Effects of Increased Primary Care Access on Process of Care and Health Outcomes among Patients with Asthma Who Frequent Emergency Departments

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PURPOSE: Many asthmatic patients discharged from emergency departments do not have timely follow-up visits with a primary care physician. This study was conducted to determine the effectiveness of a health professional–based intervention in improving process of care and health outcomes among asthmatic patients discharged from emergency departments.

METHODS: We enrolled 125 asthmatic patients, aged 5 through 50 years, from the emergency department of a community-based hospital; 62 patients were assigned to usual care and 63 to enhanced care. Enhanced care consisted of usual care plus employment of a coordinator to make follow-up appointments with the patient's primary care physician with at least one reminder telephone call to the patient.

RESULTS: At 6 months of follow-up, mean (± SD) asthma and pediatric quality-of-life scores were higher in the enhanced care group than in the usual care group (5.7 ± 1.2 units vs. 5.0 ± 1.3 units, $P = 0.01$). The enhanced care group also had a higher rate of follow-up office visits (78% [n = 44] vs. 60% [n = 33], $P = 0.003$), were more likely to have written action plans (46% [n = 26] vs. 25% [n = 14], $P = 0.02$), and had fewer asthma symptoms (1.8 ± 1.1 units vs. 2.2 ± 1.3 units, $P = 0.09$). However, these differences disappeared by 12 months of follow-up.

CONCLUSION: A simple intervention wherein a health professional facilitates follow-up visits can improve the process of care and health outcomes of high-risk asthmatic patients. However, the effect of this intervention is time limited and largely wears off by 12 months. **Am J Med. 2004;117:479–483.** ©2004 by Elsevier Inc.

Effective long-term control of asthma is possible for the vast majority of patients with the disease (1). To promote seamless care and better education of patients with asthma, the 1997 National Asthma Education and Program Guidelines Expert Panel recommended that patients have a follow-up appointment after discharge from the emergency department (1). Indeed, improved follow-up has been associated with better clinical outcomes (2–4). However, in many jurisdictions, more than 60% of asthmatic patients discharged from emergency departments do not have a follow-up visit with their primary care physicians, leading to suboptimal control of their disease and frequent clinical relapses (5). Emergency department–based interventions may therefore be necessary to improve the existing follow-up rates. We conducted a controlled study to determine whether a simple health professional–based intervention could improve the rate of follow-up visits and enhance the process of care and health outcomes of asthmatic patients discharged from emergency departments.

METHODS

Patients and Setting

This study was conducted at the Misericordia Hospital in Edmonton, Alberta, Canada, between April 2001 and November 2002. All patients between the ages of 5 and 50 years who were admitted to the emergency department with a primary diagnosis of asthma were eligible for participation. The study was approved by the Health Research Ethics Board (Biomedical Panel), Faculty of Medicine and Dentistry, University of Alberta.

The study comprised an enhanced care and usual care arm. To best mimic a real-life situation and to minimize any disturbances to the participating emergency department, we employed a time-series method for patient assignment. Rather than using patients as the unit of randomization, we decided a priori to allocate certain weeks for usual care and other weeks for enhanced care (in a 1:1 ratio). Accordingly, all patients admitted to the emergency department on the "on" week were assigned to enhanced care, while all patients admitted on the "off" week were assigned to usual care. Study patients, and all staff members (including the attending physicians) working

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in the emergency department, were unaware of which were the "on" and "off" weeks.

Intervention

After informed consent was obtained from patients who had been fully stabilized medically in the emergency department, all study patients, regardless of treatment assignment, were asked to make a follow-up appointment with their primary care physician within 4 weeks of discharge. In the enhanced care arm, a study coordinator offered to make the appointment directly with the patient's physician on behalf of the patient. If the patient did not have a regular primary care physician, the patient was asked to choose a physician from a list of primary care physicians in the region who were willing to accept new patients. This list had been previously collated and disseminated by the local health authority region. Patients in the enhanced care arm received a reminder telephone call 1 or 2 days before the scheduled follow-up visit. This intervention was not repeated during the follow-up period.

Patients in the usual care arm were encouraged to visit their regular primary care physician, but there were no attempts to make the appointment for them and no telephone reminders were provided.

Follow-up

Patients were contacted via telephone at baseline, and then at 1, 3, 6, and 12 months following discharge from the initial emergency department visit using standard survey techniques (6). A strict protocol was instituted to minimize any potential for differential follow-up bias. During each encounter, patients' health-related quality of life and asthma control were assessed using the mini Asthma Quality of Life Questionnaire (7) and the Asthma Control Questionnaire (8). The Pediatric Asthma Quality of Life Questionnaire was used to assess the health-related quality of life for children under 12 years of age (9). Participants' visits to emergency departments and physician offices; use of medications and written action plans; and ownership of a peak expiratory flow meter were also determined during each of these encounters.

