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Inadequate antiasthma drug use in the north of Italy

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Inadequate antiasthma drug use in the north of Italy. I. Cerveri, M.C. Zoia, M. Bugiani, A. Corsico, A. Carosso, P. Piccioni, L. Casali, R. De Marco. ©ERS Journals Ltd 1997.

ABSTRACT: A multicentre survey of prevalence, determinants and management of asthma (the European Community Respiratory Health Survey (ECRHS)) has shown that the ratio of subjects declaring current use of antiasthmatic drugs to those reporting asthma attacks in the previous 12 months was particularly low (0.54) in the north of Italy.

In this study, we used a standardized clinical interview to gather a more detailed insight into the issue of asthma undertreatment in the north of Italy. A total of 1,104 subjects were interviewed, 116 of whom had been defined as asthmatic by the family doctor. Fifty subjects had current asthma and 66 had a history of previous asthma.

A considerable percentage (26%) of subjects with current asthma were not being treated with antiasthmatic therapy. Even when only patients with severe asthma were considered, the percentage of untreated patients was still high (21%). Forty two per cent of subjects used inhaled beta$_2$-agonists alone, 28% inhaled steroids plus beta$_2$-agonists, 2% inhaled steroids alone and 2% other drugs. Only 19% of the asthmatics on treatment, 85% of whom had more severe asthma, received daily treatment. Only 65% of the subjects who had received antiasthmatic drug prescriptions declared they had taken all the drugs prescribed; this percentage was 74% when respiratory symptoms were worsening. Of the patients with past asthma, 18% had taken antiasthmatic drugs. Most of these patients were those who had had more severe asthma.

In conclusion, antiasthmatic drugs are underused in the north of Italy, at least in part due to low compliance.

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Asthma is a serious, increasing public health problem in many countries throughout the world and constitutes a major economic burden [1, 2]. Undertreatment with anti-inflammatory preparations is regarded as one of the factors potentially responsible for the apparent increase of asthma morbidity and mortality. A number of studies have attempted to shed light on asthma care in different countries by using data from general practice registers, national medical expenditures and indirect costs, antiasthma drug sales, pharmacists or community pharmacy records [3–6]. The estimates drawn from these studies are inevitably approximate.

More recently, this issue has been better approached by measuring antiasthmatic drug consumption and the use of healthcare resources by asthmatic patients identified through adequate epidemiological or clinical surveys [7, 8].

Based on the results of a screening questionnaire administered in the first phase of the European Community Respiratory Health Survey (ECRHS), a multicentre survey of the prevalence, determinants and management of asthma [9, 10], we found Italy to be one of the countries with the lowest ratio (0.54) between subjects declaring current consumption of antiasthmatic drugs and those reporting asthma attacks during the previous 12 months [11, 12]. In the second phase of the ECRHS, carried out in three Italian cities (Pavia, Turin and Verona), a standardized clinical interview was used to improve the identification of asthmatic subjects and to obtain a more precise estimate of antiasthmatic drug consumption.

The aim of this study was to assess whether and, if so, to what extent, there is inadequate use of antiasthmatic preparations in the north of Italy.

Materials and methods

The design of the ECRHS has been described elsewhere [9, 10]. Briefly, in phase 1, a screening questionnaire on respiratory symptoms and use of asthma medication was mailed to a probability sample of 20–44 yr old people resident in three Italian cities. There was an 86% (6,031 subjects) response rate to this phase of the survey [12]. In phase 2, a 20% random sample of subjects who responded to the questionnaire were invited to attend the local chest clinic, in order to undergo a standardized clinical interview as well as lung function and allergy tests.

A total of 1,835 subjects out of 6,031 who had returned the screening questionnaire were invited to attend the clinics. Of these subjects, 914 participated in phase 2. The general demographic and socioeconomic characteristics of subjects participating or not participating in phase 2 were similar and representative of the three cities. Given

the relatively low percentage of subjects who agreed to take the time to attend a chest clinic (914 out of 1,835), a further group of all 190 subjects who had reported asthma attacks, use of antiasthmatic drugs, or awakening because of shortness of breath in the screening questionnaire were added, to increase the sample of asthmatics. Thus, a total of 1,104 subjects participated in this study and underwent clinical examination.

