13th Annual Reach the Peak Asthma & Allergy Overview & Update and Asthma Educator-Certified (AE-C) Prep Course

April 14-15, 2021

Children's Hospital Colorado
Anschutz Medical Campus

Provided by:

Children's Hospital
Colorado Breathing Institute

Children's Hospital Colorado

Affiliated with
University of Colorado
Anschutz Medical Campus

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13123 E 16th Ave, Aurora, CO 80045
720-777-1234 | childrenscolorado.org

Overview and Target Audience

Reach the Peak provides an annual interdisciplinary overview of asthma & allergy management and is a comprehensive review course for the National Asthma Educator Certification Board (NAECB) AE-C exam, with a curriculum based upon the AE-C exam matrix. Facilitated by leading experts in their field, Reach the Peak incorporates problem-based learning methods with a combination of lecture, small group case scenarios, networking and comprehensive collaboration strategies. Proceeds from Reach the Peak support Roundup River Ranch, helping children and families with asthma and lung disorders to attend camp. Camp opportunities can be life changing for these children.

Target audience includes MDs, advanced practice providers, nurses, respiratory therapists, pharmacists, clinical social workers, certified health educators and other asthma care professionals.

The NAECB exam is a voluntary testing program used to assess qualified health professional's knowledge in asthma education. There are multiple testing sites throughout the United States. Upon successful completion of the AE-C exam an individual may add "AE-C" to their professional credentials. Continuing education credits from Reach the Peak may also be used to recertify for AE-C.

Learner Outcome

As a result of this activity, the participant will be able to implement evidence-based asthma guidelines/protocols accurately when caring for pediatric asthma patients. Attendance will help prepare participant to take the Asthma Educator Certification exam and educational credits may be applied towards asthma educator recertification.

Educational Objectives

Upon completion of this course, participants should be able to:

- Describe the pathophysiology and contributing factors of asthma diagnosis.
- Conduct a patient and family assessment addressing the medical history, objective measures of asthma severity and educational needs.
- Develop an Asthma Action Plan that includes prescribed medications and behavioral and environmental modifications.
- Integrate newly acquired knowledge into clinical practice.
- Assess community needs, develop programs to address identified needs and measure outcomes related to program effectiveness.
- Identify the requirements for AE-C certification and how to take the AE-C exam.

CONFERENCE AGENDA

Wednesday, April 14, 2021

7:30-8:00am	Welcome and Course Overview *Bridget Raleigh, MSN FNP-BC AE-C*
8:00-8:45am	Asthma Guidelines update and implementation *Monica Federico, MD, Pulmonologist*
8:45-9:30am	Allergic and Environmental Factors Contributing to Acute and Chronic Asthma *William C. Anderson III, MD, Allergist*
9:30-10:15am	Spirometry for the Asthma Educator *Deborah Liptzin, MD, Pulmonologist*
10:15-10:30am	Break
10:30-11:15am	Patient Assessment and Physical Exam *Melanie Gleason, MS PA-C AE-C*
11:15-NOON	Motivating patients—social determinants of health *Mfon Udoko, MD*
NOON - 1:00pm	Pharmacologic Therapy for Asthma *Laney Brennan, PharmD*
Self-study	Case Studies - Virtual Workbook

Thursday, April 15, 2021

8:00-9:15am	Key Messages for Asthma Education and the Asthma Action Plan *Kate Michalek, MS PA-C AE-C*
9:15-9:45am	Medication Device Demonstrations *Bridget Raleigh & The Respiratory Therapy Team*
9:45-10:30am	Program Development, Implementation and Outcomes *Kate Johnston, MPH CHES AE-C*
10:30-10:45am	Break
10:45-NOON	Small Group Sessions
NOON-1:00pm	Panel Presentation: Comprehensive Asthma Care, Complicated Cases & Case Reviews
1:00-1:30pm	Evaluation and Adjourn

Continuing Education Credit

Nursing: Children's Hospital Colorado is an approved provider of continuing nursing education by the Continuing Nursing Education Group, an accredited approver by the American Nurses Credentialing Center's Commission on Accreditation. This educational activity for 14.75 nursing contact hours is provided by Children's Hospital Colorado.

Respiratory Care: This program has been approved for 14 contact hours Continuing Respiratory Care Education (CRCE) credit by the American Association for Respiratory Care, 9425, N. MacArthur Blvd, Suite 100, Irving TX 75063.

Others: A general certificate of attendance will be given to all other care providers.

Note: A certificate of attendance will be available upon completion of the online evaluation. Claim only credit commensurate of your conference attendance.

Faculty & Committee

William C. Anderson III, MD
Assistant Professor of Pediatric Allergy and Immunology, University of Colorado
Director, Multidisciplinary Asthma Clinic (MAC
Co-Leader, CHCO Pediatric to Adult Transition Program
Associate Program Director, Allergy & Immunology Fellowship

Joyce A. Baker, MBA, RRT-NPS, AE-C
Asthma Clinical Program Coordinator
Children's Hospital Colorado/ Breathing Institute

Kelli Bernier, BSN RN AE-C
Clinical Nurse III
Children's Hospital Colorado/ Breathing Institute

Laney Brennan, PharmD
Clinical Pharmacy Specialist

Beth Carroll BSN, RN, CPN, AE-C
Clinical Nurse IV
Children's Hospital Colorado

Catherine Clark MS RN PCNS-BC AE-C
Asthma Clinic Nurse Specialist
Child Health Clinic

Trish Eells, MS CPNP AE-C
Senior Instructor of Pediatrics
University of Colorado
Children's Hospital Colorado/ Breathing Institute

Monica Federico, MD
Associate Professor Pediatrics
University of Colorado
Director, Asthma Program &
Pediatric Pulmonologist

Melanie Gleason, MS PA-C AE-C
Senior Instructor
University of Colorado
Children's Hospital Colorado/ Breathing Institute

Kate Johnston, MPH CHES AE-C
Manager, Community Health
Children's Hospital Colorado/ Breathing Institute

