors to gauge the severity of a patient's asthma and monitor treatment progress. The guidelines also recommend that people with asthma use a written action plan with treatment instructions to control their illness and handle worsening symptoms. They encourage partnerships among individuals with asthma, families, and clinicians, and prescribe measures to avoid or eliminate environmental factors that cause asthma symptoms.

While caring for individual patients is crucial, decreasing the burden of asthma also demands a comprehensive, coordinated public health approach. Although there have been important clinical advances in the care of individuals with asthma, the Centers for Disease Control and Prevention's (CDC) National Asthma Control Program recognized that delivering those interventions at the community level had been less successful, particularly for the racial and ethnic minorities who experience a disproportionate burden of the illness. There was clearly a need to integrate clinical asthma care and community health. CDC's focus on public health, improving health at a population level, presented an opportunity to address that need.

The Controlling Asthma in American Cities Project (CAACP) was designed to fund the translation of "bench and bedside" success to community- and household-level interventions in underserved communities with a high asthma burden. The project's intent was to create inner-city laboratories where evidence-based or promising asthma interventions could be applied in a culturally appropriate, integrated way to improve the health of children with asthma. Although improving access to quality asthma care and asthma self-management training was a primary concern, the project's other objectives focused on broader, more ambitious outcomes that reflect a public health approach including:

- Assessing the effectiveness of a comprehensive, community-based collaborative approach in achieving population-based outcomes and building community resources and trust
- Developing (and possibly packaging and disseminating) innovative asthma-control interventions for application in other communities
- Establishing or strengthening relationships among institutions and individuals in each CAACP community
- Developing the capacity of community-based organizations, academic professionals, community leaders, etc., to address public health problems
- Establishing or promoting asthma-related policy changes
- Increasing sharing and collaboration between communities and their health departments

CDC selected as implementation sites seven inner-city communities with racial and ethnic minorities who had a high asthma burden and used community-based coalitions with representation from a wide range of organizations, including academic institutions. Site locations, target-area size, demographic characteristics, and the agency receiving the award are summarized in Table 1.

CDC monitored and evaluated the project on multiple levels. At the process level, CDC confirmed through site visits, reports, and regular phone calls that coalitions were formed and functioning, and that quality services were provided to children with asthma, their families, their primary care providers, and other individuals involved with asthma management. The two core interventions implemented at the sites were training primary care providers in EPR-3 asthma

TABLE 1 Characteristics of the Controlling Asthma in American Cities sites

Location	Size of target population (Census 2000)	Target community	Managing agency
Chicago, Illinois	450,000	Region 4, Chicago Public School System	University of Illinois at Chicago, School of Public Health
Minneapolis/St Paul, Minnesota	670,000	Minneapolis and St Paul metropolitan areas	American Lung Association of Minnesota
Northern Manhattan, New York	530,000	Washington Heights and Harlem	Columbia University, Mailman School of Public Health
Philadelphia, Pennsylvania	300.000	North Philadelphia and Germantown	The Children's Hospital of Philadelphia
Oakland, California	400,000	Oakland City	University of California, Berkeley
Richmond, Virginia	720,000	Richmond metropolitan areas: Richmond City, Chesterfield and Henrico Counties	Bon Secours Richmond Health Care Foundation
St Louis, Missouri	450,00	St Louis City and three bordering zip codes to the north	St. Louis Regional Asthma Consortium

guideline implementation[4] and providing asthma self-management training to children and families of children with asthma. Over the course of the project, approximately 1,256 primary care physicians participated in training classes based either on the Physician Asthma Care Education curriculum[5] or the Zeitz problem-based learning curriculum.[6] Academic detailing reached 135 additional providers, and 115 primary care practices engaged in systems-change initiatives. Nearly 11,000 children and 6,600 parents or guardians attended asthma self-management classes. Course structure varied from single- to multi-session training; the training venues included community organizations, local health departments, faith-based settings, schools, and daycare centers. Some sites used existing educational materials such as You Can Control Asthma,[7] Open Airways,[8] and Wee Wheezers,[9] while others adapted or created materials to meet the needs of their communities.

In addition to group training sessions, the sites provided personalized, home-based services or care coordination to approximately 2,800 families. The scope and intensity of services varied by site, with some sites emphasizing indoor-trigger reduction and remediation, and others focusing on social services provision to meet urgent, basic family needs.[10] All of the home-based interventions, however, had strong asthma-education and trigger-reduction components.

