

ASSESSMENT AND CONTROL

Asthma control and concordance of opinions between patients and pulmonologists

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Abstract

Patient–physician opinion concordance could play a key role in asthma control. There have been no studies evaluating this association in large samples of patients. **Objectives:** To determine opinion concordance between asthma patients and their pulmonologists on the impact of the disease and to correlate concordance to asthma control. **Methods:** This was a cross-sectional multicentre study including 1160 patients and 300 pulmonologists. Patient–physician concordance rates were assessed by two semi-structured qualitative questionnaires: (1) impact of the disease and (2) treatment satisfaction. Subsequently, participating pulmonologists determined the concordance between their perceptions and their patient's. Sociodemographic and clinical data were recorded for all patients. **Results:** In 53.6% of cases, asthma was controlled. The rate of patient–pulmonologist concordance on disease impact on patient daily life was 57%, with physicians underestimating the impact (compared to patients) in 26% of cases. Concordance on satisfaction with treatment was 56%, with physicians underestimating satisfaction in 26% of cases. Patient–physician discordance rates were significantly lower among patients with controlled asthma (29 and 32.1%) than those with poor control (73.7 and 73.1%). **Conclusions:** Patient–pulmonologist concordance on perceptions of disease impact is low, particularly in uncontrolled asthma. This poor concordance should be addressed in education programmes, particularly for patients with uncontrolled symptoms.

Keywords

Control/management, education, quality of life

History

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Introduction

Currently, there are excellent clinical practice guidelines [1–3] for the management of asthma. They all state that the primary objective of treatment in this disease is to achieve and maintain good control. On the other hand, though research has shown that good control can be achieved in most patients [4], the reality in clinical practice is that asthma is poorly controlled [5–8]. To a surprising extent, even patients tend to believe that their condition is worse than it is and underestimate the level of improvement that can be expected with treatment, believing that episodes of worsening and a lower quality of life are unavoidable consequences of their asthma [9].

Several reasons have been reported for the aforementioned poor management of asthma, including a lack of patient involvement in treatment, partially attributed to poor communication with their doctor [10–13]. One of the key aspects of the doctor–patient relationship, especially for chronic patients, is communication and the exchange of information.

It is believed that enabling patients to learn about key aspects of their condition, including the expected benefits of treatment and how to adapt it to their lifestyle, improves the effectiveness of this relationship, ensuring the necessary involvement of patients in their treatment and, consequently, better adherence. Understanding patients' perception of the real impact of the disease and their satisfaction with clinical outcomes (self-perceived improvement in symptoms, ability to perform usual tasks, quality of life and tolerance to the treatment, as well as whether they are comfortable with the treatment plan) should be key in health professionals' decision-making when assessing and treating asthma patients.

Consequently, asthma clinical practice guidelines [1–3] recommend maximising concordance between patients and clinical professionals involved in healthcare. The term “concordance” in this study encompasses the level of agreement between doctors and their patients, in terms of what they each expect from treatment, positive and negative aspects and their general expectations with regards to their condition. This means patients should understand the risks associated with the disease and the potential benefits of treatment, while doctors ought to understand the expectations and concerns of patients. The concept recognises that patients and doctors may have different

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perspectives and that there is, therefore, a need to work together to improve mutual understanding. Currently, however, a range of factors negatively affect patient–physician concordance, including increasing demands for healthcare, short durations of medical appointments and, sometimes, unrealistically high or low expectations among patients concerning the care they can receive from health professionals [14].

Despite its potential importance, there has been little research into patient–physician concordance in asthma. What is more, the few studies that have been conducted have involved very small sets of patients or have suffered from poor design and failed to provide conclusive data. In order to overcome this problem and to assess the degree of concordance between asthma patients and their pulmonologists, the Pulmonology Section of the Spanish Society of Pulmonology and Thoracic Surgery (SEPAR) performed this study.

Materials and methods

Study design

This was a cross-sectional multicentre study designed to determine the degree of concordance of opinions between asthma patients and their pulmonologists by means of qualitative semi-structured questionnaires. Data were collected during the second half of 2010.