Standardized clinical interview

The standardized clinical interview used in this ECRHS substudy was a structured questionnaire [9] aimed at evaluating the presence of asthma and asthma-like symptoms, potential risk factors, drug and medical care use. Most of the questions on current symptoms and past medical history were taken from the questionnaire of the International Union Against Tuberculosis [13]. The mean duration of each interview was 25 min. Doctors were instructed to merely read the questions to the subjects without any comment.

Asthma identification

For the purpose of this study, we considered asthmatics to be all subjects who answered "yes" to the item of the standardized clinical interview "Have you ever had asthma? If yes, was this confirmed by a family doctor?". Of these subjects, those who reported at least one asthma attack in the last 12 months were defined as being current asthmatics and those who did not were defined as being past asthmatics (table 1).

Owing to the difficulty of categorizing the severity of asthma by epidemiological tools, we considered only two levels of severity: the more severe were those subjects who, in the preceding 12 months, reported >12 asthma attacks, or had been admitted to an emergency room or intensive care unit, or had spent at least one night in a hospital because of respiratory troubles.

Antiasthmatic drug consumption and the use of healthcare resources

To evaluate antiasthmatic drug use we asked the following questions: 1) In the last 12 months, have you used sprays or aerosols to help your breathing? 2) In the last 12 months, have you taken pills, tablets, or other drugs (other than aerosols or sprays) to help your breathing? 3) What sort of drugs have you used in the last 12 months (inhaled beta$_2$-agonists, inhaled anticholinergic agents, inhaled steroids, combinations of inhaled steroids and bronchodilators, other inhaled agents (not-steroids, not-combined), oral steroids, beta$_2$-agonists and theophylline)? All available inhalers were shown to the patients to ensure the correct identification of the name and contents of what they were using or had used.

Table 1. – Distribution of the sample by sex, centre and presence of disease

Centre	Current asthma n	Past asthma n	No asthma n
Pavia	18	20	338
Torino	20	24	311
Verona	12	22	339
Total	50 (26M, 24F)	66 (33M, 33F)	988 (487M, 501F)

M: males; F: females.

To evaluate whether drugs were used as "controllers", *i.e.* to prevent the occurrence of or limit the severity of symptoms, or were used "as needed", *i.e.* to counteract the onset or alleviate worsening of symptoms, we analysed the following two items: 1) Did you take drugs every day to help your breathing even when you did not have shortness of breath? and 2) Did you only take drugs when you had an attack of shortness of breath? Did you take them at the beginning of the attack or when the attack became more severe?

To evaluate the compliance to treatment we analysed the following items: 1) If drugs are prescribed to help you breathe, do you usually take them all or not? 2) If the respiratory troubles become more severe, do you usually take them all or not? and 3) Do you think that it is bad for you to take drugs continuously to help you breathe?

To evaluate the use of healthcare resources we analysed the following items: 1) Have you ever been admitted to an emergency room or an intensive care unit because of respiratory problems? and 2) Have you ever been hospitalized (at least for one night) because of respiratory problems?

Statistical analysis

The distributions of different treatments were compared between sexes, age classes (10 yr ranges), centres, asthma type (current or not) and severity. The statistical significance was tested by means of Pearson's Chi-squared test. A statistical comparison was also performed comparing the collapsed treatment categories *versus* the no-treatment category, and the odds ratio (OR) was computed.

To test for reciprocal relationships between variables, a multivariate analysis was also performed using a Log-Linear model assuming a multinomial response [14]. The type of treatment was considered as the dependent variable, current or not asthma and severity as predictive variables, age, sex and centre as confounding variables.

The OR corrected for confounders was also computed for treatment *versus* no treatment.

Results

Twenty six per cent of subjects currently suffering from asthma had never received antiasthmatic treatment of any kind. The percentage of untreated patients affected by more severe asthma was still high (21%). Antiasthmatic drugs had been taken by 18% of patients with past asthma. This percentage was higher in patients with more severe asthma (41%). Less than 50% of the subjects were being treated with inhaled beta$_2$-agonists alone, about one third with inhaled steroids plus beta$_2$-agonists, only one subject with inhaled steroids alone and one with theophylline and cromolyn. Surprisingly, neither bronchodilator nor anti-inflammatory drugs were used more frequently in the subgroup of more severe asthmatics (table 2, fig. 1). The

