

Original article

Early effects of Asthma Prevention Program on asthma diagnosis and hospitalization in urban population of Poland

Background: Asthma is one of the commonest public health problems in Poland and the commonest chronic disorder in children. Lodz Regional Health Insurance Fund was a sponsor of the Prevention Asthma Program in 2000–03, directed at increasing early detection and providing optimal treatment of allergies by specialists in children.

Methods: All funds were divided between 127 primary and 12 specialized care centres participated in the programme. Primary care centre goals were: anamnestic information, mapping of allergy-causing factors, repeated auscultation of the lungs, bronchial dilation test, peak expiratory flow (PEF) measurement at the clinic and at home for 2 weeks. After preliminary diagnosis patients have been sent to specialized centres. Specialized care centre goals were as follows: skin testing, spirometry, repeated bronchial dilation test, determination of eosinophilic white blood cells and eosinophil cationic protein (ECP) in blood.

Results: Increasing trend of new asthma diagnosis, expressed per 1000 inhabitants, was observed from 0.99 in 2000 to 2.19 in 2003. In the first year of Asthma Prevention Program, we observed more hospital episodes because of asthma exacerbation in comparison with year 1999 but from the second year of programme we showed systematically decreasing number of hospital episodes as a result of asthma exacerbation from 1.48 in 2000 to 0.84 in 2003. We found significantly decreasing trend in duration of hospitalization due to asthma exacerbation ($P = 0.001$).

Conclusions: Effects of this programmes are: early identification of allergic diseases, mainly asthma, reduced number and shorter duration of hospitalization because of asthma exacerbation and establishing new Asthma Schools Education.

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Asthma is one of the most common public health problems in Poland and the commonest chronic disorder in children. In 1998–2000 an epidemiological, multicentre study on the prevalence of allergic diseases and asthma was performed across Poland (1). The percentage of adult and children asthmatic individuals in the Polish population was 5.4 and 8.6 (1), and in Lodz province 7.3 and 8.5 (2) respectively. The epidemiological situation in the city-centre of Lodz is far worse with percentage of adult asthma of 13.2 and children asthma 18.4 (2). The same epidemiological study showed that only 3.8% of adults and 2.5% of children had been previously diagnosed with asthma by their primary care doctor or by a specialist. This illustrates that asthma underdiagnosis was as high as 71% in children and 49% in adults. Underdiagnosis leads directly to undertreatment. Approximately 50% of symptomatic subjects had not received any antiasthmatic medication. Only 36% of them used inhaled steroids and 47% β -agonists. This obviously constitutes a source of serious anxiety. Above epidemiological situation

concerning allergic asthma within the Lodz province is subject to in-depth analyses that have been employed in the process of monitoring the Asthma Prevention Program of the Lodz Regional Health Insurance Fund. Lodz Regional Health Insurance Fund was a sponsor of the Prevention Asthma Program in 2000–03 directed at increasing early detection and providing optimal treatment of allergies (by specialists) leading to the prevention of asthma exacerbation and hospitalization.

Methods

Study area

Lodz province is situated in Central Poland. At the end of 2002, Lodz province had a population of 2 607 380 with 622 290 inhabitants below 19 (≤ 5 years: 139 613; 6–13 years: 246 861; 14–19 years: 235 816) (3). Lodz province is the centre of the textile and chemical industry with many power stations. Air dust pollution in Lodz province is higher than in other Polish regions. In 2000, mean

dust concentration in city-centre of Lodz was 38 mcg/m² and SO₂ 18 mcg/m³ (4).

Description of Asthma Prevention Program

Asthma Prevention Program in Lodz was based on Finnish Asthma Program (5).

Regional Insurance Health Fund initiated and sponsored the prevention programme to improve early diagnosis and treatment of asthma in children. All funds were divided between primary and specialized care centres. About 127 primary health care centres and 12 specialized centres (all which have contract with Regional Insurance Health Fund) participated in this programme. Patient flow in the programme is presented in Fig. 1.

Primary care centre goals:

- 1 Anamnestic information, mapping of allergy-causing factors.
- 2 Repeated auscultation of the lungs.
- 3 Bronchial dilation test. Peak expiratory flow (PEF) measurement at the clinic before and 15 min after inhalation of β -2 sympathomimetic (two to four inhalations).
- 4 PEF home measurement for 2 weeks.
- 5 After preliminary diagnosis patients have been send to specialized centres.

