

What is the Asthma Impairment and Risk Questionnaire and how can it help patients with asthma? A plain language summary of publications

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Summary

What is this summary about?

- The Asthma Impairment and Risk Questionnaire (**AIRQ**[®]) has been designed and tested to measure patients' levels of asthma control in a healthcare setting.
- Unlike other available questionnaires that only assess asthma symptoms that can be bothersome or limit a person's activities and quality of life (impairment-related symptoms), the **AIRQ** also includes questions related to risk of an asthma attack. This allows for a broader measurement of asthma control and a prediction of the chance of having future asthma attacks.
- **AIRQ** scores are linked to a patient's own experience of their health and how it impacts their daily life (health-related quality of life).
- The **AIRQ** may make it easier for patients and healthcare professionals to have shared decision-making discussions that can lead to better asthma care and asthma outcomes.
- This document summarizes several published studies of the **AIRQ** in people with asthma.

How to say

- **AIRQ**: Air-Q
- **Bronchodilator**: Bronk-co-DYE-late-or
- **Feasibility**: Fees-uh-BILL-uh-tee
- **Longitudinal**: Longe-uh-TUDE-uh-null
- **Steroid**: STEH-royd

Keywords: AIRQ, asthma, asthma attacks, asthma symptoms, questionnaire

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What is asthma?

- Asthma is a chronic (long-lasting) disease in which inflammation and/or tightening of the airway muscles make it difficult to breathe.
- A person can be born with asthma or develop the condition at any point in their life.
- Symptoms of asthma include wheezing, shortness of breath, chest tightening, and/or coughing.
- A person's asthma symptoms may be caused by inhaling substances that are irritating (such as air pollution, cigarette smoke, or chemical fumes) or allergens (such as pollen or animal dander), or by having a lung infection.
- Asthma is typically treated with inhaled medicines called **bronchodilators**, which work by relaxing tightened muscles in the airways. Asthma is also treated with anti-inflammatory medicines, which work by relieving swelling and the production of excess mucus, and by stopping the release of blood cells and substances of the immune system into the lung that cause the airways to narrow.
- Asthma affects people in different ways. Some people may experience only minor symptoms once in a while. Other people may have more frequent or severe symptoms. When airway inflammation and narrowing cause asthma symptoms to worsen, this is called an asthma attack (Figure 1).

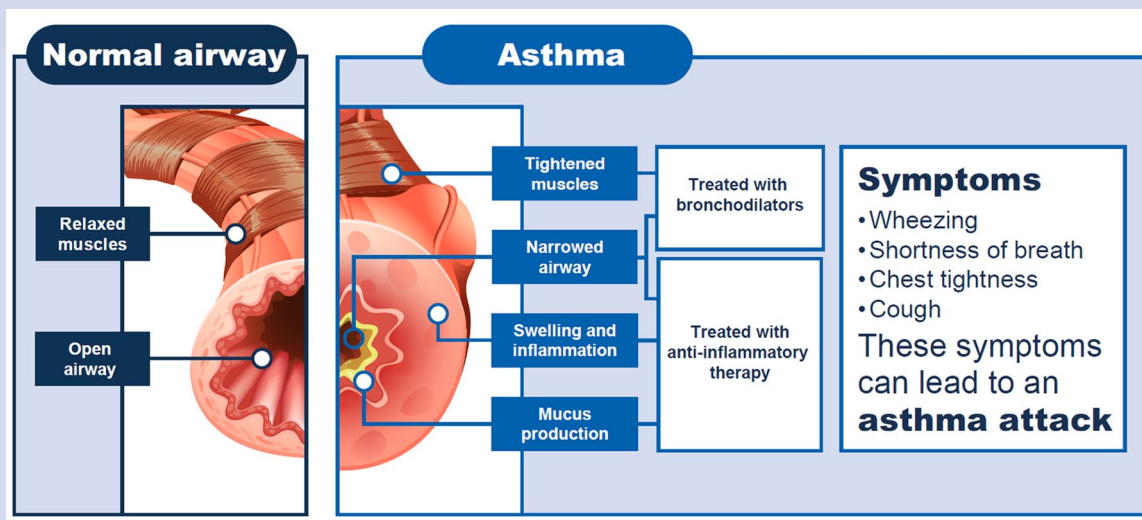


Figure 1. Normal and asthmatic lung airways.

- During an asthma attack, a short course, or “burst”, of **steroid** tablets or injections may be needed to decrease symptom severity (how bad) and duration (how long), and to reduce the risk of death.
 - Even though these **steroids** are given over a limited number of days, their repeated use can lead to short-term side effects (medical problems) such as infections, blood clots, and broken bones, and long-term health conditions such as depression and anxiety; diabetes; and heart, bone, kidney, and eye disease.
- For people with frequent symptoms or who have two or more asthma attacks per year, daily “controller” medications are recommended to reduce inflammation in the lungs and avoid asthma attacks. They usually contain an inhaled **steroid** and may also include other long-lasting medications.

