

Grzegorz M. Brożek¹, Marcin Nowak², Władysław Pierzchała³, Jan E. Zejda¹

¹Department of Epidemiology, Medical University of Silesia in Katowice

Head: Prof. J.E. Zejda, MD, PhD

²Department of Psychiatry, II Faculty of Medicine, Physiotherapy Division, Medical University of Warsaw

Head: Prof. B. Łoza, MD, PhD

³Department of Pneumonology, Medical University of Silesia in Katowice

Head: Prof. W. Pierzchała, MD, PhD

Profile of adults suffering from asthma in Poland — results of PulmoScreen study

Profil dorosłych chorujących na astmę w Polsce — wyniki badania PulmoScreen

The work was supported by a research grant funded by ADAMED.

Abstract

Introduction: Adult patients with diagnosis of asthma remain largely under the care of primary care physicians (general practitioners). Thus, they play an important role in diagnosing and treating this population. The aim of the study was to characterize of adults with asthma remaining under the care of Polish general practitioners (GP) as well as to evaluate the use of diagnostic tools and treatment in light of GINA recommendations.

Material and methods: This questionnaire study included a representative sample of 1852 general practitioners (GPs) who were asked to complete questionnaires on the diagnosis and treatment of their patients with asthma.

Results: Altogether 1250 GPs provided information about 10 981 patients. Controlled asthma had 21.2% patients, 46.9% partly controlled, and 31.9% uncontrolled asthma. Allergy skin prick tests were performed in 64.8%, bronchial reversibility tests in 58.1% and bronchial provocation tests in 9.8% of patients. Spirometry results were obtained for 41.9% of patients. In the last year 16.6% of patients underwent emergency intervention due to asthma exacerbation and 18.1% required hospitalization.

Conclusions: In Polish asthma patients the frequency of allergological and pulmonological visits as well as the frequency of spirometric assessment are poorly associated with asthma control level. The diagnostic tests recommended by international and national guidelines for the management of asthma are performed too seldom. Hospitalizations and emergency interventions related to asthma exacerbations are found in a large portion of patients and depend on their gender and asthma control level. Asthma has a negative impact on everyday activity in more than half of patients. Proper assessment of the level of causes asthma control according to GINA guidelines poses problems to Polish general practitioners.

Key words: asthma, adults, diagnostic, quality, asthma control, primary care

Pneumonol. Alergol. Pol. 2012; 80, 5: 402–411

Introduction

Asthma is a common chronic disease, which has a significant impact on patients' quality of life but also on life expectancy and risk of death. The disease is a universal health problem, and the num-

ber of affected persons is estimated at 300 million worldwide [1].

Asthma affects 8% of children and 5–7% of adults in Poland. Both international and Polish population-based studies show increasing incidence of the disease in children [2–5].

Address for correspondence: Grzegorz Brożek, MD, Katedra i Zakład Epidemiologii SUM, ul. Medyków 18, 40–752 Katowice, tel.: + 48 (32) 252 37 34, e-mail: gbrozek@sum.edu.pl

Manuscript received on: 19.08.2011 r.

Copyright © 2012 Via Medica

ISSN 0867–7077

The report of the Global Initiative for Asthma (GINA) states that adequate medical care leads to effective control of the disease, defined as retained normal pulmonary ventilatory capacity, no nocturnal or daytime symptoms (≤ 2 episodes/week), no need for emergency medical interventions (≤ 2 episodes/week), and no limitations to daily activities because of asthma. The authors of the report agree that adequate management of patients with asthma is costly; however, the costs of refraining from adequate therapy can be even higher [1]. Optimal disease control is not only of critical importance for the individual's health but also has significant social and economic consequences [1, 6–8].

Medical care of patients with asthma in Poland lies within the field of competence of general practitioners (GPs) and diagnostic reference institutions, in accordance with the officially acclaimed policy and the national healthcare system regulations, in agreement with World Health Organization (WHO) documents and the National Programme for Early Detection and Management of Asthma (POLASTMA). This is the daily medical practice and individual experience of a Polish patient [9, 10].

Since the role of general practitioners is crucial in the Polish healthcare system, this study was initiated to characterise the population of adult patients with asthma taken care of by GPs and to evaluate following of the GINA guidelines.

