

MAINE HOME ASTHMA EDUCATION PROGRAM: EVALUATION RESULTS 2016 - 2017

*Comprehensive Asthma Control Through Evidence-based Strategic and
Public Health-Healthcare Collaboration Cooperative Agreement*

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Acknowledgments

The PFH Team acknowledges the Maine CDC Division of Disease Prevention's Chronic Disease Prevention and Control Program for providing insight into this report.

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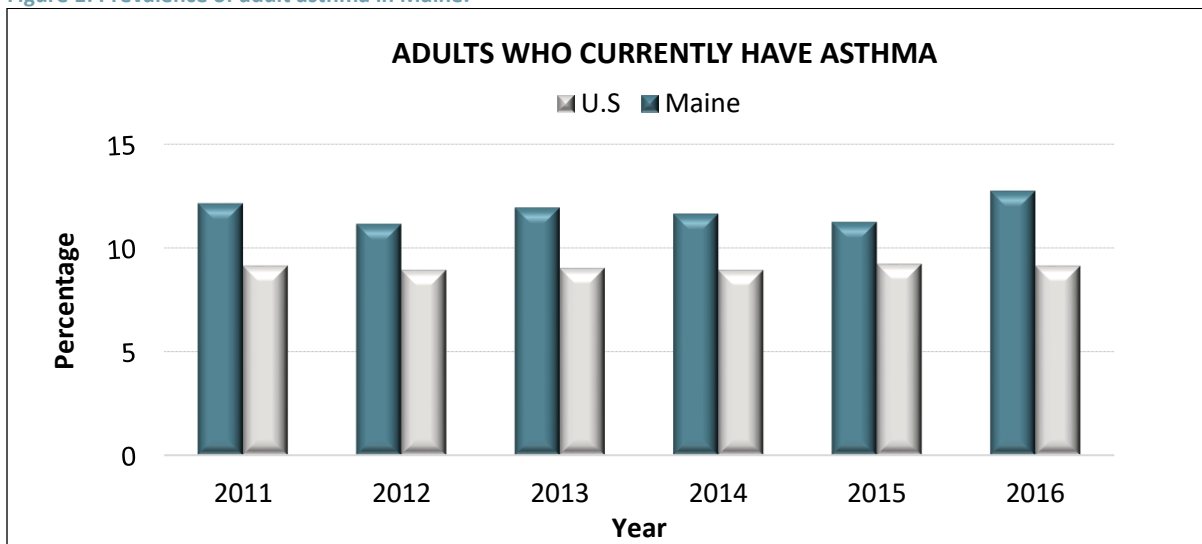
INTRODUCTION

Asthma in Maine

Asthma is one of the most common long-term diseases impacting children in the United States (Centers for Disease Control and Prevention, 2017). While asthma is more prevalent among children (compared to adults), adults are more likely to die from asthma (Greenblatt, Mansour, Zhao, Ross, & Himes, 2017).

Maine is one of the few states with an adult asthma prevalence higher than the asthma prevalence among children (Maine Center for Disease Control and Prevention, 2017). In Maine, approximately 12.2% of adults have asthma (Centers for Disease Control and Prevention, 2015), compared to 9.1% nationally (ibid). As shown in Figure 1, people residing in Maine have experienced consistently higher rates of adult asthma compared to the national average.

Figure 1: Prevalence of adult asthma in Maine.



In Maine, one in two adults and one in four children have asthma that is not well controlled based on frequency of asthma symptoms, night-time awakenings due to asthma, and use of rescue medications (Maine Center for Disease Control and Prevention, 2017).

Asthma results in an estimated 99,000 days of lost work (almost \$20 million in absenteeism costs) and \$160 million in direct medical costs annually in Maine (Maine Center for Disease Control and Prevention, 2017). The total costs of asthma are projected to increase by 60% to \$287 million by 2020 (ibid).

Currently, there is no cure for asthma. However, asthma can be controlled and managed with proper intervention and treatment (National Heart Lung and Blood Institute, 2017).

