The Current (MIS) Perception of Asthma Control

Using Evidence-based Tools to Advance the Identification and Management of Uncontrolled Asthma Across Disease Severities
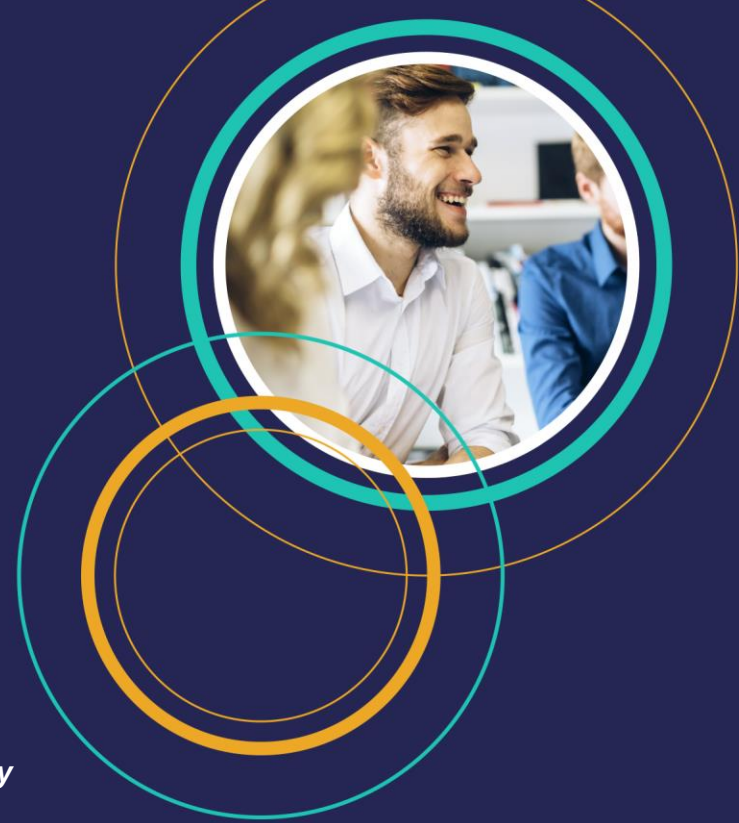
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Objectives

1 Recognize the burden of uncontrolled asthma in the United States

2 Heighten awareness of patients' and clinicians' overestimation of asthma control and the consequences of SABA utilization, exacerbations, and systemic corticosteroid exposures

3 Learn how the AIRQ® and accompanying evidence-based educational materials can help identify and act on uncontrolled asthma

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AIRQ®, Asthma Impairment and Risk Questionnaire; SABA, short-acting β_2-agonist.

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Pre-Evaluation Survey

Open your browser and navigate to
https://forms.office.com/r/QrSvbJUABY
or

Point your phone's camera at the QR code

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What is PRECISION?

PRECISION is an unbranded initiative dedicated to improving the **identification** and **management** of patients with **uncontrolled asthma**

AstraZeneca united a network of >200 advisors across the United States who directly informed the objectives and initiatives of the PRECISION program to help address the unmet need of asthma

≈25M people in the United States have asthma[1]

≈60% of adults with asthma have **uncontrolled asthma**[2,a,b]

≈44% of children with asthma have **uncontrolled asthma**[3,a,b]

≈65% of people (≥12 years old) with persistent asthma have **used OCS**[4,c]
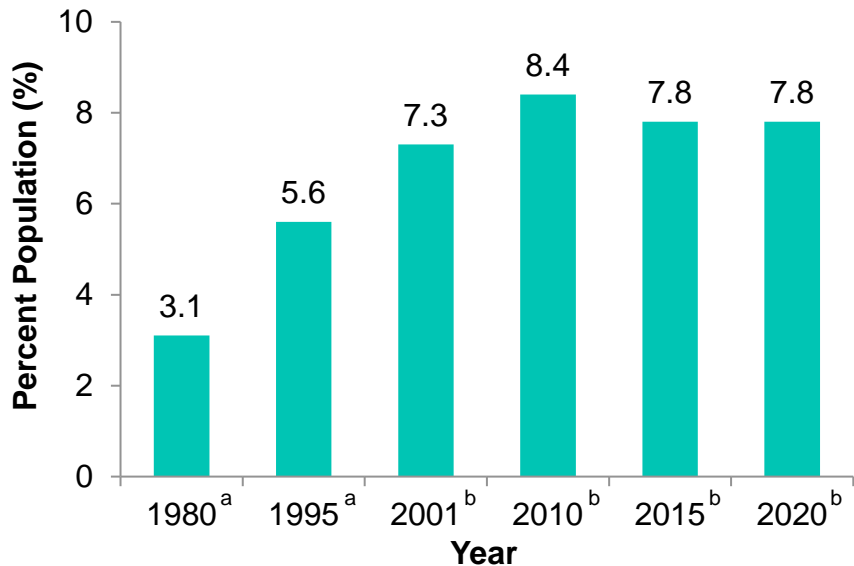
[a]Asthma control classified as well-controlled or uncontrolled based on National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma, 2007. [b]Data for children and adults from Behavioral Risk Factor Surveillance System (BRFSS).[c]The IBM MarketScan Commercial Claims and Encounters, Medicare Supplemental, and Medicaid Multistate Claims research databases were used to identify 435,675 patients ≥12 years old with persistent asthma and without COPD or other excluded conditions from January 1, 2012 to December 31, 2017; All patients were followed for OCS use from the date after the index date to the end of follow-up.

OCS, oral corticosteroid

1. Most Recent National Asthma Data, 2020. CDC. https://www.cdc.gov/asthma/most_recent_national_asthma_data.htm. Accessed March 8, 2023. 2. Uncontrolled Asthma Among Adults, 2019. CDC. https://www.cdc.gov/asthma/asthma_stats/uncontrolled-asthma-adults-2019.htm. Accessed March 8, 2023. 3. Uncontrolled Asthma Among Children with Current Asthma, 2018-2020. CDC. https://www.cdc.gov/asthma/asthma_stats/uncontrolled-asthma-children-2018-2020.htm. Accessed March 8, 2023. 4. Tran TN, et al. *J Allergy Clin Immunol Pract.* 2021;9(1):338-346.

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Asthma Is Common and Often Uncontrolled

Asthma Prevalence in the US[1-4]

Bar chart — Percent Population (%) vs Year:
- 1980[a]: 3.1
- 1995[a]: 5.6
- 2001[b]: 7.3
- 2010[b]: 8.4
- 2015[b]: 7.8
- 2020[b]: 7.8

Burden of Asthma in the United States

Prevalence of asthma attacks 2020[4,b,c]

≈10.3 million annual asthma attacks

Missed days due to asthma 2018[5]

7.9 million school days

10.9 million workdays

Deaths due to asthma 2020[4]

4145 total; 204 in individuals <18 years old

[a]12-month prevalence. Includes persons who gave an affirmative response to the question: "During the past 12 months has anyone in the family had asthma?" Data from National Health Interview Survey (NHIS). [b]Current prevalence. Includes persons who gave an affirmative response to the questions: "Have you ever been told by a doctor or other healthcare professional that you had asthma?" and "Do you still have asthma?" Data from NHIS. [c]Having had one or more asthma attacks in the past 12 months among people with current asthma.

1. Moorman JE, et al. *MMWR Surveill Summ*. 2007;56:1-54. 2. Moorman JE, et al. *Vital Health Stat 3*. 2012;(35):1-58. 3. Archived National Asthma Data, 2015. CDC. https://www.cdc.gov/asthma/archivedata/2015/2015_data.html. Accessed March 8, 2023. 4. Most Recent National Asthma Data, 2020. CDC. https://www.cdc.gov/asthma/most_recent_national_asthma_data.htm. Accessed March 8, 2023. 5. American Lung Association. Asthma trends and burden. https://www.lung.org/research/trends-in-lung-disease/asthma-trends-brief/trends-and-burden. Accessed March 8, 2023.