Deborah Liptzin, MD
Associate Clinical Professor
University of Colorado School of Medicine &
University of Montana

Lindsey McLemore, RRT CRT CPFT RPFT AE-C
Respiratory Therapist
Pulmonary Diagnostics
Children's Hospital Colorado/ Breathing Institute

Kate Michalek, MS PA-C AE-C
Senior Instructor of Pediatrics
University of Colorado
Children's Hospital Colorado/ Breathing Institute

Laurel More, MS RN CNN
Ambulatory Clinical Nurse Educator
Children's Hospital Colorado

Bridget Raleigh MSN FNP-BC AE-C
Associate Medical Director, Asthma Programs
Senior Instructor
University of Colorado
Children's Hospital Colorado/ Breathing Institute

Matthew Stern, MS
Manager, Continuing Medical Education
Children's Hospital Colorado

Julie Troglia, BSN RN AE-C
Clinical Nurse III
Children's Hospital Colorado/ Breathing Institute

Mfonobong Udoko, MD
Pediatric Pulmonology Fellow

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Criteria for Verifying Participation in this CE Activity
Participants are required to sign-in for this CE activity to verify their participation in the educational program. Signing in for other participants is not permitted.

Criteria for Successful Completion of this CE Activity
Registration, attendance, sign-in and submission of the evaluation, including a written response to questions related to any change in practice that you may make as a result of learning that took place at this activity, are required for successful completion and receipt of the certificate of attendance. Claim only those hours you attend.

Off-Label Use of Products
Faculty are asked to inform the audience when they are discussing the use of a product (medication, device, etc…) other than for which it was approved by the Food and Drug Administration.

Disclosure of Relevant Commercial Interest Relationships and/or Conflicts of Interest for Planner, Faculty, Content Expert and Content Reviewer
As a provider of continuing medical education (CME) activities accredited by the Accreditation Council for Continuing Medical Education, and continuing nursing education (CNE) activities accredited by the Continuing Nursing Education Group, an accredited approver by the American Nurses Credentialing Center's Commission on Accreditation, Children's Hospital Colorado ensures balance, independence, objectivity and scientific rigor in all its CME/CNE activities. Conflict of interest disclosure identifies the presence **or** absence of *any* potentially biasing relationship of a financial, professional or personal nature.

A perceived conflict of interest would occur, if:

- they or their spouse/partner have, within the past 12 months, received a salary, royalty, speaking honorarium, research appointment, board of directors remuneration, or consulting fee from an organization whose product or service is being discussed in the learning activity
- they or their spouse/partner own stock in such a company
- they or their spouse/partner have any potential to benefit personally or professionally from the presentation (work for a proprietary company presenting the learning activity, have written a book about the topic, provide consulting services related to the topic, etc.)

To comply with the CME and CNE accreditation guidelines, the planner, reviewer, content expert or faculty presenter in a position to control the content of this educational activity is required to disclose whether or not they have a conflict of interest prior to the activity.
Choose one of the following:

☐ *This educational activity does not include any content that relates to the products and/or services of a commercial interest that would create a conflict of interest.*

☒ *No individuals in a position to control content for this activity have any relevant financial relationships to declare.*

☐ *The following individuals, who are in a position to control content for this activity, declare they have a commercial interest relationship relevant to the content of this activity and it has been resolved with CME/CNE experts.*

Children's Hospital Colorado is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

Children's Hospital Colorado is an approved provider of continuing nursing education by the Continuing Nursing Education Group, an accredited approver by the American Nurses Credentialing Center's Commission on Accreditation.

Thank you for attending the 13th Annual Reach the Peak Asthma & Allergy Overview & Update and Asthma Educator-Certified (AE-C) Prep Course.

We hope you enjoyed the course and learned something new!!

This document will be emailed to you on Thursday afternoon, April 15th.

Signing in for the course, accessing the course evaluation and your CE certificate

To obtain your continuing education certificate, you must complete the online evaluation by midnight on **April 29, 2021**.

Registration, Evaluation and Crediting for this activity are hosted on-line in our new Continuing Education (CE) Platform. We have moved away from a paper sign-in process to an electronic version for sign-in process for CE Activities.

- **Save our CE Phone number as a contact to sign-in via mobile device - 720-790-4423**
  - ***This number will never change.***
- **The 6-digit code for the Reach the Peak Course is BUPHUN.**

There are two options to sign-in for the session - as you would have in a live session on the day of the course.

a. Use your Mobile Device and Send a SMS Text Message - Send the 6-digit, session specific code to the CE Phone Number, both above. This option is available thirty minutes prior to the designated start time.
b. Desktop Sign-in Feature on Your Computer/Tablet – Sign-in with the 6-digit, session specific code (above) via desktop at www.ce.childrenscolorado.org/code.
   i. After the activity, complete the required evaluation for CME credit within seven days.
   ii. Your transcript will be credited, and accessible via the "My Account" area of the CE Portal

REMINDER - Following the course, you will receive an email with the link to complete the course evaluation and obtain CE credits

Any questions or concerns with access should be directed to Matthew.Stern@childrenscolorado.org

Thank you,

Matthew Stern, MS

-Table of Contents-

- Inhaled Steroids
- Leukotriene Modifiers
- Metered Dose Inhalers (MDI)
- Nasal Spray Technique
- Oral Steroid Bursts
- Redihaler
- RespiClick Inhaler
- Respimat Soft Mist Inhaler
- Twisthaler
- What is Asthma?
- Nasal Irrigations

