Evaluation of a Program Aimed at Increasing Referrals for Asthma Education of Patients Consulting at the Emergency Department for Acute Asthma*

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**Background:** Emergency department (ED) visits for asthma may reflect poor asthma control, often due to insufficient asthma education and medical follow-up. However, few patients consulting at the ED for acute asthma are referred for education.

**Aims:** To describe a model for automatic referral to educational interventions targeting patients consulting at the ED for acute asthma, to demonstrate how this model can be integrated into current care, and to increase referrals for asthma education.

**Methods:** The program combines a short ED-based educational intervention with the goal of motivating patients and their families to pursue an educational program with an automatic referral to an asthma education center (AEC) after agreement with ED physicians. The program was implemented in nine acute care centers with a high number of ED visits for asthma. The main study parameter was the number of patients referred to an AEC after 4 months of program implementation, as compared with 4 months before. In addition, we assessed potential barriers to successfully establishing the program.

**Results:** In the first 4 months of the program, 1,104 patients were referred to an AEC, compared with 110 for the same period the year before; 106 patients (15%) patients could not be contacted, 114 patients (16.1%) refused the intervention, 488 patients (68.9%) made appointments, and 346 patients (48.9%, or 72.8% of scheduled patients) honored their appointments.

**Conclusion:** We describe a model of educational intervention for asthmatic patients consulting at the ED. We found that ED professionals can motivate patients to attend an asthma education program and that an automatic referral process is well accepted by ED staff. Such intervention can help to reduce asthma-related morbidity, but local barriers to implementation of such program should be addressed.

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**Key words:** asthma education; emergency department; self-management

**Abbreviations:** ACC = acute care center; AEC = asthma education center; ED = emergency department

Asthma is one of the most common health problems worldwide, and its prevalence has increased over the last 2 decades.1–3 In addition to causing significant morbidity and affecting the quality of life of those with from the condition, asthma imposes a significant burden on health-care systems.4,5 In the province of Quebec, approximately 10% of emergency department (ED) visits for asthma result in hospitalization, and one third of those who consult make more than one ED visit for asthma during the year.6 ED visits for asthma may reflect poor asthma control, often related to the patient’s insufficient...
A multicenter study\textsuperscript{10} done in the United States and Canada showed that although most ED physicians considered asthma education to be important, only 16% of academic medical centers reported offering such programs. Practice guidelines\textsuperscript{11,12} indicate that a structured educational intervention should be part of the general management of the disease in order to reduce asthma-related morbidity. This is particularly true for patients with the highest morbidity, including those consulting at the ED for acute asthma.\textsuperscript{13} 

Asthma education can reduce asthma-related morbidity and acute care needs, and has been particularly successful in patients with the highest asthma-related morbidity.\textsuperscript{14–16} We previously reported a comparison of three modes of intervention offered to patients consulting at the ED for acute asthma: (1) usual care, (2) a short intervention by the ED physician including verification of inhaler use and discussion of an action plan, and (3) the initiation of an educational intervention at the ED with educational follow-up at one of the asthma education centers (AECs) of the Quebec Asthma and COPD Network, formerly the Quebec Asthma Education Network.\textsuperscript{15} A short intervention, including teaching inhaler technique and the use of an action plan provided by the ED physician, led to short-term benefits, while the same intervention combined with referral to an AEC resulted in more marked and continuous improvement of most asthma-control parameters, including a persistent reduction of ED visits.

A provincial asthma education network leading to the establishment of more than a hundred AECs was established in the 1990s in the province of Quebec. Unfortunately, only a small proportion of asthmatic patients consulting for acute asthma were initially directed to AECs, so we looked at strategies to increase the number of patients seen at these centers. A model of automatic referral of asthmatic patients to an AEC had been developed at Laval Hospital, and preliminary results had been positive, with a reduction of ED visits in the subsequent months. To get more asthmatic patients who were consulting for acute asthma into structured educational interventions, we developed a new program, subsequently supported by the Canadian Fund for Adaptation of Health Services. This program offers a model of educational intervention and follow-up strategies for acute care centers (ACCs). It is aimed at promoting participation of patients with asthma in such educational programs as the ones offered by established AECs of the Quebec Asthma Education Network; the idea is to make systematic and voluntary referrals to those centers. This article describes the above model and includes an evaluation of its impact on referrals to an AEC, as well identifying factors that influence, either positively or negatively, the implementation of such programs.