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Projected Health and Economic Burden of Uncontrolled Asthma[a]

Projections from 2019 to 2038 among patients aged 15 years or older[1] …

Asthma prevalence

17.7 Million

patients are projected to be living with asthma in 2038, up from 15.9 million patients in 2019

Uncontrolled asthma

52%

of all patient-years with asthma will be uncontrolled

Cost

≈$1 Trillion

is the projected cumulative total-direct ($300.65 B) and excess-indirect ($662.9 B) cost associated with uncontrolled asthma

Increased direct healthcare costs due to uncontrolled asthma include HCP, ED, and hospital visits as well as medications, such as rescue and maintenance medications and systemic corticosteroids.[1,2]

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Airway Inflammation Drives Asthma Symptoms

Inflammation drives airway narrowing[1,2]

Normal Airway | **Asthma**

Relaxed muscles[1,2]

Open airway[1,2]

Tightened muscles[1,2]

Swelling and inflammation[1,2]

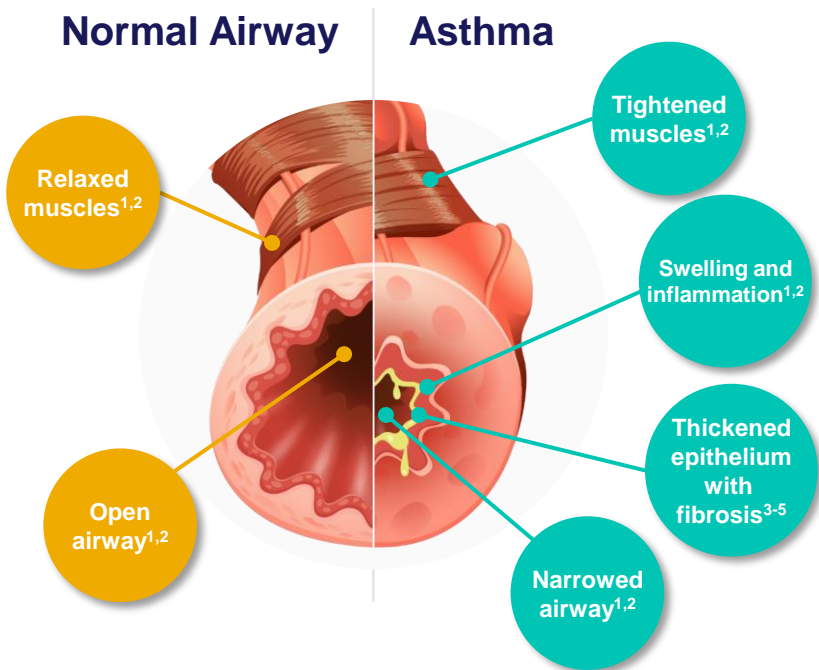Thickened epithelium with fibrosis[3-5]

Narrowed airway[1,2]

Airway narrowing causes asthma symptoms[2]:

- Cough
- Chest tightness
- Wheeze
- Shortness of breath

Inflammation and symptoms[2]:

- Variable over time
- Variable in intensity

Even when patients are asymptomatic, underlying airway inflammation can persist[2]

1. Sockrider M, et al. *Am J Respir Crit Care Med.* 2020;202:P25-P26. 2. Global Initiative for Asthma, 2022. Available at: www.ginasthma.org. Accessed March 8, 2023. 3. Bartemes KR, et al. *Clin Immunol.* 2012;143(3):222–235. 4. Holgate ST. *Immunol Rev.* 2011;242(1):205-219. 5. Cohen L, et al. *Am J Respir Crit Care Med.* 2007;176(2):138-145.

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Airway Inflammation is Poised to Lead to an Exacerbation Regardless of the Presence of Symptoms or Disease Severity

Asymptomatic asthma[1]

Epithelial disruption

Thickened basement membrane

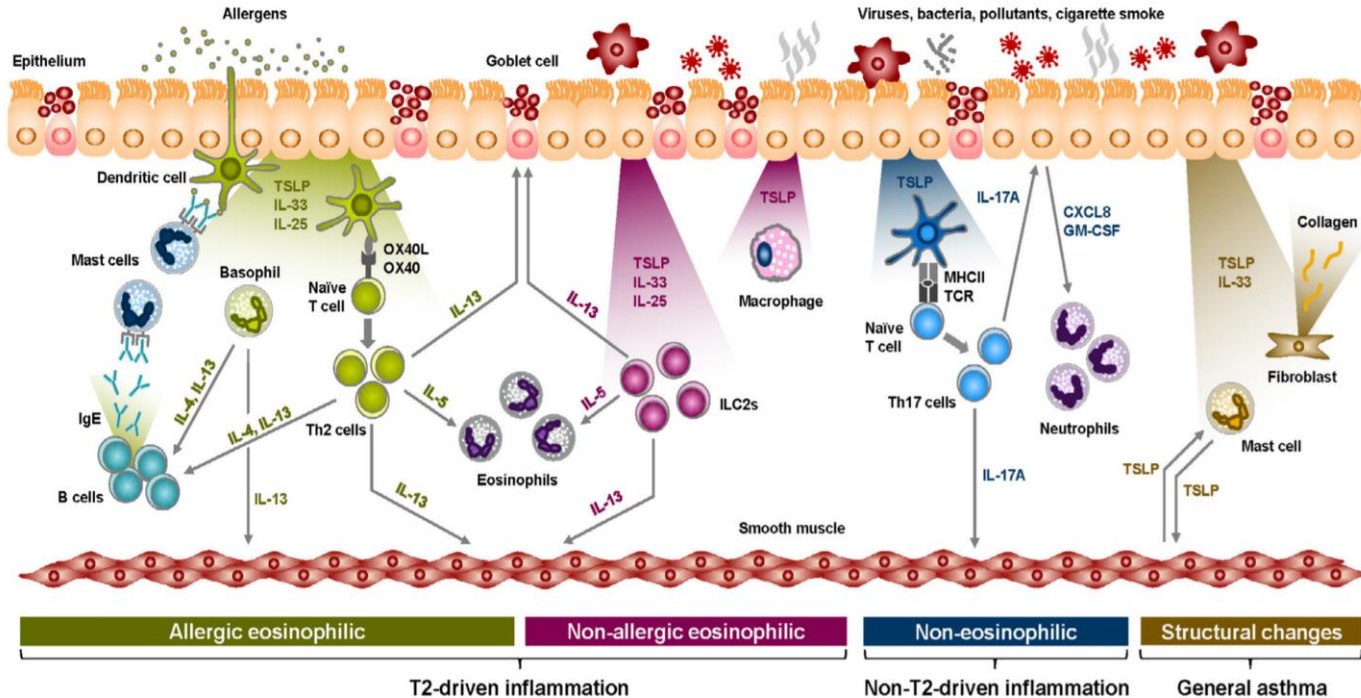Eosinophil and neutrophil infiltration
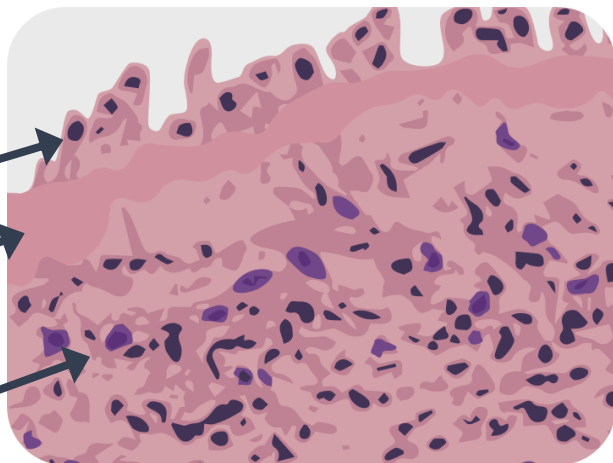
Adapted from McFadden, et al. *N Engl J Med*. 1992.

Depiction of an endobronchial biopsy from a patient *without symptoms*

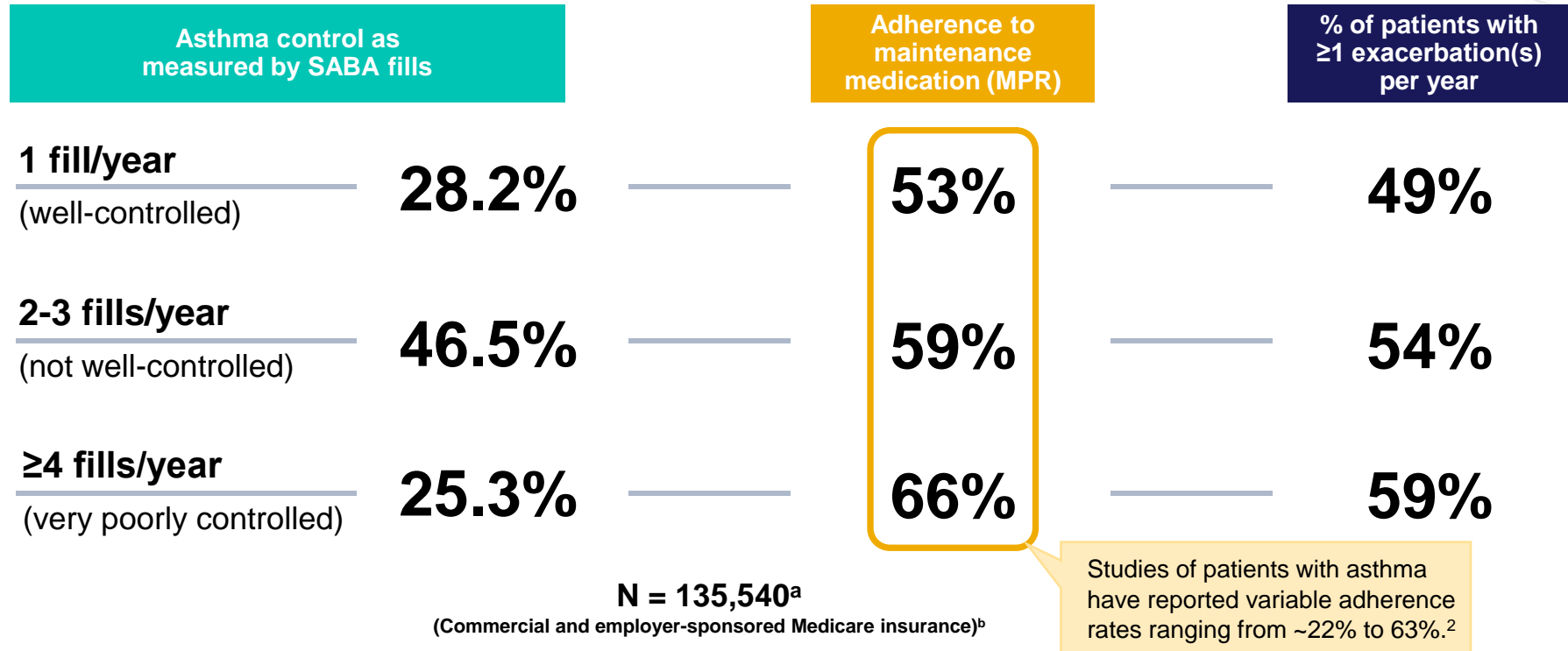**Even in patients with apparently mild asthma,[a] the risk for an exacerbation is substantial[2]**

