

Development and validation of a rhinoconjunctivitis and asthma symptom score for use as an outcome measure in clinical trials

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Background: The measurement of health outcomes has become a priority for assessing and containing health care costs.

Objective: To develop and fully validate a simple symptom scale assessing both asthma and rhinoconjunctivitis, two interdependent conditions.

Methods: A self-administered questionnaire of 31 items was tested in 102 patients with asthma and rhinoconjunctivitis between September 1992 and December 1994. The items were rated on a six-point Likert scale ranging from none to extremely severe and included commonly recorded symptoms of inflammation such as irritation, congestion, and discharge in the skin, eyes, nose, sinus, pharynx, and chest.

Results: Validation included (1) responsiveness: scores for 18 patients evaluated during an emergency room visit were statistically significantly different from those recorded after recovery and in a control group of 24 patients with asthma; (2) reliability: external consistency was 0.8 at 1 week, and internal consistency was 0.8 for individual organs and 0.7 for individual symptoms; (3) validity: a five-point scale better captured the distribution of values; irrelevant and redundant items were eliminated. The optimal questionnaire included 21 items.

Conclusions: The symptom score was applicable, responsive, reliable, and valid. Used with existing validated tools such as treatment needs and quality of life assessment, it may provide a comprehensive picture of allergic airway disease for quality assurance or research purposes. (*J Allergy Clin Immunol* 1997;100:16-22.)

Key words: Asthma, rhinoconjunctivitis, symptom score, health outcome, questionnaire, validation

Rhinoconjunctivitis and asthma are very common conditions, respectively affecting up to 22%¹ and 7% of the U.S. population.² In 1990, in the United States, hay fever resulted in an estimated cost of \$1.8 billion,³ and asthma care amounted to an estimated \$6.2 billion.⁴ Some patients suffer from only one condition, whereas others present with both. In this context, provision of optimal care would require assessment and treatment of both conditions.

Abbreviation used

r: Correlation coefficient

In asthma, useful information about a patient's condition can be provided by different means:

- (1) Clinical assessment through symptoms scores (for a review, see reference 5) or medication scores⁶
- (2) Functional assessment with peak-flow rates,^{7,8} pulmonary function tests,⁹ or bronchial provocation tests¹⁰
- (3) Burden of the disease to the individual patient through quality of life questionnaires,¹¹⁻¹⁷ disability/impairment rating,¹⁸ or economic burden of the disease to society through assessment of treatment costs.⁴

These three different approaches address different perspectives, and their results do not necessarily correlate. Recent meetings have emphasized the need for standardized instruments¹⁹ to allow comparisons between studies and patient populations. Different validated and standardized instruments already exist, which have been specifically developed to assess quality of life.¹¹⁻¹⁴ Generic questionnaires have also been used with success.¹⁵⁻¹⁷ The weak point is the assessment of asthma symptoms, because with one exception,²⁰ no standardized and validated symptom score exists.

There are no validated symptom scores for rhinoconjunctivitis either, although the impact of this disease on the quality of life has been evaluated with both a generic²¹ and a disease-specific questionnaire.²²⁻²⁴ The association of rhinoconjunctivitis and sinusitis was recently reviewed by Karlsson.²⁵ Similarly, recent studies have suggested that symptoms of rhinoconjunctivitis seem to influence the occurrence and severity of associated asthma. Effective treatment of the upper respiratory airway improved asthma scores^{26,27} and methacholine reactivity in patients with allergic rhinoconjunctivitis and asthma.²⁷ Furthermore, intranasal corticosteroid administration was shown to prevent the seasonal increase in bronchial responsiveness in the same kind of patients.²⁸

Therefore, assessment of rhinoconjunctivitis and sinus symptoms may be necessary to provide optimal treatment to asthmatic patients who present with both upper

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and lower airway diseases. This is especially important because their quality of life seems to be more impaired by the severity of their rhinoconjunctivitis than by their asthma symptoms.^{17, 21}

This study evaluates the validity as a health outcome measure of a simple symptom score that addresses both rhinoconjunctivitis and asthma. It can be self-administered in about 5 minutes and could be included in clinical practice and in rhinoconjunctivitis and asthma research along with other outcome measures such as drug requirements and quality of life assessment to provide a comprehensive picture of the impact of these two syndromes.