**Materials and Methods**

**Description of the Program**

The program described here aimed at increasing referrals of asthmatic patients consulting at the ED or admitted to the hospital for acute asthma to specialized asthma educators in AECs. Its specific goals were to integrate into current care the systematic referral of asthmatic patients to an AEC by the ED staff. Another goal, not formally evaluated in the present analysis, was to initiate a short educational intervention at the ED that would increase patients’ basic knowledge of asthma and, most importantly, motivate them to pursue the educational program.

To achieve the above goals in each center, we proposed two main types of interventions. First, the ED health professionals would be given specific training on asthma and its treatment, the appropriate use of inhalers, and the role of an AEC. Procedures and tools would be developed to facilitate referral to the AEC (their use would be adapted to the conditions specific to each ED). Furthermore, a follow-up committee would be established in each institution to look at the integration and coordination of the program.

The model of automatic referral by ED for asthma included the following: (1) targeting ACCs with a high number of acute asthma visits, based on population databases; (2) contacting key persons in each institution for a demonstration of the program and discussion of its feasibility; (3) training the ED staff, scheduling activities, and motivating participants; and (4) forming follow-up committees and establishing objectives and assessment methods. These preliminary steps were followed by (5) program implementation, which consisted of the following: (A) introducing patients with acute asthma to basic concepts in order to motivate them to pursue an educational program; (B) sending a patient identification card to the nearby AEC after patient consent; (C) having the patient or the patient’s parents contacted by the AEC educator, who tried to motivate them to attend the educational program; (D) providing a specialized educational intervention according to the provincial education program standards; (E) reporting to the referring ED physician and the patient’s personal physician in order to ensure accurate feedback (or, in cases where there is no regular physician, encouraging the patient to find one). In the final stage of the model, (6) the follow-up committee assessed the statistics and made any necessary adjustments to the program/interventions.

**Patient Characteristics**

Patients of all ages and backgrounds consulting at the ED for acute asthma were considered eligible for this program. ED staff were encouraged not to refer a patient to the AEC if the diagnosis was uncertain.
Program Activities

The provincial nurse-coordinator was responsible for overseeing the progress of the program in conjunction with the various participating institutions. She was also responsible for establishing links between the participating EDs, discussing the benefits of establishing such a program with local authorities, and obtaining their support, verifying whether each AEC was functional, and assessing the quality of the educational services provided. She also supported the implementation of the program in each institution by providing materials, tools and support, offering expert advice to health professionals and help in addressing the different barriers and problems encountered.

Each site had a local nurse-coordinator whose tasks were to evaluate local barriers to implementation, consult health professionals on strategies to be applied locally, participate in the ED staff training, establish procedures on how to provide short educational interventions at the ED, and establish a process for referring asthmatic patients to the nearby AEC. Finally, she ensured that ED and care units were offered adequate training, recruited health professionals interested in establishing or taking part in the follow-up committee, and participated in the evaluation of the program.

Selection Criteria for Participating Institutions

All 10 targeted ACCs agreed to take part in the program, although the evaluation was based on only 9 of them, as 1 ACC experienced a significant delay in getting the program underway. The institutions were selected primarily because of a high number of visits to the ED for acute asthma, as shown by the Quebec Provincial Health Program (Régie de l’Assurance Maladie-RAMQ) database and validated by a recent “cartography” of asthma-related morbidity in the province of Quebec.

Training of the ED Staff

A 3-h session was offered to the nurses and respiratory therapists working in the ED and in hospital units. A total of 600 nurses, respiratory therapists, and physicians from the targeted institutions attended the sessions, which were given by the local coordinator of the program and a specialized asthma educator, assisted by ED physicians, pulmonologists, and/or pediatricians highly involved with asthma care. The training included information on regional asthma-related morbidity, the role of ED staff, asthma and its treatment, inhaler technique, key messages to provide to the patient, services offered by the AEC and how to make referrals, and skills for approaching and motivating patients. The goal of the session was to enhance the ability of ED health professionals to improve their patients’ basic knowledge and attitudes about asthma, particularly concerning anti-inflammatory medication and inhaler technique, and to motivate them to attend the full education program. Knowledge was assessed using a standardized questionnaire (available on request).