Material and methods

From the database owned by the ADAMED company, which includes over 8,000 names of general practitioners in Poland, 1,852 physicians from all regions were randomly selected for the purpose of this study. A letter of invitation was sent to each of them. Filled in questionnaires were sent by surface mail or handed to the company's representatives. According to the study protocol, participating physicians were asked to provide information concerning ten consecutive patients treated for asthma, with the disease previously diagnosed and confirmed. Patient follow-up during the next two appointments was also reported. Physicians filled in questionnaires for individual patients, including data describing their previous medical history and clinical status at the time of the two appointments. Detailed questions concerned diagnostic procedures, specialist consultations and care, applied therapy, side effects of used drugs, degree of disease control, current results of ventilatory capacity tests, and occurrence of signs and results of clinical examinations. Diagnosis of asthma had to be made previously and was not veri-

fied during the current study. Classification of disease severity according to the GINA guidelines (retrospective assessment of four weeks preceding current appointment) was based on individual physicians' assessments and, in parallel, on assessment of the investigators who used patient data provided in the questionnaire. The study questionnaire included direct questions concerning criteria of asthma control according to the GINA guidelines [1]. The results concerning disease control presented in this publication are based on the second analysis, performed by the investigators.

The requirement for current spirometry results concerned tests performed within the last 12 months (including yearly monitoring of FEV₁ decrease), the result of which was known for the GP taking care of the patient.

Data from questionnaires were transferred to a digital database and coded so that identification of an individual patient was not possible. Statistical analysis was performed using Statistica 7.1 software. Distributions of quantitative variables (arithmetic mean, standard deviation, median value, and mode) as well as qualitative variables (frequency of respective variables' occurrence) were analysed. For qualitative variables, 95% confidence intervals (95% CI) were calculated. Normal distribution of variables was verified using Shapiro-Wilk's test. Results for quantitative variables are presented as mean value \pm standard deviation; in cases of non-normal distribution, median value and range are presented. Differences for quantitative variables were verified using *t*-Student's test or non-parametric tests (U Mann-Whitney test). In cases of comparisons of more than two groups for quantitative variables, analysis of variance (ANOVA) and respective non-parametric tools were used. Differences in distributions of qualitative variables were analysed using χ^2 test. The adopted level of statistical significance was $p < 0.05$. Kappa test was used for analysis of decision agreement.

The study was designed and performed under the auspices of the Polish Society for Lung Diseases and financed by a research grant from the ADAMED company. The study duration was from November 2009 until January 2010.

The current publication includes data obtained during the first appointment at a GP's office. Data concerning adequacy of treatment are not included and will be the subject of a separate report.

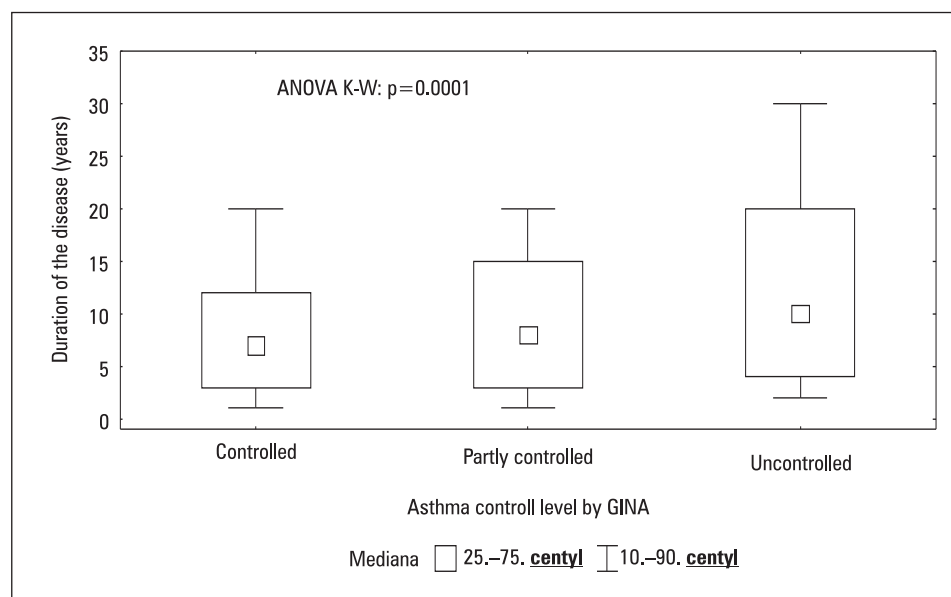
Results

The study was based on data obtained from filled in questionnaires. A total of 1,250 general

