Results of a Culturally Directed Asthma Intervention Program in an Inner-city Latino Community*

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Study objectives: To determine the effect of an asthma intervention program targeted to a predominantly Latino population of inner-city, adult asthma patients with a recent emergency department (ED) visit for asthma care.

Design: A prospective study measuring changes in asthma quality of life (QOL), asthma knowledge, and ED and hospital utilization in a group of patients enrolled in an outpatient asthma intervention program.

Setting: Academic medical center located in New York City (NYC) and a local community-based organization.

Participants: One hundred ninety-eight patients with asthma > 18 years of age and residing in Washington Heights/Inwood, a predominantly Latino community in NYC.

Measurements: Changes were assessed by hospital and ED utilization and mini-Juniper QOL score before and after the intervention.

Results: From July 2000 through December 2002, 198 patients agreed to be enrolled into an asthma intervention program. The mini-Juniper QOL score improved by 0.67 points. There was a 40% reduction in ED visits and a 36% reduction in hospitalizations over 1 year, compared with a 10% reduction in ED visits and no reduction in hospitalization rate for a control group who declined the intervention.

Conclusion: A culturally targeted asthma intervention program in adult individuals living in a predominantly Latino area of NYC is effective in reducing ED and hospital utilization for asthma, and improving overall asthma-related QOL.

Key words: asthma; intervention; minority

Abbreviations: CUMC = Columbia University Medical Center; ED = emergency department; NYC = New York City; WH/I = Washington Heights/Inwood

Surveillance studies1,2 report an increase in asthma prevalence in the United States and in other industrialized nations over the previous 2 decades. It is well recognized that asthma prevalence and morbidity are not distributed homogeneously throughout populations, with some urban areas such as New York City (NYC) bearing a disproportionate burden of asthma morbidity and mortality within the United States.3,4 Even within NYC, specific regions and ethnic groups demonstrate excessive rates of asthma prevalence, morbidity, and mortality.3–7

Nationally, Latino individuals exhibit a relatively low asthma prevalence rate, although in NYC asthma prevalence among Latino adults exceeds that of other ethnic groups.8,9 Even among Latino individuals nationally, asthma prevalence varies according to ethnic background.10,11 Ledogar et al10 reported that among Latinos sharing the same neighborhood and housing complexes in NYC, Puerto Ricans had a nearly threefold higher prevalence of asthma than Dominicans, 13.2% compared with 5.3%, respectively. A recently conducted phone survey of 10,000 NYC residents demonstrated that Latino adults residing in Manhattan reported an asthma prevalence of 6.4% compared with a prevalence of 4.6% reported by blacks.9 Thus, asthma prevalence among Latino individuals differs considerably depending on ethnic background and geographic region.

Washington Heights/Inwood (WH/I) are two com-
munities located at the northern tip of Manhattan in NYC. According to 2000 census data, 271,000 residents, 71% of whom belong to Latino ethnic groups, inhabit the area; this compares with 27% of residents living in NYC who are of Latino descent. Over half of the Latino population in Washington Heights is of Dominican Republic descent, with this area constituting the largest Dominican population in the United States. The majority of residents are of low socioeconomic status, with 30% living in poverty range, compared with a 14% poverty level in NYC. Based on asthma hospitalization and mortality rate, this region is considered to be a high-risk community with regard to asthma morbidity and mortality. In addition to exhibiting many of the psychosocial features associated with high-risk asthma, the community is exposed to a disproportionate amount of diesel exhaust. Land use is mixed residential and light commercial, with shops and warehouses interspersed among the dwelling units. The area is bisected by several major highways that are in close proximity to one of the largest bus terminals in NYC. Columbia University Medical Center (CUMC) is the only hospital in the community and serves as the main medical center from which asthmatic patients living in the area receive emergency and inpatient care. We undertook a 3-year, culturally targeted intervention program aimed at reducing asthma morbidity in adults living in WH/I. The intervention consisted of a multifaceted approach, including training of asthma educators, development of educational materials in Spanish and English, and collaboration with local primary care physicians, the ED staff, and community-based groups.

**Materials and Methods**

**Partnering With Community-Based Organizations**

Collaboration with local community groups was deemed a critical component of asthma intervention in the community, both because of their direct involvement with residents of the community and because of their ability to facilitate contacts with a variety of community forums including schools, tenant organizations, places of worship, and state-funded agencies. Asthma educational seminars were provided through these forums simultaneous with the intervention program as an effort to increase public awareness of asthma. We collaborated with Alianza Dominicana, a community-based organization with strong ties to Columbia University and with over a decade of experience conducting health education and interventions among individuals living in WH/I. This organization assisted with development, testing, and distribution of culturally appropriate educational information and assisted with training of the two designated asthma educators.

