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The role of questionnaires in the assessment of asthma control

Rola kwestionariuszy w ocenie kontroli astmy

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Abstract

The achievement and the maintenance of asthma control is currently considered the main goal of asthma treatment. Recent guidelines recommend regular assessment of asthma control and indicate questionnaires as important tools that can facilitate its evaluation. Questionnaires relate to GINA or NAEPP guidelines. Questionnaires constitute complex numerical or categorical scales and consist of several to over a dozen questions relating to the patient's symptoms of asthma, limitations in daily activities and usage of rescue medications within a period of time. Each questionnaire is characterized by the features that affect its reliability and usefulness.

In the following paper we discuss most of the questionnaires which assess asthma control. We focus on the items they include and present the results of studies that prove the effectiveness of individual questionnaires in assessment of asthma control. Attention was drawn to the patient groups to which the questionnaires are addressed. We list the features of the questionnaire which should be considered before choosing a test, so that it satisfies both the doctor's and the patient's needs.

The role of questionnaires as the easy-to-use tools is growing steadily. Unfortunately, not all are available in Polish language. Conducting appropriate validation studies may allow to use many of them in Polish conditions.

Key words: asthma, asthma control, asthma control test, astma control questionnaire

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Streszczenie

Aktualnie uznaje się, że nadrzędnymi celami leczenia astmy są uzyskanie i utrzymanie jej prawidłowej kontroli. Najnowsze wytyczne zalecają regularną ocenę kontroli astmy i wskazują kwestionariusze jako ważne narzędzia, które mogą ułatwiać jej ocenę. Kwestionariusze odnoszą się do istniejących wytycznych GINA lub NAEPP. Mają charakter złożonych skal liczbowych lub kategorycznych i składają się z od kilku do kilkunastu pytań odnoszących się do występujących u chorego objawów astmy, ograniczeń w codziennej aktywności i stosowanego leczenia doraźnego w określonym czasie. Każdy kwestionariusz charakteryzuje się cechami, które wpływają na jego wiarygodność i przydatność.

W niniejszej pracy omówiono większość kwestionariuszy służących do oceny kontroli astmy. Wymieniono elementy wchodzące w ich skład, sposób pomiaru kontroli choroby oraz wyniki badań, które udowadniają skuteczność poszczególnych kwestionariuszy w procesie oceny kontroli astmy. Zwrócono uwagę na grupę pacjentów, do których są adresowane kwestionariusze. Wymieniono parametry testu, którymi należy się kierować przy jego wyborze, tak by odpowiadał on potrzebom lekarza i pacjenta.

Rola kwestionariuszy, jako łatwych w użyciu narzędzi pomagających przeprowadzić ocenę kontroli astmy, systematycznie rośnie. Niestety, nie wszystkie są dostępne w języku polskim. Przeprowadzenie odpowiednich badań walidacyjnych może umożliwić zastosowanie wielu z nich w warunkach polskich.

Słowa kluczowe: astma, kontrola astmy, test kontroli astmy, kwestionariusz kontroli astmy

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Introduction

Asthma is a chronic inflammatory disease of the airways, in which the enormous progress of treatment has been recently achieved. The introduction of new drugs gave a chance to obtain complete control of symptoms in many patients. However, asthma remains an incurable disease, and in some patients symptoms still persist and severe, life-threatening exacerbations occur despite optimal treatment. Therefore, the goal of asthma treatment is to achieve and maintain proper control of the disease, to minimize the risk of exacerbations and to prevent further disease progression [1].

Asthma control is defined as the extent to which symptoms of the disease have been reduced by treatment. The term of asthma control is multidimensional and includes daytime and night symptoms, daily life activity, lung function, and use of medications. In the last decade the emphasis has been put not only on the severity of symptoms, but also on the risk of adverse events in the future. Those adverse events are exacerbations, impaired lung function and side effects of treatment [2].

GINA guidelines show how to assess asthma control and future risk of the disease in a simple way, just by asking a few questions about asthma symptoms and by lung function measurement [1]. As shown by observational real-life studies, a substantial proportion of patients, reaching even higher than 50%, can not achieve satisfactory control of the disease [3−10]. In recent times, in addition to the GINA guidelines, several questionnaires are available that allow in a quick and affordable way to assess asthma control without the need for costly, complex and sometimes difficult to access additional tests.