Table 1. Descriptive characteristics of the study population

	Total n = 10 981	Women n = 5964	Men n = 5017	p*
Gender (%)	-	54,3%	45,7%	
Age (years)	47,4 (SD ± 15,7)	47,3 (SD ± 15,2)	47,6 (SD ± 16,2)	0,3
Age at diagnosis (year of life)	35,6 (SD ± 14,1)	35,8 (SD ± 14,5)	35,3 (SD ± 13,8)	0,1
Duration of asthma (years)	10,6 (OS ± 9,6)	10,3 (OS ± 9,4)	10,9 (OS ± 9,5)	0,1

SD — standard deviation; *U Mann-Whitney test

**Figure 1.** Duration of asthma by asthma control level

practitioners (67.5% of all invited GPs) responded to the questions. The obtained information concerned 11,262 patients with asthma. The results presented herein are based on information concerning 10,981 patients; in 2.5% of cases data were removed from the final analysis due to incomplete information. Table 1 presents the baseline characteristics of the study population. Patient age in the cohort ranged between 18 and 80 years (mean age 47.4 ± 15.7 years). Women constituted 54.3% of the cohort. The ages of male and female patients did not differ significantly ($p = 0.3$). Patient age at diagnosis was between 5 and 63 years (mean age 35.6 ± 14.1 years). Age at diagnosis was not different for men and women ($p = 0.1$). Mean duration of disease was 10.6 ± 9.4 years, with no difference between the sexes ($p = 0.1$).

At the time of first visit, 61.8% of patients (95% CI: 60.9–62.7%) complained of episodes of dyspnoea, wheezing, or cough during the day, and 50.7% of patients (95% CI: 49.8–51.6%) experienced similar symptoms during the night. Emergen-

cy application of short-acting β_2 -agonists more than twice a week was reported by 32.0% of patients (95% CI: 31.1–32.9%). Cough or dyspnoea on exertion was declared by 70.1% of patients (95% CI: 69.3–71.0%). In 41.6% of subjects (95% CI: 40.7–42.6%), during initial physical examination, physicians could identify at least one of the following signs: wheezing, rhonchi, rales, or forced expiration.

Detailed analysis of the obtained questionnaire data revealed that during the first appointment 21.2% of 10,981 patients (95% CI: 20.2–21.7%) had controlled asthma, 46.9% had partly controlled disease (95% CI: 45.9–47.8%), and in 31.9% asthma was poorly controlled (95% CI: 31.0–32.8%). There were no differences between male and female patients as to initial disease control ($p = 0.5$). Patients with partial or poor asthma control had longer duration of disease ($p = 0.0001$) as compared to subjects with adequately controlled asthma (Fig. 1).

Analysis of the performed ancillary tests revealed that skin prick tests were performed anyti-

me during the disease in 64.8% of patients, bronchial reversibility test in 58.1% of subjects, and bronchial provocation test in 9.8% of persons. No differences were found for respective tests between females and males ($p = 0.7$; $p = 0.9$; $p = 0.9$, respectively). Statistically significant differences were found between patients with disease of varying severity. Skin prick tests were most often (70.5%) performed in patients with controlled asthma, similarly to bronchial provocation tests (11.2% of patients in the same group). Bronchial reversibility test was performed most often (61.6%) in subjects with uncontrolled asthma (Tab. 2).

Hospitalisation because of asthma (anytime during the disease duration) was necessary for 45.8% of patients (95% CI: 44.9–46.8%). During the

last 12 months, 18.1% of patients (95% CI: 17.4–18.8%) were hospitalized due to asthma, with significantly different values for subjects with various degrees of asthma control ($p = 0.00001$). The incidence varied from 31.2% in the group with controlled disease, 41.7% in the case of partly controlled, and up to 62.1% patients with poorly controlled disease. More men were hospitalised during the last 12 months as compared to women (19.1% vs. 17.2%; $p = 0.009$). Detailed characteristics are presented in Table 2 and Figure 2.