- Up to **37%** of asthma-related ED admissions were in patients with mild asthma[3]

- **16%** of patients with mild persistent asthma had at least 1 exacerbation in the previous year[3]

- **60%** of patients with intermittent asthma had at least 1 exacerbation in the previous year[3]

[a]Includes mild persistent asthma and intermittent asthma.

ED, emergency department.

1. McFadden ER Jr, Gilbert IA. *N Engl J Med*. 1992;327(27):1928-1937. 2. Global Initiative for Asthma, 2022. Available at: www.ginasthma.org. Accessed April 3, 2023. 3. Dusser D, et al. *Allergy*. 2007;62(6):591-604.

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The Asthma Inflammatory Cascade Involves Multiple Pathways[1-5]

Regardless of the specific pathway, rising inflammation can lead to uncontrolled asthma and exacerbations[6]

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Real-world Use of Maintenance Therapy May Not Address Fluctuating Inflammation or Eliminate the Risk of Exacerbations[1]

Asthma control as measured by SABA fills		Adherence to maintenance medication (MPR)	% of patients with ≥1 exacerbation(s) per year
1 fill/year (well-controlled)	**28.2%**	**53%**	**49%**
2-3 fills/year (not well-controlled)	**46.5%**	**59%**	**54%**
≥4 fills/year (very poorly controlled)	**25.3%**	**66%**	**59%**

N = 135,540[a]
(Commercial and employer-sponsored Medicare insurance)[b]

Studies of patients with asthma have reported variable adherence rates ranging from ~22% to 63%.[2]

[a]Analysis of US administrative claims data from IBM MarketScan research databases to determine real-world associations between SABA use and severe exacerbations in patients ≥12 years old with asthma (September 30, 2014, to September 30, 2016, data). [b]Commercial Claims and Encounters (Commercial) and Medicare Supplemental and Coordination of Benefits (Medicare) databases were used in this study. The Medicare database contains both medical and pharmacy data of individuals with Medicare supplemental insurance paid for by employers.

MPR, medication possession ratio; SABA, short-acting β_2-agonist.

1. Lugogo N, et al. *Ann Allergy Asthma Immunol.* 2021;126(6):681-689.e1. 2. Barnes CB, Ulrik CS. *Respir Care.* 2015;60(3):455-468.

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Geographic Variability in Severe Uncontrolled Asthma[1,2,a]

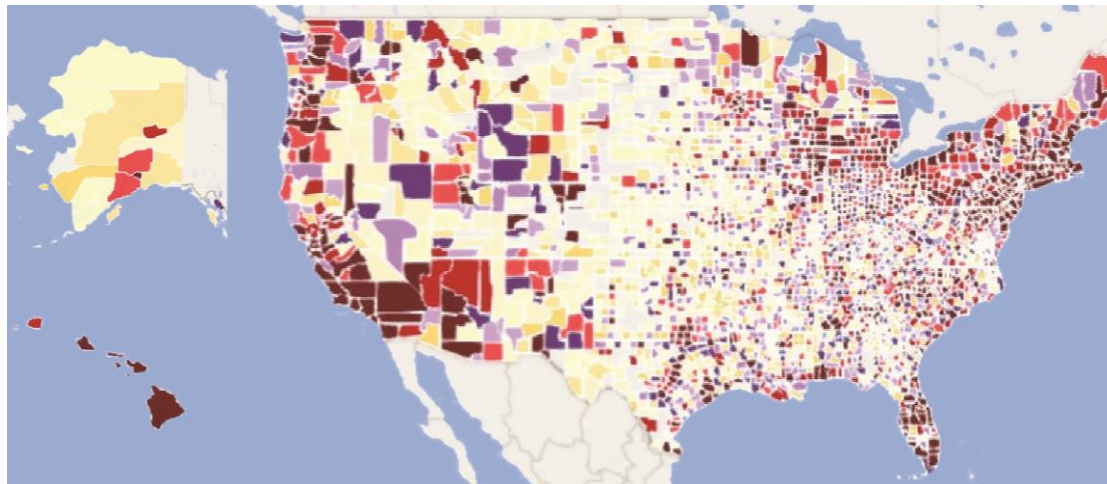In a large US administrative claims population **≈4.5M** of all ages with an asthma diagnosis[a]

Findings

15% Uncontrolled (≥2 annual SCS fills)

14% Treated as severe asthma (GINA 4/5 therapy)[b]

≈3% Severe and uncontrolled asthma (n ≈ 144K)

Percentile Rank of Severe Uncontrolled Asthma

- 85-100
- 75-84
- 65-74
- 55-64
- 45-54
- 35-44
- 25-34
- 15-24
- 5-14
- 0-4
- NA

Darkest colored counties represent greatest concentration of severe uncontrolled asthma

[a]US IQVIA LAAD medical and pharmacy databases of 4,506,527 patients of all ages with a diagnosis code for asthma and pharmacy claims for asthma therapies defined as 1 SABA and any leukotriene modifier ICS or ICS/LABA pharmacy claim or ≥2 SABA pharmacy claims in 2016. [b]Asthma severity defined by age-specific pharmacologic treatment with ≥25% of proportion of days covered as per NAEPP 2007 and GINA 2018 reports.

GINA, Global Initiative for Asthma; ICS, inhaled corticosteroid; LABA, long-acting β_2-agonist; NAEPP, National Asthma Education and Prevention Program; SABA, short-acting β_2-agonist; SCS, systemic corticosteroid.

1. Bleecker ER, et al. *Ann Allergy Asthma Immunol*. 2022;128:78-88. 2. Bleecker ER et al. 2020 American Thoracic Society International Conference. Abstract retrieved from: https://www.abstractsonline.com/pp8/#!/8998/presentation/13255. Accessed March 8, 2023.

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Defining Control by BOTH Risk[a] & Impairment[b] Reveals the Full Magnitude of Uncontrolled Asthma[1,2,c]

N ≈ 4.5M database of patients diagnosed with asthma (all ages)

Approximately 38% of all patients with asthma are uncontrolled

■ Risk[a]
(≥2 annual SCS fills)

■ Impairment[b]
(≥3 annual SABA fills)

■ Uncontrolled
(≥2 SCS fills and/or ≥3 SABA annually)

Severe Asthma
(GINA 4/5)
N ≈ 640k

- n≈147k (23%)
- n≈250k (39%)
- n≈320k (50%)

Mild/Moderate Asthma
(GINA 1, 2, & 3)
N ≈ 3.9M

- n≈541k (14%)
- n≈1.1M (28%)
- n≈1.4M (36%)