What is asthma control and why is it important?

- A goal of asthma treatment is to achieve asthma control, which means that patients have minor or no asthma symptoms and do not have asthma attacks.
- Poor asthma control is associated with an increased risk of potentially life-threatening asthma attacks, as well as sleep disturbances, missed work or school, reduced ability to exercise, and reduced health-related quality of life.
- Achieving asthma control is desirable because it reduces or even eliminates any impact on a patient's daily activities and the need for **steroid** bursts.
- One challenge that healthcare professionals (such as doctors, physician assistants, nurse practitioners, and nurses) and patients face is that asthma control is often overestimated using traditional measurement questionnaires. This means more patients have asthma that is considered to be better controlled than it actually is, especially relative to their risk for a future asthma attack.

What are the different ways to measure asthma control?

- Several questionnaires have been developed and validated to assess asthma control.
 - The most frequently used and studied questionnaire for adults and adolescents aged 12 years and older is the Asthma Control Test (ACT™).
 - The ACT consists of five questions that patients answer themselves. For each question, patients can choose from five options to indicate how often they have symptoms, how often they need to use their rescue inhaler, and how well they feel their asthma was controlled over the past 4 weeks.
- The ACT does not include questions about a patient's history of asthma attacks. Having a history of asthma attacks can increase the risk of future asthma attacks.
- Therefore, the current measures for assessing asthma control are not sufficient.
- There is a need for a simple, easy-to-complete asthma control questionnaire that assesses both impairment from asthma symptoms and the risk of asthma attacks (based on the patient's history of prior attacks) that patients can discuss with their healthcare professionals.
- The Asthma Impairment and Risk Questionnaire (**AIRQ**®) has been developed to more fully assess symptoms and risk of asthma attacks than existing questionnaires.
- The **AIRQ** has been tested for use in patients aged 12 years and older with diagnosed asthma. It has 10 yes-or-no questions.
- Patients answer the questions themselves either electronically or on paper, or in response to an in-person or telehealth interviewer.
- The questions included in the **AIRQ** are shown in Figure 2. The questions are designed to be simple to understand and answer. There are:
 - seven impairment questions that assess asthma symptoms over the past 2 weeks, and
 - three risk questions that assess the number and types of asthma attacks over the past 12 months.
- All "yes" responses are added up, and the patient is grouped into one of three categories based on their total number of "yes" responses. An explanation of what the final score means is shown at the bottom of Figure 2.
- The **AIRQ** can help healthcare professionals and patients better assess current asthma control and the risk of future asthma attacks. This may lead to improved shared decision-making conversations, patient education, and disease management strategies, which can result in long-term symptom control, fewer asthma attacks, and less need for **steroid** bursts.

AIRQ[®] (Asthma Impairment and Risk Questionnaire)



For use by health care providers with their patients 12 years and older who have been diagnosed with asthma. AIRQ[®] is intended to be part of an asthma clinic visit.

Please answer all of the questions below.

In the past 2 weeks, has coughing, wheezing, shortness of breath, or chest tightness:

1. Bothered you during the day on more than 4 days ?	Yes	No
2. Woke you up from sleep more than 1 time ?	Yes	No
3. Limited the activities you want to do every day ?	Yes	No
4. Caused you to use your rescue inhaler or nebulizer every day ?	Yes	No



Primatene[®] MIST
(Amphastar Pharmaceuticals)
or
Epinephrine



ProAir RespiClick[®]
(Teva Respiratory, LLC)
or
Albuterol sulfate



Proventil[®] HFA (Merck Sharp
& Dohme Corp., a subsidiary
of Merck & Co., Inc.)
or
Albuterol sulfate



Ventolin[®] HFA
(GlaxoSmithKline)
or
Albuterol sulfate



Xopenex HFA[®] (Sunovion
Pharmaceuticals Inc.)
or
Levalbuterol tartrate



Albuterol sulfate or Xopenex[®]
(Sunovion Pharmaceuticals Inc.)
or
Levalbuterol HCl

Please see all prescribing information for all products.

In the past 2 weeks:

5. Did you have to limit your social activities (such as visiting with friends/relatives or playing with pets/children) because of your asthma?	Yes	No
6. Did coughing, wheezing, shortness of breath, or chest tightness limit your ability to exercise?	Yes	No
7. Did you feel that it was difficult to control your asthma?	Yes	No

In the past 12 months, has coughing, wheezing, shortness of breath, or chest tightness:

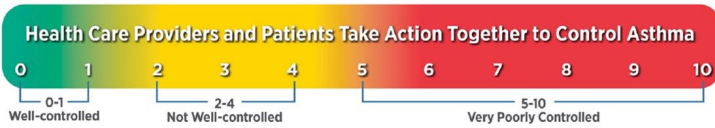
8. Caused you to take steroid pills or shots, such as prednisone or Medrol [®] ?	Yes	No
9. Caused you to go to the emergency room or have unplanned visits to a health care provider?	Yes	No
10. Caused you to stay in the hospital overnight?	Yes	No

Total YES Answers

What Does My AIRQ[®] Score Mean?