METHODS

Population studied

Between September 1992 and December 1994, 335 questionnaires were recorded from 102 individual patients (26 men and 76 women) with asthma and rhinoconjunctivitis. Thirty-two patients were evaluated once, 30 patients, twice, and the remaining patients, up to nine times (the maximum was 25 times for one patient). All were evaluated as outpatients, and most were evaluated at the time of a visit for allergy shots. The mean age at the time of the first evaluation was 40.6 years (SD = 13.5, range = 18 to 76). The age range and the predominance of women are in accordance with data from the literature.²⁹

Symptom score

Description. The symptom score was determined by target organ and addressed the usual manifestations of airway inflammation: irritation, congestion, and discharge. It included the symptoms usually reported in the literature and the most frequent complaints of patients. The severity of symptoms was assessed with reference to the previous week ($n = 78$) or previous 2 weeks ($n = 24$), and was scored on a Likert scale from 0 to 5 (0 = none, 1 = trivial, 2 = mild, 3 = moderate, 4 = severe, and 5 = very severe). Specific questions addressed the following target organs: skin (one item), eyes (three items), nose (six items), sinuses (six items), and asthma. Asthma complaints were divided into three periods: awakening (four items), daytime (six items), and nighttime (five items). These questions addressed symptoms at the time of completing the questionnaire, except for the question about the previous night, which combined the number of times the patient was awakened by asthma symptoms per night and the number of nights it occurred in the reference period. The total number of nocturnal awakenings for asthma per week were translated into the same six-point scale as follows: no awakening = none, 1 awakening = trivial, 2 to 3 awakenings = mild, 4 to 6 awakenings = moderate, 7 to 10 = severe, and 11 or more awakenings = very severe. For the subgroup evaluated at the 2-week interval, these numbers were doubled. This scoring scale seems particularly permissive compared with asthma treatment guidelines³⁰ but was established on the basis of its discriminant characteristics as determined by pilot studies. Finally, individual organ scores were grouped into two major scores: one for rhinoconjunctivitis, describing symptoms occurring "above the larynx" and grouping skin, eye, nose, and sinus scores; and one for asthma, describing symptoms occurring in the lower airway and group-

ing the asthma symptoms recorded at different times of the day. These two scores were then summed into a total score.

Administration. The symptom score was self-recorded, which may slightly increase the severity of reported symptoms as compared with interviewer administration.³¹ On subsequent scoring, patients were not shown their previous responses, and this increased the variance of the responses.³² The time to complete the questionnaire was on average 5 minutes.

Analysis

To maximize the number of independent observations, random selection was applied when multiple evaluations were available for a given patient. The validation process was performed in accordance with published guidelines³³ and included the following six points:

- (1) Responsiveness: ability to detect a change when one should be present.
- (2) Reliability: ability to provide the same results when used repeatedly in the absence of a change in the condition measured and consistency of results obtained with the different items of different groups of questions. The correlations between the different measures were computed with Spearman's correlation coefficient. Internal reliability was established with Cronbach alpha correlation coefficient³⁴ and split-half correlation coefficients. For both approaches, good correlation was assumed to exist if the coefficients were 0.7 or higher.
- (3) Statistical validity: assessment of the appropriateness of the data with respect to the statistical assumptions and of the appropriateness of statistical tests for drawing desired substantive conclusions.
- (4) Content validity: assessment of the extent to which survey items cover the content area the survey purports to measure.
- (5) Construct validity: assessment of the relationship of an item to the other variables in the instrument or to measures of specific real-world criteria. Multitrait-multimethod correlation matrix was used for this purpose.³⁵ It is a simple method of pairwise comparison of correlations examined by groups. Briefly, the construct of interest (the trait; in this study, the symptom) is assessed in two or more ways (the methods; in this study, the organs). Measurements are obtained on each trait by each method, and correlation coefficients between each pair of measures are computed. This method allowed the identification of redundant items (correlation coefficient higher than 0.7) and irrelevant items (correlation coefficient less than 0.4).
- (6) Prediction of performance after modifications: the Spearman Brown prophecy formula³⁶ allows the prediction of the future performance of a questionnaire when the number of items is modified.