0 — 300,000 — 600,000 — 900,000 — 1,200,000 — 1,500,000
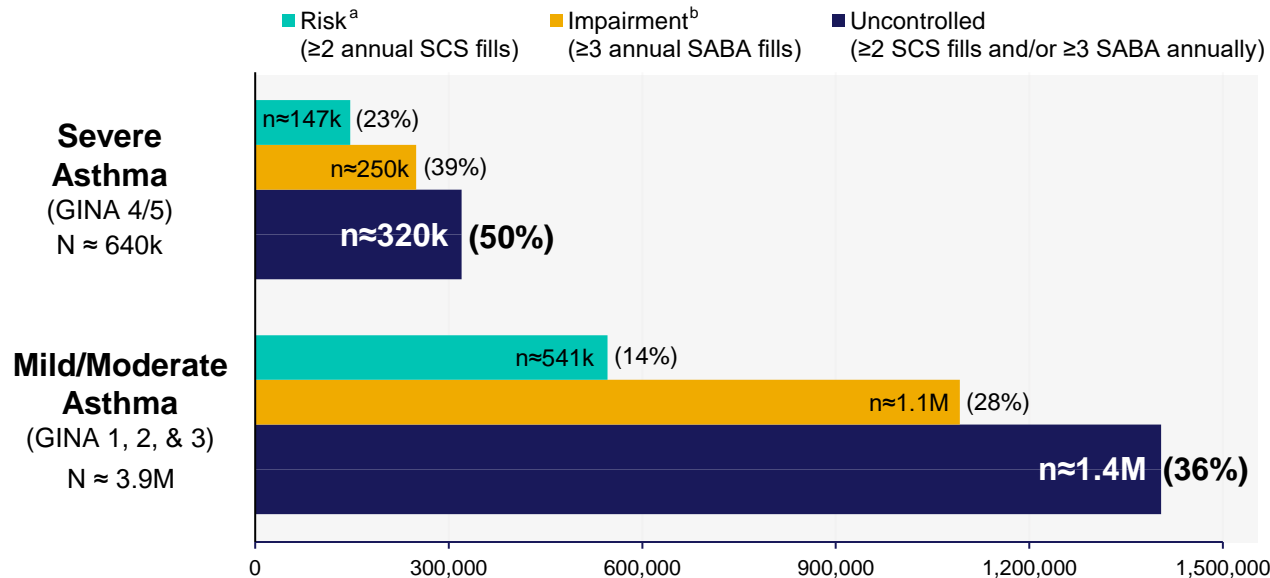
81%
of all uncontrolled asthma is in patients treated for **mild or moderate asthma**

[a]≥ 2 annual SCS fills; [b]≥ 3 annual SABA fills; [c]US IQVIA LAAD medical and pharmacy databases of 4,506,527 patients of all ages with a diagnosis code for asthma (from 2015-2018) and any medical or pharmacy claim in 2016 and 1 or more pharmacy claim for an inhaled corticosteroid (ICS), leukotriene modifier (LM), fixed-dose combination inhaled corticosteroid + long-acting β₂-agonist (ICS/LABA) or 2 or more claims for a short-acting β₂-agonist (SABA). Severe asthma was defined by age-specific pharmacologic treatment with ≥25% of proportion of days covered as per NAEPP 2007 and GINA 2018 reports.

GINA, Global Initiative for Asthma; k, thousand; M, million; NAEPP, National Asthma Education and Prevention Program; SCS, systemic corticosteroid.

1. Bleecker ER, et al. *Ann Allergy Asthma Immunol.* 2022;128:78-88. 2. Bleecker ER et al. 2020 American Thoracic Society International Conference. Abstract retrieved from: https://www.abstractsonline.com/pp8/#!/8998/presentation/13255. Accessed March 8, 2023.

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Treatment of Exacerbations With Short Courses of OCS* Are Associated With a Risk of Developing Adverse Health Conditions[1-3]

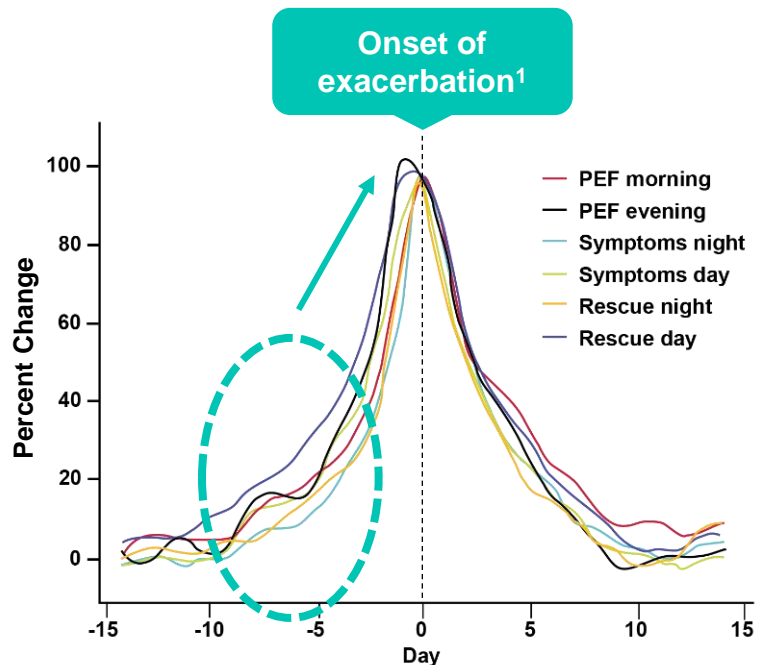| Burst 1				Burst 2				Burst 3		
Days	**40 mg**	**50 mg**	**60 mg**		**40 mg**	**50 mg**	**60 mg**	**40 mg**	**50 mg**	**60 mg**
3	120 mg	150 mg	180 mg		240 mg	300 mg	360 mg	360 mg	450 mg	540 mg
4	160 mg	200 mg	240 mg		320 mg	400 mg	480 mg	480 mg	600 mg	720 mg
5	200 mg	250 mg	300 mg		400 mg	500 mg	600 mg	600 mg	750 mg	900 mg
6	240 mg	300 mg	360 mg		480 mg	600 mg	720 mg	720 mg	900 mg	1080 mg
7	280 mg	350 mg	420 mg		560 mg	700 mg	840 mg	840 mg	950 mg	1260 mg
8	320 mg	400 mg	480 mg		640 mg	800 mg	960 mg	960 mg	1200 mg	1440 mg
9	360 mg	450 mg	540 mg		720 mg	900 mg	1080 mg	1080 mg	1350 mg	1620 mg
10	400 mg	500 mg	600 mg		800 mg	1000 mg	1200 mg	1200 mg	1500 mg	1800 mg

Below the LIFETIME high-risk SCS exposure threshold

≥500mg cumulative SCS increases the risk of Type 2 Diabetes and Depression/Anxiety

≥1000 mg cumulative SCS increases the risk of Renal Impairment, Cataracts, Heart Failure, Pneumonia, Osteoporosis

Significant risk is evident when crossing a 500 mg threshold of cumulative OCS* exposure compared to the reference category of >0 to <0.5 g SCS[1,a,b]

Individual Experiences Vary

*Of 305,110 SCS prescriptions analyzed, 2% were parenteral. Estimated cumulative exposure of SCS calculated as prednisolone equivalent.

[a]Incidence rates of each adverse outcome were calculated as cases per 100 patient-years of follow-up, and conditional multivariable Cox proportional hazard models were used to compare the risk of adverse outcomes between SCS and non-SCS arms. Adverse outcomes in SCS arms vs non-SCS arms from the Optimum Care Research Database and Clinical Practice Research Datalink from 24,117 matched pairs of patients. Data shown are for the majority of outcomes. Of SCS prescriptions included in the analyses, 98% were for OCS and 2% were for parenteral corticosteroids. [b]Record availability before SCS initiation of 9.9 and 8.7 years and median follow-up of 7.4 and 6.4 years in SCS and non-SCS arms, respectively. Data not shown for cumulative exposures >2.5 g. OCS, oral corticosteroids; SCS, systemic oral corticosteroids.

1. Price DB, et al. *J Asthma Allergy*. 2018;11:193-204. 2. Global Initiative for Asthma, 2022. Available at: www.ginasthma.org. Accessed March 8, 2023.
3. National Heart, Lung, and Blood Institute. National Asthma Education and Prevention Program. Expert Panel Report 3: Guidelines for the diagnosis and management of asthma, 2007. Available at: https://www.ncbi.nlm.nih.gov/books/NBK7232/pdf/Bookshelf_NBK7232.pdf. Accessed March 8, 2023.

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Treatment of Exacerbations With Short Courses of OCS* Are Associated With a Risk of Developing Adverse Health Conditions[1-3]

	Burst 1				Burst 2				Burst 3		
Days	**40 mg**	**50 mg**	**60 mg**		**40 mg**	**50 mg**	**60 mg**		**40 mg**	**50 mg**	**60 mg**
3	120 mg	150 mg	180 mg		240 mg	300 mg	360 mg		360 mg	450 mg	540 mg
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8	320 mg	400 mg	480 mg		640 mg	800 mg	960 mg		960 mg	1200 mg	1440 mg
9	360 mg	450 mg	540 mg		720 mg	900 mg	1080 mg		1080 mg	1350 mg	1620 mg
10	400 mg	500 mg	600 mg		800 mg	1000 mg	1200 mg		1200 mg	1500 mg	1800 mg

It only takes 1-2 courses of OCS to increase the risk of adverse health outcomes

*Of 305,110 SCS prescriptions analyzed, 2% were parenteral. Estimated cumulative exposure of SCS calculated as prednisolone equivalent.