Table 2. – Distribution of asthmatics by severity of the disease and treatment

	Current asthma n (%)			Past asthma n (%)		
Treatment	More severe	Less severe	Total	More severe	Less severe	Total
No treatment	7 (21)	6 (37)	13 (26)	13 (59)	41 (93)	54 (82)
Treatment	27 (79)	10 (63)	37 (74)	9 (41)	3 (7)	12 (18)
Inhaled β_2-agonists	16	5	21	5	2	7
Inhaled steroids	1	0	1	0	0	0
Inhaled β_2-agonists + inhaled steroids	9	5	14	4	1	5
Other	1	0	1	0	0	0
Total	34	16	50	22	44	66

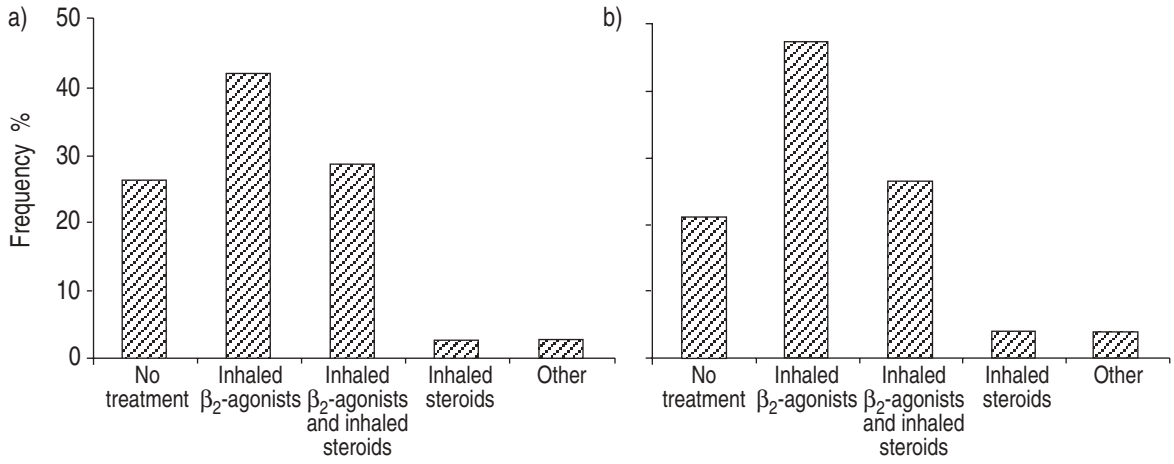

Fig. 1. – Distribution of treatments in a) the group of current asthmatics and b) the subgroup with more severe asthma.

Table 3. – Distribution of different treatments by sex, age, centre and type of asthma

	Treatment										Total		χ^2	
	None		Inhaled β_2-agonists		Inhaled β_2-agonists		Inhaled steroids		Other					
	n	%	n	%	n	%	n	%	n	%	n	%	Total	Y *vs* N
Sex														
Males	35	63.6	12	21.8	1	1.8	7	12.7	0	0.0	55	47.0	4.6	1.7
Females	32	51.6	16	25.8	0	0.0	12	19.4	2	3.2	62	53.0		
Age yrs														
<30	36	72.0	9	18.0	1	2.0	4	8.0	0	0.0	50	42.7		
30–40	20	51.3	14	35.9	0	0.0	5	12.8	0	0.0	39	33.3	23.8**	8.7**
>40	11	39.3	5	17.9	0	0.0	10	35.7	2	7.1	28	23.9		
Centre														
Pavia	17	44.7	7	18.4	1	2.6	12	31.6	1	2.6	38	32.5		
Torino	23	52.3	14	31.8	0	0.0	6	13.6	1	2.3	44	37.6	17.9**	8.5**
Verona	27	77.1	7	20.0	0	0.0	1	2.9	0	0.0	35	29.9		
Current asthma														
No	54	80.6	7	10.4	0	0.0	5	7.5	1	1.5	67	57.3	35.6**	34.8**
Yes	13	26.0	21	42.0	1	2.0	14	28.0	1	2.0	50	42.7		
Severe asthma														
No	47	77.0	7	11.5	0	0.0	6	9.8	1	1.6	61	52.1	21.3**	20.4**
Yes	20	35.7	21	37.5	1	1.8	13	23.2	1	1.8	56	47.9		
Total	67	57.3	28	23.9	1	0.9	19	16.2	2	1.7	117			

Percentages are calculated using the row total. **: p<0.01. Y: yes; N: no.

distribution of the use of different drugs or drug combinations by subjects with past asthma was very similar to that by subjects with current asthma (table 2).