Specialized care centre goals:

- 1 Skin testing.
- 2 Spirometry. Repeated bronchial dilation test.
- 3 Determination of eosinophilic white blood cells and eosinophil cationic protein (ECP) in blood.
- 4 Possibly, measurement of total and specific immunoglobulin (Ig)E antibodies in serum in accordance with anamnestic information.

- 5 If necessary, more detailed diagnosis included: measurement of bronchial reactivity, other challenge tests and pulmonary physiological and bronchological tests.

In differential diagnosis, pharyngeal tonsillitis, bronchiolitis, sinusitis, upper respiratory tract obstruction, foreign bodies, immunodeficiencies were excluded. The diagnosis of asthma in children was established according to Global Initiative for Asthma (GINA) (6). In children under 5 years old asthma was confirmed by recurrent episodes of wheezing, parental history of asthma along with the presence of other atopic manifestations. The diagnosis in children above 5 years old was confirmed by repeated monitoring of respiratory function: measurement of PEF or forced expiratory volume in 1 s (FEV₁) in a bronchial dilation test and PEF monitoring.

Goals of Asthma Program

- 1 Early diagnosis and active treatment of children with asthma and asthma-like symptoms.
- 2 Better access to specialized medical care.
- 3 Asthma education for children and their parents.
- 4 Prevention of development and exacerbation of asthma in children.

Statistical methods

The results were analysed according to well-known statistical methods with STATSOFT STATISTICA for Windows, release 6.0 (Stat-Soft, Inc., Tulsa, OK, USA). Data was presented as mean with SD. To estimate differences in hospitalization time test for trend was used. *P*-values < 0.05 were considered to be significant.

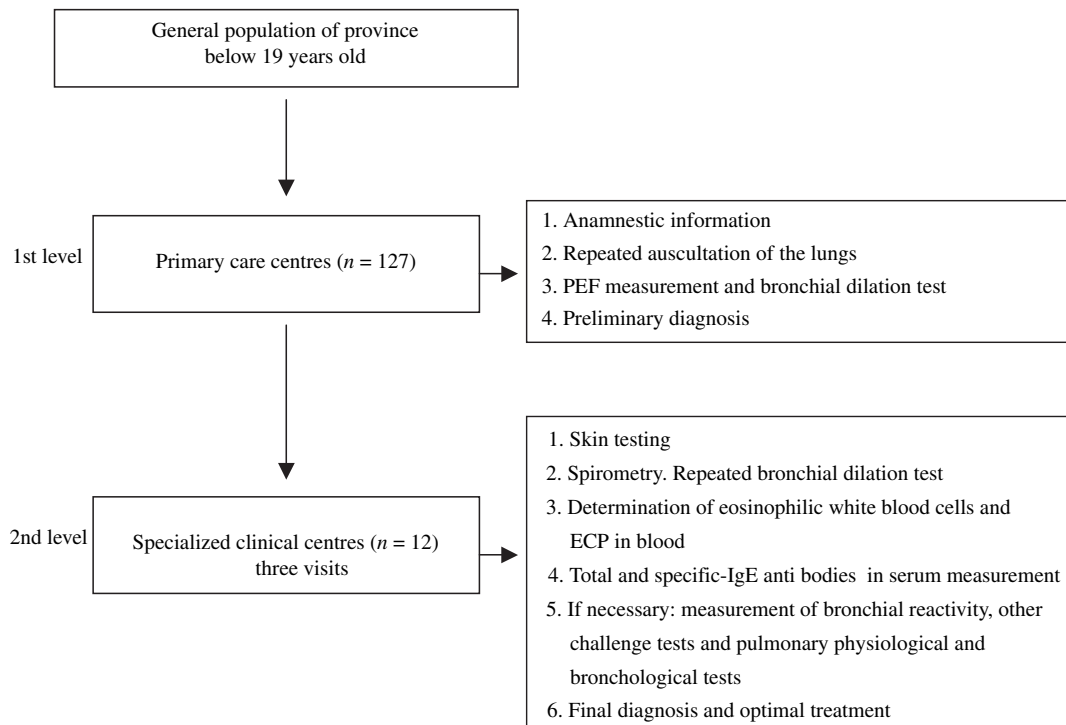


Figure 1. Patient flow in the programme.