The AIRQ[®] is meant to help your health care providers talk with you about your asthma control. The AIRQ[®] does not diagnose asthma. Whatever your AIRQ[®] score (total **YES** answers), it is important for your health care team to discuss the number and answers to each of the questions with you. All patients with asthma, even those who may be well-controlled, can have an asthma attack. As asthma control worsens, the chance of an asthma attack increases.¹ Only your medical provider can decide how best to assess and treat your asthma.

Health Care Providers and Patients Take Action Together to Control Asthma



0 1 2 3 4 5 6 7 8 9 10

0-1 Well-controlled 2-4 Not Well-controlled 5-10 Very Poorly Controlled

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¹Global Strategy for Asthma Management and Prevention: ©2023 Global Initiative for Asthma

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Figure 2. The Asthma Impairment and Risk Questionnaire (AIRQ). AIRQ is a registered trademark of AstraZeneca. The AIRQ is reproduced with permission from AstraZeneca. AstraZeneca is the copyright owner of the AIRQ. However, third parties will be allowed to use the AIRQ free of charge. The AIRQ must always be used in its entirety. Except for limited reformatting, the AIRQ may not be modified or combined with other instruments without prior written approval. The 10 questions of the AIRQ must appear verbatim, in order, and together as they are presented and not divided on separate pages. All copyright and trademark information must be maintained as it appears on the bottom of the AIRQ and on all copies. The layout of the final authorized AIRQ may differ slightly, but the item wording will not change.
Source: <http://www.airqscore.com>

What do these studies look at?

- The development of the **AIRQ** started in August 2017 in the United States. Its development included the testing of patient understanding of the questions, use in real-life medical practice (**feasibility analysis**), and patients' experiences of using the **AIRQ** as part of their asthma care (Figure 3).
- Afterwards, the **AIRQ** was tested in a two-part study, as shown in Figure 3.
 - The first part of the study tested the questionnaire based on the first time that it was completed by 442 patients. This part of the study is known as a **cross-sectional analysis**.
 - The second part of the study tested the questionnaire in patients who were asked questions about their asthma each month over 1 year. This is known as a **longitudinal analysis**. In total, 1112 patients were included in this part of the study, including the 442 who completed the first part of the study.

