Community-Based Asthma Education

Rohini Rau-Murthy, BA; Leslie Bristol, RRT, AE-C; and David Pratt, MD, MPH

ABSTRACT

OBJECTIVES: The authors studied the impact a community hospital-based asthma education (AE) program had on asthma understanding, healthcare utilization, and estimated costs.

STUDY DESIGN: Prospective observational study.

METHODS: Every self-selected enrollee in Ellis Hospital's AE program from April 1, 2011, to December 31, 2015, was captured using quality assurance data. Significant changes comparing individual progress were evaluated using 2-tailed paired *t* tests using SPSS software. Care utilization was measured 1 year before and after AE. Asthma control was evaluated with Asthma Control Test (ACT) scores. The average charges for emergency department (ED) visits and asthma admissions were used to estimate cost impact.

RESULTS: In total, 574 patients of all ages (mean age = 30 years) were seen over the study period. Participants reported better controlled asthma (mean pre–AE ACT score = 14; mean post–AE ACT score = 19; *P* <.001). Individuals also demonstrated increased asthma knowledge (mean pre–AE knowledge score = 10; mean post–AE score = 13; *P* <.001). In the 12 months prior to education, there was a mean of 1.1 ED visits and 0.16 inpatient admissions per AE participant. In the 12 months following education, ED visits dropped to a mean of 0.4 visits and admissions to 0.06 per individual (*P* <.001). We estimated that the program decreased ED charges for this study cohort by about $600,000 and inpatient charges by about $230,000.

CONCLUSIONS: Our data suggest that patient AE efforts at the community level are associated with better knowledge of asthma, decreased symptoms, and increased quality of life. The use of expensive resources also was favorably impacted.

Am J Manag Care. 2017;23(2):e67-e69

Asthma, as a chronic disease with available treatment, should be managed in the outpatient setting, not in the emergency department (ED). Achieving better management of this intermittent airways disorder is a priority at the local, state, and national levels. In 2011, there were 1.8 million visits to US EDs with asthma as the primary diagnosis, representing 1.3% of all ED visits.[1-3] In Schenectady County, New York, over 1100 ED visits were attributed to asthma, representing approximately 1.8% of total Schenectady County ED visits.[4,5] Of these ED visits, per internal data from Ellis Hospital in Schenectady, there were 900 visits there in 2012 for asthma, resulting in total cost charges of about $2 million.

Asthma education (AE) programs are a cornerstone of asthma management. The National Asthma Education and Prevention Program, convened by the National Institutes of Health and the National Heart, Lung, and Blood Institute, lists education as the second of 3 pivotal, essential components to asthma management.[6] Education programs, when coupled with regular medical review, have repeatedly been shown to improve health outcomes for individuals with asthma[7] and to reduce use of the ED.[8]

Here, we describe the outcomes of a community-based AE program and outline the benefits of such a program to providers and patients alike.

Study Design

Ellis Hospital in Schenectady, New York, established an AE program in 2011 that follows Medicaid guidelines.[9] The patient-centered goals of this program are 4-fold: 1) increase quality of life, 2) decrease "sick visits" to primary care physician, 3) decrease lost work or school days, and 4) decrease ED/urgent care visits and hospitalizations. Treating providers refer to the program and, consequently, respiratory therapists with Certified Asthma Educator credentialing see newly diagnosed or complex patients to provide up to 10 hours of instruction. This is accomplished within a continuous 6-month period.

During the initial session, a baseline laboratory and qualitative evaluation of symptom control is conducted, education is

TAKEAWAY POINTS

- Our work supports other research suggesting asthma education programs can have a material impact on individuals' lives and the cost of care.
- We differ from other studies in that our work was done in the real world of a community hospital, not an academic medical center.
- Asthma education programs that are monitored for quality should be part of every population-based asthma intervention effort.

initiated, and materials to facilitate control are given to the patient (**Table 1**). In follow-up visits, Asthma Control Test (ACT) and asthma knowledge questionnaires are completed, symptoms are tracked, and education materials are reviewed as needed. In 2015, a more concentrated 4 sessions per patient program was initiated. **eAppendix A** (eAppendices available at **www.ajmc.com**) provides a copy of the AE new visit intake form and the clinic note template used for education sessions. The program employs 3 to 4 full-time therapists and supplements with volunteers and student interns.

METHODS

Every self-selected enrollee in Ellis Hospital's AE program from April 1, 2011, to December 31, 2015, was captured prospectively, using quality assurance data. Variables captured in the database include gender, date of birth, referring MD, primary care physician, insurance type, initial visit date, initial ACT score, follow-up ACT scores, the number of Ellis inpatient admissions in the 12 months prior to and after the initial AE visit, the number of Ellis ED visits in the 12 months prior to and after the initial AE visit, whether a controller medication was used before and after AE knowledge assessments and whether referrals were made to community organizations.