Results

Demographic characteristic

All primary and specialized care centres participated in the program. About 20 109 children below 19 years old participated in Asthma Prevention Program between year 2000 and 2003. Patients characteristic is shown in Table 1. No disparity was observed in respect of sex and age structure between participants group and total region population (data not shown) (3). We observed increasing number of participants during the following years of Asthma Prevention Program in each age subgroup.

New asthma diagnosis

The highest number of new asthma diagnosis, expressed per 1000 inhabitants, was observed in the second year of Asthma Prevention Program. Increasing trend especially in children below 13 years old is clearly visible. New asthma diagnosis during Asthma Prevention Program in age subgroups is shown in Table 2. Percentage of new diagnosis of all allergic disease in Asthma Prevention Program is shown in Table 3.

Hospital episodes due to asthma exacerbation

Hospital episodes due to asthma exacerbation is shown in Table 4. We attached data from year 1999, the year before beginning Asthma Prevention Program. However, in the

Table 1. Characteristics of patients participating in Asthma Program

	Year			
	2000 (<i>n</i> = 3786)	2001 (<i>n</i> = 5246)	2002 (<i>n</i> = 6341)	2003 (<i>n</i> = 5736)
Age (years)				
<5	1042 (27.6)	1689 (32.2)	1869 (29.5)	1749 (30.5)
6–13	1845 (48.7)	2500 (47.7)	3197 (50.4)	2853 (49.7)
14–19	899 (23.7)	1057 (20.1)	1275 (20.1)	1134 (19.8)
Number				
Male	1749 (46.2)	2429 (46.3)	2931 (46.2)	2668 (46.5)

Values expressed are number of patients (%).

Table 2. New asthma diagnosis during Asthma Program in age subgroups

Asthma Program Program (years)	New asthma diagnosis							
	Age (years)						Total	
	<5		6–13		14–19			
	<i>N</i>	<i>N</i> /1000*	<i>N</i>	<i>N</i> /1000*	<i>N</i>	<i>N</i> /1000*	<i>N</i>	<i>N</i> /1000*
2000	94	0.67	384	1.56	140	0.59	618	0.99
2001	342	2.45	915	3.71	373	1.58	1630	2.62
2002	233	1.67	814	3.30	345	1.46	1392	2.24
2003	340	2.44	770	3.12	252	1.07	1362	2.19

**N*/1000, number of new asthma diagnosis expressed per 1000 inhabitants in corresponding age subgroups.

Table 3. Percentage of new diagnosis of allergic disease* during Asthma Program in all participants

Asthma Program (years)	%
2000	57.9
2001	90.8
2002	76.8
2003	80.5

*Atopic asthma and/or allergic rhinitis, atopic dermatitis, urticaria.

Table 4. Hospital episodes due to asthma exacerbation

Asthma Program (years)	<i>N</i>	<i>N</i> /1000†
1999*	791	1.27
2000	919	1.48
2001	731	1.17
2002	649	1.04
2003	535	0.86

*Year before Asthma Program starting.

†*N*/1000, number of hospital episodes due to asthma exacerbation expressed per 1000 inhabitants in corresponding age subgroups.

first year of Asthma Prevention Program we observed more hospital episodes because of asthma exacerbation in comparison with year 1999 but from the second year of programme we showed systematically decreasing number of hospital episodes due to asthma exacerbation.

Data on hospital episodes because of asthma exacerbation in age subgroups cannot be provided.

Duration of hospitalization due to asthma exacerbation

Duration of hospitalization as a result of asthma exacerbation is shown in Table 5. We attached data from year 1999, the year before beginning Asthma Prevention Program. We found significantly decreasing trend in duration of hospitalization because of asthma exacerbation during Asthma Prevention Program ($P = 0.001$) and during the period from 1999 to 2003 ($P < 0.001$).

