OUTCOMES IN PRACTICE

Results of a Telephone-Based Asthma Management Pilot Program
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In 1997, Blue Cross and Blue Shield of Massachusetts (BCBSMA) implemented the Asthma Care Management program, developed by the Access Health Group at McKesson HBOC, for its Medicaid HMO plan members. BCBSMA sought to improve participants’ self-management practices, communication with providers, health status and quality of life, and health service utilization patterns. This report provides a preliminary assessment of the pilot program.

Background
Disease Burden and Impact
According to the Centers for Disease Control and Prevention, the prevalence of asthma in the United States increased from 3.5% in 1982 to 5% in 1992 [1]. In recent years, asthma-related medical service utilization, hospitalization rates, and mortality rates also have increased [2,3]. Estimated medical spending for asthma-related care was approximately $10 billion in 1998 [4]. As the medical costs related to asthma are only 40% to 50% of total societal costs (eg, lost work days, school absenteeism, lower quality of life) [4–6], the economic consequences of this disease are indeed great.

Research indicates that proper management of asthma, as outlined in national guidelines [7], can improve health status and reduce costs associated with acute exacerbations of the disease. A number of factors, however, create barriers that impede compliance with suggested health practices [8]. Although knowledge is a precursor to changing behavior and practices, patients and caregivers have been shown to have insufficient self-management information [9–11]. In addition, some health plans do not include reimbursement for prescribed medicines or peak flow meters (PFMs). Such coverage limitations provide disincentives for appropriate asthma self-management practices.

Because of the prevalence and costs of asthma, many health plans and employer groups are implementing programs to assist persons in managing this condition. The National Committee for Quality Assurance encourages implementation of such disease management programs by assessing them as part of its accreditation process. Programs differ in their primary target audiences (ie, providers, patients, or both), the range of interventions provided, delivery mechanisms, and program intensity [5]. Many asthma education programs involve increased outpatient visits or attendance at asthma educational sessions consisting of a few sessions to year-long programs [12–15]. Some programs include access to teams of providers that may include nurses, medical specialists, and pharmacists.

Asthma Education Programs
In recent years, studies have documented the success of asthma education programs in reducing utilization of hospital emergency department (ED) and inpatient services, reducing symptom frequency and severity, and improving quality of life [12,15–17]. Studies of such programs, however, often have been based on a limited number of participants, and outcomes demonstrated by such studies may be due in part to factors that influence program participation (eg, severity of illness, patient motivation to understand and manage the disease).

In addition, research findings concerning the cost-effectiveness of the programs have been mixed [5,14–16,18]. Some of the variation may be explained by differences in the ways that program costs and savings were accounted for. Program savings were often determined by assessing changes in medical service utilization. However, some studies did not account for resources used to develop the program or costs or productivity losses (eg, missed days of work or school) associated with attending the program. Economic...
findings were more favorable when programs targeted high-risk or costly patients (eg, patients who made visits to the ED) or when operational costs were relatively low.

Managed care organizations and employers also seek to provide programs that encourage participation. Because outpatient and hospital-based programs may be inconvenient for younger and working participants, participation may be limited [15,19,20]. Therefore, additional research is needed to determine which components and delivery mechanisms provide for greatest compliance with asthma self-management recommendations.

A Health Plan Responds
In response to such pressures, BCBSMA attempted to improve the care of members with asthma by providing them with asthma management books and PFMs and by sponsoring continuing medical education programs for physicians. The impacts of these programs on the commercial population were assessed using data collected from 1993 to 1995 by the Managed Health Care Association’s Asthma Outcomes Study [BCBSMA, unpublished data, 1996]. BCBSMA members with severe asthma showed significant improvement in health status, and members with moderate asthma had the highest functional scores at the conclusion of the study. A similar evaluation was conducted for Medicaid plan members, but the findings were mixed [BCBSMA, unpublished data, 1996]. Although adults reported fewer days disrupted by asthma, their self-reported health declined. Significant changes for children in the group also were negative, with an increase in reported asthma-related exacerbations and self-reported use of hospital emergency room services.

Subsequent claims analyses revealed that asthma, along with diabetes, depression, and low back pain, was one of the more costly medical conditions for BCBSMA members [BCBSMA, unpublished data, 1997]. In 1996, total medical costs for asthma in BCBSMA’s commercial managed care populations were close to $9 million, approximately 0.7% of the total medical costs for that year. BCBSMA decided that a more comprehensive asthma care management program that focused on member education with monitoring over time was needed to improve use of comprehensive primary care services, reduce hospital utilization associated with asthma-related exacerbations, and increase plan member and physician satisfaction with programs and services. During this same period, the Massachusetts Department of Medical Assistance asked that all plans statewide address the health needs of Medicaid plan members with asthma. For these reasons, BCBSMA decided to conduct a pilot study with the HMO Medicaid population and initiate plans for expanding program enrollment to the commercial population dependent upon the pilot program findings.