GINA guidelines

The need to establish the concept of asthma control was noticed in the late 90's of the last century. The term first appeared in the GINA guidelines published in 2006 [11]. The guidelines recommended basing treatment decisions on the level of asthma control rather than on its severity. The goal of treatment was to achieve and maintain full control of the disease [11]. For this reason, the guidelines advice how to carry out an assessment of asthma control. It is based on three questions, which concern the frequency of symptoms of the disease, use of short-acting inhaled bronchodilators and spirometry (percentage of predicted values of PEF or FEV_1). Rated symptoms are the daily symptoms, the limitation of daily activity and nocturnal symptoms or awakenings caused by asthma. Spirometric assessment includes PEF or FEV_1 measurement and estimation whether the measured value is higher or lower than 80% of predicted value. The time period undergoing measurement is four weeks prior to the assessment. Depending on the results, asthma is defined as totally controlled, partly controlled or uncontrolled.

After 2006, GINA guidelines has been significantly modified. The most important change is the introduction of the concept of the future adverse outcomes risk in form of exacerbations, fixed airflow limitation and medication side effects. The changes were implemented following the guidelines of the US National Asthma Education and Prevention Program Expert Panel Report 3 (NAEPP EPR3) published in 2007 [12]. This is a very significant modification, because finding specific risk factors significantly increases the likelihood of exacerbations in the future. In addition, the guidelines point out risk factors for fixed airflow limitation and medication side effects. They are listed in Table 1.

Table 1.   Risk factors for poor asthma outcomes in the future according to GINA 2014 [1]

Tabela 1. Czynniki ryzyka niekorzystnych wydarzeń w przyszłości, według GINA 2014 [1]

Potentially modifiable risk independent factors for flare-ups (exacerbations)

Uncontrolled astma symptoms
Excessive short-acting beta agonist (SABA) use
Inadequate inhaled corticosteroid (ICS): not prescribed, poor adherence, incorrect inhaler technique
Low FEV_1, especially if < 60% predicted
Major psychological or socioeconomic problems
Exposures: smoking, alergen exposure if sensitized
Comorbidities: obesity, rhinosinusitis, confirmed ford allergy
Pregnancy
Sputum or blood eosinophilia
1 severe exacerbation in last 12 months
Ever intubated or In intensiva care unit for asthma
At least one severe exacerbation In last 12 months

Risk factors for developing fixe airflow limitation

Lack of ICS treatment
Low initial FEV_1
Chronic mucus hypersecretion
Sputum or blood eosinophilia
Exposures: tobacco smoke, noxious chemicals, occupational exposures

Risk factors for medication side-effects:

Systemic: frequent oral corticosteroid, long term, high dose and/or potent ICS, also taking P450 inhibitors
Local: high dose or potent ICS, poor inhaler technique

Table 2. Asthma symptom control according to GINA 2014 [1]

Tabela 2. Kontrola objawów astmy, według GINA 2014 [1]

Asthma symptom control	Level of asthma symptom control		
In the past 4 weeks has the patent had: (answer yes/no): Daytime asthma symptoms more than twice/week? Any night waking due to asthma? Reliever needed for symptoms more than twice/week? Any activity limitation due to asthma?	Well controlled	Partly controlled	Uncontrolled
	Answers „yes" for none of these questions	Answers „yes" for 1–2 of these questions	Answers „yes" for 3–4 of these questions

It is worth noting that from 2014, the spirometric assessment of lung function is no longer a basis for assessing the control of the disease [1]. Asthma control is evaluated only by questions about asthma symptoms and use of rescue medications. FEV_1 is an element used to identify patients at risk of asthma exacerbations. The new guidelines also extend the period of time undergoing assessment, from one to four weeks. The latest assessment criteria of asthma control according to GINA 2014 are presented in Table 2.

Rules for the assessment of asthma control proposed in the GINA guidelines are applicable for adults, adolescents and children over 11 years of age [1]. For children aged 6–11 years, in addition to questions about symptoms control (identical to those in adults), an additional set of questions for parents was prepared. These questions concern the child's behavior in everyday life, intolerance of physical exertion, increased fatigue, irritability, the severity of viral respiratory infections and other symptoms resulting from the lack of adequate control of the disease. A separate questionnaire was also prepared for parents of children under 6 years of age.