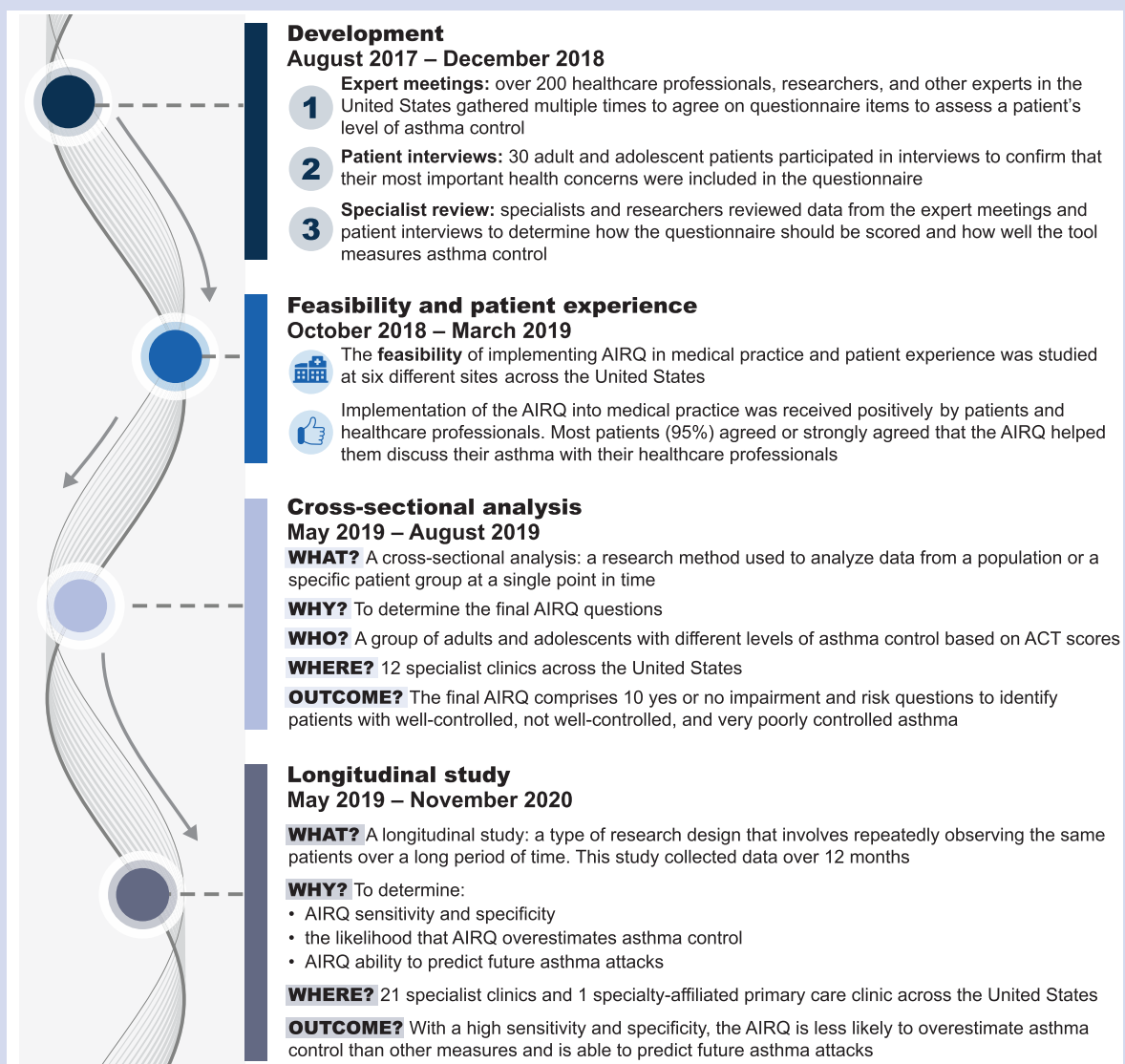


Figure 3. Timeline of AIRQ development, validation, and testing.

Source: The information in this figure is adapted with permission from Murphy K.R., et al. *J Allergy Clin Immunol Pract* 2020; 8: 2263–2274, Elsevier, and Beuther D.A., et al. *J Allergy Clin Immunol* 2022; 10(12): 3204–3212.e2, Elsevier.

Who took part in these studies?

- Patients with asthma who were aged 12 years or older.
- Patients who were currently taking asthma medication of any kind and who had varying levels of asthma control before joining the study.
- All participating study sites were required to have access to patients' medical records for at least 12 months before they joined the study. This was to provide documentation of asthma medications, prior asthma attacks, and risk factors for future attacks.
- Patient characteristics of those participating in the **feasibility** study, cross-sectional analysis, and **longitudinal** analysis are shown in Figure 4.