Selection of pulmonologists

A total of 300 pulmonologists (members of the Asthma Section of the SEPAR) were included in the study. The doctors had volunteered to participate and were based in many different regions of Spain; see Appendix I for a list of their names and places of work.

Selection of patients

Each of the pulmonologists recruited up to five consecutive asthma patients. The inclusion criteria were: to be previously diagnosed as asthmatic, aged 15 years or older, undergoing regular check-ups for at least one year by the collaborating pulmonologist (at least one previous visit); agreeing to participate (freely and voluntarily) in the study and providing written informed consent. The diagnosis of asthma was based on patients reporting symptoms consistent with the condition and written proof in their medical history of a significant airway response to a bronchodilator or bronchoconstrictor challenge assessed using spirometry.

Questionnaires

All participants completed two questionnaires:

Questionnaire I: it was composed of 10 items about the impact of the disease on the patient's life. Participants rated each item on a Likert-like scale, ranging from 0 (no impact) to 10 (severe impact).

Questionnaire II: it was composed of 10 items about the satisfaction with treatment. Participants rated each item on a Likert-like scale, ranging from 0 (not at all satisfied) to 10 (severe impact).

Patients completed the questionnaires themselves while in the waiting room before a routine appointment with their

pulmonologist. Auxiliary nurses helped as necessary (e.g. for those with visual impairment, by reading the questions and recording patient responses, etc.). In order to ensure the validity of the process, the patients' completed questionnaires were collected in sealed envelopes before patients saw their specialists.

Doctors completed the same questionnaires using the information available in each patient's medical history and their knowledge of the case after seeing the patient, while they were still blind to the patient's responses to the questions.

Subsequently, the pulmonologists were given access to the responses of each of their patients and asked to compare them with their own. They were requested to rate the degree of concordance between their opinions by giving one overall rating and specific ones for each of the 10 items for each questionnaire.

For questionnaire I (disease impact), the doctors had to select from the following options: the impact of the disease was rated as more severe by the patient than by their doctor (underrated by the doctor); was rated as more severe by the doctor than by their patient (overrated by the doctor); or patients' and doctors' ratings were similar.

For questionnaire II (satisfaction with treatment), there were three options: the doctor was more satisfied with the treatment than the patient (overrated); the patient was more satisfied than the doctor (underrated); and the views of the patient and doctor were similar. The results of this study are based on these final assessments of the pulmonologists.

The questionnaires were drawn up based on the main dimensions covered in three other instruments related to asthma that have recently been translated into Spanish, adapted and validated (the London Chest Activity of Daily Living Scale, the Modified Baecke Physical Activity Questionnaire and the Sydney Asthma Quality of Life Questionnaire [15–17]). The final version of the questionnaires used was agreed upon after pre-testing the questions (to ensure that they were easy to understand and respond to) in 20 patients with asthma.

Demographic and clinical variables

The following data were collected from each patient: socio-demographic data (age and sex), level of education, marital status, smoking status as well as clinical data: number of years since onset, and control and severity of asthma (according to Global Initiative for Asthma guidelines, 1).

Ethical considerations

The study design complied with the principles of the Declaration of Helsinki (18th World Medical Assembly, 1964) and was approved by the Clinical Research Ethics Committee of the Clinic Hospital in Barcelona. Patients gave informed consent prior to their participation in the study. No data were recorded that could identify individual patients; their identities were only known to their doctors and not disclosed to any third parties. Furthermore, information identifying participating health professionals was also organised to preserve anonymity, while data concerning authors' institutions were treated according to Spanish law on Personal Data Protection (Organic Act 15/1999 of 13 December).

Statistical analysis

The maximum random error was $\pm 2.9\%$ for two-sided tests with $\alpha = 0.05$ assuming the worst case scenario of $p = q = 0.5$.

