**Childhood Asthma in an Urban Community**

*Prevalence, Care System, and Treatment*

Michelle M. Cloutier, MD; Dorothy B. Wakefield, MS; Charles B. Hall, PhD; and Howard L. Bailit, DMD, PhD

**Objectives:** We describe the system of asthma care in Hartford, CT, an urban, minority community.

**Methods:** The health field concept was used to organize factors influencing asthma prevalence and severity. Data were obtained from national, state, and municipal reports, and from surveys of children in Hartford seeking medical care in an asthma program called Easy Breathing.

**Results:** Between June 1, 1998, and May 1, 2000, 21% of children receiving Medicaid in Hartford did not file a medical claim. Between 1998 and 2000, the number of providers in Hartford decreased by 37% while the number of outpatient visits increased by 8%. Using claims data, we found the following: 19.0% of Hartford children had asthma (data from the *International Classification of Disease*, ninth revision, and the National Drug Code); and 12% of children with asthma filled a prescription for inhaled corticosteroid therapy, 83% for a bronchodilator, and 36% for an oral corticosteroid. Children with asthma were more likely to be hospitalized (10% vs 5%, respectively) and to visit an emergency department (45% vs 29%, respectively), and, on average, they had more hospital days (0.603 vs 0.415 days per child, respectively) and more outpatient visits per year (4.7 vs 2.5 visits, respectively) compared to children without asthma. Asthma prevalence in the 6,643 children surveyed in the Easy Breathing program was 41%. Persistent asthma was diagnosed in 50% of the children with asthma. Asthma prevalence varied by ethnic origin, age, and gender, and was highest in Hispanic/Puerto Rican children, in children 5 to 10 years of age, in boys up to 10 years of age, and in girls after 15 years of age.

**Conclusion:** Improved personal behaviors and medical care will have a limited sustained impact on childhood asthma until basic environmental issues are modified. The health field concept provides a mechanism with which to address the issues surrounding asthma in urban communities.

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**Key words:** asthma severity; health-care utilization; minority population

**Abbreviations:** ED = emergency department; FTE = full-time equivalent; S-CHIP = State Children’s Health Insurance Plan

**Asthma** is the most common chronic disease of children in the United States. Almost 6 million children in the United States have asthma compared to 3.1 million in 1984, an increase of 80%. Annually, asthma accounts for 12 million primary care visits, 1.6 million emergency department (ED) visits, 11 million missed school days, 200,000 hospital admissions, and 150 pediatric deaths.

Asthma disproportionately affects urban children. Asthma prevalence varies between 1.6% and 36.8%, with higher prevalence rates in minority, urban, low socioeconomic status populations and results in increased ED visits, hospital days, and mortality rates. In 1998, the direct costs of providing care to children with asthma were > $6.2 billion, and the indirect costs were $1 billion, which is a 30% increase since 1985. Seventy-five percent of medical resources are consumed by 20% of the people with asthma. Reducing asthma morbidity is a national health-care objective.

Community factors and personal health behaviors associated with asthma prevalence and morbidity

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include low socioeconomic status, environmental tobacco smoke exposure, poorly maintained housing, and indoor and outdoor allergens, including cockroach and rodent infestation.\textsuperscript{14-17} Health-care delivery factors that are responsible for high asthma morbidity and mortality include inadequate availability and access to health care, and language and cultural barriers.\textsuperscript{18} Major provider problems include the failure to diagnose asthma and the underprescribing of inhaled and oral corticosteroid therapy.\textsuperscript{19-21}

In this article, we take a broad public health perspective of childhood asthma and its impact in Hartford, Connecticut, a medium size, low-income city in the northeast United States with a predominantly minority population. We use the "health field concept" of Green and Ottoson\textsuperscript{22} to organize the multiple factors that influence the prevalence and severity of asthma in the community. Green and Ottoson\textsuperscript{22} identified the following four categories of factors that determine the health of populations: environment; human biology (ie, genetics); personal behavior; and health-care organization. They noted that a full understanding of these four dimensions is necessary to effectively prevent and treat a disease. With this background of descriptive information, we discuss the implementation of a community-specific asthma intervention program. This program, called Easy Breathing, began in 1998 and continues in full operation.