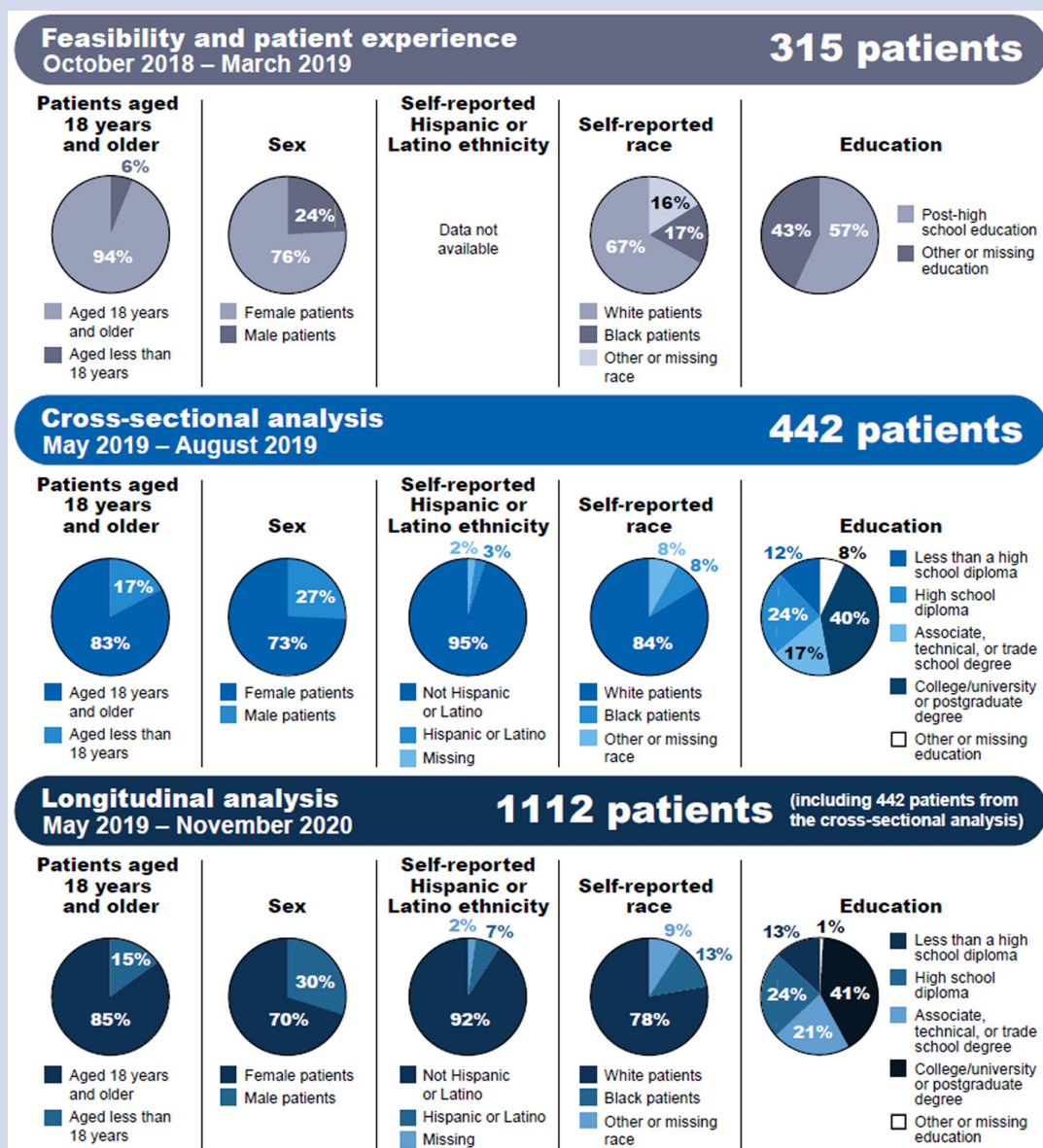


Figure 4. Patient characteristics.

Source: The information in this figure is adapted with permission from Murphy K.R., et al. *J Allergy Clin Immunol Pract* 2020; 8: 2263–2274, Elsevier, and Beuther D.A., et al. *J Allergy Clin Immunol* 2022; 10(12): 3204–3212.e2, Elsevier. Some percentages may add up to more than 100% owing to rounding.

What were the results of these studies?

What does the AIRQ tell us and how is it used?

- Patients and healthcare professionals can use the **AIRQ** to tell if a patient's asthma is well-controlled, not well-controlled, or very poorly controlled.
- The results from the **AIRQ** give patients and healthcare professionals information that they can discuss together and create the best plan for managing that individual patient's asthma in the future.
- The **AIRQ** is useful because it is accurate.
 - Out of 100 patients identified by the **AIRQ** as having well-controlled asthma, 90 truly have well-controlled asthma.
 - Out of 100 patients identified as *not* having very poorly controlled asthma, 96 truly do not have very poorly controlled asthma.
 - The **AIRQ** is less likely to overestimate the patient's level of asthma control than the ACT.

How is the level of asthma control, as measured by the AIRQ, linked to health-related quality of life?

- Asthma can have a negative impact on a patient's health-related quality of life. Patients with poor asthma control have worse health-related quality of life, physical and mental health, work productivity, and activity limitations than patients with well-controlled asthma.
- Comparing patients' **AIRQ** scores with scores from patient-reported health-related quality of life questionnaires showed that as the patient's **AIRQ** control level got worse, so did the patient's health-related quality of life score.
- This means that, as the patient's asthma control gets worse, they may experience some or all of the following:
 - worse or more frequent asthma symptoms
 - tiredness or exhaustion
 - more difficulty completing daily tasks, like household chores or walking up stairs
 - more difficulty exercising or taking part in sports
 - feelings of embarrassment or shame around other people because of their asthma symptoms
 - lower well-being or mental health.

How does the AIRQ measure asthma control over time?

- Patients and healthcare professionals want to know how asthma control may change over time.
- Therefore, the **AIRQ** has questions about symptoms during the past 2 weeks and questions about asthma attacks during the past year. This helps the healthcare professionals see if a patient's asthma is changing over time.
- Sometimes patients see their healthcare professionals more often than once a year, especially if a change in their treatment has occurred or if their asthma is getting worse. Therefore, a questionnaire that assesses their asthma control over a shorter period of time than a year is needed.
- The Follow-Up **AIRQ** has the same questions about symptoms over the past 2 weeks as the **AIRQ**, but the questions about asthma attacks over the past year are changed to ask about the past 3 months. Now, even if patients see their healthcare professional more often than once a year, the Follow-Up **AIRQ** can tell healthcare professionals if the patient's asthma is getting worse or better.
- As with the **AIRQ**, the Follow-Up **AIRQ** has been shown to reflect patients' experiences with their symptoms, health-related quality of life, and whether they have had one or more asthma attacks in the past 3 months.

What is the best way to predict future asthma attacks?

- The **AIRQ** includes questions about a patient's history of asthma attacks in addition to their current symptoms. Because of this, it is less likely to say a patient's asthma is controlled if an asthma attack has occurred in the past year than other common asthma control questionnaires that only consider symptoms.