### The Asthma Care Management Program

#### Program Description

A registered nurse conducts a comprehensive clinical assessment of all participants upon their enrollment in the program. During the intake assessment, the nurse obtains information concerning symptoms, comorbidities, health status, medical service utilization, prescribed and non-prescribed medications, knowledge of asthma, and self-management practices. Based on symptom severity and frequency and past medical service utilization, each participant is classified according to level of severity, with Level IV comprising persons at greatest medical risk. The severity classification scheme mirrors that of the National Heart, Lung, and Blood Institute (Table 1) [7].

During the intake assessment, the nurse asks a series of questions concerning asthma self-management. Participants’ responses to these questions and their existing self-management practices are used to determine their educational and counseling needs. The program is designed to meet the needs of persons newly diagnosed with asthma as well as persons more familiar with the condition and self-management practices. Program interventions thus vary according to the member’s severity level and individualized needs and include the following: written educational materials; a customized self-management plan; an asthma information video; standard education program and informal education; access to a toll-free, 24-hour nurse triage service; regular nurse communication with participants’ physicians; and referrals to the health plan’s case management program for additional services, if needed.

Because improving communication between participants and their physicians is an important goal of the program, participating physicians are sent information concerning nurse contacts with participants, including a copy of the self-management plan. Participants are encouraged to discuss topics addressed by the program nurses with their physicians, and nurses contact physicians with any urgent medical problems identified during a call. In addition, physicians can contact professionals at the Access Health Group with any questions or concerns about the program through a toll-free information line.

#### Phases of Intervention

Throughout the program, the nurses educate and counsel members about asthma management and monitor members’ symptoms by telephone. (For participants under the age of 12 years, nurses educate the parent or guardian, who assumes responsibility for educating and monitoring their child. For children aged 12 to 18 years, whether the nurse contacts the child directly, contacts the child and parent or guardian together, or contacts the parent alone is at the discretion of the parent or guardian.) There are 4 basic types of
nurse calls: education, monitoring, assessment, and follow-up to participant-initiated calls.

During the first part of the program, nurses contact patients frequently to teach the standard education program. The standard education program is based on 8 modules that address important asthma self-management issues identified in the national guidelines—asthma basic knowledge, asthma self-care, asthma triggers, exercise, inhaler use, medications, nighttime symptoms, and PFM use [7]. Because the amount of education a participant receives varies according to need, not all participants are taught each program module. After each module is taught, participant comprehension of the module’s content is assessed through a series of standardized questions. Written and telephonic educational materials are at a 7th-grade reading level. Some participants may be taught a module more than once to ensure understanding of the content.

Informal education also occurs in the program as nurses discuss questions, symptoms, medical service utilization, and self-management practices with participants during other types of calls. If a participant reports having asthma symptoms in the previous week, the nurse uses the episode to teach or reinforce appropriate aspects of asthma self-management. For example, a member who reports chest tightness during exercise would be taught methods to prevent or reduce the likelihood of such symptoms. During these discussions, information from the educational modules may be reviewed, and individual factors that limit participant compliance with specific self-management practices may be addressed.

After the standard education program is completed, participants receive routine monitoring calls. During these calls, nurses discuss health symptoms and behavioral changes with participants to reinforce existing self-management practices and to promote new ones. Research findings indicate that newly acquired behaviors, such as use of PFMs, may decrease over time if follow-up is not provided [19,21].

The third type of call is an assessment call. Program nurses conduct intake assessments and clinical reassessments. Assessments occur 6 months after enrollment, and the final assessment is conducted after 12 months. The information obtained during these assessments is the same as the information obtained during the intake assessment.

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In addition to calls initiated by nurses, participants have access to a toll-free, 24-hour nurse triage service that they can use to discuss symptoms and concerns with nurses or to be triaged for a medical complaint. If a participant places a triage call, program nurses conduct follow-up calls to monitor the participant’s health status and answer additional questions. If program nurses determine that a participant’s needs require the provision of additional services, they contact either the participant’s physician or the health plan’s case management program to initiate referrals for such services as locally provided home care or coordination of community services.

Pilot Study Design

Program Enrollment

BCBSMA primarily used data from a Medicaid HMO enrollment health status survey to identify Medicaid plan members with asthma. Other asthmatics were identified through a claims analysis of diagnostic codes. Health resource counselors at the Access Health Group contacted the plan members to describe the program and invite them to enroll. Program enrollment began in February 1997, and the pilot program operated for 1 year; 72 plan members were successfully contacted and enrolled in the Asthma Care Management program. This report includes data for 37 persons who actively participated in the program (ie, completed at least 2 educational modules and were either enrolled in the program during the baseline period [1 year before program implementation] or completed a clinical reassessment).