OCS, oral corticosteroids; SCS, systemic corticosteroids.

1. Price DB, et al. *J Asthma Allergy*. 2018;11:193-204. 2. Global Initiative for Asthma, 2022. Available at: www.ginasthma.org. Accessed March 8, 2023. 3. National Heart, Lung, and Blood Institute. National Asthma Education and Prevention Program. Expert Panel Report 3: Guidelines for the diagnosis and management of asthma, 2007. Available at: https://www.ncbi.nlm.nih.gov/books/NBK7232/pdf/Bookshelf_NBK7232.pdf. Accessed March 8, 2023.

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A Window of Opportunity to Intervene May Exist in the Days Leading Up to an Exacerbation

Onset of exacerbation[1]

Legend:
- PEF morning
- PEF evening
- Symptoms night
- Symptoms day
- Rescue night
- Rescue day

Y-axis: Percent Change
X-axis: Day (-15 to 15)

- Asthma is a variable, inflammatory disease[2]

- As inflammation rises, so do symptoms and the use of rescue therapy[1]

There may be a window of opportunity to treat symptoms and concomitantly mitigate a rise in airway inflammation to prevent exacerbations

Window is for illustrative purposes only and is not part of the published data set.
Adapted from Tattersfield AE, et al. *Am J Respir Crit Care Med.* 1999;160(2):594-599.

Data for the rate of change in PEF, symptoms, and rescue use were standardized, with day -14 equal to 0% and day 0 equal to 100%. A *severe asthma exacerbation* was defined as an exacerbation that required oral corticosteroids as judged by the clinical investigator or an episode in which morning PEF fell by more than 30% from mean morning PEF during the last 10 days of the run-in period (baseline) on 2 consecutive days.

PEF, peak expiratory flow.

1. Tattersfield AE, et al. *Am J Respir Crit Care Med* 1999;160(2):594-599. 2. Global Initiative for Asthma, 2022. Available at: www.ginasthma.org. Accessed March 8, 2023

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NAEPP and GINA Support ICS/Fast-acting Bronchodilators[a] as Rescue/Reliever in Patients ≥12 Years[1,2]

NAEPP-Focused Updates 2020[1]

Preferred treatment steps

Step 1	PRN SABA
Step 2	Daily low-dose ICS and PRN SABA, or PRN concomitant ICS and SABA
Step 3	Daily and PRN combination low-dose ICS-formoterol[*,b]
Step 4	Daily and PRN combination medium-dose ICS-formoterol[*,b]
Step 5	Daily medium-/high-dose ICS-LABA + LAMA and PRN SABA
Step 6	Daily high-dose ICS-LABA + OCS + PRN SABA

GINA 2023[2]

Track 1 (Preferred)

RELIEVER: As-needed low-dose ICS-formoterol[*,c]

Steps 1-2	As-needed-only low-dose ICS-formoterol[*,c]
Step 3	Low-dose maintenance ICS-formoterol[*]
Step 4	Medium-dose maintenance ICS-formoterol[*]
Step 5	Add on LAMA. Refer for phenotypic assessment ± biologic therapy. Consider high-dose ICS-formoterol.[*]

SABA alone as reliever therapy no longer recommended[2]

"The risk of severe exacerbations and mortality increases incrementally with higher SABA use, independent of treatment step."[2]

[*]The use of ICS-formoterol is not approved for maintenance and rescue therapy or for as-needed rescue only in the US. The recommendations for ICS-formoterol are based on clinical data evaluating the use of ICS-formoterol formulations and strengths not approved and not available in the US.

[a]Fast-acting bronchodilators: SABA or formoterol.[2] [b]ICS-formoterol as daily controller and reliever is preferred over equivalent-dose ICS + LABA or higher-dose ICS as daily controller therapy and SABA reliever.[1]
[c]Anti-inflammatory reliever (AIR); ICS-formoterol should not be used as the reliever by patients who are taking a different maintenance ICS-LABA; for these patients, the appropriate reliever options are SABA or ICS-SABA.[2]
GINA, Global Initiative for Asthma; ICS, inhaled corticosteroid; LABA, long-acting β$_2$-agonist; LAMA, long-acting muscarinic antagonist; NAEPP, National Asthma Education and Prevention Program; OCS, oral corticosteroid; PRN, as-needed; SABA, short-acting β$_2$-agonist.
1. NHLBI. 2020 Focused Updates to the Asthma Management Guidelines: a report from the National Asthma Education and Prevention Program coordinating committee expert panel working group. Accessed May 2, 2023.https://www.nhlbi.nih.gov/health-topics/all-publications-and-resources/2020-focused-updates-asthma-management-guidelines. 2. GINA. Global strategy for asthma management and prevention, 2023. Accessed May 2, 2023. https://ginasthma.org.

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GINA 2023 Includes Recommendations for Concomitant Use of SABA and ICS Across All Steps of Therapy[1]

GINA 2023 Track 2 in patients ≥12 years

When Track 1 is not possible or if a patient is stable with good adherence and had no exacerbations on current therapy

Alternative **CONTROLLER** and **RELIEVER** (Track 2):
Before considering a regimen with SABA reliever, check if the patient is likely to adhere to daily controller treatment

Step 5 Add-on LAMA. Refer for phenotypic assessment ± biologic therapy. Consider high-dose ICS-LABA

Step 4 Medium-/high-dose maintenance ICS-LABA

Step 3 Low-dose maintenance ICS-LABA

Step 2 Low-dose maintenance ICS

Step 1 ICS whenever SABA is taken[a]

RELIEVER: as-needed SABA, or *as-needed ICS-SABA*[a]

Personalized asthma management: Review, Assess, & Adjust for individual patient needs

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Addressing the Comprehensive Burden of Uncontrolled Asthma

Asthma control consists of 2 domains, represented by **symptom impairment** and **exacerbation risk**[1]

As asthma control worsens, the chance of an asthma attack increases[2]

Many asthma control questionnaires that are recommended by expert guidelines or reports to assess adolescents and adults with asthma address the **impairment domain only,**[1] including:

ATAQ = Asthma Therapy Assessment Questionnaire®
ACQ = Asthma Control Questionnaire®
ACT = Asthma Control Test™

The PRECISION Program was initiated to develop innovative, **validated tools** to improve the **identification** of uncontrolled asthma and **educational resources** for both practitioners and patients

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1. National Heart, Lung, and Blood Institute. National Asthma Education and Prevention Program. Expert Panel Report 3: Guidelines for the diagnosis and management of asthma, 2007. Available at: https://www.ncbi.nlm.nih.gov/books/NBK7232/pdf/Bookshelf_NBK7232.pdf. Accessed March 8, 2023. 2. Haselkorn T, et al. *J Allergy Clin Immunol.* 2009:124(5):895-902.e9024.

Validation of a Composite Tool: The Asthma Impairment and Risk Questionnaire (AIRQ®)

Cross-sectional Study[1]

Objective: To derive the AIRQ® questions and cut points to **validate AIRQ® as a measure of current asthma control** relative to a standard of ACT™ score and prior 12-month exacerbations

- N = 442 patients
- 12 clinical sites

Longitudinal Study[2]

Objective: To assess the ability of **AIRQ® to predict exacerbation occurrence** over the subsequent 12 months

- N = 1112 patients
- 25 clinical sites

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The Standard of Asthma Control Against which the AIRQ® Was Validated

ACT™ + Exacerbation Outcome[a]	ACT™ Score		OCS Use or ED/unplanned Visits in Past 12 Months		Hospitalization in Past 12 Months
Well-controlled	≥20	AND	0	AND	0
Not well-controlled	16-19	OR	1	AND	0
Very poorly controlled	≤15	OR	≥2	OR	≥1

Exacerbation was defined as a change in asthma clinical status requiring a course of systemic corticosteroids (oral steroids for ≥3 days) OR an emergency department, urgent care, or unplanned office visit for an asthma exacerbation (not associated with a hospitalization) OR hospital stay for asthma for >24 hours.

[a]Well-controlled: ACT™ ≥20 and no OCS use, ED/unplanned visits, or hospitalizations. Not well-controlled: ACT™ of 16-19 *or* 1 burst of OCS *or* 1 visit to the ED/unplanned visit due to asthma in the past 12 months with no hospitalizations in the past 12 months. Very poorly controlled: ACT™ ≤15 *or* ≥2 bursts of OCS *or* ED/unplanned visits or hospitalized due to asthma in the past 12 months.

ACT™, Asthma Control Test; ED, emergency department; OCS, oral corticosteroid.

Murphy KR et al, on behalf of the US PRECISION Advisory Board. *J Allergy Clin Immunol Pract.* 2020;8(7):2263-2274.e5.