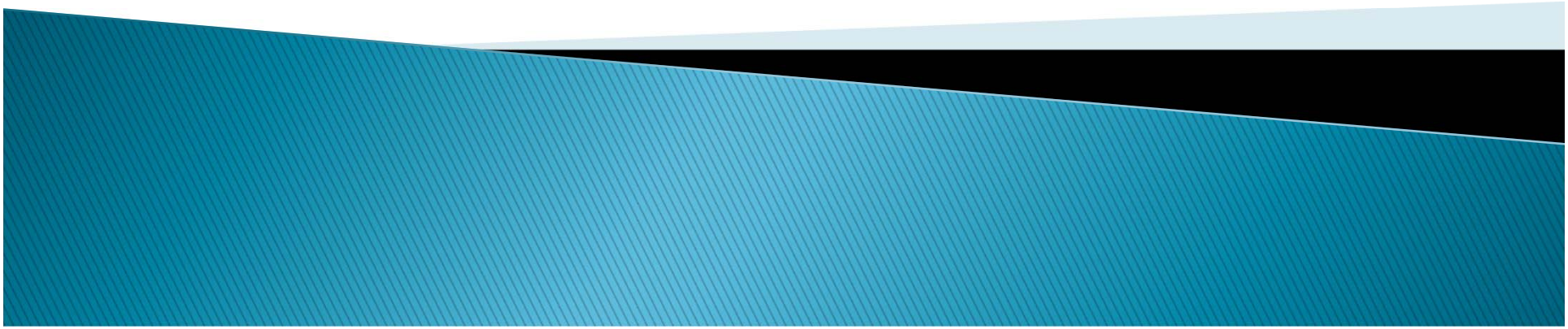
****This document is subject to change.*

2. Test Resources

WELCOME

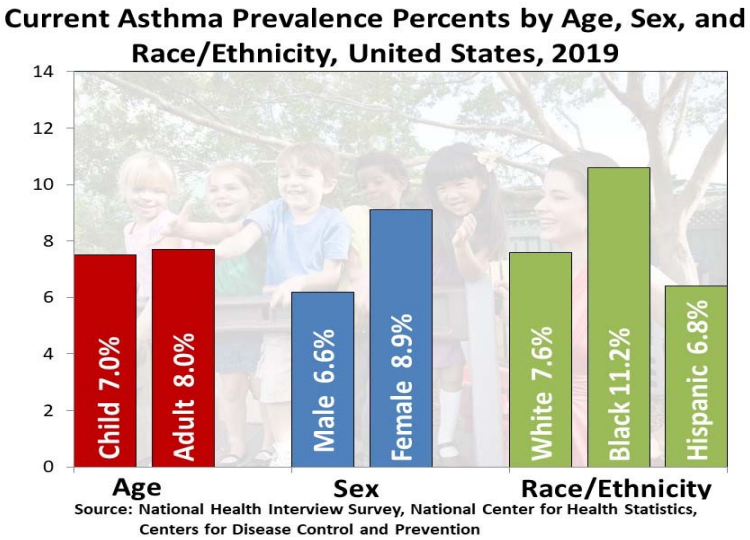
2021 Reach the Peak
Asthma & Allergy Overview & Update and Asthma Educator-Certified (AE-C) Prep Course

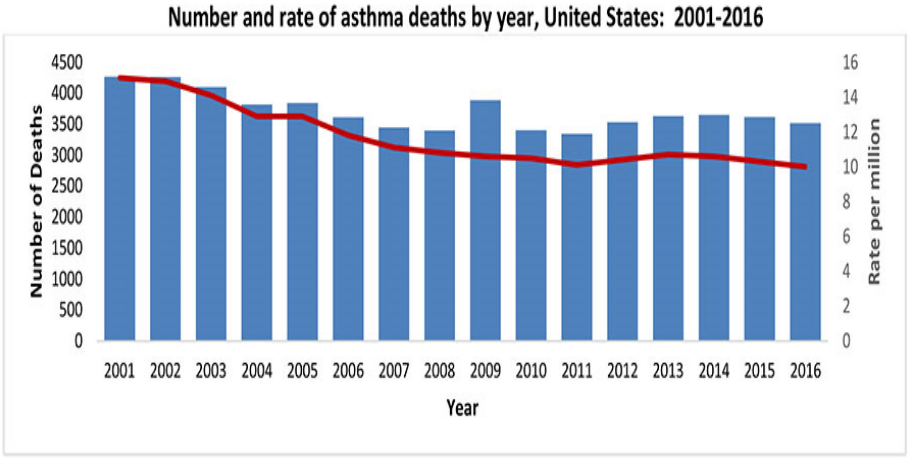
Bridget Raleigh, MSN, FNP-BC, AE-C



No financial disclosures

Why are we here today?

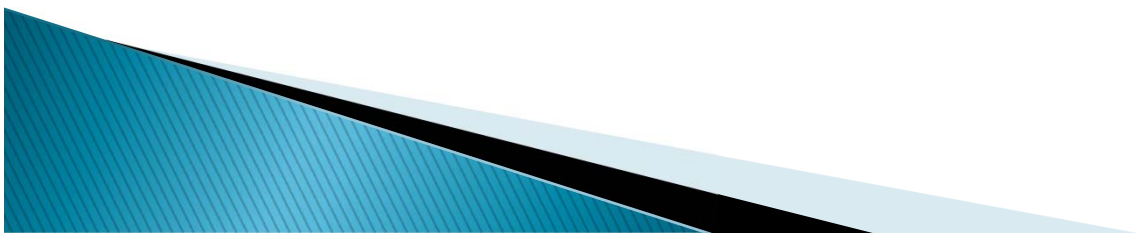




- Asthma is the most common chronic illness in childhood, accounting for 13.8 million missed school days each year. It also accounts for 14.2 million lost work days for adults.
- More than 3,500 people die of asthma each year, nearly half of whom are age 65 or older. Recent statistics show that half of people with asthma have at least one asthma attack each year, with children (53 percent) more likely to have an attack than adults (44.9 percent).
- Asthma results in 439,000 hospitalizations and 1.3 million emergency room visits annually.
- CDC Study Puts Economic Burden of Asthma at More Than $80 Billion Per Year

January 12, 2018

- Asthma is:
  - Common
    - 1:12 children
    - 20.4 million American adults currently have asthma.
  - Chronic
  - Can be controlled
  - Complex



Goals of Asthma Management/Control

Provider View

- Normal lung function (Spirometry most common testing after 4 years of age)
- Infrequent symptoms and rare need for quick relief inhaler, ED visits, oral steroids, no hospitalizations.
- No school loss from asthma
- Parents aren't missing work
- Avoidance of triggers, takes medications as instructed
- Child can participate in sports, games without limitations

Parent View

- Wants asthma to be ‘fixed’ or child to ‘outgrow it’.
- Wants child to breathe better, not be ‘sick all of the time’.
- Wants their child to be ‘normal’- like other kids.
- Wants child to be responsible for their medications.
- Change is hard, sometimes feels impossible in chaos.
- Parent wants to be heard, not judged.
- Multiple care-givers- not everyone is onboard with the plan.
- Medications affordable, available and easy to take.