Follow-up Committee

After ED staff training was done, a follow-up committee comprising health professionals interested in contributing to the program was established in each institution. This committee had to foster partnerships among health professionals, review and discuss the process of program implementation, and look at its performances every 3 months, in order to make any adjustments required.

Evaluation Methods

A specific evaluation process was put in place for this program. First, each AEC had to provide an evaluation of how successful the program was in regard to implementation strategies; they were required to keep statistics on the results obtained from the interventions, particularly the number of patients recruited at the ED and referred to the AEC. Second, a global external (provincial) evaluation was also done to determine the feasibility of implementing such programs in different ED settings, and also to uncover any barriers to its implementation. This aspect of the evaluation was done by a group of experts from an independent organization (Direction de la Santé Publique de Québec). More specifically, the global evaluation looked at the implementation process and the degree of participation by the targeted population, according to the characteristics of the ED/hospital environment. It also measured the impact of the program on referrals to the AEC, the participation rate of the patients referred to the AEC, the accessibility of AEC services, and the frequency of visits to ED in the participating hospitals. Finally, it identified factors and conditions that favored or impeded program implementation. The evaluators used quantitative methods to analyze the implementation of the program and measure the effects of referrals on the population.

Information about program implementation was obtained from four sources: (1) written documentation (eg, administrative reports); (2) a self-administered questionnaire before and after the ED staff training to measure changes in knowledge; (3) meetings of the nurses responsible for the implementation, and (4) 50 semi-directed individual interviews with program participants.

The rate of visits to ED for acute asthma was collected from the database of the Quebec Provincial Health Program (Régie de l’Assurance Maladie-RAMQ). The observation period for implementation of the program was from September to April. However, data on referred patients was entered from January 1 to April 30; for two key variables—frequency of referral to the AEC and patient participation in AEC educational activities—the observation period was prolonged by 6 months.

Results

Influence of the Program on Referrals to AECs

Forty-eight percent of referrals for asthma education were for patients with two or more annual visits to ED; 22.8% had two visits, and 25.3% had three or more visits; 75.2% of all referrals to AECs came from an ED, while before the program, < 10% had been from an ED. Table 1 illustrates the comparative data for the nine sites evaluated.

The main observation of the evaluation of this program is that in the first four months after initiating the program, there were 1,104 referrals to AECs, as compared with 110 referrals for the same period a year before (Table 2). Fifty-nine percent of those referred were aged 0 to 18 years, 26% were between 19 years and 44 years old, and 15% were > 45 years old. Fifty-three percent were men, and 47% were women. This shows that the automatic referral process is working and that ED staff have integrated it into their practices. There was a ratio of 18.8 referrals per 1,000 visits to the ED for asthma (range, 8.8 to 37.3 referrals). Of these, 197 patients (17.8%) could not be contacted, 206 patients (18.7%) refused the intervention, 701 patients (63.5%) made appoint-
ments, and 468 patients (42.4%; 66.7% of scheduled patients) came to their scheduled visits.

Among patients referred to AECs, the number of scheduled visits was slightly higher for patients < 18 years old than for those > 18 years old (67.4% and 59.8%, respectively). This may be influenced by the lower proportion of patients in pediatric AECs that could not be contacted (9.4% compared with 20.9% for adult AECs and 23.7% for AECs working with both adults and children).

Knowledge of ED Health Professionals

In addition to ED physicians, the training sessions were attended by > 450 nurses and 150 respiratory therapists, coming mostly from EDs, but also from hospital care units. The professionals’ knowledge about asthma increased after the training. Scores obtained on the evaluation questionnaire increased, from 16 to 70%.