The categorical variables were expressed as relative frequencies (%) for each response and the corresponding 95% confidence intervals, while quantitative data were described using measures of central tendency and dispersion (mean, median and standard deviation), using the mean and 95% confidence intervals as estimators. Potential associations between the patient's personal or clinical characteristics (age, level of education, sex and time since onset) and patient-physician discordance were explored using appropriate bivariate statistical tests (Chi square, Mann-Whitney U and Kruskal-Wallis).

The variables that showed association were assessed in a multivariate logistic regression model, with a backward strategy, using as a variable the result of the binomial comparison of the patient-physician discordance, in order to check which of them remained as associated independent factors.

A level of significance of $\alpha = 0.05$ was selected for all the comparisons, and all the statistical analysis was performed using SPSS software (version 13.0, Chicago, IL).

Results

The final ratings of the specialists were considered valid and included in the analysis for 1160 patients (of whom 64% were women) with a mean age of 48.1 (17.4) years. Data on other demographic, sociocultural and asthma clinical variables are summarised in Table 2. Notably, asthma was well controlled in only 53.6% of cases, while most patients had persistent mild or moderate asthma.

The overall rate of concordance between patients and pulmonologists with respect to the impact of the disease on patient activities of daily living (questionnaire I) was 57%; in 26% of cases, doctors underrated the impact, while in the other 17% they overrated it. The concordance rate on the overall satisfaction with the results of treatment was 56%, with doctors underrating and overrating satisfaction 21% and 23% of cases, respectively. In Table 1, patient-pulmonologist concordance on impact of the disease and satisfaction with treatment is detailed for the 10 items in each questionnaire. Regarding disease impact, the lowest rates of concordance were observed for sporadic leisure-time activities (57.1%), normal daily activities (57.6%) and health-related quality of life (61.5%), while for satisfaction with treatment, the lowest rates were found in the perception of improvement in symptoms (62.8%), reduction in the frequency of attacks (64.1%) and whether recommendations on lifestyle changes were clear and achievable (64.3%).

Table 3 shows the results of the categorical demographic, sociocultural and asthma-related clinical variables, associated with discordance between pulmonologists and patients regarding disease impact (questionnaire I) and satisfaction with treatment (questionnaire II). The greatest levels of disagreement on the impact of asthma were associated with being female (46.8%), having lower levels of education (63.6% among those who were illiterate and 59.3% among those who could only read and write), being widowed (57.5%), having persistent moderate asthma (43%) and,

notably, in those with poor control of the disease (73.7%). Furthermore, cases of discordance corresponded to older patients (difference of 5.4 years between discordant and concordant groups; $p < 0.001$) with a longer history of asthma (1.9 years difference in time since onset between discordant and concordant groups; $p = 0.007$). On the other hand, we did not observe significant differences in concordance as a function of smoking status ($\chi^2 = 2.424$; $p = 0.298$). Regarding satisfaction with treatment, the highest levels of discordance between patients and pulmonologists were associated with being female (68.3%), being married or having a stable partner (67.1%), having completed primary education (34.1%) and having persistent moderate asthma (41.2%), as well as poor asthma control (73.1%). As for disease impact, the cases of discordance also corresponded to older patients (difference of 4.7 years between discordant and concordant groups; $p < 0.001$) with a longer history of asthma (1.5-year difference in time since onset between discordant and concordant groups; $p = 0.030$). Again, we found no statistically significant differences in concordance as a function of smoking status ($\chi^2 = 1.069$; $p = 0.586$).

Table 4 shows the results of multivariate analyses of the variables that are associated with increased risk of discordance of opinion between pulmonologists and their patients about the impact of the disease and the satisfaction with the results of the treatment. The greatest levels of disagreement on both areas were associated with the lowest educational level, a greater degree of asthma severity and worse disease control. Being female was only associated with an increased risk of discordance of opinions as they related to the impact of the disease.

Discussion

The main finding of this study, based on a large series of patients, is that there are low rates of concordance between patients and their pulmonologists in both perception of the impact of asthma on patient activities of daily living and in satisfaction with treatment, at 57% and 56%, respectively. Furthermore, among the various sociodemographic and clinical variables considered, poor control of asthma was most strongly associated with higher rates of discordance (73%).

