

Asthma School Program in children and their parents

Zorica Živković, Snežana Radić, Sofija Cerović, Zoran Vukašinić

Belgrade, Serbia

Background: This study was undertaken to analyze the clinical efficiency of Asthma Education Intervention (AEI, Asthma School) in children and their parents, a program was designed to produce acceptable asthma knowledge and to improve the treatment.

Methods: This study assessed the effectiveness of an educational intervention within 12 months after attending Asthma School. The study was designed as a population based cohort study. The project endorsed by the European Respiratory Society (ERS) Educational Grant was launched in 2004 and finished in 2006, but the Asthma School continued working. Three hundred and two asthmatics recruited during hospital treatment of acute asthma exacerbation completed the study together with their parents. The intervention group of 231 asthmatics received full Asthma School program. The non-intervention group enrolled 71 asthmatics receiving usual instructions for asthma management. Clinical and educational outcomes were investigated immediately after completion of the program and 12 months later.

Results: Significant achievements were found in the intervention group in asthma knowledge (baseline score 63%, 82% after 12 months, $P < 0.05$), compliance (70% before, 90% after), and inhalation technique (20% before, 70% after). No change was found in the attitude and behavior regarding asthma prognosis in adolescent patients and parents.

Conclusion: This study together with others clearly confirm the effectiveness of educational intervention for childhood asthma.

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Key words: asthma;
education;
follow-up;
intervention;
self-management

Introduction

National guidelines for asthma management promote asthma education as one of the strongly recommended actions. However, systematic reviews that support this recommendation are still lacking. Despite the raised public awareness of asthma and allergies in the previous years, asthma knowledge, training in asthma management, and child self-awareness of inhalation therapy are still unsatisfactory. In our daily work, there are extreme asthma ignorance, unsatisfactory asthma prevention, poor disease control and behavioral problems in patients and their parents. The high prevalence of asthma has challenged scientific and pharmaceutical endeavors to improve disease management. Wolf and coworkers^[1] systematically summarized literature data to determine whether asthma education reduces clinically important morbidity. Evaluated self-management educational programs are differed by type of educational sessions, intensity, self-management strategy and intervention length. In their systematic review, Wolf et al^[1] reported 26 randomized-controlled trials and 6 clinical trials, which involved 3706 patients. The trials proved the improvement of lung function and in the measures of self-efficacy, fewer days of school absence and less emergency visits.

The majority of developed countries widely introduced asthma self-management due to their established National Health Programs. The updated guidelines issued by the National Asthma Education and Prevention Program (NAEPP) outlined essential components of asthma therapy, monitoring of symptoms, patient education, and prevention of asthma triggers.^[2] In undeveloped countries, however, uncontrolled asthma has been both medical and economic burden.^[3,4]

Better medical care has been offered to patients with severe persistent asthma due to enormous expenditure

Author Affiliations: Children's Hospital for Lung Diseases and Tuberculosis, Medical Center "Dr Dragiša Mišović", Belgrade 11000, Serbia (Živković Z, Radić S, Cerović S); Medical Faculty, University of Belgrade, Belgrade 11000, Serbia (Vukašinić Z)

Corresponding Author: Zorica Živkovic, MD, PhD, Children's Hospital for Lung Diseases and Tuberculosis, Medical Center "Dr Dragiša Mišović", Jovana Marinovića 4, Belgrade 11000, Serbia (Tel: +381 11 2661887; Fax: +381 11 3066970; Email: zoricazivkovic@yahoo.com)

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of management. However, less serious forms of asthma, especially childhood ones, remain uncontrolled. Therefore they result in a high level of patients' disability and increase both direct and indirect costs.