GM3

Child's view

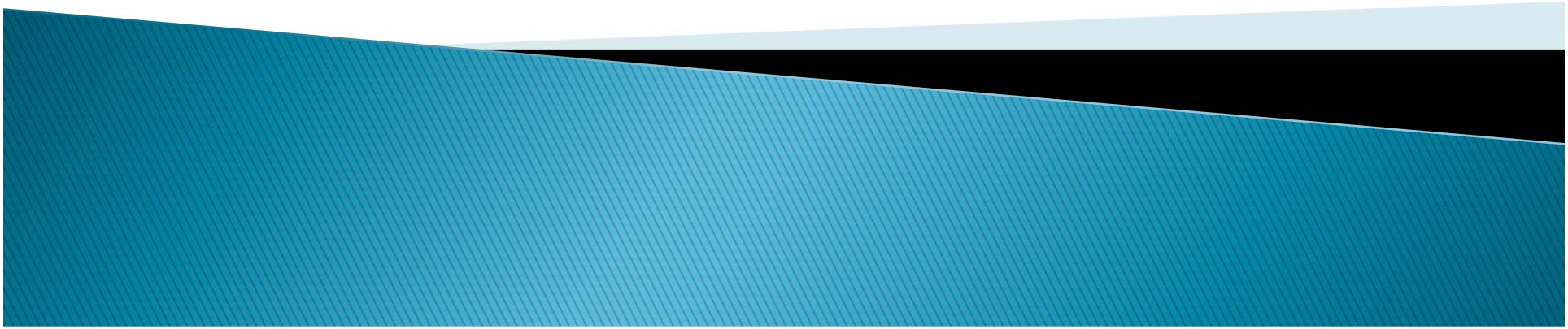
- I want to have a dog and 2 cats
- I hate taking medications
- I can't play like the other kids
- I don't want to be different.
- Sometimes I am scared when I can't breathe
- I want my asthma to go away
- What did I do to make this happen?
- My asthma makes me feel sad

Slide 7

GM3 These are great insights! Nice job.
Gleason, Melanie, 1/19/2018

What is an Asthma Educator?

- ✓ Expert in teaching, educating, and counseling individuals with asthma and their families in the knowledge and skills necessary to minimize the impact of asthma on their quality of life.
- ✓ Builder of partnerships with patients, families, schools, communities, and health care providers & staff to individualize care following evidence based guidelines.



Roles of an Asthma Educator

- Educator
- Advocate
- Partner→ multi-levels; patient, family, schools & communities
- Detective → triggers, barriers, obstacles
- Coach → Skill building, asthma management tools
- Care Coordinator
- Resource—> evidence-based interventions
- Mentor

Reach the Peak Notebook

- Certified Asthma Educator Candidate Handbook
- Presentations
- Asthma management tools
- Educational Tools

Eligibility for AE-C Exam

- Licensed Health Care Professional (MD, PA, NP, RN, LPN, RT, RPh, CSW, CHES, PT, OT)
- Individuals providing asthma education, counseling, or coordinating services with a minimum of 1000 hours experience in these activities.

AE-C Exam Breakdown

The Asthma Condition	20%
Patient & Family Assessment	23%
Asthma Management	47%
Organizational Issues	10%

Based on Expert Panel 4 Guidelines

Asthma Educator Exam

- Exam consists of 175 questions:
  (150 scored questions, 25 pretest questions)
- Exam is computerized and you have 3.5 hours to complete. Results are known immediately after taking.
- Examination Fee: $350 Recertification Fee: $300
- Renew every 5 years- either by repeat testing or 35 continuing education credits specific to asthma care.
- See asthma educator handbook for additional information on where and how to schedule taking the exam.

Things to know

- Expert 4 Panel Asthma management updates
- Asthma medications and drug-drug interactions
- Triggers for asthma, severity and risk
- Co-morbid conditions- environmental and food allergies, Gastroesophageal reflux, etc.
- Safe drugs during pregnancy
- Herbal supplement interactions
- Criteria for referral to specialist
- Understanding spirometry results
- Signs/symptoms that it is not asthma
- Implementing an asthma action plan, peak flow monitoring
- Incorporating evidence-based practice in community programs.

NAECB

NATIONAL
ASTHMA EDUCATOR
CERTIFICATION BOARD

CERTIFIED ASTHMA EDUCATOR AE-C

CANDIDATE HANDBOOK

TABLE OF CONTENTS

Rev. 1/14/2020

ABOUT NAECB

The National Asthma Educator Certification Board, Inc. (NAECB) is a voluntary health certifying board created in 2001 to evaluate the professional competence of asthma educators. The primary purposes of the NAECB are to prepare and conduct examinations to test the qualifications of candidates for certification as asthma educators.

The NAECB is governed by no less than 9 and no more than 17 voting members. The Directors represent the multiple disciplines involved in asthma education, counseling, and coordination of care and include at least

- one (1) behavioral scientist;
- one (1) health educator;
- one (1) nurse;
- one (1) pharmacist;
- one (1) physician; and
- one (1) respiratory therapist.

Representation is by discipline and competency, not by organizational membership. The Board of Directors also includes a Public Member and an At-Large Member.