The ages of the 37 program participants ranged from 3.5 to 57.9 years (average age = 27.9 years), and nearly 60% of program participants were women. Of the 37 participants, 24 (65%) were classified as Level III or IV. The 37 participants were enrolled in the program an average of 9.4 months; the mean number of educational modules taught was 4.4.

Of the 72 persons who completed intake assessments, 33 persons did not actively participate in the program. For members who actively participated in the program, disenrollment reasons included telephone disconnection or invalid telephone numbers, plan member request, and changes in insurance coverage.

Evaluation and Data Sources

A pre/post study design was used to compare the knowledge, self-management practices, health status, and medical service utilization of program participants. The data used in this study are from 3 sources: the asthma program database, health plan medical claims, and a satisfaction survey. Although program nurses recorded patient information during every contact with participants, data concerning asthma-related knowledge, behaviors, and health status in this analysis were obtained from the 3 clinical assessments. For most participants, data from the intake and final assessment were used. Approximately one-third of participants (n = 12) did not have a final assessment, so data from the interim assessment were used instead. Because 2 participants who met the eligibility criteria did not have an interim or final assessment, the sample size for most program statistics is 35.

BCBSMA claims data were used to determine utilization of physician office, hospital ED, and hospital inpatient services by participants during the baseline period and the program period. Claims data for both time periods were available for 31 of the 37 participants. Information concerning satisfaction with the program was obtained from a survey conducted by an independent research firm and was not compared to a baseline rate. Satisfaction data are available for 24 of the 37 participants (response rate = 64.9%).

Results of Pilot Program

Participant Knowledge and Self-Management Practices

Program nurses assessed participant knowledge of the following competencies: medication use, inhaler technique, PFM use and interpretation, avoidance of asthma triggers, exercise, asthma self-management, and nighttime symptom management. For each content area, the nurses asked participants a series of questions to assess whether they understood the required information.

In general, participants demonstrated consistent improvements in understanding the 7 competencies assessed (Table 2). Upon reassessment, all program participants were knowledgeable about nighttime symptom management, and nearly all participants were knowledgeable about medications (94%), inhaler technique (91%), and asthma aggravators (89%).

The asthma self-management practices addressed by the program include use of PFMs and spacers, pet ownership, smoking behaviors, avoidance of asthma triggers, and medication compliance. Approximately two thirds of participants acquired PFMs after enrolling in the program; 91% of participants had PFMs upon reassessment. This increase is important because PFMs are critical tools for asthma self-management. Participants who had PFMs when they enrolled in the program reported more frequent use of their PFMs upon reassessment.

Compared with before program enrollment, after program enrollment an additional 17% of participants reported avoiding asthma triggers (eg, pets, pollen) and environments with tobacco smoke. Use of inhaled steroids and spacers also increased.

Health Status

Measures of general asthma symptoms and nighttime symptoms were used to monitor symptom frequency. Participants reported symptom frequency using categories based on the number of symptoms experienced per week
Improvements in the frequency of overall asthma symptoms were mixed: 29% of participants reported improvements, but 20% reported increased symptom frequency (Table 3). Thirty-seven percent of participants reported decreases in nighttime symptoms, and only 6% reported increases.

To assess the severity of asthma symptoms, participants reported the frequency with which asthma symptoms caused them to alter their daily activities (never, rarely, often, always). Over half of program participants reported decreases in the severity of their symptoms.

Medical Service Utilization
Utilization of medical services during the baseline and program periods was evaluated for 31 program participants for whom baseline data were available. Utilization rates for visits with asthma as the primary diagnosis were lower after program enrollment compared to the baseline period.

Utilization of physician office and hospital ED services decreased by 37% (from 112 visits to 70 visits) and 57% (from 19 visits to 8 visits), respectively. There were also fewer hospital admissions during the program period than during the baseline period (2 versus 4).

Program Satisfaction
An independent research firm conducted a survey to assess participant satisfaction with the program. In general, participants were very satisfied with the asthma program, and 92% of survey respondents (n = 24) rated the program as good, very good, or excellent and stated that they would recommend the program to others with asthma. Participants also reported high levels of satisfaction with the nurses’ understanding of their asthma symptoms and with the advice and education provided by the nurses; 83% of survey respondents found the advice helpful in relieving asthma symptoms. Of persons who saw or spoke with their physicians after enrolling in the program, 86% reported that the information provided by the nurses helped to improve their communication with physicians about asthma.

When asked what they liked best about the program, most participants responded that they liked the information provided to them. Other responses included the understanding and friendliness of the nurses, the toll-free telephone number, and nurse monitoring calls placed after completion of educational modules.