Within the last 12 months, 16.6% of patients (95% CI: 15.9–17.3%) required emergency medical intervention at least once. This value increased with worse control of the disease, from 3.5% (95% CI: 2.8–4.3%) in controlled asthma, 12.3% (95% CI:

Table 2. Diagnostic tests and hospitalization for asthma ever during the course of the disease by asthma control level according to GINA

Anytime during the disease	Total N = 10 981 % (95% CI: %)	Level of asthma control according to GINA			p*
		Controlled n = 2319 % (95% CI: %)	Partly controlled n = 5146 % (95% CI: %)	Uncontrolled n = 3502 % (95% CI: %)	
Skin prick tests	64.8% (31.0–32.8)	70.5% (68.6–72.4)	64.2% (62.9–65.5)	62.3% (60.7–62.3)	0.000001
Bronchial reversibility tests	58.1% (57.1–58.9)	57.3% (55.3–59.3)	56.0% (54.6–57.3)	61.6% (60.0–63.2)	0.00001
Bronchial provocation tests	9.8% (9.2–10.4)	11.2% (9.9–12.5)	8.7% (7.9–9.5)	10.6% (9.5–11.6)	0.00003
Hospitalization because of asthma	45.8% (44.9–46.8)	31.2% (29.2–33.0)	41.7% (40.3–43.0)	62.1% (60.5–63.7)	0.00001

CI — confidence interval; p* — chi-square test result

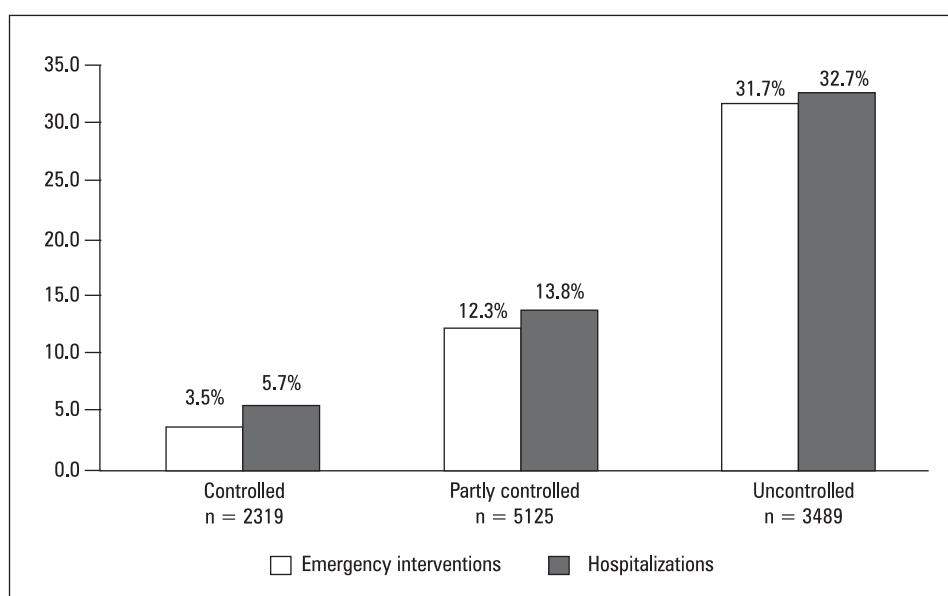


Figure 2. Emergency interventions and hospitalizations due to asthma during last year by asthma control level

11.4–13.2%) in partly controlled disease, to 31.7% (95% CI: 30.2–33.2%) in subjects with uncontrolled asthma ($p = 0.001$). During one year, emergency medical team intervention was necessary 1–12 times in the total of 1,658 patients (mean 1.9 ± 1.4 interventions; median 2.0). One intervention per year was most commonly noted and concerned 48.8% of patients. Female patients did not differ from males as to the number of emergency interventions during one year ($p = 0.5$). Significant differences were however found for patients with poorer control of the disease ($p = 0.0001$) (Tab. 3).

More than half of all patients (53.3%) were consulted by specialist pulmonologist or allergologist every six months, 25.5% of patients were consulted by a specialist once a year, 7.6% once every two years, and 13.5% of patients, less often than that. The greatest proportion of patients who met specialists least often (less than once every two

years) were observed among those with partly controlled or uncontrolled asthma (approx. 14% of the patients in each group) (Tab. 3). Female patients had more often appointments at pulmonologists or allergologists compared with male subjects; the difference was statistically significant ($p = 0.0007$) (Tab. 4).

