

Clinical Communications

What are key symptoms to be captured for preventing a physician's underestimation of asthma control?

Ayumi Chikumoto, MD^a, Kazuto Matsunaga, MD, PhD^a,
Keiji Oishi, MD, PhD^b, Kazuki Hamada, MD^a,
Yoshikazu Yamaji, MD^a, and Tsunahiko Hirano, MD, PhD^a

Clinical Implications

- It is possible to reduce a physician's underestimation of asthma control by capturing during the patient review the presence of dyspnea or wheeze at least "a little of the time".

Assessments of asthma control occasionally differ between patients and physicians, and the discordance has a negative impact on current symptom control and future risk. We examined factors associated with physician-patient discordance in the perception of asthma control in 1697 adult asthmatic patients in the Subjective Evaluation of Asthma Control (SEACON) multicenter, cross-sectional, observational study.¹ In the SEACON study, before the routine asthma review, patients completed the 5-item Asthma Control Questionnaire (ACQ-5). An ACQ score of 0.75 or more was defined as "not well-controlled asthma." Physicians recorded their perception of the patients' asthma control (well-controlled or not well-controlled) without viewing the ACQ results. The discordance was defined as the discoincidence between the physicians' perception and patients' assessment (based on the ACQ score). The rate of patient-physician discordance was 35.4%. We suggested that the periodic use of validated objective parameters such as ACQ and lung function testing could have a pivotal role in attenuating the physician-patient discordance in the perception of asthma control.¹ However, it is well known that sufficient adherence by physicians to the use of composite measures that assess the asthma condition is lacking. Therefore, we herein investigated which symptoms and their intensity on the ACQ-5 would be useful to capture a physician's underestimation of asthma control as efficiently as possible without sacrificing reliability.

Among 1697 adult asthmatic patients, the subjects were 1350 patients who were judged to have well-controlled asthma by the physician. Furthermore, 1350 patients were dichotomized into 2 groups based on the presence or absence of the patient-physician discordance. We compared the average score for each symptom in the ACQ-5 to identify the frequent symptoms. Next, we determined the optimal cutoff value of symptoms for detecting not well-controlled asthma by using the area under the curve (AUC). Finally, using the cutoff values of frequent symptoms, we compared the proportion of patients between concordant and discordant groups to determine the association with the physician-patient discordance in the perception of asthma control. Comparisons between 2 different groups were performed by Mann-Whitney *U* tests. All analyses were performed with JMP pro version 13.0.0 (SAS Institute Inc., Cary, NC). Data were

expressed as mean values $\pm$ standard deviation. A *P* value of $<.05$ was considered significant.

In 1350 patients, there were 818 patients in the concordant group and 532 patients in the discordant group. In all patients, the average scores by ACQ-5 items were as follows: nocturnal awaking (0.59 ± 0.03), morning symptoms (0.61 ± 0.03), activity limitation (0.59 ± 0.02), shortness of breath (0.86 ± 0.02), and wheeze (0.79 ± 0.03) (Figure 1, A). Dyspnea and wheeze were identified as significantly more frequent symptoms compared with other items ($P < .0001$). As shown in the table, the AUC for detecting discordance per intensities of these 2 symptoms was as follows: 1 (0.792), 2 (0.818), 3 (0.623), and 4 (0.530). The most appropriate cutoff value was 2-point intensity symptom. In other words, the presence of occasional shortness of breath and/or wheeze was identified as a clinically important feature to identify patients whose asthma was not well controlled and whose control was underestimated by their physicians.

The actual distribution of patients who had symptoms of 2 or more points was as follows: shortness of breath (24%) and wheeze (21%) in the whole. In the concordant group, the proportion of patients with shortness of breath was 2.6%, and the proportion of those with wheeze was 2.8%. On the other hand, in the discordant group, the proportion of patients with shortness of breath was 55.8%, and the proportion of those with wheeze was 49.2%. Shortness of breath and/or wheeze with a score of 2 or more occurred in 5.4% of the concordant group. On the other hand, 69.0% were found to have a score of 2 or more in the discordant group (Figure 1, B and C). This combined feature showed a sensitivity of 69.0% and a specificity of 94.6% in detecting asthma cases that were underestimated by the physicians (Table 1).