Presence of daytime asthma symptoms for more than a few minutes, more than once a week, activity limitation during play or exercise, night waking and coughing due to asthma and the need for reliever medication more often than once a week mean partial control or lack of control of the disease in the child. Assessment of the risk of adverse events in the future is based on other grounds than in adults because performance of spirometry is impossible. Moreover, some specific problems exist in this age group, which include respiratory viral infections, the typical flare-up period (usually autumn and fall), psychological and social problems of the child or the family, poor adherence to medication and incorrect inhalation technique [1].

NAEPP EPR3 Guidelines

In 2007, in the United States, National Asthma Education and Prevention Program Expert Panel Report 3 (NAEPP EPR3) guidelines were published. The guidelines for the first time highlighted the role of disease control in asthma management [12]. According to the recommendations, assessment of asthma control results from rating of two domains: impairment imposed by the disease and future risk of adverse events.

Assessment of impairment domain is based upon questions about daily and night asthma symptoms, limitation of daily activities, rescue use of bronchodilators and evaluation of lung function (FEV_1 or PEF). Moreover, results of validated asthma control questionnaires are taken into account. Guidelines mention ACT (Asthma Control Test), ACQ (Asthma Control Questionnaire) and ATAQ (Asthma Therapy Assessment Questionnaire). They will be discussed below. After assessment of the mentioned above parameters the patient is assigned to one of three groups: well controlled, poorly controlled and uncontrolled asthma. Time period under assessment is two to four weeks preceding examination.

The second domain which is assessed, is future risk. It is evaluated by determining the number of exacerbations requiring systemic corticosteroids during the last year. Patients who have had at least two such flare-ups have reduced global rate of disease control, even if the assessment of impairment domain was consistent with well-controlled asthma. In addition, side effects of the treatment are evaluated. The guidelines also provide specific recommendations concerning assessment of asthma control in children under 5 and from 5 to 11 years of age [12].

Asthma Control Test (ACT)

The test is a tool for evaluating asthma control consisting of 5 questions. For each question patient chooses one from five possible answers. To each answer a point value from 1 to 5 is assigned. The test result is the sum of points obtained from the answers to all the questions. The maximum score (25 points) means total control of asthma, the result of 20 to 24 points means a partial control, while the result of 19 points and below indicates the insufficient level of disease control. Questions relate to a time period of four weeks preceding the survey. The first four questions of the questionnaire relate to the symptoms of the disease. They concern limitation of daily activity, dyspnea, nocturnal symptoms and the utilization of rescue medications. The fifth question refers to the patient's self-assessment of the degree of asthma control in the past four weeks. The patient determines the degree of control as complete (5 points), good (4 points), moderate (3 points), poor (2 points), or states that in the recent four weeks the disease has not been controlled (1 point). ACT was developed in 2004 in the United States by a team of professionals, who have created a questionnaire consisting of 22 questions concerning symptoms of asthma, the impact of the disease on the patient's life, use of medications, exacerbations and psychosocial aspects of the disease [13]. Then, using the questionnaire, a large group of patients was studied. The same patients were then evaluated by specialists in terms of meeting the goals of asthma treatment according to current guidelines of the National Heart, Lung and Blood Institute (NHLBI). Using statistical methods, 5 out of 22 questions were selected, according to which the assessment of asthma control most closely matched the assessment performed by the specialists. Furthermore, after analysis of the sensitivity and specificity of the questionnaire, the cut-off point for uncontrolled asthma was set at the level of 19 points. It was also found that the correlation between rating of disease control performed by ACT and by asthma specialist is strong, while the correlation between the result of the ACT and FEV_1 was weak. It confirms the limited value of spirometry as a single tool for assessment of control of the disease [13].

In 2009, another study was conducted, which showed that the minimally important difference (MID) between the results of the ACT assessed at a different time is 3 points [14]. This means, that if the current patient's score is lower by at least 3 points in comparison to the result obtained on the previous visit, the clinician should consider changes in the treatment of the patient [14].