**Materials and Methods**

**Disease Prevalence and Severity**

Asthma prevalence and severity were estimated from surveys of children seeking medical care in Hartford clinics. The surveys were completed as part of the Easy Breathing program and took place from June 1, 1998, to May 1, 2000. Easy Breathing is an asthma-management program for primary care providers who care for children who reside or receive their medical care in the city of Hartford. The program was specifically designed for busy primary care providers who work in clinic settings with a high volume of patients. The overall goals of the program are to improve asthma diagnosis and treatment by primary care providers and to reduce the burden of asthma in an urban pediatric population. Entry into the program begins with a self-reported survey (the Easy Breathing Survey). The survey instrument was adapted (tested for reliability and validity in children\textsuperscript{23}) from the International Union Against Tuberculosis and Lung Disease Bronchial Symptom Questionnaire.\textsuperscript{24} All six primary care clinics in the city screened children (age range, 6 months to 18 years) for asthma regardless of their insurance coverage, residence, or chief complaint using the Easy Breathing Survey. Clinic health-care providers diagnosed asthma in children or confirmed a diagnosis of asthma using patient responses to the survey questions, reviews of the medical record, and additional history and testing. The criteria used to diagnose asthma were described previously\textsuperscript{25} and included recurrent episodes (ie, more than two episodes) of symptoms in response to known triggers and the exclusion of other diseases. Frequently, the response to asthma therapy also was considered in the diagnosis of asthma. Rarely, pulmonary function data were used to assist in the diagnosis.

For children who received a diagnosis of asthma, asthma severity was determined using a separate written instrument that was modeled after the 1997 National Asthma Education and Prevention Program report.\textsuperscript{26} Asthma severity was based on the frequency of daytime and nocturnal symptoms, the degree of exercise impairment, the frequency of as-needed inhaled bronchodilator therapy, and the effect of symptoms on lifestyle and school attendance.

For each child with asthma, a comprehensive management plan consisting of medications for daily use, use when sick, and emergency use was developed with a severity-specific treatment selection guide. Each medication from the treatment selection guide was matched to a color-coded (by severity) tear-away label. The labels were placed on a standardized written Asthma Treatment Plan that was especially developed for the population being served and was given to each family.

Thirty-one physicians, 28 mid-level practitioners (ie, advanced-practice nurses, pediatric nurse practitioners, and physician assistants), 46 nurses (ie, registered nurses and licensed practical nurses), pediatric and family practice residents, and medical students were trained to screen for asthma and to determine asthma severity. The educational program consisted of 90 min of training on how to implement the project and 2.5 h of training about asthma and asthma therapy.

**Health Field Concept**

**Environment:** Demographic and other data on Hartford came from national, state, and municipal reports (ie, the City of Hartford Health Department, the Connecticut State Health Department, and the 2000 US census). Information on community groups concerned with pediatric asthma was obtained from the City of Hartford Health Department.

**Human Biology:** The health field concept defines human biological factors in terms of the genetic determinants of disease. Since the relationship between genetics and asthma is complex and beyond the scope of this report, the only genetically relevant data collected concerned the family history of asthma.

**Personal Behaviors:** The parents and caretakers of children who were enrolled in the study completed a 13-question, pretested survey instrument on personal behaviors that are related to asthma. These behaviors and related living-arrangement decisions include smoking, exposure to cockroaches, dust, rodents, pets, the presence of a gas stove, and details of the child's sleeping environment (eg, carpet and mattress cover). Information also was obtained on the type of housing and the length of time the children had lived in the house.

**Health-Care Organization:** Data on the Hartford health-care system, including payers, payment methods, providers, and facilities, came from publicly available reports from the State of Connecticut and the City of Hartford.

Utilization data were available for children who were covered by Medicaid and the State Children’s Health Insurance Programs (S-CHIP). Approximately 84% of Hartford children were enrolled in these two programs at the time of baseline data collection. Claims data were obtained for a 12-month period prior to the implementation of the Easy Breathing program (ie, July 1, 1997, to June 30, 1998). Six months elapsed between the date of the last claim and the creation of the claim files to account for claim lag. Utilization rates for pharmaceuticals were obtained from the National Drug Code, and those for ED visits, outpatient visits, and hospital days were obtained from codes from the
RESULTS

Asthma Prevalence and Severity

Between June 1, 1998, and May 1, 2000, 6,643 children were screened for asthma in the Easy Breathing program. This sample consisted of children who presented for care for any reason at any of the six primary care clinics used in the study. Smaller clinics surveyed a proportionately higher percentage of their Medicaid population than did larger clinics (90% vs 32%, respectively). The age and ethnicity of the surveyed children are shown in Table 1.