Besides the advantages concerning asthma control and management, the educational intervention tends to be directed towards primary prevention. Schonberger et al^[5] followed up 443 high-risk infants for 2 years from prenatal period of life. The intervention group received instructions from nurses on how to reduce allergen exposure. Results revealed that the intervention did not actually prevent the development of asthma.^[5]

We introduced Asthma Education Intervention (AEI, Asthma School) in our Hospital as part of the asthma action plan in 2004 and developed it as a regular practice for all asthmatic children and their parents. Such a project was first of that kind in our country and its real value lies in establishing the educational process, follow-up of the intervention efficacy and appraisal of the patients/parents satisfaction of asthma management. The hypothesis of the current study is that improvement of asthma management through continuous supervised education would be beneficial for patients and their parents, schools, health services and hospital budgets. It is recognized that patients play a pivotal role in self-management asthma. Therefore, patient education is the cornerstone of asthma monitoring, symptoms control and therapy.^[6]

The first goal of our project was to educate parents for better understanding of asthma and allergies from diagnosis, management and treatment to asthma perception and patient's quality of life. The second goal was to educate children/patients and particularly adolescents for self-assessment and management. We used face-to-face interview to recognize possible

problems and dilemmas that may aggravate the disease and the well-being of the patients.

This study endorsed by the European Respiratory Society (ERS) Educational Grant was the first structured, long-term follow-up survey of research in asthma education in Serbia.

Methods

Participants

Patients, their parents and families were recruited at hospital admission because of acute asthma attack. Obviously, they cooperated well during and after in-patient care for acute asthma attack. The patients with asthma treated in the emergency department on the out-patient basis were also included.

The trial included 414 patients who had an acute asthma attack with a history of moderate to severe persistent asthma, aged from 5 to 18 years, as well as their parents/caregivers. In the 414 patients, 26 were excluded, 10 did not meet the inclusion criteria (younger than 5 and older than 18 years; presenting with an additional chronic illness-nephritic syndrome, diabetes, epilepsy) and 16 and their parents/caregivers refused to take part in the study. Further, we randomly assigned 267 patients and the same number of their parents/caregivers to the intervention group, and 121 patients, and the same number of their parents/caregivers to the non-intervention group. The inclusion of patients in the educational program was independent of actual medication; both groups were checked for inhalation technique and were checked after for regular and proper use of the inhaling devices (Fig. 1).

Seven patients were excluded from the intervention

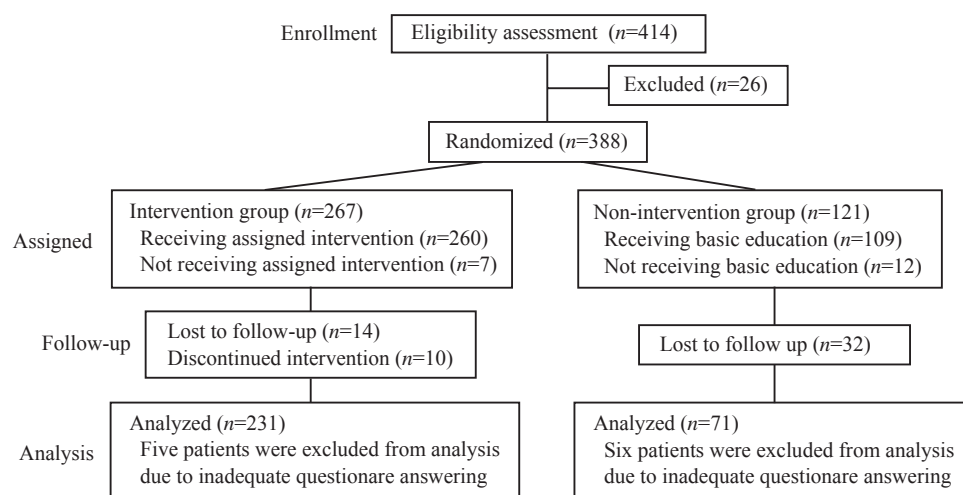


Fig. 1. Patients' enrollment flow chart.

group (267) because of their brief hospitalization for mild attack and we had no sufficient time to present them with the educational material, or since they were living 100 km away from the capital city and they were not able to attend lectures. At last, a total of 260 patients and the same number of their parents/caregivers received intervention. Fourteen patients were lost to follow-up because they moved to another city. The intervention was discontinued in 10 patients because asthma symptoms seized and they missed their regular appointments. Five patients were excluded from further analysis because of inadequate questionnaire answering and the data of 231 patients were finally analyzed.