The test was developed for patients of 12 years of age and older. For children between 4 and 11 years a special version of the questionnaire was prepared (Childhood Asthma Control Test — CACT). In this version the first four questions are answered by a child, then the parent answers to additional three questions. Questions relate to the child's symptoms, except one which concerns self-assessment of asthma control done by the child. In addition, the possible answers contain graphic elements to help the child provide the right answer. Questions for parents relate to the number of days in which they noticed daytime symptoms of asthma, the number of days in which they heard the child wheezing and the number of nights, during which the child woke up because of asthma symptoms. Cut-off point for uncontrolled asthma is also 19 points.

ACT, due to the simplicity and ease of use, is one of the best known and most widely used tools for the clinical assessment of asthma control.

Asthma Control Questionnaire (ACQ)

ACQ is another questionnaire developed for a quick and easy assessment of asthma control. It was developed in 1999 by Elizabeth Juniper and colleagues from McMaster University in Canada. The authors prepared a long list of asthma symptoms and sent it to independent centers in 18 countries, with a request for specialists to determine the suitability of individual symptoms in the evaluation of the disease control [15]. Finally, five symptoms were chosen, that according to specialists, have the greatest importance in the evaluation of asthma control. These are nocturnal awakenings due to asthma, the limitation of daily activity, the severity of morning symptoms of asthma, shortness of breath and wheezing. The questionnaire contains one question for each of these symptoms. Moreover, the authors added questions relating to use of short-acting β2-agonist and to FEV_1. Thus, the test consists of 7 questions, hence its full name ACQ7. For each question the patient selects one of the answers which are assigned numerical values from 0 to 6 (0 means no symptoms, while 6 — their highest intensity). Likewise, the percentages of FEV_1 are grouped (0 means FEV_1 greater than 95% of predicted value, 6 — below 60%). All questions relate to the period of one week before the examination. The final result of the test is the mean value of the results obtained from individual questions

and from spirometry assessment. The authors conducted a nine-week observational study in patients which showed high sensitivity of ACQ to changes in asthma control compared with other methods of assessing the disease, ie. patient's diary, spirometry, questionnaire of quality of life in asthma (Asthma Quality of Life Questionnaire — AQLQ) and generic test of the state of health (Medical Outcomes Survey Short Form 36, SF-36) [15]. A generic test SF-36 is a popular tool used in the evaluation of the quality of life in a variety of diseases, not only in asthma. Its usefulness in assessing the quality of life in asthma was previously demonstrated [16]. Another finding from the study was minimally important difference (MID) which is 0.5 point for ACQ [17]. Interestingly, the cut-off point defining the lack of asthma control was not established. It was defined in a separate study in 2006. It concluded that the score of 1.5 point and below suggests uncontrolled asthma, and the result of more than 1.5 point — controlled asthma. However, these values have not yet been validated and there are still doubts about the interpretation of the results in the range of 0.75 — 1.5 points [18].

An important element of ACQ7 is spirometry. This can cause a problem for clinicians, as it requires access to spirometry, prolongs the test taking and requires the patient to withhold bronchodilators before the visit. Therefore also a simplified versions of the test were developed: consisting of five (questions relating only to symptoms), six (questions about the symptoms and use of β2-agonist) and seven (the assessment of PEF instead of FEV_1) questions. They have been validated and are also characterized by a good, but slightly lower than the full version of the questionnaire, ability to assess asthma control [17].

Asthma Therapy Assessment Questionnaire (ATAQ)

Another simple tool to assess asthma control is ATAQ. This questionnaire consists only of four questions, and for each question, patient chooses one of the two possible answers. The first question concerns the limitation of daily activities and absence from work or school due to asthma, the second refers to the night symptoms, the third — to the use of rapid-acting β2-agonist more than 12 breaths in one day. The fourth question concerns the sense of good asthma control by the patient himself. The test period is four weeks prior to the visit. If the answers to the questions are affirmative, the patient receives one point for each answer, and if the answer is negative, patient receives zero points. Thus, patients who received a total score of zero has well controlled asthma, one or two points indicate partly controlled disease, three or four points — uncontrolled asthma. There is also a version of the test for children and adolescents aged 5 to 17 years. It consists of 20 questions addressed to the parent. A large number of questions hinders some of its application in an outpatient setting, but studies have shown that it is a valuable tool and should be used [19].