NAECB's Mission: *To promote optimal asthma management and quality of life among individuals with asthma, their families and communities, by advancing excellence in asthma education through the Certified Asthma Educator process.*

Asthma Educator Definition: *An asthma educator is an expert in teaching, educating, and counseling individuals with asthma and their families in the knowledge and skills necessary to minimize the impact of asthma on their quality of life. The educator possesses comprehensive, current knowledge of asthma pathophysiology and management including developmental theories, cultural dimensions, the impact of chronic illness, and principles of teaching-learning. The educator is knowledgeable about objective and subjective evaluations used to diagnose asthma and assess its control. The educator capably instructs individuals with asthma on the optimal use of medications and delivery devices particularly explaining technical concepts to individuals in language each can understand. The educator conducts thorough assessments of individuals and families to identify strengths and resources as well as negative psychological factors, the social and economic impact of asthma, educational needs, and barriers to optimal healthcare and self-management. The educator works with an individual with asthma, his/her family, and other healthcare professionals to develop, implement, monitor, and revise an asthma action plan customized to the individual's needs, environment, disease severity, and lifestyle to optimize the individual's self-management skills. The educator monitors asthma education program outcomes and recommends modifications to improve quality and effectiveness. The educator serves as a resource to the community by providing information about asthma as well as healthcare and community resources.*

A primary job responsibility of the certified asthma educator is the provision of asthma coordination and counseling services.

ABOUT THIS HANDBOOK

This handbook provides information that you will need to register for the NAECB Examination, including eligibility requirements, examination policies, an examination content outline and an examination application. Be sure to keep the handbook until you take the examination; you may wish to refer to it later.

TESTING AGENCY

The NAECB has contracted with PSI Services to assist in the development, administration, scoring and analysis of its examination. PSI services also include the processing of examination applications and the reporting of scores to candidates who take the examination.

STATEMENT OF NONDISCRIMINATION

The NAECB does not discriminate among candidates on the basis of age, gender, race, color, religion, national origin, disability or marital status.

ELIGIBILITY REQUIREMENTS

Individuals may be admitted to the examination based on either of the two following qualifications:

1. The following U.S.* currently licensed or credentialed active and unrestricted health care professionals may be admitted to the examination:

   Physicians (MD, DO)
   Physician Assistants (PA-C)
   Nurses (RN, LPN, NP)
   Respiratory Therapists (RRT, CRT)
   Pulmonary Function Technologists (CPFT, RPFT)
   Pharmacists (RPh)
   Social Workers (CSW)
   Health Educators (CHES)
   Physical Therapist (PT)
   Occupational Therapist (OT)

2. Individuals providing direct patient asthma education, counseling or coordinating services with a minimum of 1000 hours experience in these activities.

* Those candidates without an active U.S. license or credential will only be allowed to take this examination if they meet the criteria set forth in #2 (1000 Hours).

The NACEB will verify eligibility requirements of all candidates for the exam before the candidate can schedule a time to take the examination.

EXAMINATION ADMINISTRATION

The NAECB Examination is delivered by computer at approximately 300 PSI Test Centers geographically located throughout the United States. There are no application deadlines and a candidate who meets eligibility requirements may submit an application and fee at any time. The examination is administered by appointment only Monday through Saturday. Appointment starting times may vary by location. Candidates are scheduled on a first-come, first-served basis.

EXAMINATION FEES

You must submit the appropriate fee with a complete examination application according to the following schedule. Payment may be made by credit card (VISA, MasterCard, American Express or Discover), cashier's check or money order made payable to PSI Services Inc. **Cash, company and/or personal checks are not accepted. All fees are non-refundable and non-transferrable.**

	Location of Candidate	
Application Status	United States	U.S. Territories and Outside the U.S.
First attempt	$350	$495
Repeat attempt	$250	$395
Recertification	$300	$445

TEST CENTER LOCATIONS

A current list of Test Centers can be viewed at **www.goAMP.com**. Specific address information will be provided when a candidate schedules an examination appointment.

SPECIAL ARRANGEMENTS FOR CANDIDATES WITH DISABILITIES

NAECB and PSI comply with the Americans with Disabilities Act and strive to ensure that no individual with a disability is deprived of the opportunity to take the examination solely by reason of that disability. PSI will provide reasonable accommodations for candidates with disabilities.

Wheelchair access is available at all established test centers. Candidates with visual, sensory or physical disabilities that would prevent them from taking the examination under standard conditions may request special accommodations and arrangements. To request special accommodations, complete the two-page REQUEST FOR SPECIAL EXAMINATION ACCOMMODATIONS form included in this handbook and submit it with your application and fee at least 45 business days prior to your desired examination date. Please inform PSI of your need for special accommodations when scheduling your examination.

APPLYING FOR AN EXAMINATION

THE APPLICATION PROCESS

There are two ways to apply for the NAECB Examination after eligibility requirements are satisfied. All candidates may access the application process through the NAECB at **www.naecb.org**. Applications that are incomplete will be returned, along with any fees submitted minus a $50 processing fee.

1. **Online Application/Scheduling:** You may complete the application and scheduling process in one online session by visiting **www.naecb.org** and clicking **Register Online**. The computer screens will guide you through the complete process. After the application information and payment using a credit card (VISA, MasterCard, American Express, Discover) have been submitted, eligibility will be confirmed or denied and you will be prompted to schedule an examination appointment or supply additional eligibility information. If special accommodations are being requested, please contact PSI at 833-333-4755.

   OR

2. **Paper Application and Scheduling:** Complete and submit to NAECB/PSI the paper application included in this handbook and appropriate fee (credit card, cashier's check or money order). A paper application is considered complete only if all information requested is complete, legible and accurate; if the candidate is eligible for the examination; and if the appropriate fee accompanies the application.

   NAECB and PSI will process the paper application and within approximately two weeks will send a confirmation notice including a website address and toll-free telephone number to contact PSI to schedule an examination appointment (see table below).

If you contact PSI by 3:00 p.m. Central Time on…	Your examination may be be scheduled as early as…
Monday	Wednesday
Tuesday	Thursday
Wednesday	Friday (Saturday if open)
Thursday	Monday
Friday	Tuesday

Be prepared to confirm a location and a preferred date and time for testing and to provide your Social Security number as a unique identification number. If a confirmation notice is not received within 4 weeks, contact NAECB/PSI at 833-333-4755. When you call to schedule an appointment for examination, you will be notified of the time to report to the Test Center. Please make a note of it because you will NOT receive an admission letter.