These core interventions were supplemented and supported by: training teachers, coaches, school nurses, and other school-based staff in asthma management and trigger reduction; creating asthma-friendly pharmacies to monitor medication use and communicate with primary care providers; introducing improved asthma-care pathways in hospital and emergency departments; developing peer educators and advocates; and numerous other awareness-raising and skill-building interventions. The main interventions listed in the sites' final reports are summarized in Table 2. Several interventions have been packaged and disseminated widely. The Asthma Basics for Children handbooks for parents and early-childhood educators have been copyrighted and are now distributed through the Asthma and

TABLE 2 Interventions implemented by CAAC sites in addition to the core package

Site	Venue	Intervention description
Chicago	Schools	Case identification
		Asthma- and smoking-prevention classes
		Referrals to school-based asthma mobile vans
		Training of school staff
	Community	Asthma classes
	Medical offices	Academic detailing to individual providers
	Other	Training of school personnel, childcare staff, and social agencies on Safer Pest Control to reduce asthma triggers
Minneapolis/St. Paul	Schools	Asthma added to Early Childhood Screening
		Training for staff of before /after school care
		Comprehensive school-based asthma case management
	Daycare	Childcare-provider training
	Community	Group parent-education classes
	Medical offices	Clinic-based systems change
	Other	Asthma-educator certificate course
		Asthma education in the emergency department
		Pharmacist education and training
Northern Manhattan	Schools and daycare	Case identification
		Asthma self-management training classes for students and parents
		Staff training in trigger reduction and asthma management
	Community	Asthma self-management training classes in faith-based organizations and shelters
	Medical offices	Practice-based quality improvements
North Philadelphia	Schools	Asthma self-management classes
		School staff/nurse education
	Community	Community classes
	Medical offices	Practice-based quality improvement
Oakland	Schools	Case identification
		Asthma self-management training classes
		Comprehensive district asthma policy
	Community	Asthma camp
	Medical offices	Hospital-affiliated asthma clinics
		Practice-based quality improvement
	Other	Inpatient asthma education
		Emergency department post-discharge clinic
Richmond	Schools and daycare	School nurse and day care staff training on asthma management and trigger remediation
		Asthma workshops for students with asthma and parents
		"Asthma-fit" to promote physical activity
	Medical offices	Office-based quality improvement
	Other	Asthma educator certificate course
		Asthma education through pharmacists
St. Louis	Schools	Consulting physician services
		School nurse protocols
		Integrated asthma-awareness curriculum
	Medical offices	Practice-based quality improvement
	Other	Asthma-friendly pharmacy intervention

The core package common to all sites included family and home-based trigger reduction and training, and group training of primary care providers

Allergy Foundation of America.[11] Oakland's ***Kickin'Asthma*** curriculum[12] was designated as an American Lung Association "best practice" program, was copyrighted, and went on sale nationally in 2008.[13] Other training materials, forms, and products available from these sites are listed in Appendix B of the supplement.

Institutional changes occurred at multiple levels. For example, in Oakland, Northern Manhattan, and Minneapolis/St. Paul, revision of the standard intake and re-enrollment medical forms made it easier to identify children with asthma or symptoms consistent with asthma and to obtain information about asthma medications. The St. Louis and Minneapolis/St. Paul school systems institutionalized new procedures authorizing nurses and their delegates to assess breathing-related problems and administer medications. In Philadelphia, 11 community- and faith-based organizations integrated asthma self-management training classes into their services. The leads on Richmond's health-care-provider quality-improvement intervention received a grant from the National Asthma Control Initiative[14] to adapt their intervention to meet pediatrician certification maintenance requirements. Moreover, all of the sites' coalitions continue to be active, with some expanding their scope to address other respiratory problems and age groups.

Through their core and supplemental interventions, all of the sites reached large numbers of individuals and achieved impressive intervention-related outcomes, some of which are reported in this supplement, and others of which have been described in previous publications listed in Appendix A of this supplement. At the population level CDC, in coordination with the sites, is currently analyzing trends in hospitalization rates in the seven catchment areas to determine whether the impact of the interventions was large enough to affect those rates. Due to the lag in the availability of hospitalization data, those trends will be published at a later date.