Asthma, being a high-prevalence chronic illness, has been the subject of extensive research efforts. Nevertheless, despite the large amount of information available on the disease, it is striking how little attention has been paid to assessing concordance between patients' and their doctors' perceptions and expectations. To date, there have been no studies comparable to ours in terms of design and rationale. Cuevas-Urióstegui et al., in a study in Mexico involving 72 asthma patients managed in primary care, observed a degree of discordance in some areas (e.g. evaluation and information provided by doctors) that was lower when both patients and doctors were under 40 years of age [18]. McDonald et al. compared the perceptions of 52 older patients with asthma or chronic obstructive pulmonary disease (COPD) and their doctors regarding symptom severity and various objective parameters (including airflow obstruction and airway inflammation) and observed poor concordance in some areas [19]. Although the designs of these studies were very different than ours and therefore comparisons are difficult, their findings are consistent

Table 1. Rates of patient-pulmonologist opinion concordance, as well as overrating and underrating by pulmonologists compared to their patients' views for each of the items on the two questionnaires.

	Concordance between pulmonologists & patients (%)	Overrated by pulmonologists (%)	Underrated by pulmonologists (%)
Questionnaire I: IMPACT OF THE DISEASE ON PATIENT ACTIVITIES OF DAILY LIVING			
Having independence in self-care (personal hygiene/grooming, dressing/undressing, eating, etc.)	75.6	10.1	14.4
Doing housework (cleaning, including floors, making beds, etc.)	63.1	13.5	23.4
Performing other normal daily activities (regular commitments, going out, hobbies & exercise)	57.6	16.0	26.4
Performing sporadic leisure-time activities (travelling, theatre/cinema, sports, other hobbies, etc.)	57.1	18.7	24.3
Carrying out usual work tasks	67.1	14.4	18.5
Maintaining normal social relationships	73.3	11.2	15.6
Maintaining normal family relationships	77.9	8.3	13.8
Having an active sexual life (frequency of relations & satisfaction)	73.6	9.6	16.8
Economic burden of the disease on the family	72.6	11.5	15.9
Health-related quality of life	61.5	13.6	24.9
Questionnaire II: SATISFACTION WITH THE RESULTS OF TREATMENT			
Satisfaction with the medication in general	65.6	17.6	16.8
Acceptability of regimen (number of inhalations/day, dosing schedule, etc.)	68.9	16.6	14.5
Ease of use of inhalers (use and portability)	67.9	14.7	17.5
Recommendations on lifestyle changes are clear & achievable (smoking cessation, avoidance of allergens, physical exercise, etc.)	64.3	19.9	15.8
Improvement in symptoms: dyspnoea & coughing	62.8	21.8	15.4
Reduction in the frequency of attacks	64.1	21.6	14.4
Improvement in quality of life (functionality, physical and emotional well-being, personal autonomy, etc.)	65.2	19.8	15.0
Interaction with other medications	75.3	15.2	9.5
Adherence to/compliance with treatment	70.0	11.8	18.2
Costs associated with asthma care (transport, appointments, tests, treatments, etc.)	65.0	20.3	14.7

Table 2. Demographic, sociocultural and asthma clinical characteristics for all the patients included.

	Entire sample (n = 1160)
Age , years (mean, standard deviation)	48.1 (17.4)
Level of education (%)	
Illiterate	1.1
Able to read and write	11.1
Primary education	31.8
Secondary education including vocational training	27.6
Lower-level university degree	16.8
Higher-level university degree	11.5
Marital status (%)	
Single	21.4
Married/Living with stable partner	67.4
Separated-Divorced/Widowed	11.2
Smoking status (%)	
Smoker	11
Ex-smoker	27
Non smoker	62
Time since onset of asthma (years) (mean, standard deviation)	13.1 (10.8)
Control of asthma (%)	
Well controlled	53.6
Partially controlled	35.9
Poorly controlled	10.4
Severity of asthma (%)	
Intermittent	18.7
Mild persistent	33.4
Moderate persistent	35.9
Severe persistent	12.0

with those of this study, in which we found higher rates of patient–physician discordance among older individuals.