Home-Based Interventions

Home-based interventions are recommended for children and teens with asthma by the Community Preventive Services Task Force, (Community Preventive Services Task Force, 2013). According to a review of 23 studies, there is strong evidence indicating that such programming has been associated with reductions in days children and teens experience symptoms and school absenteeism, as well as improved quality of life (Crocker, et al., 2011). Although previous research suggests that in-home asthma prevention programs implemented among children have yielded positive results (ibid), there are limited studies examining the effects of interventions for adults with poorly controlled asthma. The same systematic review examined adult home-based interventions for asthma; researchers were unable to find sufficient evidence to support or refute their efficacy (ibid).

Maine In-Home Asthma Education Program

In 2016 and 2017, the Maine Center for Disease Control and Prevention (Maine CDC) implemented a U.S. CDC-funded initiative that provides in-home asthma education to people in Maine. The Maine In-Home Asthma Education Program (Maine HAEP) targets adults and children who have asthma that is not well controlled.

In 2016 the Program was piloted by a Certified Asthma Educator at a local health department. At the completion of the pilot, Program implementation was expanded to include a Community Paramedicine Program. In 2017, implementation was expanded for a third time to include an ethnic-based Community Health Worker organization. While the scope of practice varies across each of these professions (i.e., health department; community paramedicine; community health workers), all implementers were trained specifically in asthma self-management education and their professional scopes of practice support the implementation of the Program, as shown in Table 1.

Table 1: Implementer description.

Implementer	Certification	Scope of Practice
Certified Asthma Educator	National Asthma Educator Certification Board	Teach, educate, and counsel individuals with asthma and their families with regard to the information and skills necessary to minimize the impact of asthma on their quality of life.
Community Paramedic or EMT	National Registry of Emergency Medical Technicians	Serve as a healthcare extender in the community and identify high risk patients, provide patient education, assess patients' homes for health hazards, and navigate patients to services (Pearson & Shaler, 2015).
Community Health Worker	Association of Asthma Educators: Asthma Education for the Community Health Worker Program	Create connections between vulnerable populations and healthcare systems, provide culturally appropriate health education related to chronic disease prevention, advocate for underserved individuals to receive appropriate services, provide informal counseling, and build capacity to address health issues (Rural Health Information Hub, 2017).

The implementation of the Program is guided by the Maine In-Home Asthma Education Program document developed by staff at the Maine CDC, a Certified Asthma Educator (CAE) at a local public health department, and staff at an independent evaluation agency.

Clients are referred to the Program by a healthcare professional, community organization, or self-referral. If they agree to participate, the client (or caregiver if the client is younger than 18 years old) is enrolled in the Program. Once enrolled, the educator works with the client to strengthen/improve their self-management skills. More specifically, the aim of the Program is to contribute towards:

1. Increased client/caregiver asthma self-management knowledge and skills.
2. Improved health outcomes for clients receiving home visits.
3. Improved knowledge and understanding among professionals of appropriate asthma management practices and effective public health strategies related to asthma management.

The Program includes six modules and requires a minimum of one home visit. Each visit is comprised of one or more modules. Modules can occur consecutively within a visit. The number of visits and modules covered per visit is dependent on the individual client.¹

Program Evaluation

Partnerships For Health (PFH) is the independent evaluator for the Maine CDC asthma efforts. PFH worked together with Maine CDC staff and the implementers to develop and revise the In-Home Visiting Asthma Education Program and data collection forms.

Forms were developed to meet the needs of both the implementers and evaluators. The Evaluation Team's involvement in the design of the intervention allowed for the integration of evaluation and clinical practice from the onset, which has resulted in two primary benefits: (i) reductions in data reporting burden and duplication of data; (ii) greater accuracy in data collection.

This report summarizes the results from the first 18 months of implementation (January 1, 2016 – August 31, 2017).