This special supplement aims to sample sites' successes and experiences that extend beyond individual interventions, including alternative ways of implementing similar interventions in different difficult settings; the added value of a community-based approach; institutional or systems change; working across agencies or domains; creating linkages to health plans or HMOs; and innovative approaches to evaluating complex interventions. Thus, this supplement is part of a larger effort to summarize, in a very broad sense, what this large, well-funded, and relatively long project has developed, taught, and accomplished during two years of planning and five years of implementation. In addition to determining how many individuals were reached and engaged, ascertaining whether the project met expectations at the community, institutional, and policy levels is central. Additional questions include: Does the project as a whole add to the knowledge base about translating effective clinical and educational interventions into the real world of underserved and overburdened communities? Are resulting lessons, strategies, or tools applicable to state asthma programs and other settings? Do the evaluation processes of the sites or the project as a whole contribute to the field of evaluation, particularly the evaluation of complex community-based interventions?

This supplement reflects CDC's commitment to addressing these questions, and its papers are part of that process. Accountability requires documentation of the outcomes and impacts of this large investment of federal funds, which will occur in a separate publication. Beyond that task, however, is the responsibility to maximize what has been learned from this project to avoid the repetition of deficient or ineffective approaches in future projects, promote sharing successful strategies and interventions, and inform CDC and other implementing organizations how to

"do it better" next time. The critical, thoughtful summary of the CAACP provided in this supplement can guide not only asthma-control programs, but also other comprehensive, community-based efforts.

REFERENCES

1. Moorman JE, Rudd RA, Johnson CA, et al. National surveillance for asthma—United States, 1980–2004. *MMWR Surveill Summ*. 2007; *56*(8): 1-54.
2. Mannino DM, Homa DM, Akinbami LJ, Moorman JE, Gwynn C, Redd SC. Surveillance for asthma—United States, 1980–1999. *MMWR Surveill Summ*. 2002; 51(1): 1-13.
3. Barnett S, Nurmagambetov T. The Incremental Costs of Asthma to Society: 2002–2006. Current costs of asthma in the United States 2010.
4. Expert Panel Report 3 (EPR-3): Guidelines for the Diagnosis and Management of Asthma-Summary Report 2007. J Allergy Clin Immunol 2007; 120(*5* Suppl): S94–S138.
5. PACE Curriculum. National heart lung and blood institute 2010. Available at: http://www.nhlbi.nih.gov/health/prof/lung/asthma/pace/curriculum.htm. Accessed 20 Jan 2010.
6. Zeitz HJ. Problem based learning: development of a new strategy for effective continuing medical education. *Allergy Asthma Proc*. 1999; 20(*5*): 317-321.
7. Taggart VS, Zuckerman AE, Sly RM, et al. You can control asthma: evaluation of an asthma education program for hospitalized inner-city children. *Patient Educ Couns*. 1991; 17(1): 35-47.
8. Bruzzese JM, Markman LB, Appel D, Webber M. An evaluation of open airways for schools: using college students as instructors. *J Asthma*. 2001; 38(4): 337-342.
9. Brown JV, Bakeman R, Celano MP, Demi AS, Kobrynski L, Wilson SR. Home-based asthma education of young low-income children and their families. *J Pediatr Psychol*. December;27(8):677-88.
10. Savage-Brown A, Disler S, Burns L et al. Family and home asthma services across the controlling asthma in american cities project. J Urban Health. 2010.
11. Asthma and allergy foundation of america. Available at: http://www.aafa.org/index_noflash.cfm. Accessed 20 Jan 2010.
12. Magzamen S, Patel B, Davis A, Edelstein J, Tager IB. Kickin' asthma: school-based asthma education in an urban community. *J Sch Health*. 2008; 78(12): 655-665.
13. Kickin' Asthma: school-based asthma education in an urban community. American Lung Association 2008 December. Available at: http://www.californialung.org/lung-health/asthma-center/kickin-asthma. Accessed 20 Jan 2010.
14. National Heart, lung, and blood institute initiates thirteen new projects to advance asthma control. National Heart, Lung and Blood Institute 2010. Available at: http://www.nih.gov/news/health/dec2009/nhlbi-02.htm. Accessed 20 Jan 2010.