The Asthma Impairment and Risk Questionnaire (AIRQ®) Assesses BOTH Impairment and Risk

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

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

10-item, equally weighted, yes/no composite asthma control questionnaire with **7 impairment** and **3 risk items**

- Well-controlled (0-1)
- Not well-controlled (2-4)
- Very poorly controlled asthma (5-10)

SCAN here to visit airqscore.com

AIRQ®, Asthma Impairment and Risk Questionnaire.
Murphy KR, et al; US PRECISION Advisory Board. *J Allergy Clin Immunol Pract.* 2020;8(7):2263-2274.e5.

Ability of AIRQ® to Differentiate Asthma Control

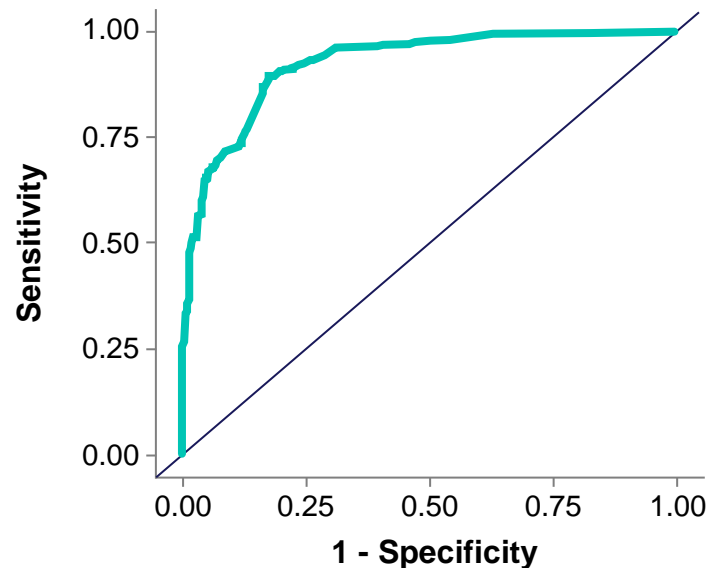## Well-Controlled vs Not Well-/Very Poorly Controlled

ROC Curve for Model 1
Area Under the Curve=0.94 for individual items

## Well-/Not Well-Controlled vs Very Poorly Controlled

ROC Curve for Model 2
Area Under the Curve=0.93 for individual items

Cut points of 0-1, 2-4, and 5-10 best represented well-, not well-, and very poorly controlled asthma.
ROC, receiver operating characteristic.
Murphy KR et al, on behalf of the US PRECISION Advisory Board. *J Allergy Clin Immunol Pract.* 2020;8(7):2263-2274.e5.
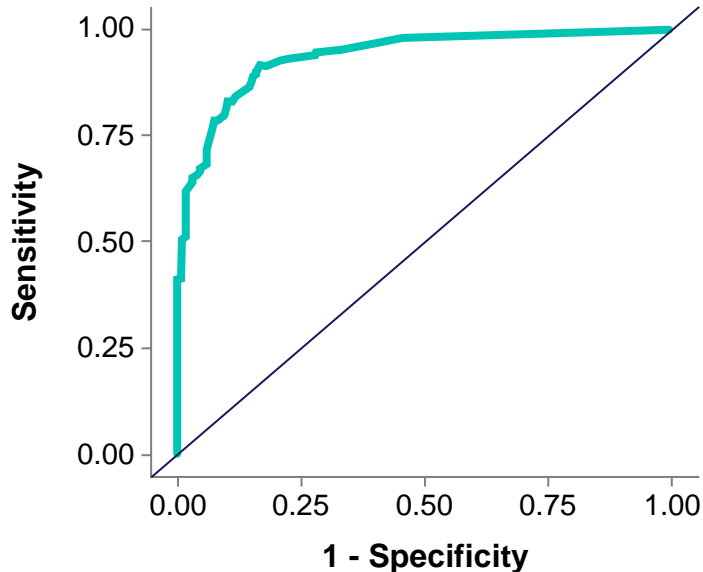
Sensitivity and Specificity Calculations Determined AIRQ® Control Cut Points

Well-Controlled vs Not Well-/Very Poorly Controlled
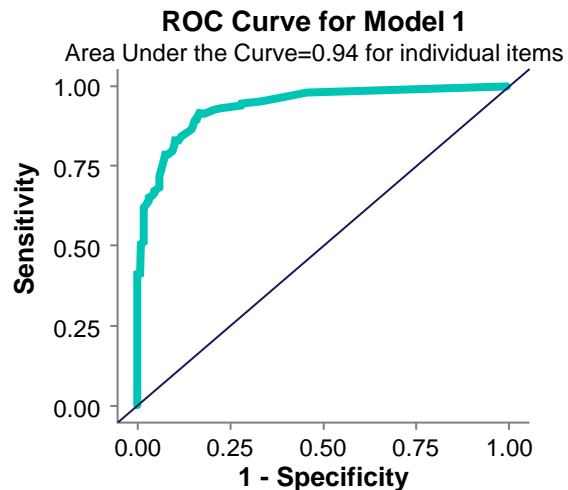
ROC Curve for Model 1
Area Under the Curve=0.94 for individual items

AIRQ® Score Cutoff	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value	Area Under ROC
≥1	0.98	0.55	0.82	0.93	0.765
≥2	0.90	0.79	0.90	0.79	0.845
≥3	0.74	0.93	0.96	0.62	0.832
≥4	0.58	0.99	0.99	0.52	0.781
≥5	0.43	0.99	0.99	0.45	0.710

Well-/Not Well-Controlled vs Very Poorly Controlled
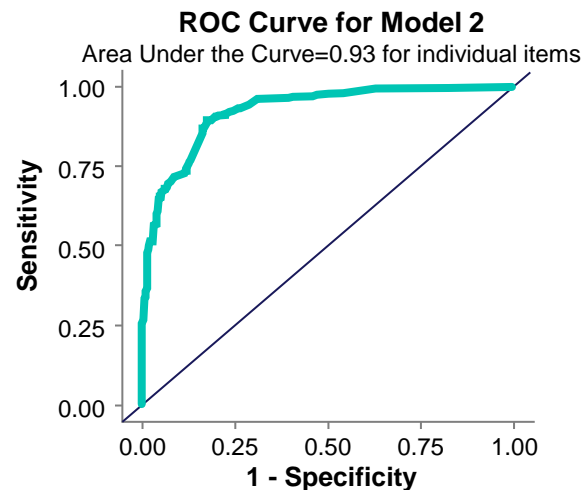
ROC Curve for Model 2
Area Under the Curve=0.93 for individual items

AIRQ® Score Cutoff	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value	Area Under ROC
≥2	0.96	0.55	0.64	0.94	0.756
≥3	0.85	0.74	0.73	0.85	0.796
≥4	0.74	0.89	0.85	0.80	0.815
≥5	0.59	0.96	0.92	0.74	0.775
≥6	0.46	0.99	0.97	0.69	0.723

Relationship of AIRQ® to Patient Perception of Asthma Control, Risk and Severity

N = 1108	Overall Asthma Control				
	Completely controlled	**Well-controlled**	**Somewhat controlled**	**Poorly controlled**	**Not controlled**
n (%)	175 (15.8)	511 (46.1)	346 (31.2)	64 (5.8)	12 (1.1)
AIRQ® score: mean (SD)	0.7 (1.0)	2.0 (1.8)	4.8 (2.2)	6.6 (2.1)	7.9 (1.8)
Risk to Health from Asthma					
	No risk	**A little risk**	**Some risk**	**A lot of risk**	**High risk**
n (%)	343 (30.9)	405 (36.6)	280 (25.3)	62 (5.6)	18 (1.6)
AIRQ® score: mean (SD)	1.4 (1.6)	2.7 (2.2)	4.5 (2.5)	6.2 (2.2)	7.0 (2.1)
Severity of Asthma Symptoms					
	No current symptoms	**Mild**	**Moderate**	**Severe**	**Extremely severe**
n (%)	300 (27.1)	461 (41.6)	281 (25.3)	64 (5.8)	2 (0.2)
AIRQ® score: mean (SD)	1.2 (1.5)	2.5 (2.1)	4.8 (2.2)	7.0 (2.0)	9.5 (0.7)

As self-perceived control, risk and severity worsened, the mean AIRQ® also increased (p<0.001 for all)

AIRQ®, Asthma Impairment and Risk Questionnaire; SD, Standard Deviation.
Reibman J, et al. *J Asthma Allergy*. 2023;16:59-72.