The test was developed in 1999 in the United States. A large study on more than 5000 adult patients has shown a good correlation between the questionnaire and Asthma Quality of Life Questionnaire (AQLQ), Saint George Questionnaire and a generic questionnaire SF-36 [20]. In addition, the test results were higher in patients who reported acute health care utilization in the past year. It indicates the ability of the test to identify patients with a high risk of exacerbations in the future.

ATAQ is a convenient and simple tool to assess asthma control. Unfortunately there is no Polish version of the questionnaire.

Asthma Control and Communication Instrument (ACCI)

It is a questionnaire created in 2008 in the United States in response to the difficulties in achieving asthma control among racially diverse patient populations. Epidemiological studies have indicated a significantly worse treatment outcomes, more frequent exacerbations and a lower level of asthma control among black patients. Different reasons of this state are indicated, among them poor clinician-patient communication resulting from low health literacy, lower educational status, lack of patient self-efficacy, and other cultural and language barriers. In order to improve the quality of asthma control assessment among minority patients, specialists developed a questionnaire dedicated for them. It contains 12 items relating to four domains of the disease. These domains are Risk (exacerbations or hospitalizations and the need for systemic glucocorticoid since the last visit), Bother (about being bothered by asthma), Direction (the well-being and overall course of the disease since the last visit) and Control (intensity of asthma symptoms over the last week). One question concerns adherence to prescribed medications. The patient selects one of several possible answers by putting an "X" in the appropriate box. Boxes

are filled with the color, in order to facilitate patient choice of the appropriate answer (green — with responses that indicate low intensity of symptoms and red — with responses indicating their significant severity). The questions are written in simple language. Next to the question text there are additional explanations, which are meant to facilitate understanding of some of the expressions. The last question is open, which means that the patient may report any problem with asthma, which was not included in the previous questions. The test result is obtained by calculating the mean of the sum of responses to each question. The questionnaire was validated in ethnically and economically diverse populations. The authors carried out a study that showed a good correlation between the assessment of asthma control using ACCI with the assessment made by other questionnaires (including ACT, ACQ) [21]. Unfortunately there is no version of the test for patients under 18 years of age. Polish version of the questionnaire does not exist.

30 Second Asthma Test

This is a short questionnaire developed in Canada in 2007. It is based on the Canadian Asthma Guidelines. It consists of five questions referring to night symptoms, daytime symptoms, use of short-acting bronchodilators, limitation of physical activity and absence from school or work because of asthma. For each question the patient indicates whether the symptom occurs (one point) or not (zero points). A score of two points or more means poor asthma control. The test refers to the period of the last week — in the case of asthma and three months — in the case of absence from work or school and activity limitation [22].

The test advantages which are emphasized are simplicity, quick and good correspondence with specialist rating of asthma control. Worth noting is the big emphasis that the authors put to the reduction of the patient's activity, both physical and professional. Still, studies are needed to compare the accuracy of the assessment of disease control using this test with other questionnaires. There is no Polish version of the test.

Royal College of Physicians 3 Questions Asthma Tool (RCP3Q)

This a short questionnaire developed in the United Kingdom, designed to quickly identify patients with poorly controlled asthma, who require medical consultation in order to prevent

exacerbations. It consists of three questions. First refers to the presence of daytime symptoms, second — to the presence of nocturnal symptoms, third — to limitation of daily activities. The assessment relates to the last month. For an affirmative answer to any of these questions the patient gets one point. The range of results is therefore between zero and three points. Zero points means good asthma control. Occurrence of daily symptoms only (and thus the result of a single point) may be in good control, but may suggest poorer disease control. Interestingly, the result of a single point due to the presence of night symptoms or limitation of daily activities is considered as a signal of poor asthma control and requires a deeper evaluation. It is the only questionnaire that assigns different weights to individual symptoms — decreased activity and nocturnal symptoms are regarded as more serious than daytime symptoms. The result of two or three points means poor asthma control. The questionnaire was validated during a multicenter study in the UK and showed a good correlation with the results of ACQ [23]. It is noteworthy that this test is a tool, which does not provide multidimensional assessment of asthma control, but it easily and quickly identifies patients who need urgent medical attention. There is no Polish version of the test.