Your application is valid for one year, during which you must schedule an appointment to test on the computer and take the examination. If you fail to schedule an appointment within the one-year eligibility period, you will forfeit the application and all fees paid to take the examination. A complete application and examination fee are required to reapply for examination. You are allowed to take only the examination for which application is made and a confirmation notice is received. **Unscheduled candidates (walk-ins) are not tested.**

EXAMINATION APPOINTMENT CHANGES

You may reschedule an appointment for examination at no charge **once** by calling PSI at 833-333-4755 **AT LEAST TWO BUSINESS DAYS** prior to the scheduled examination session. (See following.)

If your Examination is scheduled on...	You must contact PSI by 3:00 p.m. Central Time to reschedule the Examination by the previous…
Monday	Wednesday
Tuesday	Thursday
Wednesday	Friday
Thursday	Monday
Friday	Tuesday

If you wish to reschedule an examination but fail to contact PSI at least two business days prior to the scheduled examination session, reschedule a second time, appear more than 15 minutes late for an examination and cannot be seated, or fail to report for an examination appointment, you will forfeit the application and all fees paid to take the examination. A complete application and examination fee are required to reapply for examination.

EXAMINATION CONTENT

The examination is based upon four major content areas. Each of the content areas is briefly described and followed by an outline of the topics included in the area. In addition, the number of examination questions devoted to each major content area is noted. The examination is composed of 175 questions (150 scored questions, 25 pretest questions). Performance on the pretest questions does not affect your score. The pretest questions are not identified.

Each question on the examination is categorized by a cognitive level that a candidate would likely use to respond. These categories are:

1. Recall (RE): The ability to recall or recognize specific information is required.
2. Application (AP): The ability to comprehend, relate or apply knowledge to new or changing situations is required.
3. Analysis (AN): The ability to analyze and synthesize information, determine solutions and/or to evaluate the usefulness of a solution is required.

Effective September 1, 2018 **Major Category**	**Percentage of Examination Questions**
1. The Asthma Condition	**20%**
2. Patient and Family Assessment	**23%**
3. Asthma Management	**47%**
4. Organizational Issues	**10%**

CERTIFICATION EXAMINATION FOR ASTHMA EDUCATORS DETAILED CONTENT OUTLINE

Effective September 1, 2018

	Cognitive Levels			
	Recall	Application	Analysis	TOTALS
1. THE ASTHMA CONDITION	**9**	**18**	**3**	**30**
A. Pathophysiology	**4**	**6**	**0**	**10**
1. Teach an individual with asthma and their family using simple language by illustrating the following with appropriate educational aids a. normal pulmonary anatomy and physiology b. alterations in lung anatomy and physiology that characterize asthma e.g., • inflammation • bronchial hyperresponsiveness • bronchial wall edema • excess mucus secretion • smooth muscle contractions c. the processes occurring in the lungs during an asthma exacerbation d. potential long-term sequelae of airway inflammation e.g., • hyperresponsiveness • airway remodeling 2. Explain terms used to characterize asthma e.g., • severity • control • impairment • risk 3. Explain how asthma severity and its control affect lung function measurements 4. Teach an individual with asthma that asthma is a chronic airway disease with varying levels of severity and characterized by exacerbations 5. Associate signs and symptoms of asthma with its underlying pathophysiology 6. Compare asthma characteristics across age groups e.g., • infants • children • adults • elderly				
B. Factors Contributing to Acute and Chronic Asthma	**5**	**12**	**3**	**20**
1. Describe to an individual with asthma: a. differences between an allergen and an irritant b. common triggers that provoke asthma c. how triggers (e.g., allergens, irritants, exercise, infections) can be distinct and synergistic for each individual with asthma d. the role of tobacco smoke exposure (in all forms) in the development and control of asthma e. the role of family history (including genetics) and environmental factors (e.g., infections, diet, exposures) in the development of asthma f. potential occupational risks in the development and control of asthma g. medications (e.g., β-blockers, non-steroidal anti-inflammatory agents, anesthetics) that may exacerbate asthma 2. Explain how to identify factors (e.g., allergens, pollutants) in the environment contributing to symptoms experienced by an individual with asthma: e.g., • home • school • work place • outdoors				

Effective September 1, 2018	Cognitive Levels			
	Recall	Application	Analysis	TOTALS
3. Identify conditions that may mimic asthma or affect asthma control: e.g., • obesity • obstructive sleep apnea • vocal cord dysfunction • stress • depression 4. Explain how specific conditions may relate to the development and control of asthma: a. pregnancy b. gastroesophageal reflux disease c. allergic conditions e.g., • rhinitis • sinusitis • eczema d. infections (e.g., sinusitis, pneumonia) e. COPD				
2. ASSESSMENT OF AN INDIVIDUAL WITH ASTHMA AND FAMILY	**7**	**20**	**7**	**34**
A. History from an Individual with Asthma	**2**	**6**	**2**	**10**
1. Interview an individual about the pattern of current symptoms 2. Interview an individual about the impact of asthma on the quality of life, activity level, and social / functional roles for an individual with asthma 3. Interview an individual about signs and symptoms requiring medical care 4. Interview an individual about high-risk asthma signs and symptoms e.g., • past intubations • over-use of β-agonists • "poor perceivers" • frequent use of systemic corticosteroids 5. Interview an individual about reason(s) for loss of control 6. Define an individual's asthma severity and control (e.g., impairment, risk) from available information 7. Identify the criteria for appropriate referral of an individual to an asthma specialist 8. Identify triggers (e.g., irritants, allergens) 9. Identify association of exercise with asthma symptoms 10. Identify co-morbid conditions (e.g., sinusitis, nasal polyps, gastroesophageal reflux disease, obesity, obstructive sleep apnea) 11. Solicit information about medications and alternative and complementary therapies: e.g., • over-the-counter • prescription medications • herbal and nutritional supplements • natural food products • physical therapies (e.g., yoga, acupuncture) 12. Integrate information from the medical record into an assessment: e.g., • family, clinical and past medical history • physical examination • vital signs findings • laboratory, pulmonary function, and radiological results • current and past therapies • diagnostic interpretations of objective measures				