Statistical Analysis

Data were analyzed on an intention-to-treat basis. The primary endpoint was to compare patients' health-related quality of life between enhanced and usual care at 6 months following initial discharge from the emergency department. Secondary endpoints were asthma control; use of anti-asthma medications and written action plans; possession of peak expiratory flow devices; and rates of office visits and repeat emergency department visits at 6 and 12 months following emergency discharge. We used independent sample *t* tests to compare the differences between groups. We used linear regression analyses to evaluate the effect of age, sex, written action plans, and peak expiratory flow meters on asthma-specific quality-of-life scores at 6 months. All tests were two-tailed in nature. For each visit, the analysis was restricted to those participants who did not have missing information or who did not drop out at that visit. Analyses were performed using SAS, version 8.2 (Cary, North Carolina). *P* values <0.05 were considered significant.

RESULTS

During the study period, 250 patients were evaluated for asthma in the emergency department. Of these, 125 were excluded for the following reasons: 63 (24%) could not be reached to obtain informed consent, 43 (17%) did not wish to participate, and 19 (7%) declined for other reasons, including inability to comprehend English or lack of a fixed address. In total, 125 patients were enrolled in the study (Table 1): 112 (90%) completed 6 months of follow-up and 103 (82%) completed the full 1-year protocol. The dropout rate was similar between usual and enhanced care arms: 10% (6/62) versus 11% (7/63) at 6 months, and 21% (13/62) versus 14% (9/63) at 12 months. The data for the dropouts were included in the analyses until the date they were lost to follow-up, after which they were censored from subsequent analyses.

Table 1. Baseline Characteristics of Study Participants, by Treatment Assignment

Characteristic	Usual Care (n = 62)	Enhanced Care (n = 63)
	Number (%) or Mean ± SD	
Age (years)	22.7 ± 12.6	22.5 ± 13.7
<18 years	25 (40)	27 (43)
Male sex	16 (26)	34 (54)*
Current smoker	11 (18)	14 (23)
Never smoker	38 (62)	33 (53)
White race	50 (81)	53 (84)
Peak expiratory flow† (L/min)	265 ± 117	224 ± 125
Has allergies	56 (90)	55 (87)
Has pets in house	33 (53)	43 (68)
Has a primary care provider	54 (87)	52 (83)
Self-assessment of asthma severity	1.7 ± 0.5	1.7 ± 0.5
Asthma control score	3.6 ± 1.5	3.7 ± 1.5
Quality-of-life score	4.1 ± 1.3	4.0 ± 1.2
Current medications‡		
Short-acting β_2-agonists	53 (86)	55 (87)
Leukotriene modifiers	6 (10)	4 (6)
Inhaled steroids	32 (52)	30 (48)
Long-acting β_2-agonists	9 (15)	5 (8)

* $P<0.05$.

† At the time of presentation to emergency department.

‡ At initial emergency department visit.

Table 2. Effects of Enhanced Care at 1 and 3 Months of Follow-up on Asthma Health Outcomes and Processes of Care

Characteristic	1 Month			3 Months		
	Usual Care (n = 62)	Enhanced Care (n = 63)	*P* Value	Usual Care (n = 60)	Enhanced Care (n = 60)	*P* Value
	Mean ± SD or Number (%)			Mean ± SD or Number (%)		
Office visit*	22 (36)	43 (68)	0.002	29 (48)	45 (75)	0.003
Asthma or pediatric quality-of-life score	5.2 ± 1.3	5.4 ± 1.2	0.59	5.3 ± 1.3	5.5 ± 1.1	0.34
Written action plan†	14 (23)	21 (33)	0.18	20 (33)	28 (47)	0.14
Peak expiratory flow meter†	38 (61)	48 (76)	0.07	37 (62)	47 (78)	<0.05
Asthma control score	2.2 ± 1.2	2.2 ± 1.1	0.84	2.0 ± 1.3	2.0 ± 1.1	0.88
Inhaled steroids‡	42 (68)	43 (68)	0.95	38 (63)	33 (55)	0.35
Long-acting β_2-agonists‡	16 (26)	19 (30)	0.58	14 (23)	17 (28)	0.53
At least one emergency department visit or hospitalization	5 (8)	5 (8)	0.97	7 (11)	4 (8)	0.53

* At least one visit to a primary care physician since discharge from emergency department.
† Possession of device at the time of follow-up interview.
‡ Daily use.

Effects of Enhanced Care on Asthma Outcomes and Processes

At 1 month of follow-up, 68% (n = 43) of the study patients exposed to enhanced care had at least one office visit for their asthma (Table 2), as compared with 36% (n = 22) in the usual care arm (difference = 32%; $P < 0.05$). This difference in primary care visits persisted to 3 months of follow-up. A greater proportion of patients in the enhanced care group as compared with in the usual care group had a written action plan for self-management as well as improved disease-specific health-related quality of life at the 6-month follow-up (Table 3). Improved asthma control was also found among patients in the enhanced care group, although these differences disappeared by 12 months of follow-up. Use of anti-asthma medications, including inhaled corticosteroids and long- and short-acting β_2-adrenergic agents, were similar at 6 and 12 months of follow-up.