- Of all patients whose asthma was rated as being well-controlled either by themselves, healthcare professionals, or by other symptom-based questionnaires, about 30% had an asthma attack in the past year. However, only 15% who were assessed as having well-controlled asthma by the **AIRQ** had an asthma attack.
- The **AIRQ** is also less likely to miss patients who are at risk of future asthma attacks than ACT ratings, assessments by healthcare professionals, or patient self assessments (Figure 5).

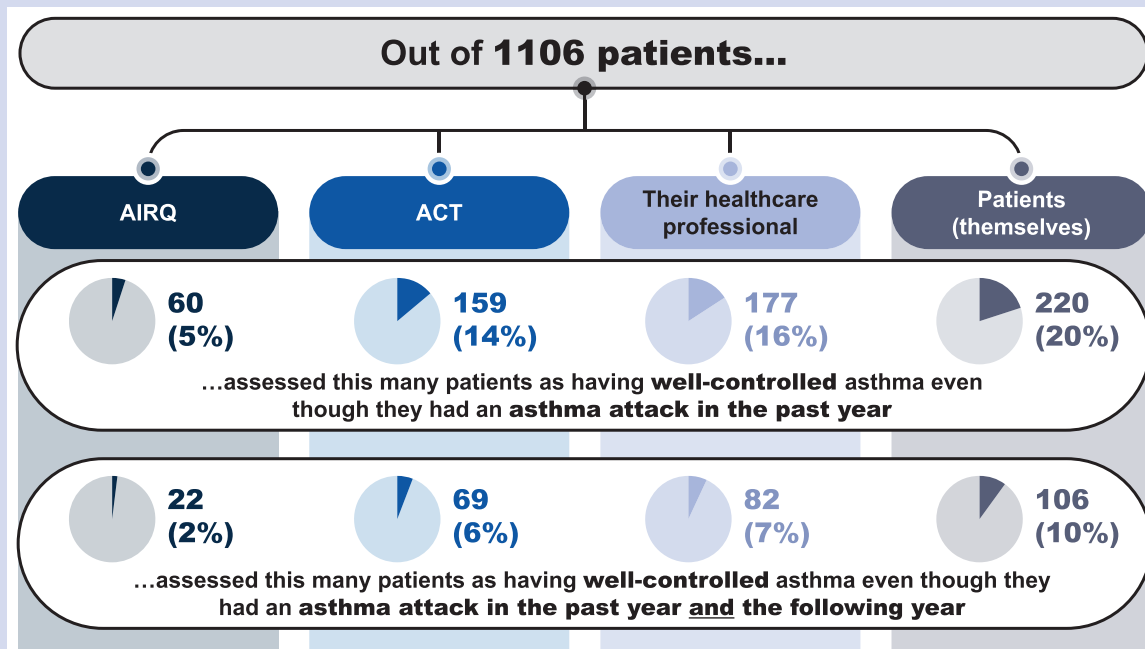


Figure 5. Number of patients with asthma that was rated as well-controlled by the AIRQ, ACT, their healthcare professionals, or the patients themselves, despite having had an asthma attack in the past year and another in the next 12 months.

Source: The information in this figure is adapted with permission from Chipps B., et al. *Ann Allergy Asthma Immunol* 2023; 131: 436–443, Elsevier.

- The **AIRQ** can help healthcare professionals and their patients predict if a patient is at risk of an asthma attack so that they can act quickly to help prevent it from happening (Figure 6).
- In the 12 months after completing the **AIRQ**, patients who have asthma that is not well-controlled or very poorly controlled as measured by the **AIRQ** are more likely to have an asthma attack than those whose asthma is well-controlled.
- This information can help healthcare professionals and patients make changes that may help to lower the risk of future asthma attacks. For example, the healthcare professional might give the patient a different medicine or suggest they avoid certain things that trigger their asthma.