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Correlations Were Significant Between AIRQ® Score and SGRQ Total and Component Scores

N=1112

Mean SGRQ score

Total: p<0.001 — Well-controlled 16.8, Not well-controlled 30.4, Very poorly controlled 51.5

Symptoms: p<0.001 — Well-controlled 29.9, Not well-controlled 49, Very poorly controlled 66.3

Activity: p<0.001 — Well-controlled 24.1, Not well-controlled 38.4, Very poorly controlled 63

Impacts: p<0.001 — Well-controlled 9.1, Not well-controlled 20.4, Very poorly controlled 40.5

■ Well-controlled (n=389) ■ Not well-controlled (n=423) ■ Very poorly controlled (n=300)

HRQoL is significantly related to AIRQ® control category

AIRQ®, Asthma Impairment and Risk Questionnaire; HRQoL, Health-Related Quality of Life; SGRQ, St. George's Respiratory Questionnaire.
Reibman J, et al. *J Asthma Allergy.* 2023;16:59-72.

AIRQ® Control Level Predicts Future Patient-reported Exacerbations Over a 12-month Period

Time to First Patient-reported Asthma Exacerbation Relative to Asthma Control as Assessed by AIRQ®[1,a]

N=1112

- **Well-controlled (0-1)**
- **Not well-controlled (2-4)**
- **Very poorly controlled (5-10)**
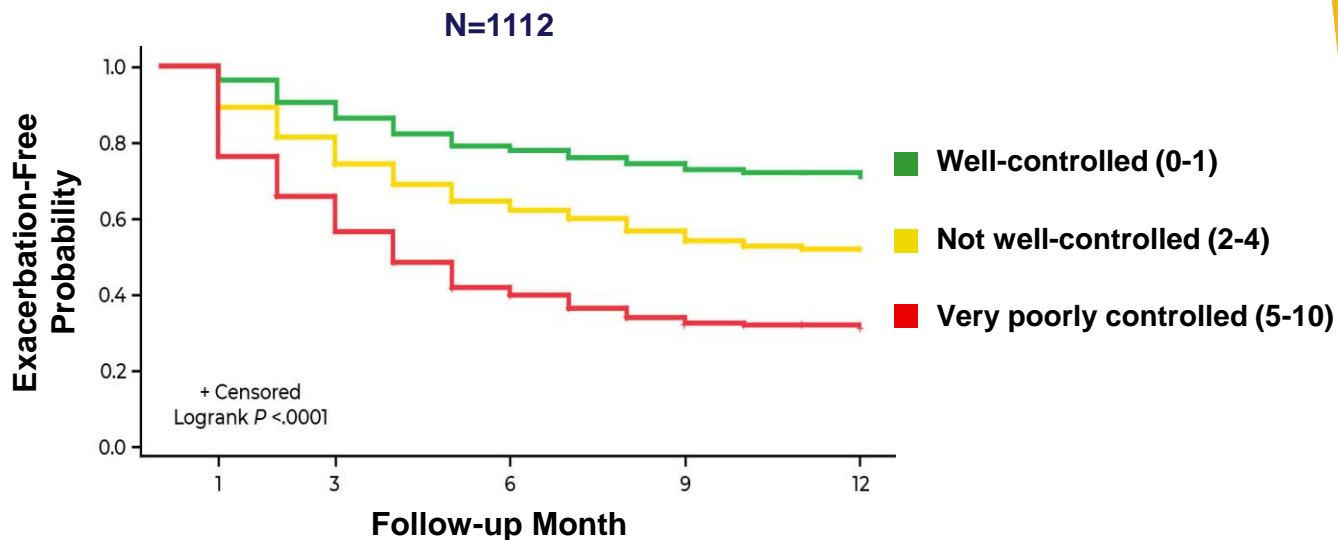
Baseline AIRQ® control level is highly predictive of future patient-reported exacerbations over the subsequent 12 months and the probability of time to first exacerbations

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Baseline AIRQ® Control Level is Highly Predictive of Future Short- and Long-term Exacerbation Risk

N=1070

Odds ratios and 95% CI for the occurrence of future exacerbations relative to AIRQ® control category[a]

Log Odds of Any Patient-reported Asthma Exacerbation

Increased likelihood of future exacerbation(s)

Short-term (0-3 months)

AIRQ® NWC (2-4) vs WC (0-1) — OR 2.17

AIRQ® VPC (5-10) vs WC (0-1) — OR 4.51

Long-term (4-12 months)

AIRQ® NWC (2-4) vs WC (0-1) — OR 2.37

AIRQ® VPC (5-10) vs WC (0-1) — OR 3.83

Demographic characteristics (age, sex, race and BMI) were not significant in either model

Odds Ratio and 95% CI

Follow-up AIRQ® With a 3-month Exacerbation Recall Period[1]

Follow-up 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

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 3 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

- Developed to enable monitoring of control and assessment of management interventions between annual visits
- The **Follow-up AIRQ®** retains the 2-week recall for the symptom-based questions but has a **3-month recall period for the risk-based exacerbation questions**[1,2]

In the past 3 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
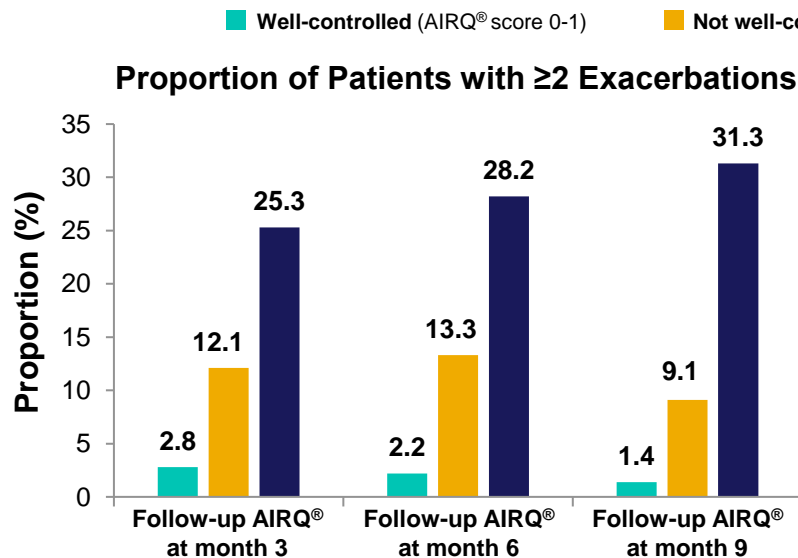10. Caused you to stay in the hospital overnight? Yes No

The Follow-up AIRQ® offers the opportunity to assess the impact of educational and/or therapeutic interventions!

1. Chipps BE, et al. *Ann Allergy Asthma Immunol.* 2022;128(5):544-552.e3.
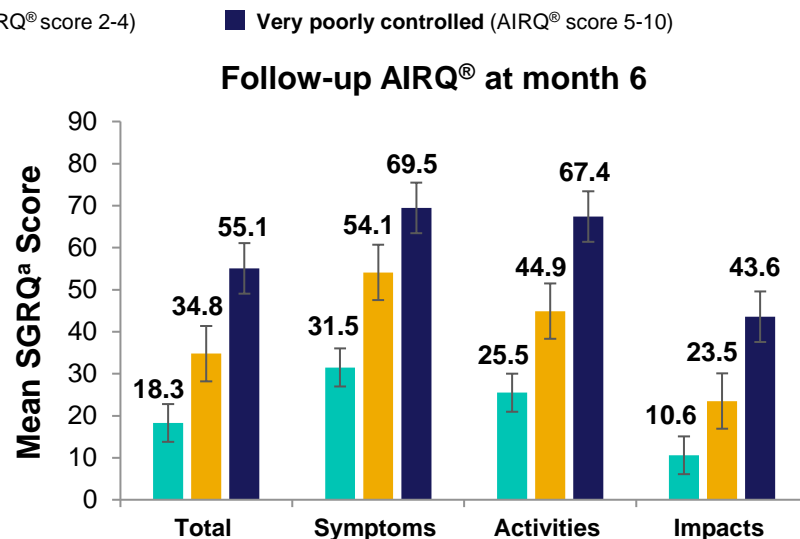2. Murphy KR, et al. *J Allergy Clin Immunol Pract.* 2020;8(7):2263-2274.e5.

The Follow-up AIRQ® Demonstrated Construct Validity

Exacerbation History[a]

Health-Related Quality of Life (HRQoL)[b]

- ■ **Well-controlled** (AIRQ® score 0-1)
- ■ **Not well-controlled** (AIRQ® score 2-4)
- ■ **Very poorly controlled** (AIRQ® score 5-10)

Proportion of Patients with ≥2 Exacerbations

Follow-up AIRQ® at month 6

Construct validity was also demonstrated with respect to patient self-perception of control, risk, and symptom severity[c]

[a]$P < 0.001$; between 3 control levels across all exacerbation outcomes. [b]SGRQ scores range from 0 to 100, with higher scores indicating more limitation; minimum clinically meaningful change in SGRQ score is 4.0 units. $P < 0.001$; between the 3 AIRQ® control levels. [c]$P < 0.0001$ by analysis of variance (ANOVA) modeling with Scheffe's Test for pairwise comparisons.