Program Barriers and Facilitators

This section of the analysis is only descriptive. In general, nurses and respiratory therapists declared that they had little time after their current tasks to provide the short educational intervention, although this varied from one institution to another. They did say, however, that they informed most of their patients about the existence of the AEC and motivated them to use that service.

Various factors were identified as barriers to the implementation and maintenance of the program. As expected, among factors influencing implementation were the following: (1) the characteristics of the ED (number of patients treated, priority offered to various health problems, including the difficulties that professionals had in adopting new measures such as educational interventions or referrals to an educational program); (2) the ability of AECs to offer the educational service; (3) support by institution administrators (to allocate resources); (4) lack of support, in some of the centers, from local specialists; (5) health professionals’ interrelations and articulation of interventions; and (6) previous exposure to asthma updates or training. Some of the ED personnel mentioned that they were not used to this type of intervention, and that they initially had some difficulty incorporating the changes into their regular routines.

<table>
<thead>
<tr>
<th>Site</th>
<th>Appointment with AEC</th>
<th></th>
<th>Referrals to AECs</th>
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<tbody>
<tr>
<td></td>
<td>Present</td>
<td>Absent</td>
<td>Subtotal</td>
</tr>
<tr>
<td>1</td>
<td>55 (37.7)</td>
<td>35 (24.0)</td>
<td>90 (61.6)</td>
</tr>
<tr>
<td>2</td>
<td>116 (49.4)</td>
<td>65 (27.7)</td>
<td>181 (77.0)</td>
</tr>
<tr>
<td>3</td>
<td>41 (63.1)</td>
<td>24 (36.9)</td>
<td>65 (100.0)</td>
</tr>
<tr>
<td>4</td>
<td>32 (47.8)</td>
<td>17 (25.4)</td>
<td>49 (73.1)</td>
</tr>
<tr>
<td>5</td>
<td>82 (40.2)</td>
<td>28 (13.7)</td>
<td>110 (53.9)</td>
</tr>
<tr>
<td>6</td>
<td>9 (12.9)</td>
<td>9 (12.9)</td>
<td>18 (25.7)</td>
</tr>
<tr>
<td>7</td>
<td>44 (31.4)</td>
<td>29 (20.7)</td>
<td>73 (52.1)</td>
</tr>
<tr>
<td>8</td>
<td>33 (37.9)</td>
<td>13 (14.9)</td>
<td>46 (52.9)</td>
</tr>
<tr>
<td>9</td>
<td>56 (62.2)</td>
<td>13 (14.4)</td>
<td>69 (76.7)</td>
</tr>
<tr>
<td>Total</td>
<td>468 (42.4)</td>
<td>233 (21.1)</td>
<td>701 (63.5)</td>
</tr>
</tbody>
</table>

*Data are presented as No. (%).
Certain conditions, such as insufficient medical support in some centers, interpersonal conflict within the treatment team, or previous participation in a training program, reduced interest in participating in this new initiative. Some physicians mentioned their lack of confidence in an AEC to improve asthma control; in three centers, physicians said they lacked confidence in this type of program, particularly if the patients were being followed up at an asthma clinic; some believed that only physicians should provide education to patients.

Various other factors, however, were identified as having a positive influence on the implementation of the program. These included the availability of referral forms and the initiation of the referral by nonphysicians, when the physicians agreed with such referrals in principle, but preferred not to initiate the process themselves. One factor considered beneficial by participants was the “program’s follow-up committee,” which kept an eye on program performance, although physician participation in these committees was low.

Impact of Waiting Time for an AEC Appointment on Patient Participation

Because the number of referrals increased markedly once the program was in operation, many of the centers were unable to offer educational services promptly to all of the referred patients. Adjusting to the increased demand required considerable effort from the AECs; accessibility to the centers varied from 10 to 63 h/wk.

The average time between referral to an AEC by ED staff and the telephone contact from the AEC to schedule a visit was 32.6 days (median, 27 days) [Table 3]; 26.9% of patients had a waiting period of 0 to 14 days, 26.6% waited 15 to 28 days, 20.2% waited 29 to 42 days, and 26.2% waited 43 to 211 days. The proportion of patients not showing up for their appointments was 27.6% for those whose waiting period was between 0 days and 14 days, and 39.4% for those who had to wait ≥ 43 days.