Of the 6,643 children surveyed (32% of the 20,632 children with medical claims), 2,225 (33.5%) reported a previous diagnosis of asthma that was physician-confirmed. For 499 children (18% of the 2,724 children with asthma or 7.5% of the 6,643 children screened), a new diagnosis of asthma was made. The overall asthma prevalence in this group of Medicaid children who had submitted claims was 41% (2,724 of 6,643 children). This represents the prevalence of asthma in children seeking medical care and not the prevalence of asthma in the community. This prevalence, however, has not changed since the program began. If this is a representative sample of children and if this prevalence rate is applied to the 31,082 total Medicaid-eligible children in Hartford, as many as 12,744 children who enrolled in Medicaid in Hartford have asthma.

The age and ethnic distribution of the children with asthma are shown in Table 1. Hispanic/Puerto Rican children had the highest asthma prevalence (48.6%) followed by African-American children (35%). Children with asthma were more likely to be <5 years of age (34%) or between 5 and 10 years of age (31%). The age distribution of children with asthma did not vary by ethnicity. The prevalence of asthma in boys was higher (45%) than that in girls (37%), however, the higher prevalence of boys at <5 years of age disappeared between 10 and 15 years of age and was reversed at 15 to 18 years of age (p < 0.0001) [Fig 1].

Asthma severity by ethnicity is shown in Figure 2. Overall, mild intermittent asthma was diagnosed in 50% of the children, mild persistent asthma was diagnosed in 30%, moderate persistent asthma was diagnosed in 18%, and severe persistent asthma was diagnosed in 2%. Asthma severity was greater in Hispanic/Puerto Rican children than in African-American children. Multivariate log-linear models showed that African-American children were 55% less likely to have moderate persistent asthma (p < 0.001), and were 50% less likely to have severe persistent asthma (p < 0.05) than were Hispanic/Puerto Rican children after controlling for age. In addition, children aged 5 to 10 years and 10 to 15 years of any ethnicity were more likely to have severe persistent asthma than were children of other age groups (p = 0.02 and p = 0.03, respectively). Otherwise, there were no differences in the distribution of severity across age groups.

Table 1—Characteristics of Children Surveyed in the Easy Breathing Program*

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Children Surveyed</th>
<th>Children with Asthma</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic/Puerto Rican</td>
<td>3,571 (58.3)</td>
<td>1,883 (48.6)</td>
</tr>
<tr>
<td>African American</td>
<td>1,664 (25.0)</td>
<td>583 (35.0)</td>
</tr>
<tr>
<td>White</td>
<td>162 (2.4)</td>
<td>45 (27.8)</td>
</tr>
<tr>
<td>Other</td>
<td>946 (14.3)</td>
<td>194 (20.5)</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.5–5 yr</td>
<td>2,471 (37.2)</td>
<td>928 (37.6)</td>
</tr>
<tr>
<td>5–10 yr</td>
<td>1,899 (28.4)</td>
<td>833 (44.1)</td>
</tr>
<tr>
<td>10–15 yr</td>
<td>1,697 (24.2)</td>
<td>687 (42.8)</td>
</tr>
<tr>
<td>15–18 yr</td>
<td>676 (10.2)</td>
<td>257 (38.0)</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>3,221 (48.5)</td>
<td>1,193 (37.0)</td>
</tr>
<tr>
<td>Male</td>
<td>3,422 (51.5)</td>
<td>1,592 (44.7)</td>
</tr>
</tbody>
</table>

*Values given as No. (% of total). Numbers do not add up to totals due to a small amount of missing data.
The City of Hartford Health Department has a full-time director and staff. A 1997 survey of the perceived needs of the adult population, which was conducted by the Health Department, identified asthma as a major health problem and resulted in a city-initiated “Asthma Call to Action.” More recently, in 1999 a Hartford Pediatric Asthma Coalition, which is composed of 25 individuals from 25 different groups who were interested in childhood asthma, was formed to specifically address the needs of children with asthma.