Spirometric testing was performed every 6 months in 38.5% of patients, once a year in 34.4%, once every two years in 11.0%, and least often in 16% patients, described by their GPs. Testing was more often performed in women ($p = 0.05$). Significant differences ($p = 0.0001$) were found between groups of patients with varying levels of disease severity according to GINA (Tab. 4). In the described cohort of patients with asthma, 15.9% had a peak flow meter, 28.2% owned a nebuliser, and inspiratory force assessment in order to choose an adequate inhaler device was performed at some

Table 3. Frequency of visits to the pulmonologist or allergologist by asthma control level according to GINA

Pneumonologist or allergologist consultation	Total N = 10 981 % (95% CI: %)	Level of asthma control according to GINA			p*
		Controlled n = 2319 % (95% CI: %)	Partly controlled n = 5146 % (95% CI: %)	Uncontrolled n = 3502 % (95% CI: %)	
Once every 6 months	53.3% (52.4–54.2)	52.9% (50.9–54.9)	52.8 (51.4–54.1)	54.4 (52.7–56.0)	0.0007
Once a year	25.5% (24.7–26.3)	27.8 (25.9–29.6)	25.4 (24.2–26.5)	24.2 (22.8–25.6)	
Once every 2 years	7.6% (7.1–8.1)	8.1 (7.0–9.2)	7.8 (7.0–8.5)	7.0 (6.2–7.9)	
Less than every two years	13.5% (10.5–11.7)	11.1% (9.8–12.4)	14.0 (13.0–14.9)	14.4 (13.2–15.5)	

CI — confidence interval; p* — chi-square test result

Table 4. Frequency of spirometry testing by asthma control level according to GINA

Spirometry testing	Total N = 10,981 % (95% CI: %)	Level of asthma control according to GINA			p*
		Controlled n = 2,319 % (95% CI: %)	Partly controlled n = 5,146 % (95% CI: %)	Uncontrolled n = 3,502 % (95% CI: %)	
Once every 6 months	38.5% (37.6–39.4)	36.3 (34.3–38.3)	37.7 (36.4–39.1)	41.1 (39.5–42.8)	0.0001
Once a year	34.4% (33.5–35.3)	36.0 (34.0–38.0)	34.5 (33.2–35.8)	33.2 (31.6–34.8)	
Once every 2 years	11.0% (10.4–11.6)	12.6 (11.2–13.9)	11.3 (10.4–12.2)	9.7 (8.7–10.7)	
Less than every 2 years	16.0% (15.3–16.7)	15.0 (13.6–16.5)	16.5 (15.5–17.5)	16.0 (14.8–17.2)	

CI — confidence interval; p* — chi-square test result

Table 5. Actual spirometry or peak flow results by asthma control level according to GINA

Actual result	Total N = 10,981 % (95% CI: %)	Asthma control level according to GINA			p*
		Controlled n = 2,319 % (95% CI: %)	Partly controlled n = 5,146 % (95% CI: %)	Uncontrolled n = 3,502 % (95% CI: %)	
Spirometry	41.9 (41.0–42.8)	28.3 (26.4–30.1)	45.6 (44.2–46.9)	45.6 (43.9–7.2)	0.00001
Peak flow	6.7 (6.3–7.2)	6.1 (5.1–7.0)	6.9 (6.2–7.6)	6.8 (6.0–7.6)	0.3

CI — confidence interval; p* — chi-square test result

Table 6. Agreement between GP's classification of asthma control level and GINA guidelines as assessed by information from the questionnaire

		True asthma control level		
		Controlled n = 2,307	Partly controlled n = 5,119	Uncontrolled n = 3,488
Level of asthma control assessed by GP	Controlled n = 3475	1724 15.8%	1394 12.8%	357 3.3%
	Partly controlled n = 4860	496 4.5%	2732 25.0%	1632 14.9%
	Uncontrolled n = 2579	87 0.8%	993 9.1%	1499 13.5%

time in 19.8% of patients. Current FEV₁ value was known only for 41.9% of patients, and PEF measured by peak flow meter in 6.7% of patients. These percentages increased depending on the level of disease severity, but in none of patient groups were there more than 50% of persons in whom measurements were taken (Tab. 5).

The influence of the disease on the patient's daily activity was an important issue in the study. Any kind of limitation of normal activities due to asthma was reported by 56.4% of persons (95% CI: 55.5–57.3%), with no significant difference between the sexes ($p = 0.4$) but with greater incidence of negative disease on activity in patients with worse disease control ($p = 0.00001$). No negative impact on everyday life was reported by patients with controlled asthma; however, 56.8% of patients with partly controlled disease (95% CI: 55.4–58.1%) and 94.5% of persons with uncontrolled disease (95% CI: 93.8–95.3%) experienced obstacles to daily activities because of their disease.