When we tried to obtain information from patients about why they did not attend their scheduled educational interventions, we got only a limited number of responses, with most patients being difficult to contact for a response. Therefore, this aspect could not be evaluated properly.

Motivation of Patients and Their Families To Take Part in the Educational Program

There were large variations between hospitals in the proportion of referrals to AECs (Table 1). The proportion of subjects who agreed to make appointments was higher when the referrals came from site 3 (100%), and sites 2, 4, and 9 (73.1 to 77.0%) [Table 2]. More specifically, in site 6, 67.1% of referral subjects could not be contacted; in other centers, this proportion varied from 0 to 25.5%. Moreover, from this center, the percentage of patients who honored their appointments was particularly low (12.3%) compared with sites 3 and 9 (63.1% and 62.2%, respectively). The main reason for the low success rate for site 6 appears to be a lack of motivation among the participants to make the program successful, although other unknown reasons may have played a role. The simultaneous presence of multiple barriers to the implementation of the program (four of the six barriers previously mentioned) could as well explain this result.

In most centers, attempts were made to contact the patients who did not attend the program, but without success. Nevertheless, these patients had received a copy of available resources in case of future need, and this could have influenced their long-term outcome, although it would require further study to confirm this.

**Table 3—Time Between Referral From ED and Patient Contact by the AEC: Effect on AEC Attendance**

<table>
<thead>
<tr>
<th>Time Elapsed, d*</th>
<th>Attendance at AEC, No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes (nb)</td>
</tr>
<tr>
<td>0–14</td>
<td>134 (72.4)</td>
</tr>
<tr>
<td>15–28</td>
<td>125 (68.3)</td>
</tr>
<tr>
<td>29–42</td>
<td>93 (66.9)</td>
</tr>
<tr>
<td>≥ 43</td>
<td>109 (60.6)</td>
</tr>
<tr>
<td>Total†</td>
<td>461 (67.1)</td>
</tr>
</tbody>
</table>

*Time elapsed between the referral to AEC and the telephone contact for the AEC appointment.
†Fourteen missing.

**Discussion**

We propose a program whose goals are to provide basic training to ED staff and, with the agreement of the ED physician, to offer patients presenting for acute asthma automatic referral to an AEC. Our analysis shows a high rate of acceptance of, and significant interest in such a program among ED caregivers, as determined from participants’ reports and the marked increase in AEC referrals. We also documented some barriers to the implementation of such a program.

Patients consulting at the ED are considered a privileged target for a most important component of asthma management: patient education. However, even in the presence of significant asthma-related morbidity, attendance at asthma education programs...
is often poor, and patients may not perceive the need for improving self-management of their asthma.\textsuperscript{19,20} The best way to offer this population such services and to improve their attendance at asthma education programs remains to be determined, and a need for models of educational intervention for asthmatic patients consulting at the ED has been reported by others.\textsuperscript{10}

Our model of health-education promotion was targeted to patients presenting with acute asthma at ED in both primary care centers and specialized institutions. This program was established in large hospitals with a high rate of ED visits for acute asthma, within the sometimes difficult context of real-life, current delivery of care in an emergency setting. Nevertheless, despite all barriers to such interventions, they have enabled health professionals working in ED to initiate educational interventions and to motivate ED patients and their families to take part in the educational programs available at AECs. The initial evaluation of this model shows that it is feasible and well accepted, both by health professionals working in ED or in-hospital wards and by local authorities. Practices of professionals at an ED could be modified by the proposed intervention, resulting in a marked increase in AEC referrals. The positive effects of such educational interventions have been previously shown in our institution,\textsuperscript{15} but the challenge was to determine whether this program could be exported to a large number of centers with varying characteristics and populations.

The main barriers reported to the implementation of the program were a lack of time for asthma education at the ED and insufficient support from the institution or physicians; in spite of these, however, the objectives of the program were achieved, as we observed an improvement in asthma care at the ED in keeping with asthma guidelines\textsuperscript{11} and an increased referral of asthmatic patients to AECs.