Test for Respiratory and Asthma Control in Kids (TRACK)

Assessment of asthma control is particularly difficult in preschool children and there are very few tools for such assessment. In this light, TRACK is an especially valuable questionnaire, as it is designed for children under 5 years of age. It was created in 2009. From a set of 33 questions suggested by the experts regarding different aspects of asthma control, five questions were selected, that corresponded well with the current NAEPP guidelines. Parent indicates how often in the past four weeks a child had daytime symptoms in form of coughing, wheezing or shortness of breath. Parent is also asked about the frequency of night awakenings due to asthma and limitation of the child's activity. Another question concerns the use of rescue medication used to reduce the symptoms of the disease in the last three months and the last section concentrates on the frequency of the use of systemic corticosteroids in the past year. In each question parent selects one of five answers, which are assigned numerical values from 0 to 20, with 0 corresponding to the biggest

severity of symptoms, and 20 — to lack of them. The sum of points obtained from all answers determines the result of the test. The study assessing the usefulness of the questionnaire showed that children who obtained a score less than 80 points are at high risk of uncontrolled asthma [24]. Another study demonstrated its high sensitivity in detecting changes in asthma control during the period of 4−6 weeks [25]. It is worth noting that the questionnaire is designed not only for children with asthma, but also for children with symptoms of respiratory diseases resembling asthma. In the youngest children diagnosis of asthma is particularly difficult and the use of objective tests, such as spirometry is impossible. In contrast to TRACK, childhood ACT is dedicated only for children with diagnosed asthma from 4 years of age. Therefore, TRACK is useful in the youngest patients, especially those whose diagnosis of asthma is not definitively confirmed, but the symptoms raise the suspicion of asthma. Polish version of this test was not prepared.

Summary

Modern guidelines encourage to the use of questionnaires as tools facilitating the assessment of asthma control. It must be realized that they may have a different structure and some limitations.

Asthma control evaluation can be based on a single parameter, for example the number of days in month with good control of asthma or on FEV_1. Currently, this method is not recommended. It was demonstrated that the correlation between single aspect of the disease and the degree of overall asthma control is low [26]. Recent guidelines recommend the use of composite scores, which evaluate several areas of the disease [1, 12].

Questionnaires can measure categorical variables by assigning responses to specific groups (such as the presence or absence of cough, exercise tolerance or intolerance). An example of such tool is GINA classification of asthma control. By asking questions relating to specific aspects of the disease it assigns patients to one of three defined groups (asthma well controlled, partly controlled and uncontrolled).

Another type of questionnaires measure the numeric (continuous) variables. The result of the test is a number which is within the specified range, determining the degree of asthma control. Examples of such questionnaires are ACT and ACQ. The guidelines of American Thoracic Society and European Respiratory Society published in 2009, recommend the use of composite tools measuring numeric variables, which have advantage over the tools based on categorical variables [26, 27]. Expression of the result in a numeric form is simpler both for the physician and for the patient and facilitates observation of changes in asthma control over time [26, 27].

Each composite score is characterized by a set of certain features. They should be taken into consideration while choosing the right test for the patient. These features are listed below:

1. Measured parameters. As discussed above, most of the questions in the questionnaires concern similar aspects of asthma control. A basis for assessment is constituted by the questions about daytime symptoms, nocturnal symptoms, limitation of daily activities and use of short acting $\beta2$-agonist. It is worth noting if the tool evaluates not only the current degree of asthma control, but also the future risk of exacerbations (GINA, NAEPP EPR3, TRACK). Prior to the selection of the test, clinician should also consider whether the need to perform spirometry will not be a significant obstacle to the completion, as it is with the full version of the ACQ. Some tests include questions about self-assessment of the control of the disease. In case of choosing such a questionnaire, physician must be sure that a patient actually understands the concept of asthma control.

2. The range of values and the cut-off points for each degree of asthma control. The questionnaires consist of a different number of questions, which affects their complexity and the time needed to complete them. The simplest test consisting of three questions is RCP3Q, which is by far the easiest and fastest to solve, but in turn, does not include many of the issues of asthma control, such as the use of rescue medication. ACQ is a test of greater complexity, which also includes the lung function parameter (FEV_1), but this in turn may hinder its conduction in primary care. It should also be checked whether the test has clearly defined rules for the interpretation of the results and if its reliability has been confirmed by scientific research. For example, the ACT has clearly defined cut-off points for each degree of asthma control, whereas in the case of ACQ, as mentioned earlier, there are still doubts about the interpretation of the results in a certain range.