In the non-intervention group (121 patients), 109 patients and the same number of their parents/caregivers received basic education and 12 patients were excluded from the study for meeting the same exclusion criteria in the intervention group. The 109 asthmatic children or caregivers and their parents from the non-intervention group were instructed about the inhalation technique and asthma therapy at the discharge from hospital, and given a printed handbook *Meet Your Asthma* with no additional education. They were scheduled for regular check-ups in the intervals suitable for the educated group too. In a case of emergency, however, patients from both groups had a possibility for unscheduled visits. Among the 109 patients and their parents/caregivers, 32 patients moved to another city, and they were lost to follow-up. Six patients were excluded from further analysis due to inadequate questionnaire answering and the data of 71 patients were finally analyzed (Fig. 1).

Intervention

Trained asthma educators conducted the intervention; they included pediatric pulmonologists, respiratory nurses and a social nurse specialist. Education was given in small groups by means of lectures, audiovisual presentations, and open discussions. The AEI consisted of two half-day sessions, clinical evaluation and interviews before and immediately after the sessions, follow-up visits with clinical examination, and interviews approximately 12 months after the AEI. Parents and adolescent patients at the beginning of the AEI, immediately after finishing Asthma School, and 12 months later answered the questionnaire. A detailed schedule of the sessions was designed as staff training (30 minutes) and as the workshop for children and parents (45 minutes) (Table 1). Clinical check-up consisted of physical examination, clinical score system assessment, lung function tests (Five years old children and their parents were specially instructed) and smokerlyzer analyses. The results of clinical assessment

are reported in another paper.^[7] Here we present the results concerning asthma perception, knowledge and self-management in patients and their parents. Interviews were used for analyzing the outcome of asthma perception, knowledge and self-management (Tables 2, 3).

Statistical analysis

Statistical Program for Social Sciences (SPSS) was used for analysis of the data. The Chi-square test and the analysis of variance (ANOVA) were used to assess differences between groups. $P < 0.05$ was considered statistically significant.

Results

A total of 604 participants were involved in the study. The Intervention group consisted of 231 children and the same number of parents/caregivers, and the non-intervention group consisted of 71 children and the same number of parents/caregivers. Forty percent of

Table 1. Session timetable

First day
Lecture 1: What is asthma?
Lecture 2: Inhalation techniques and compliance
Lecture 3: Allergen avoidance and environmental control
Second day
Lecture 4: Environmental tobacco exposure
Lecture 5: Asthmatic children and sports
Lecture 6: Workshops and discussions

Table 2. Written questionnaire assessing knowledge of the patients and their parents

1. In our country:
 - a) One out of ten children has asthma.
 - b) One out of five children has asthma.
 - c) I don't know.
2. Is it possible to over-grow asthma?
3. Could asthma be cured using medications?
4. Could asthma damage lungs for good?
5. Could children with asthma be engaged in daily physical activities?
6. Could a child with asthma be an active athlete?
7. Could you consider stress as an asthma trigger?
8. Do you have enough relievers at home?
9. Do you feel that besides the physician, you should also have an important role in your treatment?
10. Are most children with asthma susceptible to allergies?
11. Do you think that allergies are the only trigger for asthma?
12. Name 2 kinds of asthma medications you are familiar with.
13. In case of breathing problems, name which asthma medication would be your first choice?

Correct answers were scored with one point, incorrect answers were scored with 0 point.

Table 3. Written questionnaires assessing perception, compliance and self-management of the patients and their parents

1. Were you aware of your asthma before asthma education?
2. Are you aware of your asthma now?
3. Were you afraid of your asthma before asthma education?
4. Are you afraid now?
5. Have you met any schoolmates with asthma?
6. If yes, how important was it for you?
7. Would you like to communicate with other children with asthma outside the hospital?
8. Do you think that your asthma is under control?
9. Have you been using asthma therapy regularly before asthma education?
10. Are you using it regularly after asthma education?
11. Do you have to use the reliever when at school/or elsewhere?
12. Does it bother you if someone else knows you have asthma?
13. Does using a reliever at school bother you?
14. Were you ever in doubt before education whether asthma therapy is harmful?
15. Do you have similar doubts after asthma education?
16. Have any of the members of your household had smoking habits before asthma education?
17. Do they smoke now?
18. Do you feel that you have learned something new in asthma school?
19. If yes, what do you consider as most important?
20. What did you like the most about asthma school?
21. What did you dislike?
22. What would you suggest that the grown ups could do for children with asthma?
23. Regular and proper use of asthma medications...pediatricians comment

the included patients were adolescents. The participants were from the urban and rural areas of Belgrade and Serbia. 90% of the participants were inner citizens and 10% from suburbs and villages more than 100 km away from the capital city of Belgrade. The mean age of the children was 10.6 years in the intervention group and 11.5 in the non-intervention group. There was no significant difference in gender distribution. Ethnical distribution was not an issue in this study, since the patients in our hospital were from several ethnic groups.