**Training and Establishment of Asthma Educator**

Two individuals were hired through local advertising to serve as asthma educators. Both educators were Latino, had Associate college degrees, were bilingual, had no medical background, and had lived in the community for > 10 years. They each attended a 2-week training course to learn general key points about the pathophysiology of asthma, psychosocial issues specific to inhabitants of WH/I, and techniques for effective patient interaction and education. The training was administered by physicians and nurses from the CUMC and personnel from Alianza Dominicana. As part of training, educators met and interviewed asthma inpatients and outpatients, spent time at local community-based organizations meeting clients, and helped develop and test educational materials that would be suitable for the target population.

**Identification of High-Risk Patients**

From July 2000 through December 2002, the names and medical record numbers of all adult patients ≥ 18 years old who came to the ED for asthma care were collected through daily review of a log kept in the ED. The asthma educators made efforts to contact all patients within 1 week of their ED visit. Initially, attempts were made to contact individuals by telephone. Telephone numbers were accessed through the Web-based clinical information system. This strategy proved to be of low yield, as many patients did not list working phone numbers, and often times listed phone numbers proved to be incorrect. Subsequently, the protocol was modified so that all individuals were sent a mailing (in both Spanish and English) explaining the importance of follow-up care for asthma and inviting them to participate in the intervention program that included medical care and asthma education. Interested patients were asked to contact the educators by mail via a stamped self-addressed stamped envelope that was included with the letter or by phone so that an appointment could be set up in the asthma clinic. Patients were seen regardless of medical insurance status.

**Clinic Visits**

Patients were each seen by one of three board-certified pulmonologists or allergists during the initial visit to the asthma clinic and by the same physician during all subsequent visits. Comprehensive asthma education was provided in most instances by the physician and reviewed again independently by an asthma educator. This education consisted of use of lung models for explanation of the chronic inflammation that is associated with asthma, need for daily controller therapy, review of inhaler technique and environmental trigger control. Booklets containing the same information, written for third-grade reading level and available in English or Spanish, were distributed to all patients. These booklets were developed by a committee consisting of local health providers and community-based workers and were modified based on feedback from focus groups. All patients were treated as deemed appropriate and according to National Asthma Education and Prevention Program guidelines and were given some form of a written action plan. A home visit by a registered nurse was arranged for patients who had difficulty with asthma management despite adequate therapy or environmental and housing issues that needed further intervention.

**Tracking of Health-Related Outcomes**

All enrolled patients completed a self-administered mini-Juniper quality-of-life (QOL) questionnaire and an asthma knowledge quiz at the initial visit. The Juniper mini-QOL Questionnaire is a 15-point, multiple-choice questionnaire consisting of four domains (activity, emotional, symptom, and environmental) and scored on a scale of 1 to 7, with 1 corresponding...
to maximal symptoms. The asthma knowledge quiz was modified from the National Institutes of Health asthma IQ and consisted of 15 true/false questions testing basic asthma knowledge. The QOL questionnaire was repeated at each approximate 3-month follow-up visit for a period of up to 18 months or until four questionnaires were completed, whichever came first. The knowledge quiz was repeated at the second visit. Efforts were made to confirm all scheduled follow-up visits on the day prior to the appointment. Patients who did not return for follow-up were contacted repeatedly by phone and/or mail by the educators. ED utilization and frequency of asthma hospitalizations for the 12 months preceding enrollment in the intervention were recorded. For each patient in the intervention, a patient from the group who declined the intervention was selected based solely on gender and age (within 10 years) to serve as a control group. Comparison based on asthma severity was not feasible given the study design.

Statistical Analysis

To compare continuous variables between groups, t tests and χ² tests were used; χ² tests were used to assess associations between categorical variables. All data analyses were performed using software (Prism, Graphpad, San Diego, CA). Summary data on continuous variables are expressed as mean ± SE, unless otherwise noted.

Results

Between July 2000 and December 2002, 2,037 adult patients visited the CUMC ED for acute asthma care and were contacted by phone or mailings inviting them to participate in the asthma intervention program. Standard discharge plans from the ED include treatment with an oral corticosteroid taper and, in most cases, prescriptions for controller medication. In total, 236 patients (11.6%) responded to the solicitation and were scheduled for an appointment in the asthma clinic. One hundred ninety-eight individuals entered the intervention study and completed the requisite initial questionnaires. The remaining 38 individuals were either unwilling to participate in the study (6 people), did not show up for their appointment (26 people), or were unable to read (6 people). Seventy-one percent of participants in the intervention were women, and 29% were men. The mean age of the participants was 38.4 ± 22.2 years (range, 18 to 74 years); 91% were Latino. In comparison, 66% of individuals who declined participation were women (mean age, 32.8 ± 27.3 years).