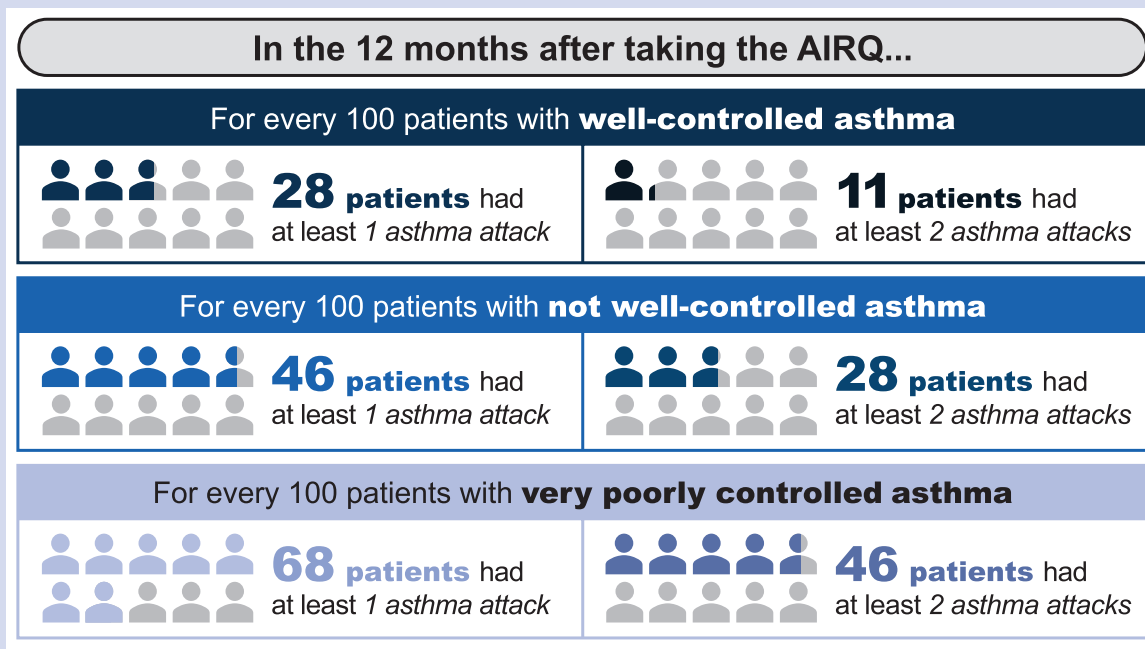


Figure 6. Number of patients with different levels of asthma control who experienced at least one or at least two asthma attacks in the 12 months after taking the AIRQ. Each icon represents five people.

Source: The information in this figure is adapted with permission from Beuther D.A., et al. *J Allergy Clin Immunol* 2022; 10(12): 3204–3212.e2, Elsevier.

How can a patient and their healthcare professional know if their asthma control is getting better or worse?

- A “minimal important difference” is the smallest change in a test score that a patient feels is meaningful. This can be a decrease in **AIRQ** score, which would indicate improvement in their asthma, or an increase in **AIRQ** score, which would indicate worsening of their disease.
 - For the **AIRQ**, a decrease of 2 points in a patient’s **AIRQ** score signals a change that the patient feels is meaningful or a feeling that their asthma control has improved.
 - An increase in **AIRQ** score of 2 points can signal a significant increased risk of a future asthma attack.

What were the main conclusions reported by the researchers?

- The **AIRQ** is a validated questionnaire that is easy to read and answer, with 10 yes-or-no questions to assess a patient’s level of asthma control.
- The **AIRQ** score effectively places the patient’s asthma into the control categories of being well-controlled, not well-controlled, or very poorly controlled based on their symptoms over the past 2 weeks and asthma attacks during the 12 months before completing the questionnaire.
- Compared with other questionnaires, the **AIRQ** is less likely to overestimate asthma control, which means that most patients with asthma rated as well-controlled by the **AIRQ** do, in fact, have well-controlled asthma.
- Additionally, **AIRQ** scores reflect a patient’s health-related quality of life and predict the risk of future asthma attacks.
- This means that the **AIRQ** provides an accurate picture of a patient’s asthma control for healthcare professionals and patients, which allows for informed decisions on educational and medical interventions and treatment strategies.

Where can you find the original articles on which this summary is based?

The original article “Development of the Asthma Impairment and Risk Questionnaire (AIRQ): a composite control measure” was published in the *Journal of Allergy and Clinical Immunology: In Practice* in 2020 (Murphy K.R., et al. *J Allergy Clin Immunol Pract* 2020; 8: 2263–2274). You can read the full article with an institutional login or subscription here: <https://www.sciencedirect.com/science/article/abs/pii/S2213219820302440>.

The original article “Relationship between asthma control as measured by the Asthma Impairment and Risk Questionnaire (AIRQ) and patient perception of disease status, health-related quality of life, and treatment adherence” was published in the *Journal of Asthma and Allergy* in 2023 (Reibman J., et al. *J Asthma Allergy* 2023; 16: 59–72). You can read the full article for free here: <https://www.dovepress.com/relationship-between-asthma-control-as-measured-by-the-asthma-impairme-peer-reviewed-fulltext-article-JAA>.

The original article “The Asthma Impairment and Risk Questionnaire (AIRQ) control level predicts future risk of asthma exacerbations” was published in the *Journal of Allergy and Clinical Immunology: In Practice* in 2022 (Beuther D.A., et al. *J Allergy Clin Immunol Pract* 2022; 10(12): 3204–3212.e2). You can read the full article with an institutional login or subscription here: <https://www.sciencedirect.com/science/article/abs/pii/S2213219822008224>.

The original article “Evaluating construct validity of the Asthma Impairment and Risk Questionnaire using a 3-month exacerbation recall” was published in the *Annals of Allergy Asthma & Immunology* in 2022 (Chippis B.E., et al. *Ann Allergy Asthma Immunol* 2022; 128(5): 544–552.e3). You can read the full article with an institutional login or subscription here: <https://www.sciencedirect.com/science/article/abs/pii/S1081120622000813>.