Asthma care education

In all 12 specialized care centres, participating in the programme, Comprehensive Asthma Schools Education

Table 5. Mean duration of hospitalization due to asthma exacerbation

Asthma Program (years)	Mean (days)	SD
1999*	10.9	3.5
2000	9.1	1.45
2001	9.8	2.1
2002	8.5	2.1
2003	8.4	2.1
<i>P</i> -value for trend (with 1999)	<0.001	
<i>P</i> -value for trend (without 1999)	0.001	

*Year before Asthma Program starting.

(CASE) were organized. Main strategies in each CASE were:

- 1 Self-management education for children and their parents.
- 2 Increasing knowledge about asthma and its prevention and treatment.
- 3 Education for classmates to engender support.
- 4 School fairs and information sessions for children, parents, teachers.
- 5 Question and answer sessions for teachers and principals.
- 6 Information provided to child's clinician.
- 7 Promotion of scientific research into asthma.

Discussion

Asthma prevalence in low-income communities continues to be inordinately high with 20% or more of children experiencing symptoms. Lodz region as any other regions in the world is not wealthy enough to provide its population with everything that the medicine could offer. The fact underpins the necessity of effective spending of the limited resources especially at the primary care level, such as health promotion and preventive services. The GINA guidelines, published in the early 1990s, have been disseminated to improve the quality of life of asthmatics and to reduce the socio-economic burden of asthma. However, the guidelines goals have far from been reached in many countries (7–9).

The Asthma Prevention Program in Lodz province was in progress from the 1 January 2000 to 31 December 2003. All of the primary health care centres (first level) and specialized clinical centres (second level) participated in this programme. To perform the tasks envisaged by the programme the total sum of 1 069 461 was allotted. The overall annual cost of Asthma Prevention Program is shown in Table 6.

Early effects of this programme are in particular: early identification of allergic diseases, mainly asthma, the increased access to specialized medical care, reduced number and shorter duration of hospitalization because of asthma exacerbation. Establishing new Asthma Schools Education was one of the most important effect of this programme. Long-term benefits of asthma education for doctors and patients has been previously

shown (10–12). Recently published French survey emphasizes the complexity of the notions of asthma control and exacerbation and provides novel informations to orient continuing education programmes (13). In other countries, similar allergy prevention programmes were performed but economical and political differences between the countries related to the way of organizing the providers' payment are the reasons for the differences in the aims and results of these programmes. However, long-time effects of these prevention programmes are clearly visible (10, 14, 15). When asthma is well controlled, it rarely leads to hospitalization. As the result of these programmes asthma is better treated. Hill et al. (16) revealed that in a group of children losing more than 10 school days per year because of asthma symptoms, as many as 70% were not taking any drugs or taking only β -agonists. Such patients are at high risk for acute exacerbations, absence at work and school (17) as a result of asthma, hospitalization (18, 19) and even mortality (20, 21). It is generally accepted that early detection, patient education and optimal treatment are today the main strategies of asthma management.

However, there are still many difficulties in the establishing effective control over the provision of preventive allergy services. The main reasons for that are related to the problems in the evaluation of the results of the prevention and the specificity of the preventive services, related to education, advice to families, ability to convince the patients to comply with the treatment. It should be noticed that this was the first allergy prevention programme in Poland. Unfortunately, the programme was abandoned in 2003 because of the limited financial resources of the health insurance institution. It seems, although that it is only a transitional state all the more so because the legal regulations on the general insurance at the National Health Fund clearly indicate the need for prophylactic programmes, especially programmes dealing with socially significant health problems such as allergic diseases.

Because the health care system will be reformed again in 2005, it would be helpful if the contract between the National Health Fund and providers changes. Given the current epidemiological situation concerning allergic diseases, the patients' accessibility to specialists should be increased.

The relatively short observation period and the type of data used in our programme did not allow us to estimate the cost-effectiveness of asthma treatment in Poland, which remains to be evaluated in further studies. Such effectiveness however, is certain.

We observed increasing number of participants during following years of Asthma Program in each age subgroup followed by increasing number of new asthma diagnosis. Results of our programme revealed the need of such strategies in the health care system. They should be directed at early diagnosis and better treatment of allergies before they lead to irreversible health deterioration.

Table 6. Costs of Asthma Prevention Program provided by the Health Insurance Fund

Year	Costs (EUR)
2000	329 369
2001	279 476
2002	256 043
2003	204 573
Total	1 069 461

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