QOL Measures

Mini-Juniper QOL questionnaires were administered to participants at the start of the initial visit and were collected approximately every 3 months thereafter during follow-up appointments. Of the 198 patients who completed the initial questionnaire, 122 patients (62%) completed two QOL questionnaires over a mean period of 5.6 ± 3.7 months, 89 patients (45%) completed three QOL questionnaires over a mean period of 12.7 ± 3.1 months, and 52 patients (26%) completed four QOL questionnaires over 16.2 ± 0.87 months. Sixty-two patients reported having a primary care physician. Table 1 shows change in overall QOL score for each group as well as change in each of the four domains. Overall QOL

<table>
<thead>
<tr>
<th>Variables</th>
<th>QOL 1</th>
<th>QOL 2</th>
<th>QOL 3</th>
<th>QOL 4</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity</td>
<td>3.54 (0.94)</td>
<td>3.69 (0.83)</td>
<td>3.80 (0.97)</td>
<td>3.33 (0.99)</td>
<td>−0.21</td>
</tr>
<tr>
<td>Emotional</td>
<td>2.53 (1.38)</td>
<td>3.41 (1.17)</td>
<td>4.13 (1.41)</td>
<td>3.49 (1.36)</td>
<td>0.96</td>
</tr>
<tr>
<td>Symptom</td>
<td>2.65 (0.77)</td>
<td>4.11 (1.70)</td>
<td>4.36 (0.74)</td>
<td>4.58 (0.69)</td>
<td>1.93</td>
</tr>
<tr>
<td>Environmental</td>
<td>2.01 (1.2)</td>
<td>2.42 (1.24)</td>
<td>2.06 (1.15)</td>
<td>2.01 (0.93)</td>
<td>0</td>
</tr>
<tr>
<td>Overall</td>
<td>2.68 (1.07)</td>
<td>3.41 (1.31)</td>
<td>3.56 (1.19)</td>
<td>3.35 (0.88)</td>
<td>0.67</td>
</tr>
<tr>
<td>Activity</td>
<td>3.33 (0.93)</td>
<td>3.48 (0.93)</td>
<td>3.66 (0.93)</td>
<td>1.13</td>
<td></td>
</tr>
<tr>
<td>Emotional</td>
<td>2.86 (1.32)</td>
<td>3.64 (1.19)</td>
<td>3.59 (1.28)</td>
<td>1.03</td>
<td></td>
</tr>
<tr>
<td>Symptom</td>
<td>3.01 (0.82)</td>
<td>4.14 (0.72)</td>
<td>4.18 (0.71)</td>
<td>1.17</td>
<td></td>
</tr>
<tr>
<td>Environmental</td>
<td>2.01 (1.17)</td>
<td>2.26 (1.23)</td>
<td>2.24 (0.01)</td>
<td>0.23</td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>2.85 (1.12)</td>
<td>3.38 (1.21)</td>
<td>3.49 (0.87)</td>
<td>0.64</td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td>3.42 (0.95)</td>
<td>3.52 (0.93)</td>
<td>0.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional</td>
<td>2.92 (1.34)</td>
<td>3.53 (1.17)</td>
<td>0.61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Symptom</td>
<td>3.05 (0.82)</td>
<td>3.97 (0.68)</td>
<td>0.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental</td>
<td>1.97 (1.23)</td>
<td>2.97 (1.05)</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>2.84 (0.99)</td>
<td>3.50 (1.02)</td>
<td>0.66</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Data are presented as mean (SE).
score improved by 0.64 to 0.67 points, a change that has been demonstrated to be clinically relevant. The most notable improvement was in symptom domain, with a change of 1.93 in the group completing four questionnaires and 1.17 in the group completing three questionnaires. There was also significant improvement in the emotional domain. Among 119 patients completing an initial and follow-up asthma knowledge quiz, there was not a significant improvement over the two quizzes; scores increased from 11.23 ± 0.17 to 13 ± 0.14 (p = 0.46).