RESULTS

Responsiveness

Responsiveness was assessed in a group of 18 consecutive patients who presented with an acute attack of asthma at our hospital. They received the usual treatment of β -2 adrenergic agonists and steroids for their acute condition. After improvement, they were asked to complete the questionnaire, assessing the importance of their symptoms on the day prior to coming to the emergency room. The same questionnaire was completed at the time of a follow-up visit, 8 to 17 days later

TABLE I. Responsiveness analysis: comparison of scores by organ between emergency room patients and controls at first and second evaluation

Organ	Items	First observation			Second observation			Difference between 1st and 2nd observation	
		Emergency room patients (n = 18)	Controls (n = 24)	Mann-Whitney test (p value)	Emergency room patients (n = 18)	Controls (n = 24)	Mann-Whitney test (p value)	Emergency room patients Wilcoxon test (p value)	Controls Wilcoxon test (p value)
		(Mean $\pm$ SEM)	(Mean $\pm$ SEM)		(Mean $\pm$ SEM)	(Mean $\pm$ SEM)			
Skin	1	0.7 $\pm$ 0.4	0.8 $\pm$ 0.3	0.4556	0.8 $\pm$ 0.2	1.0 $\pm$ 0.3	0.6382	0.8336	0.3739
Eye	3	2.3 $\pm$ 0.8	2.5 $\pm$ 0.5	0.3630	1.5 $\pm$ 0.5	2.2 $\pm$ 0.6	0.5485	0.2348	0.1475
Nose	6	15.1 $\pm$ 1.2	9.6 $\pm$ 1.5	0.0140	6.7 $\pm$ 1.4	7.6 $\pm$ 1.2	0.6095	0.0004	0.2697
Sinus	6	11.6 $\pm$ 1.4	7.8 $\pm$ 1.3	0.0197	4.3 $\pm$ 0.7	7.0 $\pm$ 0.9	0.0476	0.0003	0.7282
Total for rhinoconjunctivitis	16	29.7 $\pm$ 2.6	20.8 $\pm$ 2.8	0.0278	13.3 $\pm$ 2.4	17.9 $\pm$ 2.4	0.2171	0.0002	0.3304
Awakening asthma	4	10.3 $\pm$ 1.2	3.3 $\pm$ 0.8	0.0000	5.3 $\pm$ 0.9	2.5 $\pm$ 0.6	0.0162	0.0011	0.5349
Daytime asthma	6	13.0 $\pm$ 1.4	6.1 $\pm$ 1.4	0.0003	7.9 $\pm$ 1.3	3.4 $\pm$ 0.8	0.0047	0.0016	0.0364
Night asthma	5	10.9 $\pm$ 1.5	4.0 $\pm$ 1.2	0.0013	5.2 $\pm$ 1.4	2.4 $\pm$ 0.7	0.1335	0.0039	0.0747
Total for asthma	15	34.2 $\pm$ 3.6	13.5 $\pm$ 3.2	0.0001	18.3 $\pm$ 3.3	8.3 $\pm$ 1.5	0.0135	0.0010	0.1070
Combined total score	31	63.8 $\pm$ 4.9	34.3 $\pm$ 5.2	0.0001	31.7 $\pm$ 5.0	26.2 $\pm$ 3.2	0.3468	0.0002	0.1529

(mean, 13.5 days, with 2 outliers at 3 and 30 days respectively).

The control group consisted of 24 asthmatic patients who were regularly followed for allergy shots at the same hospital and who had completed the questionnaires at a 2-week interval.

There were no statistically significant differences between the two groups in age (mean age, 40.7 years, range 18.1 to 72.0 years for the asthma patients; and 39.8 years, range 22.7 to 75.7 years for the control subjects) or gender (5 men and 13 women in the asthma group and 5 men and 19 women in the control group). Symptom scores for both groups are displayed in Table I. There was a statistically significant difference between the emergency cases and the control group for total scores and for organ scores except for the skin and eye scores at the time of the first evaluation. This difference disappeared at the time of the second evaluation for all scores except asthma. This was mainly due to the persistence of asthma symptoms at awakening ($p = 0.016$) and during daytime ($p = 0.005$).

There was no difference between the evaluations at week 0 and week 2 in the control group. However, a statistically significant difference was recorded between the two evaluations in the group of patients assessed in the emergency department. This suggested that the questionnaire was responsive to expected changes in severity of symptoms.

Reliability

Test-retest assessment was obtained in a subgroup of 16 patients with asthma who had completed the questionnaires 1 week apart and in another subgroup of 24 patients with asthma who were evaluated 2 weeks apart. Results are displayed in Table II. Altogether, at 1 week, the correlations for the sum of symptom scores by organ

were higher than 0.8 and for the total scores, were higher than 0.9. Thus, the construct was responsible for most of the observed variance (expressed as the square of the correlation coefficient). These findings suggested that the questionnaire was reliable. As expected with episodic diseases, the correlation coefficients were lower when measured at a 2-week interval (Table II).