METHODOLOGY

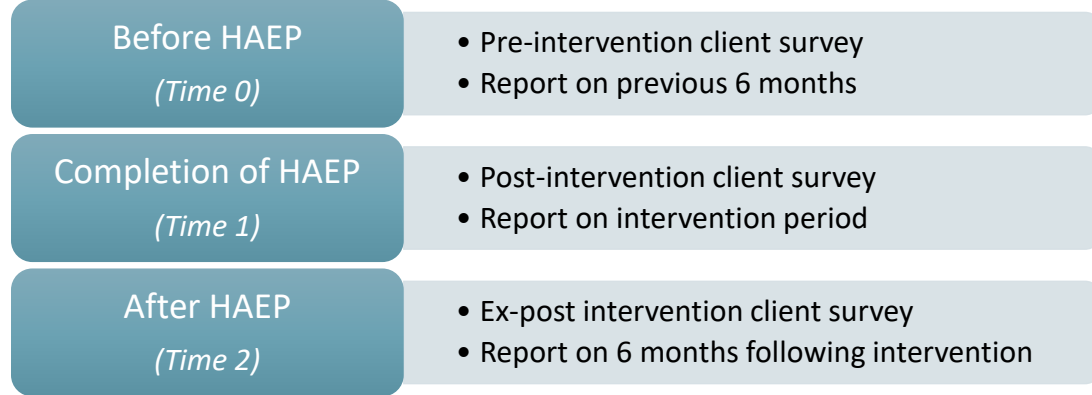
Study Design. The evaluation follows a mixed-method, pre/post study design. Although the overall evaluation comprises two different but interrelated study designs, (Implementation Agency-level and Client-level), this report focuses solely on the Client-level outcomes. Two primary sources of data were collected: Client Surveys and Intervention Logs.

Client Surveys. Clients participating in the Maine HAEP completed surveys prior to participation in the Program and during the last session. Clients younger than 18 years old completed the surveys with their caregivers. The survey included measures assessing demographic characteristics, medical history, asthma control, asthma controller medication adherence, and asthma related quality of life.

¹ For more information about Program implementation, refer to the Maine In-Home Asthma Education Program Version 2.2.

The initial (pre-intervention) survey was completed prior to the start of the intervention and included assessments which required participants to report on the previous 6 months. The second (post-intervention) survey was completed immediately after the completion of the Program and required participants to report on symptoms, behaviors, etc. since the start of the Program. A third (ex-post intervention) survey will be completed in 2018 and will ask participants to report on the time-period following the intervention. This timeline is shown in Figure 2.

Figure 2: Survey implementation timeline.



Where possible, existing, validated instruments were utilized as assessment tools. Where validated instruments did not exist, data fields were developed by the evaluators in discussions with the implementers, Maine CDC and U.S. CDC.

Intervention Log. The Intervention Log served as a client chart. It documented referral sources, sessions facilitated, forms completed, and implementers’ notes. The evaluators used the logs to assess the extent of client engagement.

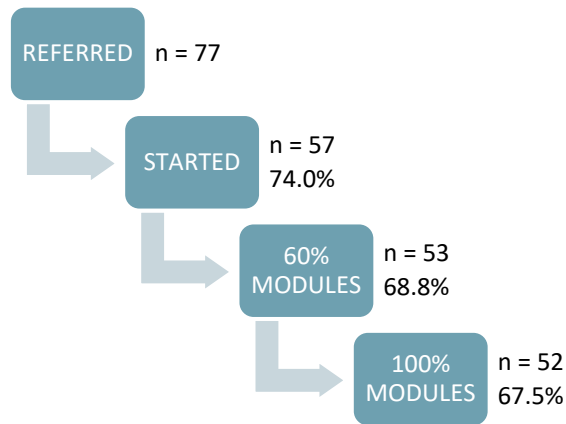
Analysis. Descriptive and inferential statistics were used to analyze data. Data on demographic, socioeconomic, and other individual variables were tabulated to describe clients and their outcomes. Inferential statistics were used to examine client outcomes. Specifically, asthma control, quality of life and service utilization were compared pre- and post-Program implementation. Additional statistical tests (such as t-tests, ANOVA, and multiple regression analysis) will be used when larger sample sizes have been achieved.