Among the most striking of our findings is that in the final assessment by pulmonologists themselves, comparing their own perceptions to those of patients, the overall concordance rates are 57% and 56% for the two questionnaires, respectively. These rates are considerably lower than the rates for the individual items assessed on each of the questionnaires, and this lower weighting in the final assessment is effectively a summary of the participants' views on a wide range of aspects of disease impact and treatment rather than just on specific issues in isolation.

We should also underline the underrating of the overall impact of the disease by doctors compared to patients (in 26% of cases) and also in the overall satisfaction with treatment (21%). In practice, this implies that in around a quarter of asthma patients, doctors are underrating the severity of the disease, at least from the patients' perspective. This is likely to contribute, on the one hand, to poor control of asthma and, on the other, to suboptimal treatment. Indeed, it is recognised that asthma control can be improved when patient perspectives are considered, and doctors and patients agree on different aspects of the disease [14].

Erroneous beliefs and expectations of patients regarding benefits (and adverse effects) of treatment are associated with poor adherence. A British study of 100 people with asthma assessing perceptions of preventative treatment with inhaled glucocorticoids found a significant association between erroneous beliefs and poor adherence, while levels of adherence were not strongly associated with patient sociodemographic characteristics or asthma severity [20]. Another study of 239

Table 3. Categorical variables significantly associated with discordance between the opinions of the pulmonologist and their patients regarding the impact of the disease (questionnaire II).

	Cases of discordance between pulmonologists and patients			
	Impact of the disease (Questionnaire I)		Satisfaction with treatment (Questionnaire II)	
	%	p Value	%	p Value
Sex		0.002		0.006
Man	37.1		31.7	
Woman	46.8		68.3	
Level of education		<0.001		<0.001
Illiterate	63.6		1.7	
Able to read and write	59.3		15.2	
Primary education	52.3		34.1	
Secondary education including vocational training	38.2		27.1	
Lower-level university degree	34.6		13.9	
Higher-level university degree	25.4		8.0	
Marital status		0.024		0.016
Single	37.3		19.4	
Married/Living with stable partner	43.8		67.1	
Separated/divorced	43.1		4.4	
Widowed	57.5		9.1	
Control of asthma		<0.001		<0.001
Well controlled	29.0		32.1	
Partially controlled	55.9		52.8	
Poorly controlled	73.7		73.1	
Severity of asthma		<0.001		<0.001
Intermittent	8.8		12.0	
Mild persistent asthma	30.2		30.7	
Moderate persistent asthma	43.0		41.2	
Severe persistent asthma	18.0		16.2	

Table 4. Multivariate analysis of variables significantly associated with discordance between the opinions of the pulmonologist and their patients regarding the impact of the disease (questionnaire I) and satisfaction with the results of treatment (questionnaire II).

	Discordance between pulmonologists and patients	
	Impact of the disease (Questionnaire I)	Satisfaction with treatment (Questionnaire II)
	OR (95%CI)	OR (95%CI)
Sex		
Man	Reference	Reference
Woman	1.3 (1.1–1.7)	1.2 (0.9–1.6)
Level of education		
Higher-level university degree	Reference	Reference
Lower-level university degree	1.5 (1.1–2.1)	1.7 (1.2–2.3)
Control of asthma		
Well controlled	Reference	Reference
Partially controlled	2.1 (1.6–2.9)	2.3 (1.7–3.1)
Poorly controlled	4.4 (2.6–7.6)	5.8 (3.5–9.6)
Severity of asthma		
Intermittent	Reference	Reference
Mild persistent asthma	2.1 (1.3–3.3)	1.6 (1.1–2.0)
Moderate persistent asthma	2.4 (1.5–3.9)	2.4 (1.6–3.6)
Severe persistent asthma	3.1 (1.6–5.7)	3.1 (1.8–5.2)

patients with difficult to control asthma found that, in 31 of the 87 patients (37%) who were initially poor adherers, treatment adherence and asthma morbidity significantly improved after an educational intervention focused on increasing concordance between patients and health professionals [21].