Internal consistency as measured by Cronbach alpha coefficients on the entire group of 102 patients confirmed these results: for individual organs, all values were higher than 0.8, and for both the rhinoconjunctivitis and the asthma group, higher than 0.9 (Table III). This was also valid, although to a smaller extent, when items were grouped by the kind of symptoms: for rhinoconjunctivitis symptoms, the coefficients reached a value of 0.7 and for asthma symptoms, 0.8 (Table III).

Split-half correlation coefficients were equal or higher than 0.7 when measured by organ, equal or higher than 0.8 for the total scores, and equal or higher than 0.6 when measured by symptoms (Table III). The slightly lower result of the second method of grouping can be attributed to the small number of items in each category. Indeed, the smallest correlation coefficients were observed in categories with only three items (e.g., discharge, cough).

All these results indicated that the questionnaire was reliable in our population of patients with asthma.

Statistical validity

Both the variability and the normality of the response distribution were assessed by examining the distribution of scores and the floor and ceiling effects (percentage of responses in the lowest or highest category, respectively). Interestingly, the results were not identical in the different subgroups of patients. The floor effect was smaller for scores by organs and total scores, because

TABLE II. Reliability analysis: test-retest evaluation at 1 and 2 week intervals

	No. of items	1-week interval (n = 6)		2-week interval (n = 24)	
		Correlation coefficient	Variance at evaluation (1)	Correlation coefficient	Variance at evaluation 1
Analysis by organ					
Skin	1	0.69	2.43	0.70	1.54
Eye	3	0.91	1.66	0.59	0.71
Nose	6	0.85	1.67	0.41	1.50
Sinus	6	0.83	1.33	0.58	1.07
Total for rhinoconjunctivitis	16	0.91	1.24	0.50	0.72
Awakening asthma	4	0.84	1.20	0.35	1.05
Daytime asthma	6	0.92	1.17	0.24	1.24
Night asthma	5	0.90	1.84	0.65	1.41
Total for asthma	15	0.96	1.07	0.41	1.10
Combined total	31	0.94	1.02	0.35	0.68
Analysis by symptom					
Itching	5	0.96	1.62	0.61	0.56
Swelling	6	0.73	1.67	0.47	1.22
Discharge	3	0.91	1.58	0.35	0.95
Coughing	3	0.89	1.36	0.32	1.18
Wheezing	3	0.89	0.91	0.49	1.16
Sputum production	4	0.86	2.08	0.65	2.18
Shortness of breath	6	0.97	1.72	0.75	1.41

they are composed of several items. This markedly reduced the probability of observing no symptoms for all of the constituting items.

On the other hand, and as expected with a population composed mostly of patients with mild to moderate asthma, the distribution of the values to the higher severity categories was limited. Therefore, no ceiling effect was stated. Moreover, the sum of the percentages of responses in the "severe" and "extremely severe" categories was lower than in the "moderate" category. Collapsing the former two categories into a single "severe" category was possible without altering the shape of the response distributions.

Similarly, the variance observed for all individual items was greater than or equal to one point on the scale. It was highest in the subgroup of patients observed in the emergency room (maximum, 4.7 points). This finding confirmed that the distribution of answers along the scale was not fixed and, therefore, that the scale was performing well.

The distribution of responses to the computed index of nocturnal awakenings tended to be slightly less skewed to the left compared to the distributions of responses to the other questions about asthma. Besides its greater variance, this pattern of response was not different from the pattern observed for the most sensitive indicators in asthma, such as shortness of breath and wheezing (Table I). This finding suggested that the formula for the conversion of the number of awakenings to the six-point scale was generous but adequate.

Finally, no differences were recorded between the scores obtained when the questionnaires were com-

pleted with reference to the previous week (*n* = 78) or the previous 2 weeks (*n* = 24). Similar results were recorded when all observations available for the 102 subjects were considered or when only the first one was taken into account (data not shown).

These results indicated that the questionnaire was valid and robust and that the two versions generated comparable data.

Content validity

Content validity (also called face validity) was established by recording the comments and observations of the patients on the specific questions as well as their response patterns. Five items seemed to present difficulty for some patients and attracted comments on the questionnaire sheets. Three of these items were discarded from the questionnaire for other reasons. Problems remained with questions about "wheezing" and "sputum" and required the wording to be modified so that patients were appropriately cued to these symptoms.