RESULTS

Client Characteristics

Of the 77 people that were referred to the Program in 2016-2017, 57 people (74%), agreed to participate. A total of 52 people completed the Program. One client exited the Program after completing 60%, as shown in Figure 3.

Figure 3: Program uptake.



A summary of participant characteristics is shown in Table 2. Overall, there were more adult participants (58%), than children (42%). The proportion of male and female participants corresponds to the national prevalence, with more females (57%) among the adult clients and more males (68%) among the child clients (Centers for Disease Control and Prevention, 2015).

The average age of adults was 50.1 years old (range: 16 – 92) and the average age of children was 6 years old (range: 1 – 15). The Program successfully reached lower income residents that receive state financial assistance, with about half of participants, adults and children, reporting paying for most of their medical costs using MaineCare (Maine’s Medicaid program). Several participants, particularly adults, reported using a combination of methods to pay for their medical costs. For example, they may cover some costs through their private health insurance and cover the remainder through self-pay. All participants had a primary care provider when they started the Program.

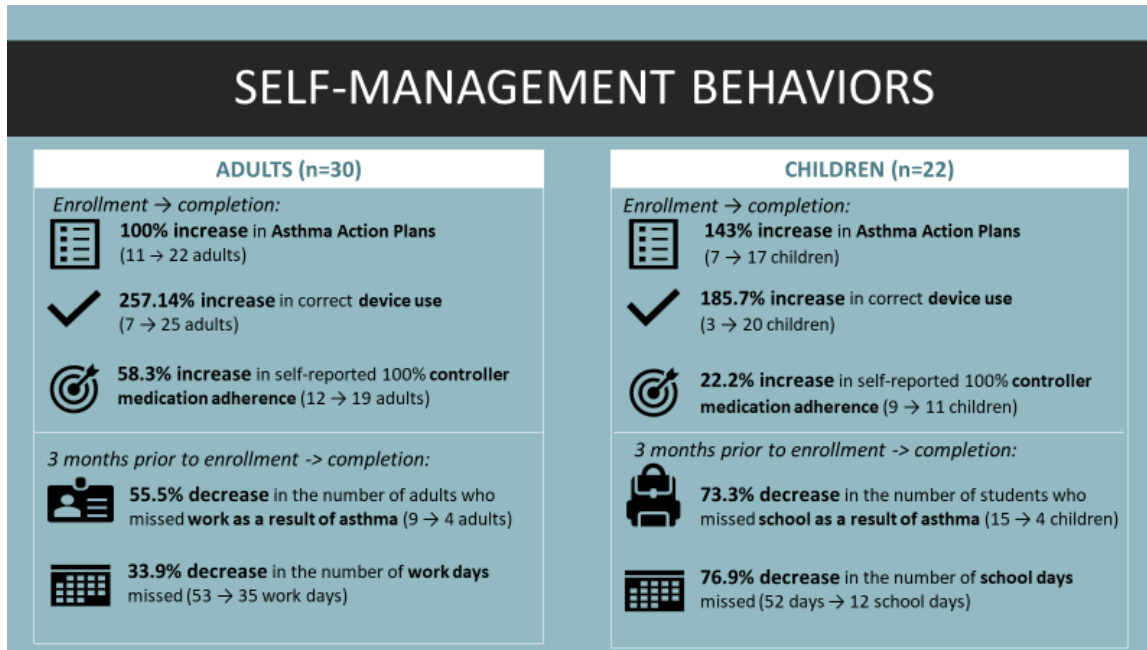
Table 2: Participant characteristics.