In analyses of the association between various process-of-care measurements and asthma-specific quality-of-life scores at 6 months, only having a written action plan was associated significantly with a higher asthma-specific quality-of-life score at 6 months (β-coefficient of slope = 0.61; 95% confidence interval [CI]: 0.11 to 1.11). Neither age (β-coefficient per 10-year increment = 0.11; 95% CI: -0.08 to 0.30) nor sex (β-coefficient for men vs. women = -0.16; 95% CI: -0.68 to 0.35) had any effect on quality-of-life scores. Similarly, ownership of a peak expiratory flow meter had little effect on scores at 6 months of follow-up (β-coefficient = 0.28; 95% CI: -0.23 to 0.80).

Table 3. Effects of Enhanced Care at 6 and 12 Months of Follow-up on Asthma Health Outcomes and Processes of Care

Characteristic	6 Months			12 Months		
	Usual Care (n = 56)	Enhanced Care (n = 56)	*P* Value	Usual Care (n = 49)	Enhanced Care (n = 54)	*P* Value
	Mean ± SD or Number (%)			Mean ± SD or Number (%)		
Office visit*	33 (60)	44 (78)	0.003	33 (68)	44 (81)	0.09
Asthma or pediatric quality-of-life score	5.0 ± 1.3	5.7 ± 1.2	0.01	5.2 ± 1.4	5.4 ± 1.4	0.47
Written action plan†	14 (25)	26 (46)	0.02	13 (27)	19 (35)	0.34
Peak expiratory flow meter†	35 (63)	42 (75)	0.15	32 (65)	43 (80)	0.10
Asthma control score	2.2 ± 1.3	1.8 ± 1.1	0.09	2.0 ± 1.2	2.2 ± 1.1	0.52
Inhaled steroids‡	31 (55)	31 (55)	1.00	24 (49)	29 (54)	0.63
Long-acting β_2-agonists‡	12 (21)	15 (27)	0.50	12 (25)	16 (30)	0.55
At least one emergency department visit or hospitalization	9 (16)	5 (10)	0.27	11 (23)	10 (19)	0.63

* At least one visit to a primary care physician since discharge from emergency department.
† Possession of device at the time of follow-up interview.
‡ Daily use.

DISCUSSION

This community-based study produced several interesting observations. Our findings suggest that a simple health professional–based intervention can increase the rates of follow-up visits by asthmatic patients to their primary care physicians after emergency discharge. The increase in the frequency of these follow-up visits was associated with a statistically significant and clinically meaningful improvement in disease-specific health-related quality of life (10). These patients who were assigned to enhanced care were also more likely to have written action plans for their asthma at 6 months of follow-up. However, the improvements in the process of care and health outcomes related to enhanced care disappeared by 12 months of follow-up, suggesting that the beneficial effects of this intervention are time limited and that further reinforcement of care patterns would be needed to maintain improvements in outcomes.

Our findings are consistent with those of several other studies (2–4,11) that have demonstrated improved patient outcomes with follow-up care. George et al (11), for instance, reported that a comprehensive in-hospital program, consisting of asthma education, bedside spirometry, and scheduled follow-up in an outpatient asthma program, resulted in a twofold increase in follow-up rates after hospital discharge and a substantial reduction in repeat emergency department visits over a 6-month period. We extend these results by showing that even a simpler intervention in an emergency department setting can lead to similar improvements in follow-up rates. Further, we demonstrated that this intervention can improve health-related quality of life of asthmatic patients over 6 months. However, the beneficial effects appear to wear off by 12 months.

Although our study was not designed to ascertain the particulars of each follow-up visit, we found that asthmatic patients who were assigned to the intervention arm were more likely to possess a written action plan and peak expiratory flow meters (although the latter did not reach statistical significance) as compared with patients in the usual care group. Use of anti-asthma medications was similar between the two groups. In a busy emergency department setting, patients usually receive good pharmacologic care (12). Emergency department staff, however, rarely have the time or resources to teach self-management skills to patients (13). Follow-up office visits, on the other hand, provide an excellent forum to devise individualized disease management strategies and to confer other educational services to high-risk patients. Empowerment of patients with self-management skills to deal with their asthma is an important and effective strategy (14).

Several limitations of the study need to be addressed. First, to keep both patients and physicians concealed to treatment assignment, we limited our contact with the primary care physicians. Thus, the details of physician-patient encounters during office visits were largely unknown. Second, we did not have any physiologic measurements to accurately diagnose or classify asthma severity. To reduce the probability of diagnostic misclassification, we restricted the age of participants.

In summary, our study suggests that a simple health worker–based intervention in an emergency department can substantially increase the rate of follow-up visits and improve the health status of patients with asthma over a 6-month period. The beneficial effects of this type of intervention, however, are time limited and would likely require reinforcements prior to 12 months to maintain the improvements for a longer period of time.

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