Construct validity

Multitrait-multimethod correlation analysis was applied to the whole patient population and the full 31-item instrument. "Skin itching" did not correlate with itching in other organs (highest correlation coefficient with eye itching was 0.41). Moreover, it presented no correlation with other symptoms in other organs. Its inclusion in the questionnaire was therefore of dubious validity, and this item was eliminated from the optimal questionnaire.

TABLE III. Reliability analysis: internal reliability coefficient (Cronbach alpha) and split-half correlation coefficients

	No. of items	Correlation coefficients	
		Cronbach alpha (<i>n</i> = 102)	Split half (<i>n</i> = 102)
Analysis by organ			
Eye	3	0.83	0.74
Nose	6	0.88	0.87
Sinus	6	0.84	0.80
Total for rhino- conjunctivitis	16	0.91	0.88
Awakening asthma	4	0.84	0.68
Daytime asthma	6	0.81	0.68
Night asthma	5	0.87	0.76
Total for asthma	15	0.93	0.78
Combined total	31	0.94	0.87
Analysis by symptom			
Itching	5	0.75	0.70
Swelling	6	0.82	0.71
Discharge	3	0.66	0.63
Coughing	3	0.83	0.68
Wheezing	3	0.89	0.76
Sputum production	4	0.82	0.73
Shortness of breath	6	0.88	0.86

The three eye symptoms ("itching," "swelling," and "discharge") presented correlation coefficients between 0.55 and 0.70. Correlations with similar symptoms in other organs were extremely weak, with the exception of nasal itching ($r = 0.46$). There was no correlation with other symptoms in other organs in the upper and lower respiratory tracts, suggesting independence of ocular and respiratory responses.

The nasal symptoms presented very high correlations between "congestion," "blockage," and "breathing difficulty" ($r = 0.67$ to 0.79) that suggested the assessment of a similar phenomenon. As a consequence, the three items could be collapsed into a single item.

Asthma symptoms displayed very high correlation coefficients when assessed at different times of the day (at awakening, during the day, and during the night). This was true for "wheezing" ($r = 0.70$ to 0.77), "breathing difficulty" ($r = 0.71$ to 0.72), and to a lesser extent for "coughing" ($r = 0.54$ to 0.68) and "sputum production" ($r = 0.58$ to 0.67). With no need to evaluate these symptoms at different times of the day, the three periods could be collapsed into a single question. However, as specific information about nocturnal symptoms is important with respect to treatment strategies, we kept it separate and collapsed only daytime and awakening symptoms.

Both "nasal congestion" and "nasal discharge" were weakly correlated with asthma symptoms, in particular "coughing" and "sputum production," especially during the day ($r = 0.40$ to 0.54). Sinus symptoms displayed

weak correlations with the asthma symptoms of "coughing" and "sputum production" ($r = 0.42$ to 0.54).

This selection and collapsing process allowed the questionnaire to be decreased from 31 items to 21 items. The optimal questionnaire is displayed in Table IV.

Prediction of performance for the optimal format of the questionnaire

When computed with the Spearman Brown prophecy formula, all predicted values, by organ or symptom, for the optimal questionnaire, were above the cutoff limit of 0.7, and thus the questionnaire was considered unaltered by the modifications linked to the validation process.

DISCUSSION

The impetus for the development of this symptom score questionnaire came from the realization that clinical trials in rhinoconjunctivitis and asthma used different exclusive symptom scales for assessing the impact of interventions. As a consequence, no comparison between these studies can reliably be carried out, thereby limiting the scope of research on these related diseases. This validation study allowed the development of an optimal symptom score questionnaire for rhinoconjunctivitis and asthma, which consists of two modules to be used together or independently. Because involvement of upper and lower respiratory tracts does not carry the same importance for the outcome of the patients, results of both subscales should be reported in addition to the global score.

Assessment of responsiveness, statistical validity, external and internal reliabilities, content validity, and construct validity in accordance with published guidelines³³ allowed the determination of an optimal five-point scale and the elimination of irrelevant and redundant items. Spearman Brown prophecy formula³⁶ predicted that these modifications did not alter the performance of the questionnaire.