	ADULT (n=30)	CHILDREN (n=22)	CAREGIVERS
Average age	50.1 years old (Range: 16 – 92)	6 years old (Range: 1 – 15)	31.9 years old (Range: 21 – 53)
Gender	Female: 17 Male: 13	Female: 7 Male: 15	Female: 20 Male: 2
Employment status/grade	Full-time employed: 4 Part-time employed: 5 Retired: 6 Not able to work: 9	Pre-K: 7 K – Grade 3: 5 Grades 7 – 9: 4	Full-time employed: 7 Part-time employed: 5 Homemaker: 6 Not able to work: 2
Health insurance	Private: 2 Medicaid/MaineCare: 14 Combination: 12	Private: 5 Medicaid/MaineCare: 13 Combination: 3	NA

Average length of intervention was approximately 2 months. The average length of time taken for participants to complete the intervention, from session 1 to session 6, was 55 days.

Self-Management Behaviors

Overall, participants reported improved self-management behaviors immediately after completing the Program. Compared with 3 months prior to participation, there were increases in Asthma Action Plans, correct controller device use (Metered Dose Inhaler - MDI or nebulizer), and medication adherence. In addition, participants reported missing fewer days of work/school.



Three-quarters of participants had an Asthma Action Plan after completing the Program.

An Asthma Action Plan, also known as an asthma management plan, is a written plan that details daily treatment, including how to use medications, achieve long-term asthma control, deal with asthma attacks, and decide when to call the doctor or go to the emergency room (Centers for Disease Control and Prevention, 2012).

In the 3 months prior to participating in the Program, only 18 participants had Asthma Action plans. Immediately after the Program, there was a 100% increase in the number of adult participants and 143% increase in the number of children participants with Asthma Action Plans, for a total of 39 participants with Asthma Action Plans.

Participants were able to demonstrate how to properly use devices, such as a MDI or Nebulizer, after the Program.

Proper use of equipment includes prepping the equipment; preparing the medication; and initiating, sustaining, and completing the treatment. For example, if using a nebulizer, the client removes the cap, primes the device, exhales, inhales appropriately for the device, and holds their breath.

At the start of the Program, only 7 adults and 3 children were using their asthma devices properly. After receiving coaching from the educator, the number of adults that were able to properly use the device increased by 257.14% to 25, and the number of children increased by 185.7% to 20.

Adherence to controller medications increased among participants.

There are two types of asthma medications: long-term controller medications and rescue medications. Long-term controller medications reduce airway inflammation and prevent symptoms. Rescue medications relieve asthma flare ups (National Heart Lung and Blood Institute, 2017). Controller medications are designed to be taken every day (ibid).

In the 3 months prior to the Program, 12 adults and 9 children reported not missing a dose of their medication. Immediately after the Program, the number of adults that were 100% adherent increased by 58.3% to 19, and the number of children increased by 22.2% to 11.

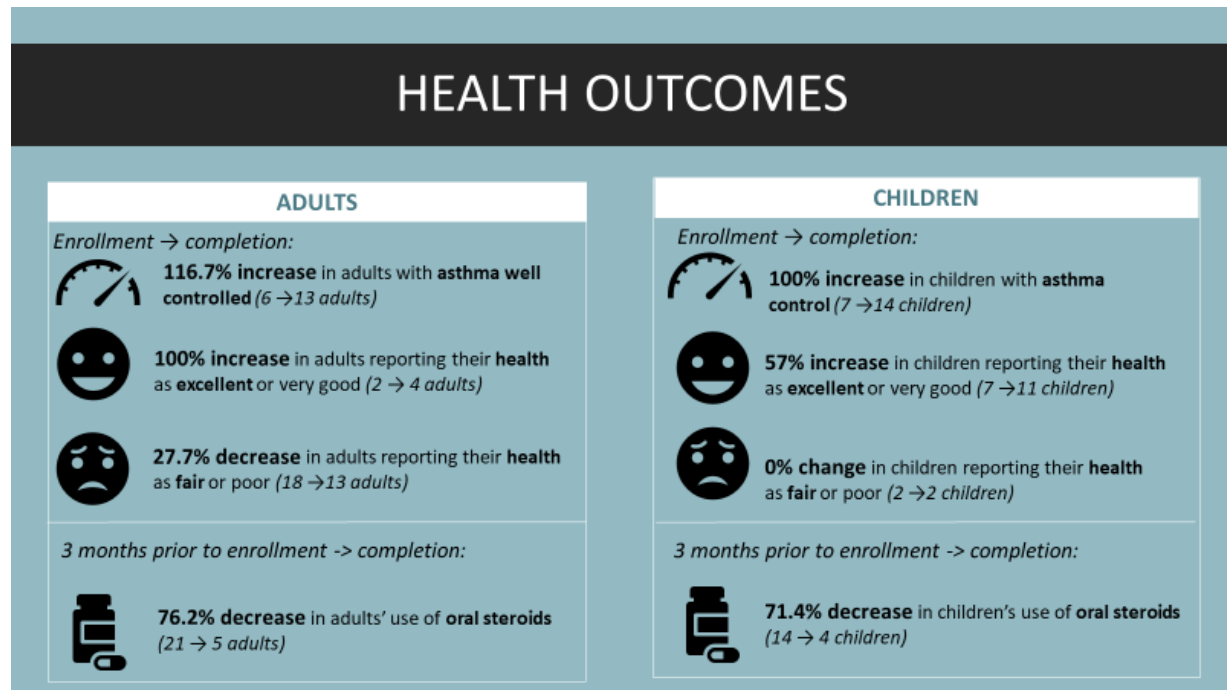
All participants missed fewer days of work and days of school.