The percentage of subjects on treatment was significantly higher in those with current than in past asthma (p<0.0001) and in those with more severe than less severe asthma (p<0.05). The significant effect of age and centre disappeared in the multivariate analysis for current asthma and severity. No first-order interaction effect was significant at the 5% level (tables 3 and 4).

Very few current asthmatic subjects on therapy admitted taking daily treatment; all but one of these subjects had more severe asthma. Among the subjects who were taking drugs only "as needed", 12% said they delayed taking therapy until the asthma attack was worsening (table 5).

Table 4. – Reciprocal relationship between the variables on study in a multivariate analysis

Variable		χ^2	p-value	OR (Yes/No)
Severity	Severe	4.31	0.038	2.9
Current asthma	Yes	21.58	<0.01	10.6
Sex		0.53	0.467	
Centre		4.30	0.116	
Age		2.27	0.322	

OR: odds ratio.

Table 5. – Distribution of current asthmatics by severity of the disease and modality of treatment

	Current asthma n (%)		
Treatment	More severe	Less severe	Total
Controller	6 (22)	1 (10)	7 (19)
Inhaled steroids	1	1	2
Inhaled β_2-agonists + inhaled steroids	5	0	5
"As needed"	21 (78)	9 (90)	30 (81)
Inhaled β_2-agonists + inhaled steroids	4	4	8
Inhaled β_2-agonists	16	5	21
Other	1	0	1
Total	27	10	37

As far as compliance to treatment is concerned, 65% of subjects who had received an antiasthmatic drug regimen prescription declared that they had taken all the drugs prescribed. The percentage rose to 74% when the patients' respiratory symptoms were worsening. Fifty six per cent of patients were convinced that continuous medication is not good for their health, although 70% realized that they need to take this medication.

Twenty two per cent of patients with current asthma and 7% of those with past asthma gave a positive answer to the question, "Have you ever been admitted to an emergency room or an intensive care unit because of respiratory problems?" Fourteen per cent of patients with current asthma and 10% of those with past asthma gave an affirmative response to the question, "Have you ever been hospitalized (at least for one night) because of respiratory problems?". Four subjects reported hospital admission in the preceding 12 months due to respiratory troubles. None of them had received antiasthmatic treatment before the admission to hospital.

Discussion

This study confirms the preliminary observations from recorded sales of drugs [15] and the first phase of the ECRHS [12] that antiasthma drugs are underused in Italy. In fact, we found a remarkable percentage of subjects with current asthma diagnosed by their family doctor who were not taking any antiasthmatic therapy. This was also the case for 21% of the subjects affected by more severe asthma, *i.e.* those who reported >12 attacks of asthma in the preceding 12 months and/or had been admitted to an emergency room, intensive care unit or respiratory unit. Moreover, the percentage of current asthmatic subjects, even with more severe disease, who were receiving anti-inflammatory treatment was relatively low.

One of the major characteristics of our study is that the identification of the asthmatic subjects was based on a diagnosis made by the family doctor, and not merely on self-reported symptoms. Another important point is that the study population was not biased by healthcare attendance. On the other hand, as our data came from a study designed for epidemiological purposes and the first international guidelines on diagnosis and treatment of asthma [16] were published subsequent to the start of our survey, some aspects of the study are inevitably approximate. In particular, the assessment of severity of disease was arbitrary and we could not classify subjects on the basis of the severity of their disease for the evaluation of long-term management, as recommended by international guidelines [16, 17]. For these reasons we were unable to separate subjects with intermittent asthma (the only subjects for whom intermittent relief medication is recommended), from all other subjects who need "controlling" medication.

Despite the above limitations of this study, we consider the percentage of subjects on anti-inflammatory treatment to be too low. Only 19% of subjects receiving treatment, the majority of whom had severe asthma, were taking medications daily.