For the intervention group, there was improvement regarding the regular intake of anti-asthma therapy (69.2% to 87.6%) ($P<0.05$) and inhalation technique (20.1% to 62.3%) ($P<0.001$) after the education (Fig. 2). The dosage of inhaled corticosteroids (83.6% to 71.8%) ($P<0.001$) was reduced 12 months after the intervention. Long-acting bronchodilators (8.7% to 17.1%) ($P<0.001$) were used increasingly after the education because of the availability of these agents and the awareness of uncontrolled asthma cases revealed by regular follow-up. Both the groups were not considered separately since our objective was to improve asthma treatment in every

asthmatic child and asthma perception and knowledge in divided groups by different methods of intervention.

Changes in parental perception of asthma and anti-asthma therapy before and after the intervention are displayed in Fig. 3. Definitely, reduced concern of having an asthmatic child (72.6% to 50.5%) ($P<0.05$) and improvement of regular anti-asthma therapy (62.4% to 32.2%) ($P<0.05$) indicate a positive trend in parental perception. About 94.9% of the parents claimed better control of asthma in their children 12 months after the educational intervention. About 70% of the parents were satisfied with the control of their children's asthma, indicating that they were more confident in self-management of the disease.

Changes in parental asthma knowledge before and after the intervention are shown in Fig. 4. The intervention group revealed sufficient asthma knowledge score at baseline in 63.1% of patients, the percentage significantly increased to 80% immediately after the education and audiovisual sessions together with face-to-face discussions, and increased to 82.8% after 12 months ($P<0.05$). The percentage of parents with sufficient asthma knowledge score showed no significant change in the non-intervention group (baseline, 55.4%; after 12 months, 69.3%) ($P>0.05$). Apparently, education consisting of audiovisual presentations and live discussions was successful in achieving better results than education only by basic instructions and printed handbook *Meet Your Asthma*.

Changes in adolescents' knowledge of asthma before and after the intervention are shown in Fig. 5. Adolescents in the intervention group presented with sufficient asthma knowledge score at baseline in 55.2% but up to 74.1% after the education with audiovisual sessions and live (face-to-face) discussions and after 12 months it remained high in 79.2% of the group ($P<0.05$). Adolescents in the non-intervention group who received basic asthma education and the handbook *Meet Your Asthma* had no significant change in their asthma knowledge score after 12 months compared to that at baseline (55.4% vs 69.3%, $P>0.05$).

Fig. 6 displays changes in adolescents' perception of asthma and anti-asthma therapy before and after the intervention. Definitely, reduced fear of asthma (35.6% to 7.8%) ($P<0.01$) and reduced concern of regular anti-asthma therapy (31.1% to 11.1%) ($P<0.01$) indicate a positive trend in patients' perception. Adolescents' fear of asthma and anti-asthma drugs were significantly reduced after the educational intervention. Adolescents' compliance increased after the intervention (66.7% to 88.3%) ($P<0.05$). Approximately 79.3% of the adolescents were satisfied with the achieved control of their asthma, showing improved self-estimation and self-management of the disease.

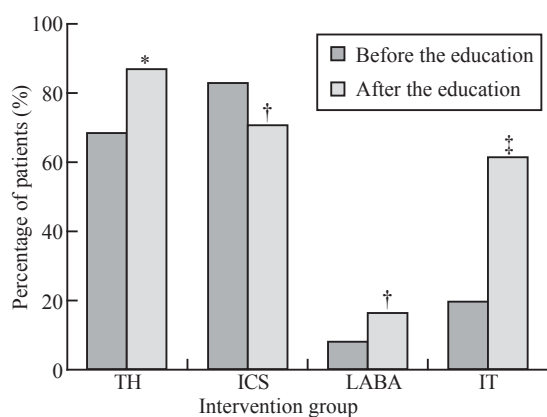


Fig. 2. Changes in asthma medication usage before and after the intervention. TH: regular intake of anti-asthma therapy; ICS: reduction of inhaled corticosteroids; LABA: introduction of long-acting bronchodilators; IT: inhalation technique. *: $P < 0.05$; †: $P < 0.01$; ‡: $P < 0.001$, compared with that before the education.