In this subanalysis of the SEACON survey, we have found that the average scores of shortness of breath and wheeze were higher than the others in patients judged by physicians to have well-controlled asthma. This suggests that shortness of breath and wheeze are key potential symptoms that physicians underestimate. We combined these scores and examined them for relevance to discordance. We showed that physicians could reduce the discordance in the perception of asthma control if they evaluate patients with shortness of breath and/or wheezing with a score of 2 or more as not well-controlled asthma. This finding was consistent even if adjusted for sex, age, and the other 3 items in the ACQ-5 (data not shown). Moreover, patients with shortness of breath and/or wheeze with a score of 2 or more had lower pulmonary function such as forced expiratory volume in 1 second % of predicted (82.1 ± 22.6 vs 87.5 ± 21.5 , $P = .0049$, $n = 722$) and higher fractional exhaled nitric oxide (FeNO) levels (39.7 ± 2.5 ppb vs 32.7 ± 1.5 ppb, $P = .016$, $n = 638$). Assessment of shortness of breath and/or wheeze may lead to detecting worse pulmonary function and high FeNO levels.

Here, we reconsider the ACQ-5. The ACQ-5 is a questionnaire that evaluates 5 items: nocturnal awaking, morning symptoms, activity limitation, shortness of breath, and wheeze. It is recommended in national and international guidelines for assessing asthma control levels and is used in many clinical studies.²⁻⁵ There are 7 intensities to the question of shortness of breath: 0 = none, 1 = a very little, 2 = a little, 3 = a moderate amount, 4 = quite a lot, 5 = a great deal, and 6 = a very great

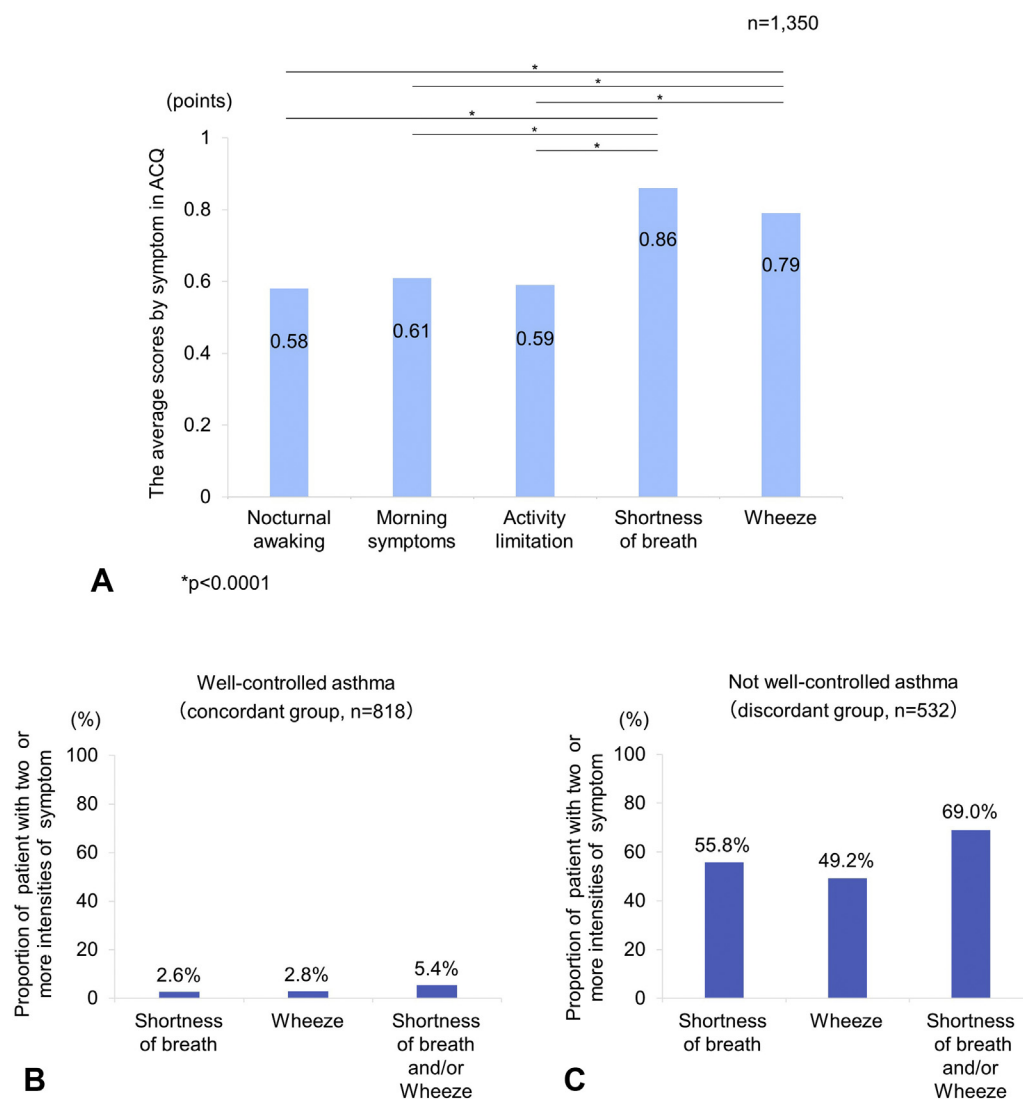


FIGURE 1. A, Comparison of the average score by each symptom in the ACQ-5; the scores of shortness of breath and wheeze were significantly higher than in the others. The actual distribution of patients who had shortness of breath and/or wheeze of 2 (cutoff value) or more intensities in the (B) concordant group and (C) discordant group. ACQ, Asthma Control Questionnaire.