The ACT is a validated measure of disease control based on reported symptoms.[10] Patients' asthma knowledge was measured by a questionnaire (**eAppendix B**) on topics covered in the AE session. Care utilization was measured by tracking enrollees' number of Ellis ED visits and inpatient admissions in the 12 months prior to and after AE. Both were established from the electronic health record and confirmed during the education session.

The impact on charges of the AE program was determined by using the average charges for ED visits and asthma admissions to calculate the estimated charge savings.[11] These were internally validated by selecting 20 adult and 20 pediatric AE patients at random who had either an ED visit or an admission for asthma and querying the Ellis financial record on the charges associated with the visits.

Significant changes comparing individual progress were evaluated using 2-tailed paired *t* tests in SPSS (IBM Corp, Armonk, New York).

RESULTS

Patient Characteristics

A total of 574 patients of all ages (mean = 30 years; range = 4-77 years) were seen over the study period. Thirty-nine percent (225) of patients were children (under 18 years) and 61% (351) were female. Ninety-eight percent (565) had insurance, and of those, 72% (415) were covered by Medicaid or Medicare (**Table 2**).

Asthma Knowledge and Control

Participants reported better controlled asthma (mean pre-AE ACT score = 14; mean post–AE ACT score = 19; $P < .001$). Of the 574 participants, 78% initially had an ACT score below 19, demonstrating poor control of their symptoms. After receiving AE, 71% had an ACT score below 19. Individuals also demonstrated increased asthma knowledge (mean pre-AE knowledge score = 10; mean post–AE score = 13; $P < .001$).

Healthcare Utilization

In the 12 months prior to AE, there was a mean of 1.1 ED visits and 0.16 inpatient admissions per program enrollee. In the 12 months following education, ED visits dropped to a mean of 0.4 visits per enrollee and inpatient admissions fell to 0.06 per individual ($P < .001$). Subsequently, the program decreased both ED and inpatient charges for this population. With a decrease of 0.7 ED visits per subject, assuming average ED charges of $1500 per visit, the total ED charges for this study cohort decreased by about $600,000. Inpatient admissions per subject had a decrease of 0.11; assuming average inpatient costs of $3600 for pediatric cases and $5500 for adult cases, inpatient charges decreased by about $230,000 for this

TABLE 1. Topics Covered in Initial Asthma Education Session

Baseline Evaluation	Current Control	Education	Materials
Spirometry	Asthma Control Test	Medication reason, method of utilization	Spacer
Exhaled nitric oxide	Last 12 months: emergency department visits	Spacer training	Allergen-free pillow and mattress cover
Asthma knowledge questionnaire	Last 12 months: hospitalizations	Allergen trigger exposure limitation	Nebulizer compressor
	Last 12 months: lost school/work time	Tobacco cessation counseling/referral	Asthma action plan
		Community resources referral	

TABLE 2. Asthma Education Patient Demographics

	Total (N = 574)
Gender	
Male	223 (39%)
Female	351 (61%)
Age	
Pediatric (<18)	225 (39%)
Adult (≥18)	349 (61%)
Insurance	
Insured	565 (98%)
Medicaid/Medicare	415 (72%)

cohort. These charge estimates from the literature[11] were substantiated by internal Ellis estimates based on 20 randomly selected ED and inpatient admissions. The average charge for a pediatrics ED visit was $1045.97, and the average adult ED visit was $1611.35. For inpatient admission, the average charge for a pediatric admission was $10,746.14 and the average adult admission cost $10,517.20. Comparing the national data with internal Ellis data, the reader can see that the savings estimates we report are conservative.

DISCUSSION

Our results show that a community-based AE program can have a significant impact on both symptom control and resource use. The decrease in symptoms has implications for improved quality of life and productivity. Having a better understanding of the disease also leads to improved self-efficacy, confidence, and well-being.

Further, our work resulted in a decrease in ED visits and the need for in-patient care for the adults and children enrolled in our program. This is similar to the results of the pediatric meta-analysis published by Coffman.[12] A prospective series reported from Canada providing education, self-management tools, and care for adults and children also showed a positive impact on symptoms, resource use, and productivity.[13]

Our observational results, like those of all observational studies, have limitations in the form of risk of bias and confounding.