Analysing items of the questionnaires separately, we observed great variability in the concordance rates. The lowest rates were found for the impact of asthma on sporadic leisure-time activities (57.1%) (questionnaire I) and satisfaction with improvement in symptoms with treatment (62.8%) (questionnaire II), while the highest rates were seen

concerning the effect on family relationships (77.9%) (questionnaire I) and interactions with other medications (75.3%) (questionnaire II). This variability in the level of agreement points to differences in observers' abilities to make judgments depending on the activity or item assessed. On the other hand, for items such as the impact of asthma on normal social, family and sexual relationships or the economic burden of the disease, concordance rates were higher than for topics regularly covered by doctors in routine appointments for which we could have expected better agreement, including limitations on normal daily or sporadic leisure-time activities. The concordance rates on satisfaction with treatment were highest for issues that are not a common problem in asthma, such as interactions with other medications. In contrast, patient–physician concordance was lower concerning factors that have more weight in determining overall satisfaction with treatment such as alleviation of symptoms, perceived improvement in quality of life and costs associated with the disease.

The sociodemographic and clinical variables that were significantly associated with greater patient–pulmonologist discordance, considering both of the areas assessed (impact on daily living and satisfaction with treatment) were poor disease control and greater severity of asthma. Being female was associated with greater discordance only as it related to the impact of the disease. Although the design of the study does not allow direct causality to be established between these variables and discordance, there seems to be a clear relationship between poor asthma control and lower patient–physician concordance. Discordance rates were significantly lower for patients with good control (29 and 32.1%), compared to those with poor control (73.7 and 73.1%). Indeed, considering all the sociodemographic and clinical variables analysed, the highest patient–physician discordance

rates were observed for patients with poor control. It is perhaps surprising that the lowest levels of agreement are found between patients with poor control and their doctors, when the reverse might be expected. These results are, however, in line with the other studies mentioned previously, showing an association between poor asthma control and erroneous beliefs of patients [20] and an improvement in control after increasing patient–physician concordance [21]; they also indicate that low levels of concordance between patients and health professionals may contribute to failure to achieve good control, probably due to an associated poor adherence to treatment. On the other hand, evidence of significantly greater discordance for women and a trend in that direction for older individuals are characteristics that have also been associated with poorer asthma control [22,23]. This could indirectly strengthen the relationship between concordance and control, and indicate that factors associated with the former are also correlated with the latter.

The large sample size (1160 cases) means that the results for the main binomial variables in the questionnaires can be considered very accurate.

The study has some limitations. On the one hand, it has a selection bias: both the pulmonologists and the patients volunteered to participate in the study. On the other hand, we used non-validated questionnaires to assess the impact of the disease and satisfaction with the treatment, while we could have used a validated questionnaire to evaluate disease control. Finally, we did not adjust the control evaluation by other variables that could affect both disease control and opinion concordance, such as patients' education in asthma.

To conclude, this study shows that there is a low rate of concordance between asthma patients and their pulmonologists, in particular, among patients with poor asthma control. The lack of concordance may in fact be contributing to poor treatment adherence and, thereby, to poor asthma control. In addition, this study indicates issues that patients consider most important in the course of their disease. Health professionals should consider their patients' views to identify specific personalised and achievable treatment goals. Educational programmes for asthma should take into account patient expectations of improvement and include strategies focussed on increasing patient–physician concordance, in particular, for patients with poor asthma control. Furthermore, treatment algorithms for asthma should include measures for assessing and minimising discordance between patients and doctors.

Declaration of interest

The authors declare no conflicts of interest with regards to what is reported in this article.