Our study was not aimed at providing information on potential changes in morbidity or health-care use by patients referred to AECs; this needs further assessment. Nevertheless, the program was based on previous projects and studies\textsuperscript{15,16} that have shown the potential of such interventions to significantly reduce asthma-related morbidity, particularly for patients with high morbidity or acute care use, for whom such intervention should be a priority. Our program is in keeping with the recommendations of these studies\textsuperscript{15,16} in that it promotes referrals to AECs. In only 4 months, the number of patients referred for formal asthma education increased more than tenfold. Additional data obtained from May to October suggest that the frequency of referrals remains stable. These results are significant when we consider the small number of referrals before the program was implemented. From January to April, referrals coming from hospitals accounted for > 60% of the total number of referrals received by the AECs. Other results support the hypothesis that this increase in referrals to AECs is directly related to the training given to the ED professionals.

Approximately half (48%) of the subjects referred to an AEC had consulted an ED for asthma at least twice during the preceding 12 months. An earlier study\textsuperscript{7} carried out in Quebec showed that approximately one third of the patients (32%) seen at the ED made more than one yearly visit. The fact that these patients had not previously received structured asthma education seems to indicate that even patients with a high rate of acute care visits are not often referred for such interventions.

Overall, approximately two thirds of referred patients agreed to make an appointment at the AEC, and approximately two thirds of these attended the program. These proportions are high if we consider the usually poor attendance at such programs among this population. However, this evaluation does not provide information on the reasons for refusal or nonattendance. In spite of a clear process and dedicated staff, only a limited number of subsequently attended patients for asthma education. This means that for many patients, alternative strategies are required to persuade them to attend an education program. These may include interventions in the ED, such as those described by Emond et al.\textsuperscript{10} We should recognize that this group of patients has a high frequency of socioeconomic and psychological problems that adversely influence not only their response to asthma education but also their motivation to attend such programs. These barriers can be recognized by the ED staff and addressed either by asthma educators, mostly in the course of an individualized intervention, or by other health professionals to whom they can be referred.

In addition, the time intervals between referrals and the appointments at the AEC were relatively long: for half of the referred subjects, the delay was approximately 4 weeks, and for approximately one fourth, it was > 6 weeks. Significantly, the longer the waiting time, the less likely the subjects were to attend the program. These results thus stress the limitations of such programs and the need for additional resources to respond adequately to the increased number of referrals for asthma education.

We did not conduct a cost-effectiveness study of the program, as the primary outcome we sought was attendance at the AEC. In our environment, the cost was minimal, being incorporated, as it was, within the current assignments of the health professionals involved. However, the cost would vary significantly from one institution to another or from one country.
to another. We believe, nevertheless, that this program can be used in most countries, as it only requires a targeted training of the ED staff, according to current national guidelines, and the availability of a trained asthma educator either in the ED or in another nearby institution. It may be necessary to adapt the program to the available resources and better articulate the interventions provided by the participants in the program. Finally, we should stress that it is not sufficient merely to promote referrals; the asthma education programs should be of high quality, and should include both teaching based on a physician-determined action plan and motivation to attend regular medical follow-ups.15,16 In addition to reducing asthma-related morbidity and improving quality of life, such interventions may improve medical care, as patients are instructed on how to better assess asthma control and use medications, thus potentially improving physician/patient communication.20,21

In conclusion, the proposed program resulted in a marked increase in referrals of patients presenting for acute asthma, showing that it can be implemented in busy EDs with the collaboration of the ED staff. All asthma guidelines propose offering structured asthma education to this population of patients in order to improve self-management skills and address deficiencies in care. Unfortunately, the participation of these patients in asthma education programs is generally poor, either because of nonreferral by the physician or lack of motivation in the patient. An intervention program such as the one outlined above has the potential to reduce morbidity and improve the quality of life of asthmatics, and further analyses of the effects of such programs are ongoing. We hope that this type of intervention, on a large-scale basis, will make it possible to reduce the morbidity associated with asthma and to improve the quality of life of asthmatic patients. Similar strategies could be explored and adapted to various environments, to reduce the “care gap” between current and optimal care.

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