Missed work and school days place a significant financial burden on individuals with asthma and their families, as well as on businesses.

The number of participants missing work/school decreased (adults from 9 to 4, and children from 15 to 4). This also resulted in a decrease in the number of work/school days missed (adults from 53 to 35 and children from 52 to 12).

Health Outcomes

Participants’ health outcomes improved immediately after completing the program. Compared to 3 months prior to participation, there were increases in asthma control and self-reported health, as well as reductions in the use of oral steroids.



The number of participants who reported their asthma as well controlled doubled for both adults and children.

According to the National Heart, Lung and Blood Institute, asthma is well controlled if a person has symptoms no more than 2 days a week, can do normal activities, use quick relief medications no more than 2 days a week, experience one or fewer asthma attacks that require corticosteroids by mouth, and peak flow does not drop below 80% of their personal best (National Heart, Lung, and Blood Institute, 2017).

In the 3 months prior to the Program, only 6 adults and 7 children reported having their asthma well controlled. Immediately after the Program, there was an increase of 116.7% among adults and 100% among children, resulting in a total of 27 participants having asthma that is well controlled.

More participants self-rated their health positively and fewer self-rated their health negatively after the Program.

Self-rated health is a proxy measure for quality of life and is associated with general happiness and life satisfaction (Siahpush, Spittal, & Singh, 2008). In addition, it is an indicator of a population's overall well-being (Ibid). Lower ratings have been associated with increased mortality and healthcare system utilization, and with illness severity (Ibid).

While most participants rated their health as good both before and after the Program, there was a noticeable increase in the number of adults (100%) and children (57%) who rated their health as 'excellent' or 'very good' after the Program, and a decrease (27.7%) in the number of adults who rated their health as 'fair' or 'poor'.

The number of participants that reported using oral steroids decreased by more than 70%.

Oral steroids (corticosteroids) are used to treat acute asthma flare-ups (Palo Alto Medical Foundation, 2015). They are typically prescribed for short time periods (5 days to 2 weeks) and tend to cause more side effects than inhalers (ibid).