Physicians who evaluated and reported occurrence of daytime and nocturnal symptoms of asthma, limitations to daily activities, necessity of emergency medical interventions, presence of disease exacerbations, and parameters of lung ventilatory capacity were also asked to qualify their patients into one of four categories of disease severity according to GINA. Only in 54.2% of cases were these answers in accordance with the actual

degree of disease severity assigned by the investigators based on data from questionnaires concerning occurrence and frequency of symptoms (Tab. 6).

Among patients classified by their GPs as having controlled asthma, only 49.6% of patients fulfilled such criteria according to GINA, 40.1% of patients had partly controlled disease, and 10.3% actually had uncontrolled disease. Of all patients assessed by their GPs as having partly controlled asthma, 56.2% of subjects were classified correctly, whereas 10.2% had optimal disease control and 33.6% had uncontrolled asthma. More than half of all patients classified by their physicians as uncontrolled disease (58.1%) fulfilled GINA criteria for this category, but 3.4% of patients had actually controlled, and 38.5% had partly controlled disease.

Analysis concerning levels of disease control assigned *ex post* by the study investigators revealed that of all subjects with controlled disease 74.7% of patients were correctly classified by their GPs, whereas in 21.5% of cases the disease was described primarily as partly controlled, and in 3.8% it was described as uncontrolled. Of all patients with partly controlled asthma, 53.4% were correctly classified, but in 27.3% of cases GPs described the disease as adequately controlled, and in 19.4% it was described as uncontrolled. Concerning patients with objective criteria of uncontrolled asthma, 43.0% of cases were correctly classified by their physicians, 46.8% of subjects were

described as having partly controlled, and 10.2% as controlled asthma.

Agreement between levels of disease severity assigned by the GPs and by study investigators was statistically analysed using the Kappa test; the obtained Kappa coefficient value was 0.38 (95% CI: 0.36–0.39).

Discussion

The aim of the presented study was to characterise the population of adult patients with asthma in Poland who are being taken care of by general practitioners, as well as to evaluate the use of diagnostic tools and methods of treatment with respect to GINA recommendations. The filled in questionnaires provided data concerning over 11,000 patients with asthma, of which only 1/5 had fully controlled disease. More than 60% of patients had signs of bronchial spasm during the daytime, and more than 50% during the night. More than 1/3 of patients used short-acting beta₂-agonists more than twice a week. Current spirometry results (testing performed within the last 12 months) were available for the GPs in only slightly over 40% of patients. Less than 16% of patients had a peak flow meter, and only half of those were actually using it. The obtained data showed that spirometry was performed during the preceding 12 months in 73.4% of patients. This observation points to a lack of effective communication between specialists and general practitioners taking care of patients with asthma.

The study gave interesting results on frequency of specialist consultations by allergologists or pneumonologists. As mentioned in Table 3, a significant difference was observed between patient groups with different levels of disease severity. The clinical significance of this finding might be of importance. Patients with poorly controlled asthma are more frequently consulted by specialists compared to others; however, the frequency of these consultations is similar to figures reported for other disease severity levels. Specialist consultations every six months were reported in 54.4% of patients with poorly controlled, 52.9% of subjects with optimally controlled, and 2.8% of persons with partly controlled disease. What is more worrisome, most patients with uncontrolled disease undergo specialist consultations less than every two years (14.4%), which is a similar frequency as that seen in patients with partly controlled (14.0%) and well controlled disease (approx. 11%). Given these minor differences in frequency of specialist follow-up appointments in different patient groups, it can be implied that patients with well controlled disease, who actually do not need such

consultations, meet specialists as often as patients with poorly controlled asthma. A similar conclusion can be drawn as to the frequency of spirometric testing (tab. 4). The healthcare system structure in Poland may be, to some extent, responsible for this *status quo*, with difficult access to specialists and long patient queues waiting for consultation, irrespective of the individual patient's actual condition or needs.