**Personal Behaviors:** Children with asthma were more likely to report exposure to tobacco smoke, dust, solvents, cockroaches, and rodents than were children who did not have asthma (Table 2). Trend tests demonstrated a strong association between asthma of increasing severity and a reported exposure to dust and cockroaches ($p < 0.0001$). Smaller but significant associations also were found between exposure to solvents and rodents and increasing severity of asthma. Exposure to birds was not associated with asthma prevalence but was weakly related to increasing asthma severity ($p < 0.01$). There were no associations of disease prevalence or severity with reported pet exposure, the presence of a gas stove, or sleeping arrangements.

**Human Biology:** Eighty-two percent of the families reported a positive family history of asthma. Of the children with a positive family history of asthma, a maternal history of asthma was present in 40% of the children and a paternal history of asthma was present in 21% of the children. The most common history was of a sibling with asthma (46%). There was no difference in the frequency of a positive family history of asthma for children with new diagnoses compared to children who had previously received diagnoses of asthma.

**Health-care Organization:** In 1998, outpatient medical care for the children of Hartford was provided by 41 physicians (full-time equivalents [FTEs], 34.5 physicians) and 28 mid-level practitioners (FTEs, 23.5 practitioners) in six community-based, primary care clinics, seven school-based clinics, and four private practices. In addition, there were 63 pediatric and family practice residents in training at four of the six clinics. The clinics varied in the size of their Medicaid population from 550 to 8,150 children. Over the next 18 months, there was a 37% decrease in the number of providers in Hartford. The number of FTEs decreased to 24 for physicians and 12.5 for mid-level practitioners. Over this same...
period, there was an increase from 34,044 to 57,713 visits per year for Medicaid children.

Emergency care is provided by two EDs. One is located at the Connecticut Children’s Medical Center, and the other is located at St. Francis Hospital and Medical Center. These two centers also provide the only inpatient care for children in the city, with 85 and 16 pediatric beds, respectively (excluding neonatal and ICU beds). Specialty referrals for Medicaid children are to a pediatric pulmonary specialist group and three allergy groups.

All Medicaid or S-CHIP children are enrolled in one of four managed care plans. In Hartford, Anthem Blue Cross/Blue Shield covers about 85% of the children. Anthem has different financial arrangements with the six participating clinics. For the two large hospital clinics, Anthem has passed on the financial risk for caring for enrolled children, based on negotiated global capitation rates. Anthem reimburses the four small independent clinics on a fee-for-service basis, based on negotiated fees. All school-based clinics are considered to be essential community providers and are reimbursed on a fee-for-service basis. Information on the Anthem capitation rates and fees with each provider organization was not available. The other three managed care plans in the area reimburse providers on a fee-for-service basis.

In the year prior to implementing the Easy Breathing program (ie, July 1, 1997, to June 30, 1998), 31,610 children (84%) in Hartford were Medicaid-eligible, and 70% of these children were eligible for at least 10 months. Twenty thousand six hundred thirty-two children (65%) had submitted at least one Medicaid claim, and 4,626 children (19%) had either submitted an asthma claim or had had an asthma medication prescription filled during this period. Twelve percent of the 20,632 children with claims only had pharmacy or laboratory charges during this period, and 11% had missing provider information. Of the remaining 15,886 children, 11,120 (70%) were seen at one of the Easy Breathing sites. The rest were seen by private prac-

![Figure 2. Asthma severity by ethnicity. The percentage of children with asthma of each severity is shown for Hispanic/Puerto Rican children, for African-American children, and for children of other ethnic origins. Asthma severity is higher in Hispanic children than in African-American children. Other ethnic groups include non-Hispanic white, Asian, Caribbean, and other ethnicities.](image)

### Table 2—Self-Reported Environmental Exposures*

<table>
<thead>
<tr>
<th>Exposures</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pets at home</td>
<td>1.19 (1.02–1.39)</td>
</tr>
<tr>
<td>Cockroaches</td>
<td>2.34 (2.05–2.68)</td>
</tr>
<tr>
<td>Tobacco smoke</td>
<td>2.74 (2.55–2.95)</td>
</tr>
<tr>
<td>Solvents</td>
<td>2.60 (1.94–3.49)</td>
</tr>
<tr>
<td>Dust</td>
<td>2.02 (1.8–2.27)</td>
</tr>
<tr>
<td>Rodents</td>
<td>2.23 (1.85–2.69)</td>
</tr>
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*OR = odds ratio; CI = confidence interval.
tioners (4%), by providers outside of the city (14%), or by school-based clinics (1.5%), and 10.5% of the children with claims only saw a specialist during this time period.