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References

- GINA 2012. From the Global Strategy for Asthma Management and Prevention, Global Initiative for Asthma (GINA). 2012. Available at: <http://www.ginasthma.org/>
- BTS 2008. British Guideline on the Management of Asthma. British Thoracic Society/Scottish Intercollegiate Guidelines Network. Thorax 2008;6:1–121.
- GEMA 2009. Guía Española para el Manejo del Asma. Arch Bronconeumol 2009;45(Suppl7):1–35. Available at: <http://www.gemasma.com/>
- Bateman ED, Boushey HA, Bousquet J, Busse WW, Clark TJ, Pauwels RA, Pedersen SE, et al. Can guideline-defined asthma control be achieved? The Gaining Optimal Asthma Control study. Am J Respir Crit Care Med 2004;170:836–844.
- Peters SP, Jones CA, Haselkorn T, Mink DR, Valacer DJ, Weiss ST. Real-world Evaluation of Asthma Control and Treatment (REACT): findings from a national Web-based survey. J Allergy Clin Immunol 2007;119:1454–1461.
- Prieto L, Badiola C, Villa JR, Plaza V, Molina J, Cimas E. Asthma control: do patients' and physicians' opinions fit in with patients' asthma control status? J Asthma 2007;44:461–467.
- Demoly P, Paggiaro PL, Plaza V, Bolge SC, Kannan H, Sohler B, Adamek L. Prevalence of asthma control among adults in France, Germany, Italy, Spain and U.K. Eur Respir Rev 2009;18:105–112.
- Olaguibel J, Quirce S, Juliá de Páramo B, Fernandez C, Fortuna AM, Molina J, Plaza V, et al. Measurement of asthma control according to 2006 Global Initiative for Asthma Guidelines: MAGIC Study. Respir Med 2012;13:50.
- Haughney J, Barnes G, Partridge M, Cleland J. The living & breathing study: a study of patients' views of asthma and its treatment. Prim Care Respir J 2004;13:28–35.
- Moffat M, Cleland J, Van Der Molen T, Price D. Sub-optimal patient and physician communication in primary care consultations: its relation to severe and difficult asthma. Prim Care Respir J 2006; 15:159–165.
- Arora NK, Ayanian JZ, Guadagnoli E. Examining the relationship of patients' attitudes and beliefs with their self-reported level of participation in medical decision-making. Med Care 2005;43: 865–872.
- Irwin RS, Richardson ND. Patient-focused care: using the right tools. Chest 2006;130:73–82.
- Moffat M, Cleland J, van der Molen T, Price D. Poor communication may impair optimal asthma care: a qualitative study. Fam Pract 2007;24:65–70.
- Horne R, Price D, Cleland J, Costa R, Covey D, Gruffydd-Jones K, Haughney J, et al. Can asthma control be improved by understanding the patient's perspective? BMC Pulm Med 2007;22:7–8.
- Garrod R, Paul EA, Wedzicha JA. An evaluation of the reliability and sensitivity of the London Chest Activity of Daily Living scale (LCADL). Respir Med 2002;96:725–730.
- Baecke JA, Burema J, Frijters JE. A short questionnaire for the measurement of habitual physical activity in epidemiological studies. Am J Clin Nutr 1982;36:936–942.
- Perpiñá M. Sydney Asthma Quality of Life Questionnaire. In: Güell MR, Morante F, eds. Manual SEPAR de Procedimientos. Barcelona: Ed. Permanyer; Módulo 12; 2007:48–51.
- Cuevas-Urióstegui ML, Avila-Martínez I, Oliver-Márquez J, Sumano-Catalan M, Palomares-Hernandez G, Garduño-Espinosa J. Relación entre médico y paciente en la consulta externa de unidades de primer nivel de Atención Médica. Salud Pública Mex 1991;33: 576–584.
- McDonald VM, Higgins I, Simpson JL, Gibson PG. The importance of clinical management problems in older people with COPD and asthma: do patients and physicians agree? Prim Care Respir J 2011;20:389–395.
- Horne R, Weinman J. Self-regulation and self-management in asthma: exploring the role of illness perceptions and treatment beliefs in explaining non-adherence to preventer medication. Psychol Health 2002;17:17–32.
- Gamble J, Stevenson M, Heaney LG. A study of a multi-level intervention to improve non-adherence in difficult to control asthma. Respir Med 2011;105:1308–1315.
- Urrutia I, Aguirre U, Pascual S, Esteban C, Ballaz A, Arrizubieta I, Larrea I. Impact of anxiety and depression on disease control and quality of life in asthma patients. J Asthma 2012;49:201–208.
- Badiola C, Badiella L, Plaza V, Prieto L, Molina J, Villa JR, Cimas E. Women, patients with severe asthma, and patients attended by primary care physicians, are at higher risk of suffering from poorly controlled asthma. Prim Care Respir J 2009;18:294–299.