The original article “The Asthma Impairment and Risk Questionnaire enhances the assessment of asthma control” was published in the *Annals of Allergy, Asthma & Immunology* in 2023 (Chippis B., et al. *Ann Allergy Asthma Immunol* 2023; 131: 436–443). You can read the full article for free here: [https://www.annallergy.org/article/S1081-1206\(23\)00308-3/pdf](https://www.annallergy.org/article/S1081-1206(23)00308-3/pdf).

The original article “Assessing meaningful change in the Asthma Impairment and Risk Questionnaire” published in the *Annals of Allergy, Asthma & Immunology* in 2024 (McCann W., et al. *Ann Allergy Asthma Immunol* 2024; 133(2): 152–158). You can read the full article for free here: <https://www.sciencedirect.com/science/article/pii/S1081120624000851>.

The original article “Advancing assessment of asthma control with a composite tool. The Asthma Impairment and Risk Questionnaire” was published in the *Annals of Allergy, Asthma & Immunology* in 2024 (Chippis B.E., et al. *Ann Allergy Asthma Immunol* 2024; 133(1): 49–56). You can read the full article for free here: [https://www.annallergy.org/article/S1081-1206\(24\)00153-4/fulltext](https://www.annallergy.org/article/S1081-1206(24)00153-4/fulltext).

The original abstract “Patient experience with the Asthma Impairment and Risk Questionnaire (AIRQ) in clinical practice” was published in the *Annals of Allergy, Asthma & Immunology* in 2019 (George M., et al. *Ann Allergy Asthma Immunol* 2019; 123(5): S43–S44). You can read the full abstract with an institutional login or subscription here: [https://www.annallergy.org/article/S1081-1206\(19\)30887-7/abstract](https://www.annallergy.org/article/S1081-1206(19)30887-7/abstract).

Declarations

Ethics approval and consent to participate

The study protocol was approved by the Ethical and Independent Review Services Institutional Review Board (Independence, MO, United States) for all sites except one, which required local institutional review board approval. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki, International Committee on Harmonisation Good Clinical Practices, Good Pharmacoepidemiology Practices, and US and local laws. Adults or legal guardians of adolescents provided written informed consent; adolescents provided verbal assent.

Consent for publication

All authors were involved in the preparation of this plain language summary publication and provided their final approval of content.

Author contributions

Author contributions to study conception and design, analysis of the data, and interpretation of results were as noted in the original publications. All authors read and approved the final manuscript for each of the studies for which they were authors and for this plain language summary publication.

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Competing interests

M.G. has served as a consultant and speaker for AstraZeneca and Regeneron; and has served as a consultant for AstraZeneca, Genentech/Roche, and Verona Pharma. B.E.C. has served as an advisor, consultant, and speaker for AstraZeneca, Boehringer Ingelheim, Circassia Pharmaceuticals, Genentech, Novartis, Regeneron, and Sanofi. D.A.B. has participated in advisory boards for AstraZeneca. W.M. has served as a consultant and speaker for AstraZeneca; has served as a speaker for Regeneron; and has served as a consultant for Aimmune. J.R. has served on advisory boards for AstraZeneca, Genentech, and Novartis; has received grants from Novartis; and has received research support from AstraZeneca, Novartis, and Teva Pharmaceuticals. R.A.W. has received research grant support from AstraZeneca, Chiesi, Sanofi–Regeneron, and Verona Pharma; and has received consulting fees for serving on data safety monitoring boards or clinical endpoint committees from AbbVie, AstraZeneca, Boehringer Ingelheim, Bristol Myers Squibb, Galderma, Kamada, Pulmonx, and Savara. R.S.Z. has received grant support from ALK-Abelló A/S, AstraZeneca, Blueprint Technologies, Merck & Co., Sanofi, and the National Heart, Lung, and Blood Institute; has received consultant fees from AstraZeneca, Bayer, and Merck & Co.; has received royalties from UpToDate; and has received warrants from DBV Technologies during the conduct of the present study. I.G. and J.M.E. are employees of AstraZeneca and may hold stock or stock options. H.N.G. is an employee of Alexion, AstraZeneca Rare Disease, and may hold stock or stock options. K.S.C., G.H., K.C., and M.R. are employees of Evidera, which was contracted by AstraZeneca for study design and to collect and analyze data for the AIRQ studies. K.R.M. has served as a consultant and is a speaker for

AstraZeneca, Boehringer Ingelheim, Genentech, GSK, Merck, Mylan, Novartis, OptiNose, Pharming, Regeneron, Sanofi, Stallergenes Greer, and Teva Pharmaceuticals.

Availability of data and materials

The data that support the findings of these studies are available from the corresponding author upon reasonable request.