An important finding of this study, which may account for the poor quality of asthma care, is the low compliance to treatment: more than one third of patients, many with more severe asthma, declared they had not taken all the drugs prescribed. Moreover, a group of the subjects on intermittent relief medication stated that they delayed drug consumption until their attack was worsening. This observation highlights the importance of educational programmes in asthma care. Our opinion that both appropriate medication prescription and patient education are inadequate in Italy is further supported by the fact that all subjects admitted to hospital because of an exacerbation of asthma in the 12 months prior to the questionnaire were undertreated despite a long history of respiratory asthma-like symptoms. However, it must be mentioned that in Italy, at the time of this study, patients had to pay half the cost of their drugs. This financial factor could influence compliance.

Inadequacies of medical therapy and education have been recently reported in an American study on asthmatic out-patients [8]. Less than one half of patients affected by moderate-to-severe asthma who were admitted to hospital for an exacerbation of asthma had been prescribed inhaled anti-inflammatory drugs. Moreover, a very small percentage of patients who had been taught how to use meter- eddose inhalers by a healthcare professional could do it correctly. In a nonselected population sample from two French cities, Bousquet *et al*. [7] found that about 15 and 39% of asthmatics who should have been receiving anti-inflammatory treatment were actually untreated.

It should be stressed that our data were collected in 1992 and 1993. The introduction of the first international guidelines on diagnosis and treatment of asthma [16], recently reiterated and reinforced [17], might have at least in part changed the present Italian scenario. The ongoing European Respiratory Community Health Survey will provide an answer on whether this is the case. In the meanwhile, further efforts should be made to promulgate the international guidelines and to improve educational programmes.

References

1. Buxton MJ. The economics of asthma - an introduction. *Eur Respir Rev* 1996; 6: 35: 105–107.
2. Barnes PJ, Jonsson B, Klim JB. The costs of asthma. *Eur Respir J* 1996; 9: 636–642.
3. Warner JO. Review of prescribed treatment for children with asthma in 1990. *BMJ* 1995; 311: 663–666.
4. Naish J, Sturdy P, Toon P. Appropriate prescribing in asthma and its related cost in east London. *BMJ* 1995; 310: 97–100.
5. Ryan D, Price D, McGovern V, Mead M. Analysis of 5 year UK prescribing trends in asthma. *Eur Respir J* 1996; 9, 23: 55S.
6. Terr AI, Block DA. Trends in asthma therapy in the United States: 1965–1992. *Ann Allergy Asthma Immunol* 1996; 76: 273–281.
7. Bousquet J, Knani J, Henry C, *et al*. Undertreatment in a nonselected population of adult patients with asthma. *J Allergy Clin Immunol* 1996; 98: 514–521.
8. Hartert TV, Windom HH, Stokes P, Freidhoff LR, Togias A. Inadequate outpatient medical therapy for patients with asthma admitted to two urban hospitals. *Am J Med* 1996; 100: 386–394.
9. Burney PGJ, Luczynska C, Chinn S, Jarvis D, for the European Community Respiratory Health Survey. The European Community Respiratory Health Survey. *Eur Respir J* 1994; 7: 954–960.
10. European Commission. 1994. The European Community Respiratory Health Survey. Medicine and Health, European Commission, Directorate- General XIII, Office for official publications, L-2920 Luxembourg.
11. European Community Respiratory Health Survey. Variations in the prevalence of respiratory symptoms, self reported asthma attacks, and use of asthma medication in the European Community Respiratory Health Survey (ECRHS). *Eur Respir J* 1996; 9: 687–695.
12. European Community Respiratory Health Survey - Italy. Prevalence of asthma and asthma symptoms in a general population sample from Northern Italy. *Allergy* 1995; 50: 755–759.
13. Burney PGJ, Laitinen LA, Perdrizet S, *et al*. Validity and repeatability of the IUATLD (1984) Bronchial Symptoms Questionnaire: an international comparison. *Eur Respir J* 1989; 2: 940–945.
14. Aitkin M, Anderson D, Francis B, Hinde J. Multinomial logistic model. *In*: Aitkin M, Anderson D, Franchis B, Hinde J, eds. Statistical Modelling Using Glim (Oxford Statistical Science Series, 4). Oxford, Clarendon Press, 1989; pp. 112–213.
15. Vermeire P. Differences in asthma management around the world. *Eur Respir Rev* 1994; 4: 21, 279–281.
16. International Consensus Report on Diagnosis and Management of Asthma. International Asthma Management Project. *Allergy* 1992; 47S, 13: 1–61.
17. NHLBI/WHO Workshop Report. Global strategy for asthma management and prevention. Publication n.95-3659; 1995.