This validation study has several limitations. The first one is the relatively small number of patients. However, the results observed were consistent when the whole population and the different subgroups were both examined, suggesting confidence in the validity of the conclusions reached. The second limitation is linked to the inclusion criteria. Most of the subjects were seen as outpatients and had mild asthma. As a result, their symptoms fluctuated within a narrow range of mild to moderate severity.

The current symptom scores allowed the evaluation of the severity of symptoms in different organs but indicated nothing about the emotional impact on patients. Such an assessment would be possible by adding a "bother" scale for each organ. The precise emotional weighting of individual symptoms might turn out to be an important issue in treatment decision. Bousquet et al. demonstrated that quality of life was more affected by rhinoconjunctivitis than by asthma symptoms.^{17, 21} Similarly, the recent instrument developed by Steen et al.²⁰ includes a "bother scale" to interpret the frequency

TABLE IV. Optimal symptom score questionnaire

Please think how much you have been disturbed by the following symptoms <i>during the last week</i> . Please mark an X on the scale at the location you think corresponds to the importance of your symptoms.					
	None	Trivial	Mild	Moderate	Severe
Eyes					
Itching	—	—	—	—	—
Swelling	—	—	—	—	—
Discharge	—	—	—	—	—
Nose					
Itching	—	—	—	—	—
Sensation of fullness, congestion, or blockage	—	—	—	—	—
Sneezing	—	—	—	—	—
Discharge or runny nose	—	—	—	—	—
Sinuses					
Headache or pain in face	—	—	—	—	—
Blowing out thick mucus	—	—	—	—	—
Postnasal drip in back of throat	—	—	—	—	—
Throat clearing or hoarseness of voice	—	—	—	—	—
Breathing					
At awakening or during the day, do you have:					
cough	—	—	—	—	—
wheeze (whistling in your chest)	—	—	—	—	—
sputum production (coughing up material)	—	—	—	—	—
shortness of breath or chest tightness	—	—	—	—	—
shortness of breath while walking	—	—	—	—	—
At night, do you wake up with:					
cough	—	—	—	—	—
wheeze (whistling in your chest)	—	—	—	—	—
sputum production (coughing up material)	—	—	—	—	—
shortness of breath or chest tightness	—	—	—	—	—
How many times per night in the last week did you wake up with these symptoms? ____					
How many nights in the last week did you wake up with these symptoms? ____					
Did you suffer from a cold in the last week? Yes ____ No ____					

categories. The usefulness of such an assessment will be evaluated in future studies.

An instrument such as the one described has important policy implications. As the first validated outcome measure for rhinoconjunctivitis, sinusitis, and asthma, it could first be used to compare the epidemiology of these diseases across populations. If translated and validated in different languages, the comparisons may be extended globally and may help delineate the different geographic, climatic, and cultural variables that modify the presentation and course of these diseases in different populations. Similarly, it would allow a more precise comparison of the impact of different types of interventions across different populations with respect to the factors just mentioned.

Second, it could benefit individual patients if used as a symptom profile to follow the severity of their diseases over time. It could delineate the threshold in severity that incited an individual patient to seek medical treatment and could guide therapy, potentially avoiding both over- and undertreatment. This approach should be cost effective because it would avoid both side effects from excessive therapy and use of other medical resources because the disease was not under control.

Third, such an instrument would definitively direct the

attention of both patients and physicians to upper respiratory tract involvement in asthma and thus promote better care by including treatment for these symptoms as well. This would help in stabilizing asthma. The savings linked with this approach are likely to offset the costs of nasal treatment.

Finally, this questionnaire may help set priorities for reimbursement for pharmaceutical therapies and for insurance coverage if the implications developed above are proven to be correct. It would also stimulate research and development of similar symptom scores for other chronic conditions, so that ultimately a battery of disease-specific validated tools would be available. The assessment of the simultaneous impact of these different diseases on generic instruments would allow comparison of the burdens imposed by these acute or chronic conditions on either patients or society. These comparisons would, in turn, allow a better allocation of resources for research, treatment, and insurance coverage.

In conclusion, this validation process allowed the determination of an optimal symptom score with rhinoconjunctivitis and asthma modules that could be used either separately or together. Combined with economic assessments, quality of life questionnaires, and functional evaluation of patients, it would provide a compre-

hensive picture of the overall severity of disease or the impact of an intervention. It would also help answer fundamental questions across different populations about epidemiology, treatment effectiveness, insurance coverage, and research funding for these common respiratory diseases.

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