CONCLUSIONS

Our work supports the observations of others and suggests that community-based AE programs can make a substantial contribution to the shared goal of the triple aim: improving the patient experience of care, improving the health of populations, and reducing the per capita cost of healthcare.[14] Bettering patient well-being while simultaneously avoiding ED visits and decreasing costs is an attractive combination for providers, patients, insurance companies, and tax payers alike. ■

Acknowledgments

The authors wish to thank the respiratory therapists at Ellis Medicine for their tireless work, Ellis Hospital, and Ed Stomski.

Author Affiliations: Albany Medical College (RR-M), Albany, NY; Ellis Hospital (LB), Schenectady, NY; Schenectady County Public Health Services (DP), Schenectady, NY.

Source of Funding: Dake Foundation.

Author Disclosures: Ms Bristol is an employee of Ellis Hospital, whose patients participated in the study. The remaining authors report no relationship or financial interest with any entity that would pose a conflict of interest with the subject matter of this article.

Authorship Information: Concept and design (DP); acquisition of data (LB); analysis and interpretation of data (DP, RR-M); drafting of the manuscript (DP, RR-M); critical revision of the manuscript for important intellectual content (LB, DP, RR-M); statistical analysis (DP, RR-M); provision of patients or study materials (LB); obtaining funding (LB); administrative, technical, or logistic support (LB, DP, RR-M); and supervision (DP).

Address Correspondence to: Rohini Rau-Murthy, Albany Medical College, 47 New Scotland Ave, Albany, NY 12208. E-mail: raumurr@mail.amc.edu.

REFERENCES

1. Asthma. CDC website. http://www.cdc.gov/nchs/fastats/asthma.htm. Updated October 6, 2016. Accessed January 2017.
2. Asthma facts: CDC's National Asthma Control Program grantees. CDC website. https://www.cdc.gov/asthma/pdfs/asthma_facts_program_grantees.pdf. Updated July 2013. Accessed January 2017.
3. National Hospital Ambulatory Medical Care Survey 2011 emergency department summary tables. CDC website. https://www.cdc.gov/nchs/data/ahcd/nhamcs_emergency/2011_ed_web_tables.pdf. Accessed January 2017.
4. Total asthma emergency department visit rate per 10,000. 2013. New York State Department of Health website. https://www.health.ny.gov/statistics/ny_asthma/data/a20.htm. Updated March 2016. Accessed January 2017.
5. Table 3a: 2006 emergency department visits by county of residence and age—male percent of county total. New York State Department of Health website. https://www.health.ny.gov/statistics/sparcs/ed/2006/table03a.htm. Accessed January 2017.
6. National Heart, Lung, and Blood Institute. Expert panel report 3: guidelines for the diagnosis and management of asthma—full report 2007. National Heart, Lung, and Blood Institute website. https://www.nhlbi.nih.gov/files/docs/guidelines/asthgdln.pdf. Accessed January 2017.
7. Gibson PG, Powell H, Coughlan J, et al. Self-management education and regular practitioner review for adults with asthma. *Cochrane Database Syst Rev*. 2003;(1):CD001117.
8. Krishna S, Francisco BD, Balas EA, König P, Graff GR, Madsen RW; Randomized trial. Internet-enabled interactive multimedia asthma education program: a randomized trial. *Pediatrics*. 2003;111(3):503-510.
9. Diabetes and asthma self-management training will soon be offered to Medicaid beneficiaries. New York State Department of Health website. https://www.health.ny.gov/health_care/medicaid/program/update/2008/2008-10.htm. Published October 2008. Accessed January 2017.
10. Nathan RA, Sorkness CA, Kosinski M, et al. Development of the asthma control test: a survey for assessing asthma control. *J Allergy Clin Immunol*. 2004;113(1):59-65.
11. Barrett ML, Wier LM, Washington R. Trends in pediatric and adult hospital stays for asthma, 2000-2010. Healthcare Cost and Utilization Project website. https://www.hcup-us.ahrq.gov/reports/statbriefs/sb169-Asthma-Trends-Hospital-Stays.jsp. Updated January 13, 2014. Accessed January 2017.
12. Coffman JM, Cabana MD, Halpin HA, Yelin EH. Effects of asthma education on children's use of acute care services: a meta-analysis. *Pediatrics*. 2008;121(3):575-586. doi: 10.1542/peds.2007-0113.
13. To T, Cicutto L, Degani N, McLimont S, Beyene J. Can a community evidence-based asthma care program improve clinical outcomes? a longitudinal study. *Med Care*. 2008;46(12):1257-1266. doi: 10.1097/MLR.0b013e31817d6990.
14. Berwick DM, Nolan TW, Whittington J. The triple aim: care, health, and cost. *Health Aff (Millwood)*. 2008;27(3):759-769. doi: 10.1377/hlthaff.27.3.759.