Discussion
The findings of the pilot study indicate that the Asthma Care Management program improved participants’ asthma self-management practices (eg, increased use of PFMs, prescribed medications, and spacers) and reduced the frequency and severity of their symptoms. The satisfaction survey results indicate that the education and advice the nurses provided by telephone not only helped in relieving asthma symptoms and concerns but also facilitated communication between program participants and their physicians.

The program was designed to increase utilization of preventive and primary care services and reduce unnecessary utilization of hospital services. Program nurses encourage participants to speak with their physicians about symptoms and treatment options; this advice may lead to greater use of physician services in the short term. In the long term, however, reduced frequency of acute attacks may decrease use of unscheduled outpatient physician services.

A formal cost-benefit model was not developed for the pilot program because of the small number of enrollees and the higher-than-average costs of implementing a pilot program. The decreases in medical service utilization observed during the 12 months following program implementation indicate that there is a potential for a positive return-on-investment when the program is extended to a larger population.
Following the success of the pilot program, BCBSMA expanded program enrollment to more than 700 commercial plan members in 1998 and contracted for additional program expansion.

The pilot program provided the Access Health Group with information used to improve the program design, internal quality monitoring programs, and database design. The program has also led to renewed work by BCBSMA and its physician practice sites to implement asthma practice guidelines.

Several limitations of the pilot program complicate its evaluation. These include a small sample size, lack of a control group, reliance on self-reported data to evaluate changes in self-management practices and health status, and a study population that consisted only of Medicaid HMO plan members. Because program participation and outcomes for larger commercial populations may differ from those of Medicaid populations, BCBSMA reviewed preliminary data for approximately 120 commercially insured HMO and point-of-service plan members who enrolled in the program during 1998. The distribution of the commercial participants by severity level was comparable to that of pilot program participants. Although the percentage of commercially insured participants who reported positive self-management practices upon program enrollment was somewhat higher than that of the Medicaid population, a significant number of participants also adopted these practices after program enrollment. For example, approximately one third of participants acquired PFMs after program enrollment, and over 40% of participants reported improvements in knowledge concerning factors that trigger asthma symptoms. One fourth of participants also reported decreases in the frequency and severity of nighttime symptoms. The preliminary findings of the commercial population indicate that the commercially insured also are very satisfied with the telephone-based program and, as with the Medicaid population, that participation in the program has helped to improve their self management practices.

Although a physician satisfaction survey was not conducted as part of the pilot program, satisfaction survey data for a similarly designed diabetes care management program provided by the Access Health Group indicate that physicians were in general satisfied with the program and observed positive changes in the health status and medical service utilization patterns of their patients. These data along with the asthma participant satisfaction survey findings indicate that telephone-based education, advice, and counseling may assist patients and their providers in managing their disease.

Because of the sample size of the pilot program, it is difficult to draw conclusions concerning program impact by severity level. In the short term, the program’s ability to reduce hospital utilization may be largest for persons with severe asthma who have higher utilization rates than persons at low risk. An important program goal, however, is to provide persons at low and moderate risk with information and counseling about asthma self-management practices to prevent disease severity from increasing. Therefore, program impact for those at low or moderate risk is also expected to be significant in the long run.

The need for in-person attendance limits participation in some asthma education programs. In this study, telephone access influenced program participation by some Medicaid plan members. The small sample size also made it impossible to evaluate the relationship between ability to self-manage the disease and disenrollment due to telephone access. However, 2 program features—the emphasis on physician-patient communication and the ability of program nurses to refer patients to health plan case management programs—help address participants’ needs that are not met through a solely telephone-based program.

Reductions in program participants’ use of medical services indicate that the Asthma Care Management program has the potential to be a cost-effective intervention. The telephone-based delivery system allows for an individualized approach to education and counseling that may be

### Table 3. Changes in Frequency and Severity of Symptoms

<table>
<thead>
<tr>
<th>Frequency of symptoms</th>
<th>Decreased Frequency</th>
<th>No Change</th>
<th>Increased Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall asthma symptoms</td>
<td>10 28.6</td>
<td>18 51.4</td>
<td>7 20.0</td>
</tr>
<tr>
<td>Nighttime symptoms</td>
<td>13 37.1</td>
<td>20 57.1</td>
<td>2 5.7</td>
</tr>
<tr>
<td>Symptoms alter daily activities</td>
<td>19 54.3</td>
<td>16 45.7</td>
<td>0 0.0</td>
</tr>
</tbody>
</table>

**Note:** Sample size = 35.
important in enabling behavioral changes. Furthermore, the flexibility in program service delivery allows participants to be contacted at home or work throughout the day. Such flexibility may lead to increased enrollment by populations that may be otherwise hard to reach. Future research will evaluate the program’s cost-effectiveness and impact on larger populations over longer periods of time.

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References