AIRQ®, Asthma Impairment and Risk Questionnaire; SGRQ, St. George's Respiratory Questionnaire.

Chipps BE, et al. *Ann Allergy Asthma Immunol*. 2022;128(5):544-552.e3.

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Asthma Control in Clinical Practice Is Often Overestimated Because Exacerbation History Is Not Always Appreciated

Patients with asthma ≥12 years of age (*N=1112*)

32%
Of **patients** who assessed themselves as completely or well-controlled[1,a]

N=**220**/686

30%
Of patients assessed by their **HCPs** as completely or well-controlled[1,a,b]

N=**177**/601

29%
Of patients classified as well-controlled by **ACT™** (scores ≥20)[1,a]

N=**159**/540

had ≥1 chart-documented exacerbation in the past year[1]

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Prior Exacerbations Are a Strong Predictor of Future Exacerbations[2]

Patients with asthma ≥12 years of age (*N=1112*)

32%
Of **patients** who assessed themselves as completely or well controlled[1,a]

N=**220**/686

30%
Of patients assessed by their **HCPs** as completely or well controlled[1,a,b]

N=**177**/601

29%
Of patients classified as well controlled by **ACT™** (scores ≥20)[1,a]

N=**159**/540

had ≥1 chart-documented exacerbation in the past year[1]

The AIRQ® assesses control by *BOTH* risk and impairment…

ONLY **60/**387 patients rated as well-controlled by the AIRQ®

(15%)

…had ≥1 prior-year, chart-documented exacerbation

[a]Cross-sectional analysis of 1112 patients aged ≥12 years with physician-diagnosed asthma, representing all Global Initiative for Asthma (GINA) severities, pa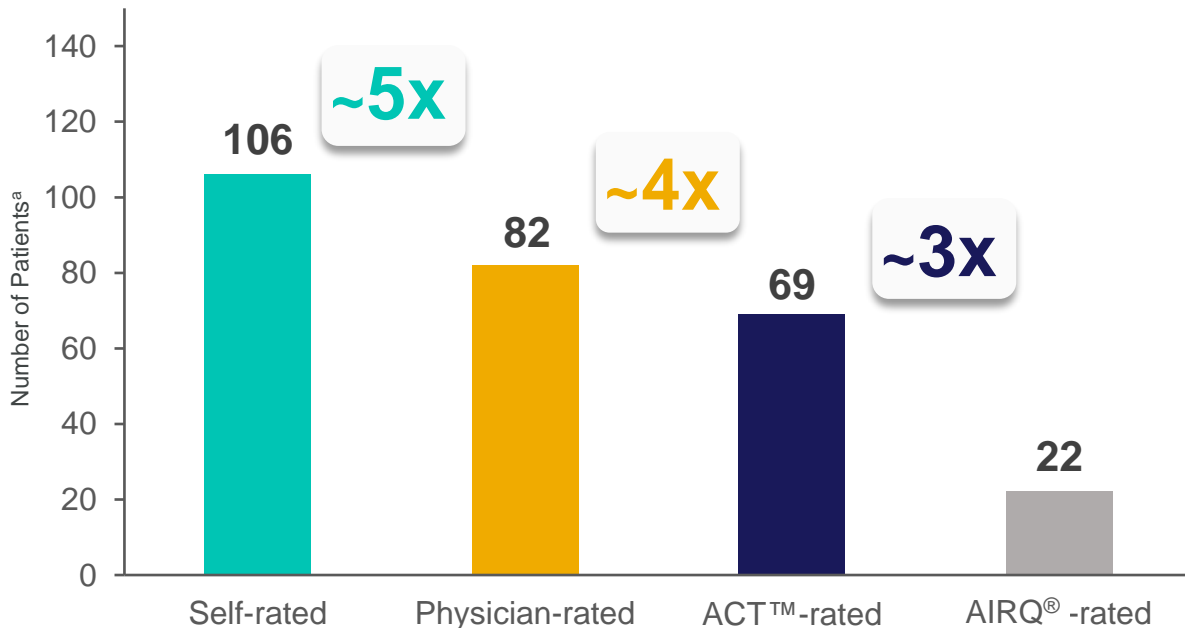rticipating in a year-long, longitudinal study. [b] Following a clinical visit and review of comprehensive clinical data.

ACT™, Asthma Control Test; AIRQ®, Asthma Impairment and Risk Questionnaire; HCP, healthcare professional.

1. Murphy KR, et al. Poster presented at: European Respiratory Society (ERS) International Congress; September 7-9, 2020; Virtual. 2. Global Initiative for Asthma, 2022. Available at: www.ginasthma.org. Accessed January 18, 2023.

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There May Be Consequences to Overlooking Prior Exacerbations

Among 1064 patients with complete baseline control assessments and prior-year and 12-month follow-up exacerbation data…

~5x

~4x

~3x

106

82

69

22

Number of Patients[a]

Self-rated   Physician-rated   ACT™-rated   AIRQ® -rated

...more patients with prior year exacerbations who were rated as completely or well-controlled at baseline by themselves, physicians, or the ACT™ had exacerbations in the subsequent year compared to those rated as well-controlled by the AIRQ®
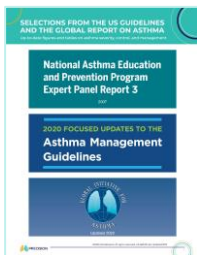
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US Advisor-developed PRECISION Education Tools

**Access AIRQ® and current PRECISION educational resources at
www.airqscore.com**

Asthma Checklist
Consolidates key concepts found in multiple guidances and expert reports on asthma assessment, management and patient education.

Provider Resources
Features in-depth resources for self-directed review including:

- Asthma Phenotypes and Endotypes
- Inhaler Selection and Technique Training
- Selections from US Guidelines & Global Report

- Systematic Approach to Spirometry
- Understanding Comorbidities Associated with Asthma
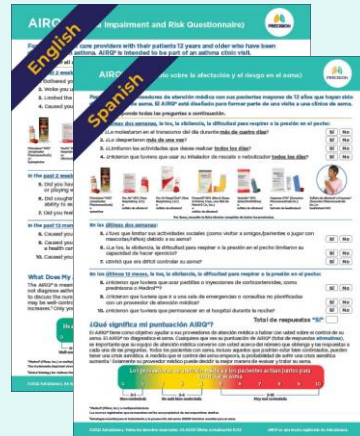- Using an Asthma Action Plan
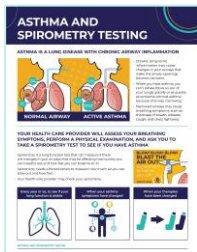
Patient Education & Animations
Features in-depth resources for patients or caregivers including:

- Asthma and Other Health Conditions
- Asthma and Spirometry Testing
- Using Your pMDI

- Understanding Airway Inflammation in Asthma
- Using Your pMDI with a Spacer

AIRQ®, Asthma Impairment and Risk Questionnaire; pMDI, pressurized metered dose inhaler; US, United States.

License the AIRQ®

Available **In Multiple Languages**

Arabic*†   **Indonesian**

English*   **Italian**

French*   **Japanese**

German   **Romanian**

Hebrew†   **Spanish***

Hindi   **Thai**

Adapted from Murphy KR, et al; US PRECISION Advisory Board. *J Allergy Clin Immunol Pract.* 2020;8(7):2263-2274.e5.

Obtaining AIRQ® in languages not listed on this card may incur a translation fee payable to RWS.

For your free license to use AIRQ®, including access to:

AIRQ®

Follow-up AIRQ®

Supporting documentation in any of the listed languages

please contact our licensing and translation partner, RWS, at
astrazeneca@rws.com

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AIRQ®, Asthma Impairment and Risk Questionnaire.

*Country-specific dialects available. †Coming soon.

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Conclusions

1. The burden of uncontrolled asthma in the United States is high, with projected future costs being substantial

2. Variability of underlying airway inflammation places all patients with asthma at risk of uncontrolled symptoms and exacerbations

3. Patients, clinicians, and impairment-based control assessment tools may not appreciate exacerbation risk and the risk of chronic health conditions associated with corticosteroid exposure

4. The AIRQ® assesses both domains of asthma control and can help predict the future risk of exacerbations

5. The AIRQ® may complement current guidelines by facilitating the identification of underrecognized asthma morbidity in clinical practice

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AIRQ®, Asthma Impairment and Risk Questionnaire.

Post-Evaluation Survey

Open your browser and navigate to
https://forms.office.com/r/Eh7pMaTwNV
or

Point your phone's camera at the QR code

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Comments to AstraZeneca

AstraZeneca is committed to conducting business with the highest standards of integrity and professionalism.

If you have comments that could improve the delivery of our promotional educational programs, please contact AstraZeneca at **1-800-236-9933**.

This concludes this presentation.

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