Hospital and ED Utilization

When comparing ED visits and hospitalizations for the 12 months before and after the start of the intervention, there was a 28% reduction (3.9 ± 3.5 to 2.8 ± 2.7, p = 0.0005) in ED visits and a 41% (1.65 ± 1.83 to 0.97 ± 1.2, p < 0.001) reduction in hospitalizations over 1 year for patients enrolled in the intervention, compared with a 7% reduction in hospitalization (1.5 ± 1.26 to 1.39 ± 0.83) and no reduction in ED visits (2.16 ± 1.67 to 2.16 ± 2.88) for a group of 198 patients with a similar demographic profile who did not enroll in the intervention (Table 2). The control group was selected based on gender and date of visit to the ED to closely match the intervention group. Notably, patients who participated in the intervention had a significantly higher baseline rate of ED visits compared with the control group (3.9 vs 2.16, p < 0.0005), suggesting that sicker patients may be more likely to enroll in an intervention.

**DISCUSSION**

Our results demonstrate that a culturally targeted intervention program for Latino individuals living in a predominantly Latino area of NYC is effective in reducing ED and hospital utilization for asthma and improving overall asthma-related QOL. Several successful intervention programs have been undertaken in NYC, however, few have been designed for predominantly Latino adults. For our intervention program, residents from within the community were hired and trained as asthma educators to work within a community and culture that they were familiar with and invested in. Culturally targeted educational materials were developed and tested in collaboration with local community-based organizations.

Our study design has the advantage of allowing us to develop and examine an intervention program in a geographically, culturally, and socioeconomically homogenous group. Our results are limited in that only 11.6% of those eligible to participate in the intervention did so. The reason for the low participation is not known but is likely to be multifactorial. Addresses for mailings may have been incorrect for some patients; thus, they would never have received the invitation. Alternatively, individuals may have been reluctant to participate because of concerns over billing or immigration issues. A selection bias may have also been introduced, in that the individuals who did accept the intervention may represent a more highly motivated group who would be more willing to adapt changes in asthma treatment and lifestyle. Although the intervention group did not significantly differ in most demographic characteristics from the nonintervention group, we do not know whether our results are applicable to the entire population.

We have demonstrated a modest success rate for enrolling patients into an intervention shortly after an ED visit for asthma. For those who did participate, there was a significant improvement in asthma symptoms and ED/hospital utilization. Over 18 months of follow-up, only 62% of those enrolled had attended at least one follow-up visit and only 45% of those enrolled had attended at least three visits for asthma care, suggesting that efforts must also be expended to retain patients in outpatient care. The possibility exists that patients utilized the clinic for education and to initiate appropriate therapy, and then took that information with them to their primary care physicians and continued their follow-up in that fashion. Additionally, some individuals may have ultimately continued care in the clinic, but with less frequent visits and would not have been included in the 18-month follow-up data. Other patients may have relocated and sought follow-up elsewhere. It is possible that the experience was not favorable for patients and they therefore decided not to return for follow-up. Patient satisfaction data were

### Table 2—Comparison of ED Visits and Hospitalizations in Intervention and Nonintervention Patients

<table>
<thead>
<tr>
<th>Groups</th>
<th>ED Visits Before Intervention</th>
<th>ED Visits After Intervention</th>
<th>Change in ED Visits</th>
<th>Asthma Admissions Before Intervention</th>
<th>Asthma Admissions After Intervention</th>
<th>Change in Admissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention</td>
<td>3.9 (3.5)</td>
<td>2.8 (2.7)</td>
<td>-1.1 (p = 0.0005)</td>
<td>1.65 (1.83)</td>
<td>0.97 (1.2)</td>
<td>-0.69 (p &lt; 0.0001)</td>
</tr>
<tr>
<td>Control</td>
<td>2.16 (1.67)</td>
<td>2.16 (2.88)</td>
<td>0% (p = NS)</td>
<td>1.5 (1.26)</td>
<td>1.39 (0.83)</td>
<td>-0.11 (p = NS)</td>
</tr>
</tbody>
</table>

*Data are presented as mean (SE). NS = not significant.
not collected during the study, but would have been helpful to address this question. Unfortunately, this study was not designed to explore each of these possibilities.

Some of the results of our intervention merit further discussion. Despite the significant improvement in scores for the symptom and emotional domain of the QOL questionnaires, there was no improvement in the activity and environmental domains. These results differ from intervention studies reported by others, in which all domains improved after initiation of an asthma intervention. One may postulate that despite improvement in asthma symptoms, patients may be unlikely to alter the lifestyle adaptations that they have made in response to their disease even after the disease is brought under control. These findings may differ among different cultures.

The present study demonstrates that a comprehensive, culturally tailored asthma intervention program is effective in reducing asthma morbidity and improving asthma symptoms and QOL. Collaboration with community groups is essential for developing these programs and for involving motivated community leaders who can perpetuate such programs on a broader community level.

References