Effective September 1, 2018	Cognitive Levels			
	Recall	Application	Analysis	TOTALS
B. Physical Signs in an Individual with Asthma	**1**	**2**	**1**	**4**
1. Recognize signs of an acute exacerbation e.g., • cyanosis • accessory muscle use • labored breathing • clipped speech 2. Recognize the significance of auscultated breath sounds e.g., • crackles • wheezes • silent chest 3. Direct an individual to emergent care based on current presentation				
C. Objective Measures	**2**	**6**	**2**	**10**
1. Emphasize to an individual the importance of using objective measures to identify asthma and assess control (e.g., Asthma Control Test®, symptom monitoring) 2. Explain to an individual with asthma the importance of testing for allergies and comorbidities 3. Explain to an individual with asthma the purpose, technique, or results for a. spirometric measures b. pre-bronchodilator and post-bronchodilator pulmonary function testing c. pulse oximetry d. exhaled nitric oxide e. in vitro specific IgE or skin prick tests 4. Explain to an individual with asthma the purpose of bronchoprovocation (e.g., methacholine challenge, cold-air challenge, exercise challenge) 5. Assess whether an individual's peak flow or spirometric results are valid				
D. Educational Needs	**2**	**6**	**2**	**10**
1. Assess the knowledge and skills of an individual with asthma and his or her family regarding asthma and treatment 2. Assess adherence barriers regarding self-assessment and self-management e.g., • financial • cultural • attitudes 3. Assess knowledge of potential and known triggers in an individual's home, school, or work environments 4. Assess readiness and ability to learn, and learning style in an individual with asthma 5. Assess coping strategies used by an individual with asthma and his or her family 6. Assess the primary source of healthcare for an individual with asthma 7. Assess how an individual with asthma is currently recognizing and acting on changes in his or her symptoms 8. Elicit goals and concerns of an individual with asthma and his or her family 9. Employ effective interviewing skills (e.g., ask open-ended questions, maintain eye contact) 10. Conduct a multidimensional assessment of an individual with asthma and his or her family: e.g., • socioeconomic • psychosocial • health literacy level • culture • language • healthcare beliefs and practices				

Effective September 1, 2018	Cognitive Levels			
	Recall	Application	Analysis	TOTALS
3. ASTHMA MANAGEMENT	**13**	**32**	**26**	**71**
A. Medications and Delivery Devices	**5**	**16**	**4**	**25**
1. Explain how medications are prescribed based on asthma severity and control				
2. Discuss asthma medications:				
a. mechanism of action (e.g., β agonist, leukotriene modifier, muscarinic antagonist, immunomodulating biologicals)				
b. role in therapy (e.g., quick relief, long-term control)				
c. side effects, drug interactions, and safety (e.g., β agonist overuse, inhaled vs. systemic corticosteroids)				
d. administration route, dose, frequency, and duration				
e. relative efficacy				
3. Dispel misconceptions (e.g., inhaled corticosteroids vs. anabolic steroids) about asthma medications				
4. Demonstrate correct techniques for inhaled delivery devices: e.g., • MDI • DPI • soft-mist inhaler • nebulizers • valved holding chambers				
a. assembly				
b. administration				
c. cleaning				
d. replacement or refilling				
e. troubleshooting				
5. Assess whether an individual with asthma correctly demonstrates techniques for inhaled delivery devices: e.g., • MDI • DPI • soft-mist inhaler • nebulizers • valved holding chambers				
a. assembly				
b. administration				
c. cleaning				
d. replacing or refilling				
e. troubleshooting				
6. Recommend devices to optimize inhaled medication delivery for an individual with asthma e.g., • elderly • child • disabled				
7. Summarize potential benefits and risks associated with alternative therapies and over-the-counter medications				
8. Emphasize importance of taking medications as prescribed when alternative and over-the-counter medications are available				
9. Discuss the purpose of				
a. controlling atopic diseases (e.g., immunotherapy, immunomodulating biologicals, intranasal therapies)				
b. preventive immunizations (e.g., influenza vaccination, pneumococcal vaccination)				
c. treatment of comorbid conditions				
d. smoking cessation medications				

Effective September 1, 2018	Cognitive Levels			
	Recall	Application	Analysis	TOTALS
B. Behavioral and Environmental Modifications	**3**	**4**	**7**	**14**
1. Recommend strategies to address a. the management of exercise-induced asthma b. psychosocial factors (e.g., stress, anxiety, depression) c. social support and family factors d. economic issues e. drug abuse f. active smoking g. adherence issues 2. Employ culturally sensitive approaches to individuals with asthma and their families 3. Allay concerns and fears of an individual with asthma and his or her family, and dispel myths they may believe 4. Emphasize the importance of following a comprehensive trigger avoidance plan 5. Recommend strategies to reduce, avoid, or eliminate common triggers in homes, work places, and schools: e.g., • second-hand smoke • other irritants • allergens • infections • chemical exposure 6. Discuss the effectiveness of various equipment e.g., • air cleaners • vacuum cleaners • dehumidifiers • allergen-impermeable cover 7. Recommend home visits to mitigate barriers to optimal asthma management				
C. Asthma Self-Management Education Plan	**3**	**4**	**12**	**19**
1. Create an individualized self-management education plan 2. Tailor the plan to the individual's goals and concerns 3. Tailor the plan to the individual's educational needs assessment e.g., • learning style • health literacy • culture 4. Tailor the plan to the individual's asthma severity 5. Tailor the plan to the individual's age 6. Select educational material for an individual while considering needs assessment results and the education plan 7. Coach an individual with asthma how to effectively communicate as a partner in his or her care with healthcare providers, caregivers, and asthma educator 8. Review an individual's decision-making skills and confidence for a. using asthma medications b. managing worsening asthma c. seeking care 9. Reinforce the importance of self-management strategies in asthma control 10. Reinforce the importance of routine follow-up care 11. Indicate how team members should track and document progress and mastery of self-management actions				