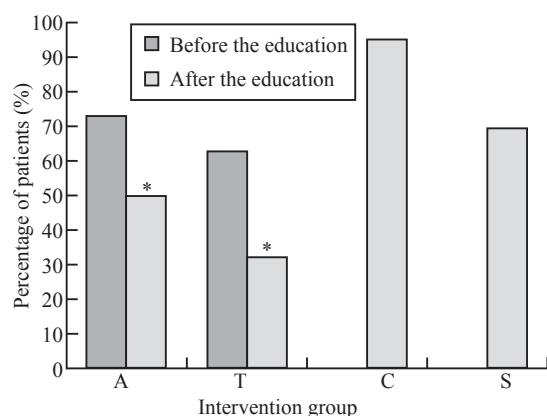


Fig. 3. Parental asthma perception. A: concern of having an asthmatic child; T: concern of regular anti-asthma therapy; C: better control of child's asthma after the intervention; S: satisfaction with child's asthma control. *: $P < 0.05$ compared with that before the education.

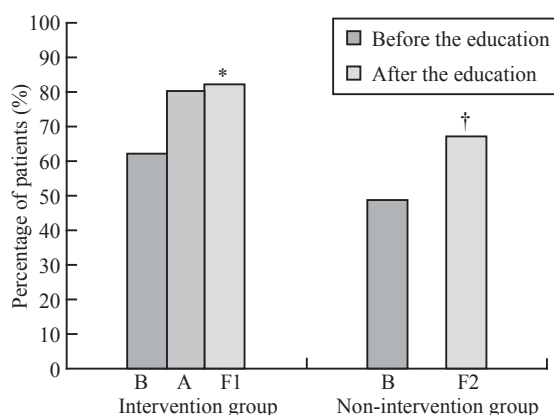


Fig. 4. Changes in parental asthma knowledge before and after the intervention. B: baseline asthma knowledge; A: asthma knowledge immediately after education and audiovisual sessions; F1: asthma knowledge at follow-up 12 months after education and audiovisual sessions; F2: asthma knowledge at follow-up 12 months after basic education and written material. *: $P < 0.05$; †: $P > 0.05$, compared with baseline asthma knowledge.

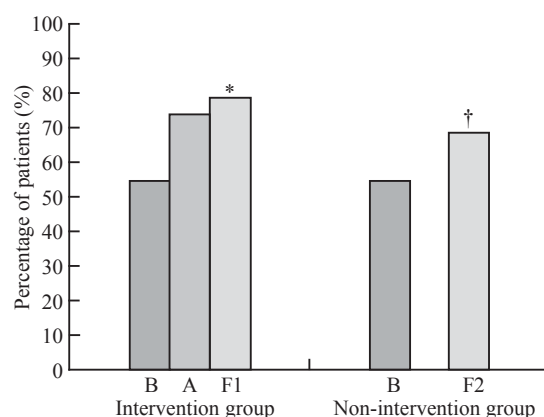


Fig. 5. Changes in adolescents' knowledge of asthma before and after the intervention. B: baseline asthma knowledge; A: asthma knowledge immediately after education and audiovisual sessions; F1: asthma knowledge at follow-up 12 months after education and audiovisual sessions; F2: asthma knowledge at follow-up 12 months after basic education and written material. *: $P < 0.05$; †: $P > 0.05$, compared with baseline asthma knowledge.