The rates of ED visits, hospital days, and outpatient visits in this same period are shown in Table 3 for the 20,632 children with and without a claim-based diagnosis of asthma. Thirty-seven percent of the 4,174 children with asthma had made an ED visit. The records of 16% of these visits listed asthma as the primary diagnosis. Of the children with asthma, 8.5% were hospitalized at least once in 12 months, and the average number of hospital days per child was 0.447. The average number of outpatient visits per child with asthma was 2.36. Compared to the 16,458 children with a medical claim who did not have asthma, those with asthma had significantly more ED visits, hospital days, and outpatient visits.

Sixty-five percent of the 4,174 children with asthma had filled a prescription for a bronchodilator during this time. Only 8.8% of children had filled a prescription for an inhaled corticosteroid, 9% for an inhaled nonsteroidal anti-inflammatory drug, and 36% for an oral steroid. The ratio of inhaled anti-inflammatory to β-agonist medication was 0.27.

**DISCUSSION**

**Prevalence and Severity**

The 41% asthma rate that we report is not the prevalence of asthma in Hartford. While the 6,643 children screened are representative of Hartford children in terms of ethnicity, age, and city neighborhoods (data not shown), they are not representative in terms of illness since they were seeking medical care when enrolled in the program. Access to medical care has been shown to increase the medical care when enrolled in the program. Access to medical care has been shown to increase the estimates of asthma prevalence. This high prevalence reflects the sampling bias from only screening children seeking care, from the probable increased screening of children with asthma, and from the addition of children with previously unrecognized asthma. As a result, our estimates of disease prevalence and severity by the screened children are higher than the “true” community average. These rates are, however, indicative of the enormous burden of asthma on providers in urban clinics.

Tested survey instruments with scripted sets of questions were used to diagnose asthma and to determine asthma severity. The diagnosis was made using clinical criteria because no single “gold standard” diagnostic test for asthma exists. In a pilot study of the survey instrument, the presence of asthma, asthma severity, and abnormalities in pulmonary function were strongly correlated. In addition, the survey instrument was adapted from the International Union Against Tuberculosis and Lung Disease bronchial symptom questionnaire, which has a strong relationship with histamine hyperresponsiveness, a hallmark of asthma in adults.

Interestingly, the estimate of asthma prevalence based on medical and drug claims was only 19%. Since children with mild intermittent asthma are probably less likely to have medical and drug claims for asthma, the 19%, which is a percentage similar to that (20.5%) of children with persistent asthma using the Easy Breathing program, most likely represents children with persistent asthma. The large number of children with mild intermittent asthma also may have skewed the ratio of anti-inflammatory drug to bronchodilator prescriptions. This ratio has been shown to be inversely related to the rate of hospital admissions.

Eighteen percent of the children with asthma, or 7.5% of the screened group, were newly diagnosed with asthma. This demonstrates the continued under-reporting of asthma symptoms by patients and the under-diagnosis by providers. Most of the newly diagnosed children had mild intermittent asthma, although a third had persistent disease and, according to guidelines, would benefit from daily anti-inflammatory therapy.

This is the first study to report asthma severity in a large inner-city population using the severity categories proposed in the National Asthma Education and Prevention Program Expert Panel Report. Asthma severity was higher in Hispanic children than in African-American children. Yet, asthma mortality is known to be higher in African-Americans than in whites and Hispanics. The reasons for the disparity between severity and mortality risk are not known.

Similar to the results of other studies, asthma was more prevalent in boys than in girls, with a change in prevalence that began in late childhood and early adolescence. This observation is compatible with the decrease in asthma symptoms in

<table>
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<tr>
<th>Table 3—Medical Services Utilization for Medicaid Children With and Without Asthma (July 1, 1997, to June 30, 1998)</th>
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<tbody>
<tr>
<td>With Asthma</td>
</tr>
<tr>
<td>Hospitalizations, %</td>
</tr>
<tr>
<td>Average hospital stay, d</td>
</tr>
<tr>
<td>ED/urgent care visits, %</td>
</tr>
<tr>
<td>Outpatient visits per year, No.</td>
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*p Values were calculated testing hypotheses that the number of children with asthma was greater than those without asthma (for each variable above).
adolescent boys and with the increase in asthma symptoms at puberty in young women.11

Health Field Concept

Asthma is a major public health problem for urban communities such as Hartford. We used the health field concept proposed by Green and Ottoson22 to identify and organize the multiple factors that influence the prevalence and severity of asthma, and to assess the relative importance of these factors. By using such a model, it is our goal not only to focus on the few variables that are relatively easy to measure, but also to identify all of the factors that affect asthma and asthma management in the community.