APPENDIX I

Participating pulmonologists according to the geographical location of work

Place	Pulmonologists
Badajoz	Ana María Castañar Jover, M Teresa Gómez Vizcaíno, Jacinto Hernández Borges, Juan Carlos Tapia Regidor
Baleares	María Liliana Chacón de Duin, Ana Luisa Kersul, Araceli Muñoz Vidal, Rosa Serra Creus
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Burgos	Félix Martín Santos, Teresa Peña Miguel, Luis Rodríguez Pascual
Cáceres	Francisco Javier Gómez de Terreros Caro, Juan Manuel Hernández Valle, María Jesús Martín Vicente
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Cantabria	Javier Barrio Soto, José Manuel Cifrián Martínez, Juan Luis García Rivero, Miguel Zabaleta Murguiondo
Castellón	Frederic Tatay Soler
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Granada	María Martínez Ceres, Ana Dolores Romero Ortiz, Pedro J Romero Palacios, Germán Sáez Roca
Guadalajara	José Gallardo Carrasco
Guipúzcoa	Ladislao Miguel Aldama Uribarri
Huelva	Eduardo Figueroa de la Guardia, Antonio Pereira Vega, Rosa María Vázquez Oliva
Huesca	Luis Borderías Clau, Joaquín Cegoñino de Sus
Jaén	Juan Manuel Bravo Santervas, José M Cruz Molina, Belén Navas Bueno, Antonia Soto Venegas
La Coruña	Rafael de los Reyes Cruz, M Elena Toubes Navarro
La Rioja	Mercedes Alcalde Manero, M Jesús Hermosa Los Arcos
Las Palmas	Francisca Susana Ascanio Monroy, Cesar García de Llanos, Jorge López García, Miguel A. Ponce González, Yaiza Rubio Socorro
León	Elena Castro Rodríguez, Silvia García García, Emilio Juárez Moreno, Francisco Javier Montero Luque, Francisco Muñoz González
Lleida	Manuel Cervera del Pino
Lugo	José M Paramio Gutiérrez, Luis Pérez de Llano
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Salamanca	José Luis Fernández Sánchez, José María González Ruiz, Miguel Ángel Hernández Mezquita, Ana Esther Jiménez Massa, Jacinto Ramos González, Ana María Sánchez Hernández
Sevilla	Graciliano Estrada Trigueros, Julio Gómez Seco
Tarragona	Juan Ramón Rozadilla Sacanel, Joan Sala Barbany, Sandra Sangenis Díez, Juan María Ventosa Rodón
Tenerife	Héctor Manuel González Expósito, Víctor Javier Correa Nazco, Jacob Enrique Rosquete González
Teruel	Juan María de Pablo Cárdenas
Toledo	José Celdrán Gil, Isabel García San José, Encarnación López Gabaldón, José Carlos Serrano Rebollo
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Vizcaya	Jesús Camino Buey, M ^a Inés Carrasco Anguiano, Susana Chic Palacín, Larraitz García Echeverría, Carmen Jaca Michelena, Juan Manuel Núñez Ortiz, Miren Begoñe Salinas Lasa, Raquel Sánchez Juez, Isabel Urrutia Landa, José Villanueva Rivero
Zamora	M Carmen Fernández García, Cristina Martín Carbajo
Zaragoza	Rocío de Andrés González, José Pablo Herrero Jarque, Laura Pérez Giménez, M Pilar Asunción Roche, Andrés Sánchez Barón, Antonio Senar Calderón