3. Time period undergoing assessment. The aforementioned tests evaluate asthma control over one week to one month period. It should

be kept in mind that different asthma symptoms may disappear or appear in a shorter or longer period of time. The GOAL study noted for example that the nocturnal symptoms disappear first after optimizing treatment, whereas daily symptoms severity is reduced after a longer time [28].

4. Repeatability. An important feature of the questionnaire is the repeatability of the measurement after a long period of time, in stable conditions. ACQ questionnaire was studied in this regard and showed good reproducibility in a stable period within 1, 5 and 9 weeks after the first measurement [15]. This is an important feature of increasing the credibility of the questionnaire.

5. Responsiveness to changes of the degree of asthma control. In case of the two aforementioned tools, ie. ACT and ACQ, an attempt was made to accurately determine the minimally important difference in test result, which may involve a substantial deterioration of control and increased risk of exacerbation in the future. For ACT this value is 3 points [14], and for ACQ it is 0.5 point [17]. As for the other described tools such value was not established, but for some tests (CACT, RCP3Q) studies confirmed their ability to detect response to treatment [27].

6. Validity. It is the term describing the ability of the test to actually measure the values that was designed to measure. Without proper validation of the test, the clinician can not be sure that the obtained test result reflects asthma control. Most questionnaires discussed above were validated according to GINA or NAEPP guidelines, or to another, previously validated tool designed to assess asthma control, or to some other parameter than asthma control, like the quality of life, the number of exacerbations or lung function. It is important to choose a questionnaire, which was validated in the language used by the patient. Unfortunately, some of the less common tests have not been translated into Polish and appropriate validation studies in Polish are lacking.

7. The target group. Before making a final choice, which questionnaire will be used in assessment of asthma control, it is necessary to check whether it is intended for the patient. This applies especially to children and adolescents. Most of the discussed tools are meant for adults. Only part of the tests have a version for patients under 18 years of age. Selec-

Table 3. **Internet addresses or literature presenting the questionnaires or allowing to obtain them**

Tabela 3. **Adresy internetowe lub pozycje piśmiennictwa, które pozwalają na zapoznanie się z kwestionariuszami lub ich uzyskanie**

GINA	http://www.ginasthma.org/documents/4 Polish translation of pocket version: http://www.ginasthma.org/documents/1/documents_variants/54
NAEPP EPR3	http://www.nhlbi.nih.gov/health-pro/guidelines/current/asthma-guidelines/full-report
ACT and cACT	http://www.asthmacontroltest.com/
ACQ	http://www.qoltech.co.uk/acq.html
ATAQ	Ref. [20]
ACCI	Ref. [21]
30-second Astma Test	Ref. [22]
RCP3Q	Ref. [23]
TRACK	Ref. [24]

tion of tools for children under 4 years of age is problematic. In fact, only TRACK questionnaire is designed for such patients. Another aspect is proper communication between doctor and patient. It is important to make sure that the patient understands the questionnaire, as this will affect the answers given by him and can disrupt the test result. The problem of poor clinician-patient communication and its impact on asthma control is perceived in multiethnic countries, such as the United States [29].

8. Availability of the questionnaire and copyrights. It should be noted that most of the questionnaires are copyrighted and access to them can involve the need to pay fees or obtain permission to use them. In Table 3. we present internet addresses of official websites of some of the questionnaires or links to literature presenting the questionnaires.

The role of the questionnaires as the easy-to-use tools to reliably assess asthma control is growing steadily. Their utilization is recommended in the latest GINA and NAEPP guidelines and they are also widely used in research studies. Also several questionnaires exist, that take into account not only the clinical parameters, but also laboratory measurements, such as nitric oxide in exhaled air or induced sputum. The results of studies determining the ability of some of the questionnaires to predict asthma exacerbations in the future are encouraging. Unfortunately, in

Poland the availability of translated and validated versions of questionnaires is low. Conducting appropriate validation studies would allow their wider use in clinical practice and thus improve asthma outcomes in our country.

Conflict of interest

The authors declare no conflicts of interest.

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