Only 1/3 of patients in the presented study had controlled asthma. Of notice, though, is the fact that this figure concerns only the persons who for some reason contacted their physician, which could, however, be related to exacerbation of previously undisclosed disease. In 2000, data from the Polish arm of the Asthma Insights and Reality in Central and Eastern Europe (AIRCEE) were published. The study was based on information obtained from telephone calls to 300 randomly selected patients with asthma, of which 70% reported experiencing disease symptoms during the day at least once a week, and 20% of respondents had symptoms every day. More than half of the respondents experienced disease symptoms at night, of which 11% had symptoms every night. Eighteen per cent of patients were hospitalised because of asthma during the preceding year, and almost 50% of patients needed emergency medical interventions [11]. Similar findings were reported by authors from other countries [12].

Of note, general practitioners could correctly classify the level of asthma control in only slightly more than 50% of their patients. Of all patients described by their physicians as having controlled disease, 33.9% of them had daytime symptoms more often than twice a week, 26.7% experienced nocturnal symptoms, and 56.8% noted limitation of their daily activities. Not more than 49.6% of patients initially assessed as having controlled disease should actually be put into this category. More than 40% of persons assigned by their GPs to the group of "controlled asthma" patients actually had only partial control, and 10% no control of the disease at all. Analysis of figures reported by general practitioners shows a tendency to underestimate disease severity. Correct assignment of controlled asthma by GPs concerned 74.7% of patients, with respective figures for partly controlled disease reaching 53.4%, and for uncontrolled asthma 43.0% of patients. Reproducibility of classification (concordance of primary and secondary assessment) was analysed using Kappa test, where 1 represents maximal and 0 lack of concordance. Kappa test result <0.4 is perceived as low level of agreement, according to universally accepted criteria [13]. The results of the presented study are

similar to observations from different countries. The Epidemiology and Natural History of Asthma: Outcomes and Treatment Regimens (TENOR) study performed in the USA showed concordant assessment of disease severity between general physicians and re-evaluation according to the GINA criteria in 58.8% of cases; the Kappa coefficient was 0.3. The authors of this study noted a particular “cautiousness” of practitioners, which resulted in underestimation of asthma severity, similarly to the results of the currently presented study [14]. Baker et al. reported similar results, with low concordance (Kappa = 0.29) for classification of asthma severity assigned by specialist allergologists or pulmonologists and re-evaluation strictly following current guidelines [15].

Given the discrepancies in assessment of disease severity, there is a need to inform and educate physicians in proper application of the GINA criteria. This finding also points to subjectivity in evaluation of the patient’s condition by the physician. It may be suspected that this subjectivity and underestimation of the disease severity results in choice of management strategies, decision making, and setting of therapy goals by the physician.

The presented study contains data concerning a large patient cohort but also has some flaws. Simplicity of the used questionnaire resulted in the choice of only a few predefined categories, e.g. frequency of specialist consultations or spirometric testing. This simplicity contributed to a greater number of questionnaires filled in but, on the other hand, impeded a detailed analysis concerning, for example, the number or frequency of hospitalisations during six months. Another weakness of the study is the inability to verify how many among all the patients treated for asthma in this cohort actually had the disease fulfilling objective diagnostic criteria. Both misdiagnosis and underdiagnosis are common problems in daily clinical practice, and were taken up by many investigators [16–18]. A study performed in Canada revealed that in 30% of adult patients treated for asthma diagnosis of the disease could not be confirmed by independent specialists [19]. Diagnosis of asthma was not verified in the presented study. However, studies performed in Łódź by Kupryś-Lipińska et al. showed no tendency for overdiagnosing asthma in inhabitants of the city, contrary to reports from other countries [12].

Conclusions

The following conclusions can be drawn based on the study results:

- actual level of asthma control was of little importance for the frequency of specialist consultations by allergologists or pulmonologists and for frequency of spirometric testing;
- investigations and tests recommended by international guidelines and national recommendations on diagnosis and monitoring of asthma are rarely performed in Polish patients;
- hospitalisations and emergency medical interventions because of asthma exacerbations are common and more often concern patients with less controlled disease and male subjects;
- asthma has a negative impact on daily activities in more than half of all patients;
- correct assignment of disease control level according to GINA guidelines poses practical problems to general practitioners taking care of patients;
- further steps and more effective education strategies concerning management of patients with asthma, based on national guidelines and international recommendations, are warranted.

Conflict of interests

The authors declare no conflicts of interest.