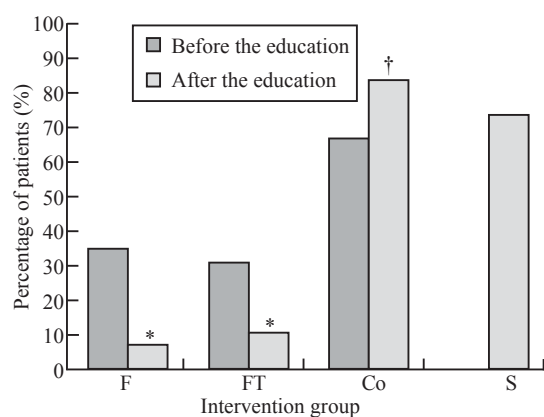


Fig. 6. Changes in adolescent perception of asthma and anti-asthma therapy before and after the intervention. F: adolescent's fear of asthma; FT: adolescent's fear of therapy; Co: adolescents' compliance; S: satisfaction with achieved asthma control. *: $P < 0.01$; †: $P < 0.05$, compared with that before the education.

Discussion

The AEI granted by the ERS School in 2004 was successfully established. The analyses have shown that asthma management must include school-based educational program for patients, their parents and other relevant subjects (school teachers, coaches, peers).

For the first time in our country, we established an intervention for a large group of asthmatic children and their parents which were followed up for 12 months or longer. Therefore, we determined not only the short-term benefit but also the long-term recognition and perception of the disease and behavior of asthmatic children and their parents.

The results in parents of asthmatic children were similar to those of asthmatic adolescents who were

interviewed separately. Our results are similar to those reported elsewhere, for instance significant effectiveness of educational program in children and adolescents in terms of self-perception of asthma control and utilization of healthcare services.^[8] Others reported the same strategy and outcomes in different settings (schools, daycare centers, community centers, churches, etc).^[9] A Chicago study on a school-based asthma intervention investigated long-term follow-up impact on clinical markers and resource utilization.^[10] Their findings suggested that in children who had four follow-up visits, clinical symptoms were improved and health care utilization was reduced to the highest degree. Comparisons of the intervention group and non-intervention group showed that the AEI resulted in improved self-esteem and disease control together with gaining better quality of life. A Hong Kong study compared the effectiveness of an intensive asthma education program and a standard asthma education program.^[11] The results of this prospective randomized single blinded study revealed that parents' satisfaction and cost effectiveness were favorable for the patients in the intensively educated and followed-up group.^[11] The same conclusions were drawn by Karnick et al who compared three different asthma education protocols: one session, reinforced sessions and reinforced asthma session plus case management. The participants receiving reinforced asthma session plus case management consistently had the best results regarding clinical outcome measures associated with considerable cost savings (10% of year costs per asthmatic child).^[12]

In the present study we also observed the perception of asthma intervention and its impact on the patients/parents quality of life. The participants were able to reduce anxiety, fear and panic of acute asthmatic episode, and to avoid permanent negative influence of asthma on their daily life and physical activities. The majority of the participants admitted the advantage of better control and even self-management of asthma. Their emotions related to asthma prognosis, possible long or recurrent anti-asthma treatment were complicated. Patients and their parents refused to come to terms with the real picture of asthma and allergies (still not possible to be cured completely but may be very well controlled). These results are in accordance with the statements of Bayliss^[13] and Juniper^[14], who assessed the asthma quality of life in clinical practice.

Our study proved significant improvement in compliance rate and inhalation technique. In our study, two respiratory nurses were specially trained for the implementation of the inhalation techniques and various devices. Our findings are in accordance with the conclusions drawn by Kritikos et al,^[15] who reported significant differences in education produced

by pharmacists, and specially trained pharmacists and researcher as asthma educators. The positive effects of our AEI were particularly impressive. Lectures, workshops, assessment of inhalation techniques and face-to-face interviews proved to be the most comprehensive and the best appreciated methods.^[16] Moreover, increased patients' knowledge-behavior-health outcome was directly related to the action taken after an acute asthma episode. However, increased knowledge does not ensure behavioral change and the majority of patients and parents still estimate the chronic disease as quite a disturbing utility.^[17,18] There should be some confounding effects, mainly in terms of the environmental tobacco smoke exposure, but this was another issue of our survey and will be presented separately.

In conclusion, the results of our first study on educational intervention in childhood asthma showed significant differences between the intervention and non-intervention groups in perception of asthma, knowledge, self-management, compliance and inhalation technique. Our results as well as many others clearly confirmed the effectiveness of educational intervention in childhood asthma management. Educational programs, well-designed and correctly applied in children and parents together should be considered part of good clinical care in childhood asthma.

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