TABLE I. The area under the curve (AUC) per intensities of shortness of breath and/or wheeze

Cutoff value (shortness of breath/wheeze)	AUC	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
1 (a very little/hardly any of the time)	0.792	97.6	60.8	61.8	97.5
2 (a little/a little of the time)	0.818	69.0	94.6	90.0	82.4
3 (a moderate amount/a moderate amount of the time)	0.623	24.6	99.9	97.8	67.1
4 (quite a lot/a lot of the time)	0.530	6.0	100.0	100.0	62.1

NPV, Negative predictive value; PPV, positive predictive value.

deal. And there are 7 intensities to the question of wheeze: 0 = not at all, 1 = hardly any of the time, 2 = a little of time, 3 = a moderate amount of the time, 4 = a lot of the time, 5 = most of the time, and 6 = all the time. We again realized that the patient-reported occasional wheezing or shortness of breath is a key feature to review current asthma management. This is a useful finding because our review time is limited.^{6,7} For example, in Japan, approximately 67% of patients were reported to have an average review time of less than 10 minutes in 2005.⁷

Further development of a simplified index to evaluate disease activity is a major challenge because most of patients with asthma are managed by nonspecialized physicians.⁸ We must add some limitations that patients in the SEACON study were characterized by older age, presenting with a milder disease, and one-third had a smoking history. These patient characteristics may have influenced the findings. Moreover, given the nature of the observational study design, there could be unmeasured confounders that could influence results.

In the present analysis, we concluded that it is possible to reduce the physician's underestimation of asthma control by capturing the occasional dyspnea or wheeze during the patient review even if the consultation time is limited.

^aDepartment of Respiratory Medicine and Infectious Disease, Graduate School of Medicine, Yamaguchi University, Ube, Japan

^bDepartment of Medicine and Clinical Science, Graduate School of Medicine, Yamaguchi University, Ube, Japan

No funding was received for this work.

Conflicts of interest: The authors declare that they have no relevant conflicts of interest.

Received for publication March 20, 2020; revised July 31, 2020; accepted for publication July 31, 2020.

Available online ■ ■

Corresponding author: Kazuto Matsunaga, MD, PhD, Department of Respiratory Medicine and Infectious Disease, Graduate School of Medicine, Yamaguchi University, 1-1-1 Minami-kogushi, Ube 755-8505, Japan. E-mail: kazmatsu@yamaguchi-u.ac.jp.

2213-2198

© 2020 American Academy of Allergy, Asthma & Immunology

<https://doi.org/10.1016/j.jaip.2020.07.053>

REFERENCES

1. Matsunaga K, Hamada K, Oishi K, Yamaji Y, Hirano T. Factors associated with physician-patient discordance in the perception of asthma control. *J Allergy Clin Immunol Pract* 2019;7:2634-41.
2. Juniper EF, O'Byrne PM, Guyatt GH, Ferrie PJ, King DR. Development and validation of a questionnaire to measure asthma control. *Eur Respir J* 1999;14:902-7.
3. Juniper EF, Svensson K, Mörk AC, Ståhi E. Measurement properties and interpretation of three shorted versions of the asthma control questionnaire. *Respir Med* 2005;99:553-8.
4. Global Initiative for Asthma. GINA Report; 2019. Available from: <https://ginasthma.org/reports/2019-gina-report-global-strategy-for-asthma-management-and-prevention/>. Accessed March 4, 2020.
5. Matsunaga K, Kawabata H, Hirano T, Sugiura H, Minakata Y, Ichinose M. Difference in time-course of improvement in asthma control measures between budesonide and budesonide/formoterol. *Pulm Pharmacol Ther* 2013;26:189-94.
6. Kisa K, Kawabata H, Maezawa M. A systematic review of studies on consultation length in Japan. *J Japan Primary Care Assoc* 2012;35:37-44.
7. Waiting time until consultation and consulting time in Japan. Treatment behavior survey, Ministry of Health, Labor and Welfare; 2005. Available from: <https://www.mhlw.go.jp/toukei/saikin/hw/jyuryo/05/kekka2.html>. Accessed March 4, 2020.
8. Chapman KR, Boulet LP, Rea RM, Franssen E. Suboptimal asthma control: prevalence, detection, and consequences in general practice. *Eur Respir J* 2008; 31:320-5.