Piśmiennictwo

1. Global Strategy for Asthma Management and Prevention, Global Initiative for Asthma (GINA) 2009 (www.ginasthma.org).
2. Pearce N., Ait-Khaled N., Beasley R. et al. The ISAAC Phase Three Study Group. Worldwide trends in the prevalence of asthma symptoms: phase III of the International Study of Asthma and Allergies in Childhood (ISAAC). *Thorax* 2007; 62: 758–766.
3. Liebhart J., Malolepszy J., Wojtyniak B., Pisiewicz K., Plusa T., Gladysz U. Polish Multicentre Study of Epidemiology of Allergic Diseases. Prevalence and risk factors for asthma in Poland: results from the PMSEAD study. *J. Investig. Allergol. Clin. Immunol.* 2007; 17: 367–374.
4. Brożek G.M., Zejda J.E., Kowalska M., Gębuś M., Kępa K., Igielski M. Opposite trends of allergic disorders and respiratory symptoms in children over a period of large-scale ambient air pollution decline. *Polish J. Environ. Stud.* 2010; 6: 1133–1138.
5. Lis G., Bręborowicz A., Cichoń-Jarosz E. et al. Wzrost występowania astmy oskrzelowej u dzieci szkolnych w Krakowie i Poznaniu — badanie ISAAC. *Pneumonol. Alergol. Pol.* 2003; 71: 336–343.
6. Jarvis D., Newson R., Lotvall J. et al. Asthma in adults and its association with chronic rhinosinusitis: The GA2LEN survey in Europe. *Allergy* 2012; 67: 91–98.
7. Masoli M., Fabian D., Holt S., Beasley R. The global burden of asthma: executive summary of the GINA Dissemination Committee Report. *Allergy* 2004; 59: 469–478.
8. Bousquet J., Ansotegui I.J., van Ree R., Burney P.G., Zuberbier T., van Cauwenberge P. European Union meets the challenge of the growing importance of allergy and asthma in Europe. *Allergy* 2004; 59: 1–4.
9. Kuna P., Kupryś-Lipińska I. Postępy we wczesnej diagnostyce i leczeniu astmy — główne cele programu POLASTMA. *Przewodnik Lekarza* 2011; 1: 112–115.
10. Kuna P., Kupczyk M., Kupryś-Lipińska I. POLASTMA, narodowy program wczesnej diagnostyki i leczenia astmy. PTA 2009 (dokument dostępny na stronie: http://www.mojaastma.org.pl/files/polastma_pl.pdf).

11. Kowalski M.L., Jędrzejczak M., Cirlić M. Efektywność leczenia astmy oskrzelowej w Polsce w ocenie pacjentów — wyniki badania AIRCEE (Asthma Insights & Reality in Central and Eastern Europe). *Alergia Astma Immunologia* 2004; 9: 187–195.
12. Rabe K.F., Adachi M., Lai C.K.W. et al. Worldwide severity and control of asthma in children and adults: The global Asthma Insights and Reality surveys. *J. Allergy Clin. Immunol.* 2004; 114: 40–47.
13. Altman D.G. *Practical statistics for medical research.* Chapman and Hall, London 1991.
14. Miller M.K., Johnson C., Miller D.P., Deniz Y., Bleecker E., Wenzel E. Severity assessment in asthma: an evolving concept. *J. Allergy Clin. Immunol.* 2005; 116: 990–995.
15. Baker K.M., Brand D.A., Hen J. Jr. Classifying asthma: disagreement among specialists. *Chest* 2003; 124: 2156–2163.
16. Aaron S.D., Vandemheen K.L., Boulet L.P. et al. Overdiagnosis of asthma in obese and nonobese adults. *CMAJ* 2008; 179: 1121–1131.
17. Kupryś-Lipińska I., Elgalal A., Kuna P. Niedodiagnozowanie i brak właściwej terapii astmy — badanie populacji ogólnej mieszkańców województwa łódzkiego (Polska). *Pneumonol. Alergol. Pol.* 2010; 78: 21–27.
18. Tinkelman D.G., Prince D.B., Nordyke R.J., Halbert R.J. Misdiagnosis of COPD and Asthma in Primary Care Patients 40 Years of Age and Over. *Journal of Asthma* 2006; 43: 75–80.
19. Luks V.P., Vandemheen K.L., Aaron S.D. Confirmation of asthma in an era of overdiagnosis. *Eur. Respir. J.* 2010, 36, 255–260; Contoli M., Papi A. When asthma diagnosis becomes a challenge. *Eur. Respir. J.* 2010; 36: 231–233.