In this regard, the physical, economic, and social environments in Hartford are major factors that are responsible for the high prevalence of childhood asthma. Hartford has marked poverty, old, poorly repaired housing stock, high rates of infant mortality and premature births, and significant cockroach and rodent infestations (data from the Connecticut State Department of Health). Of great concern, during a period of unprecedented growth of the national and state economy, the average family income of Hartford residents declined by 21%. Increased poverty, in association with urban living, will undoubtedly contribute to a continued rise in asthma prevalence as the physical and social environments decline. Most public health, medical, and community programs, including this one, have focused primarily on medical management and access to medical care. Until state and federal governments address these basic environmental issues, the impact of improved asthma therapy, and only half of those children were prescribed any anti-inflammatory therapy. However, before implementation of the Easy Breathing program, only 17.8% of children with persistent asthma and would benefit from daily anti-inflammatory therapy. Thirty-six percent of the

High exposures rates to cockroaches are present in urban communities and high rates of sensitization to cockroaches have been demonstrated in people with asthma.35,36 Self-reported exposures, however, may not be completely reliable.34 In addition, some of the association may reflect an increased awareness of environmental triggers for asthma with increasing asthma severity.

Allergy testing and environmental sampling is underway for these children. Preliminary results suggest a high frequency of dust mite sensitization, irrespective of asthma severity, and associations among cockroaches, mold sensitization, and increasing asthma severity.37 Pets were common in the homes both of children with asthma and of those without asthma. In urban settings, pets serve a number of functions including protection (dogs) and a reduction in rodents and cockroaches (cats). The latter may be an important factor for why cat exposure does not correlate with asthma in inner-city populations. Information about personal behaviors will help to direct programs that will have the greatest impact on asthma in the community.

A high percentage of families reported a family history of asthma. Siblings with asthma were the single largest group, followed by a maternal history of asthma.

Although all major outpatient delivery sites in Hartford participated in the screening system, only one third of the 20,632 children submitting a Medicaid claim were screened in this 23-month period. In part, this was because only 70% of the children received their medical care in one of the participating clinics. A more important factor, however, is that the two large hospital-based clinics screened only about 30% of the eligible children seen in their facility. The ability of these clinics to screen children was related to the marked increase in outpatient visits and the significant decrease in providers as these institutions struggled with financial problems. The low screening rates also may have resulted from the size and complexity of patient care operations in these large, urban, hospital-based clinics. In contrast, the smaller clinics did an outstanding job, surveying > 90% of the eligible children. To increase screening rates in the larger clinics, dedicated screening providers may be required. The cost-effectiveness of dedicated screeners needs to be investigated.

Fifty percent of the children with asthma had persistent asthma and would benefit from daily anti-inflammatory therapy. However, before implementation of the Easy Breathing program, only 17.8% of children were prescribed any anti-inflammatory therapy, and only half of those children were prescribed inhaled corticosteroid therapy, which is the first-line therapy for persistent asthma. Thirty-six percent of the
children filled a prescription for an oral corticosteroid, suggesting aggressive acute asthma management and ready health-care access, which undoubtedly are important factors in asthma mortality. Despite the high prevalence, no child has died from asthma in Hartford in the past 10 years.

The impact of asthma on the utilization of EDs, hospital beds, and outpatient visits, was substantial compared to children without asthma. If the Easy Breathing program is successful in reducing the number of bed days by 10%, we estimate that approximately $440,000 would be saved annually. This is more than enough to cover the costs of running an organized asthma screening and treatment program in all Hartford ambulatory medical facilities and includes the cost of provider screeners in the two large hospital clinics.

The asthma care system in Hartford is almost entirely financed through the Medicaid and S-CHIP programs. In 1998, 84% of Hartford children were enrolled in the Medicaid program. Since then, the enrollment of near-poor children in the S-CHIP program has expanded the financial access to medical care to almost all children. Hartford may be one of the few cities in the United States that has almost universal medical coverage for children. While this may reduce financial access barriers for families, the level of reimbursement may be inadequate for the extent of medical and social services needed by these families. Undoubtedly, this contributes to the lack of a private sector medical system in Hartford and to the understaffing of hospital clinics.

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