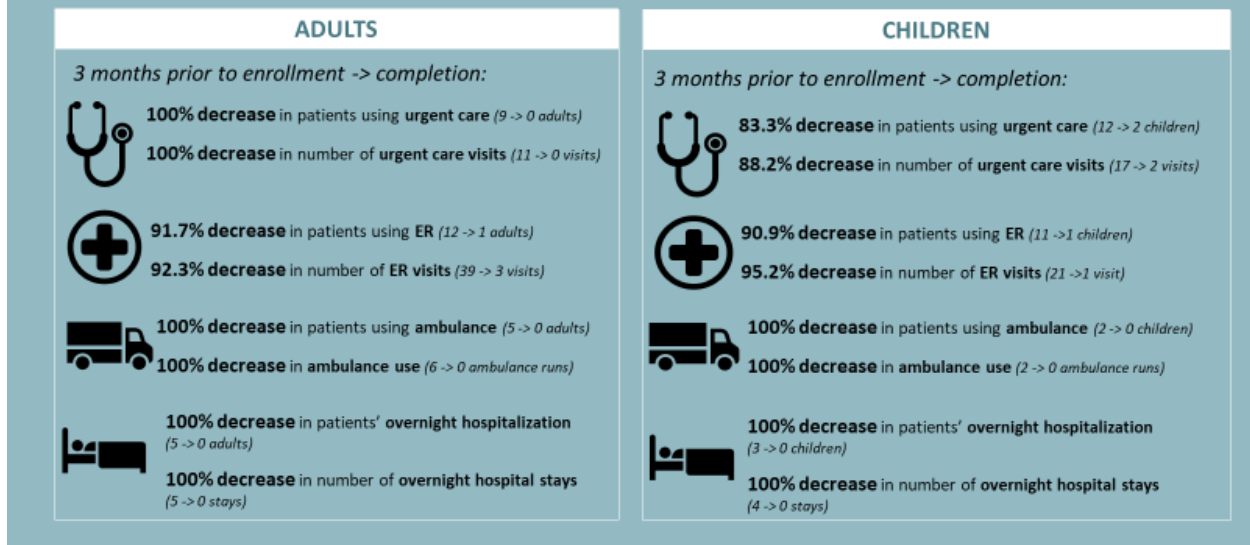
In the 3 months prior to the Program, 35 participants (21 adults and 14 children) reported using oral steroids in the last 3 months. By the end of the Program, this decreased to 9 participants (5 adults and 4 children).

Healthcare Utilization

According to the Centers for Disease Control and Prevention, asthma costs in the U.S. were \$56 billion in 2007 (Centers for Disease Control and Prevention, 2011). Decreasing the use of urgent care, emergency rooms, ambulance rides, and overnight hospital stays can all contribute to reducing healthcare costs associated with asthma.

Compared to 3 months prior to participation in the Program, reductions were seen among both adults and children in each of these categories immediately after the Program.

HEALTHCARE UTILIZATION



Fewer adults and children used urgent care.

In the 3 months prior to the Program, 21 participants (9 adults; 12 children) visited urgent care 28 times. Immediately after the Program, no adults reported visiting urgent care and 2 children had a total of 2 visits.

There was a decrease of more than 90% in asthma-related emergency room visits.

It is important to note that among adult participants, there were 2 participants that reported very high utilization of the emergency room: those two participants accounted for the majority of the visits.

By the end of the Program, no participants reported using an ambulance in the past 3 months for their asthma.

In the 3 months prior to the Program, 7 participants (5 adults and 2 children), reported 8 ambulance rides (6 adults and 2 children). Immediately after the Program no adults or children reported using an ambulance.

No participants reported overnight hospital stays by the end of the Program.

Five adults and 3 children reported having to stay overnight in the hospital because of their asthma in the 3 months prior to starting the Program. At the end of the Program, no participants reported any overnight hospital use for asthma care.

CONCLUSION

The efficacy of the Program was evaluated using a mixed-methods, pre/post study design. Findings suggest that implementing the Program has resulted in increased patient self-management behaviors, improved health outcomes, and improved quality of life. Additionally, patients experienced increased medication adherence and self-efficacy in asthma management, improved asthma control, and decreased emergency steroid usage, urgent care use, emergency room visits, and school absenteeism for children.

Overall, the Program and data collection tools appear to be effective in obtaining the desired information. Results will be expanded on with the implementation and analysis of the 6-month follow-up survey among the two continuing implementers.

LIMITATIONS

Due to the relatively small sample size, the results of these analyses are not generalizable. In addition, without the six-month follow-up survey it is not possible to determine the long-term impact of the Program.

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