Effective September 1, 2018	Cognitive Levels			
	Recall	Application	Analysis	TOTALS
D. Written Asthma Action Plan	**2**	**6**	**2**	**10**
1. Create an individualized, written asthma action plan that addresses a. daily management (e.g., medications, environmental control, self-monitoring) b. recognition of worsening asthma c. control of worsening asthma and appropriate follow-up care 2. Review written asthma action plan with clinician and other team members 3. Clarify a clinician's instructions for an individual with asthma 4. Encourage integration of the written asthma action plan into childcare, home, workplace, and / or school 5. Instruct an individual with asthma to assess control using symptoms and peak expiratory flows 6. Review an individual's decision-making skills and confidence for implementing his or her written asthma action plan 7. Demonstrate use of peak expiratory flow equipment with return demonstration				
E. Periodic Reevaluation of the Written Asthma Action Plan	**0**	**2**	**1**	**3**
1. Reassess the level of asthma control 2. Review decision-making criteria with an individual with asthma and his or her family, particularly looking for what he or she can do differently 3. Reassess adherence to the written asthma action plan 4. Revise an asthma management plan after regular reassessment based on individual goals, expectations, and outcomes 5. Use monitoring tools to assist in reevaluation of asthma control: symptoms diaries and checklists 6. Use monitoring tools to assist in reevaluation of asthma control: peak expiratory flow results 7. Establish a personal best and revise zones 8. Coordinate follow-up care at each visit to check skill in self-monitoring and self-management				
4. ORGANIZATIONAL ISSUES	**5**	**8**	**2**	**15**
A. Needs Assessment	**1**	**2**	**0**	**3**
1. Identify outcome indicators 2. Obtain information (e.g., methods, data sources) about the asthma population and healthcare providers 3. Use findings to make recommendations				
B. Program Development	**1**	**2**	**1**	**4**
1. Identify program resources e.g., • funding • facilities • personnel 2. Prioritize program features based on resources and characteristics of the target population (e.g., asthma severity, risk factors) 3. Compare evidence-based solutions to program needs 4. Create goals of program and specific objectives to meet those goals 5. Select teaching methods and settings that will best meet objectives for the target population 6. Critique educational materials for cost, readability, accuracy, specificity, illustrations, and source credibility				
C. Program Implementation	**1**	**1**	**0**	**2**
1. Ensure safety and privacy of individuals with asthma (e.g., HIPAA, FERPA, OSHA, infection control) 2. Maintain a program database 3. Coordinate training for program staff				
D. Program Evaluation	**1**	**1**	**1**	**3**
1. Select validated program evaluation tools				

Effective September 1, 2018	Cognitive Levels			
	Recall	Application	Analysis	TOTALS
2. Assess program processes: e.g., • adherence (e.g., attendance, diary completion) of participant • the influence of the program on participants' knowledge, skills, or attitudes (e.g., confidence, outcome expectations) • procedure and task implementation 3. Assess program outcomes: e.g., • key outcomes (e.g., quality-of-life, functional status, asthma control, healthcare utilization, participant satisfaction) • measures for key program outcomes • program effectiveness 4. Use findings to assess program impact and need for modifications				
E. Professional Partnerships	**1**	**2**	**0**	**3**
1. Identify community resources that may be beneficial to the needs of individuals with asthma 2. Organize family support / education activities 3. Collaborate with other providers and between systems 4. Provide education and technical assistance to • third-party payers • community and health care professionals • work sites • schools • faith-based groups				
Total	**34**	**78**	**38**	**150**

TESTING OUTSIDE OF THE UNITED STATES

Individuals who reside in U.S. Territories or outside the United States may apply to take the examination to achieve the AE-C credential. Scheduling for examinations at test centers outside the United States may be available online or by phone. Please contact Candidate Services at 833-333-4755 for information about international scheduling.

NAECB SAE

The NAECB SAE is a 75-item multiple choice online practice examination. It was developed to be parallel in content and difficulty to the actual asthma educator certification examination. Items are based on the four major content areas and detailed content outline that details the knowledge, skills, and ability consistently used to provide asthma education. The content outline is available in the Candidate Handbook on the NAECB website. Each item includes rationale statements for both correct and incorrect answers. The actual examination time allotted is 3½ hours; consider completing the SAE in half that time because it contains half the number of items. The SAE should be regarded as a diagnostic tool to assess a candidate's strengths and weaknesses, rather than a study guide for the examination. A passing score on the SAE does not, in any way, guarantee a passing score on the NAECB examination. Utilization of this SAE tool is not a requirement for eligibility or for success in passing the certification examination. Certified practitioners can use the SAE to see if they are remaining current with the profession. The SAE will provide experience in computer-based testing as well as the NAECB-type items.

The SAE will be available online to you for a period of 90 days from the date the order is placed. After you receive your score report, you cannot access the examination again. Your individual results will be anonymous and are not reported back to the NAECB. You will receive a report with a total score report and subscores by major content area.

SAMPLE EXAMINATION QUESTIONS

Sample question 1. Matrixed at 1A1b application (answer: B)
Which of the following should be included when educating an adult female regarding the characteristics of asthma?

A. Airway inflammation is the main cause of her exercise-induced asthma symptoms
B. Bronchoconstriction is the main cause of her increased coughing during exertion
C. Airway inflammation causes her initial symptoms when she is exposed to cigarette smoke
D. Bronchoconstriction causes her symptoms that do not respond to quick relief medications

Sample question 2. Matrixed at 2A6 application (answer: C)
A six year old with asthma was seen by her clinician with recurrent cough and wheeze. She admits to waking twice per month with a cough the past three months and requiring albuterol twice per week. The asthma educator knows that according to the EPR-3 guidelines, this child's level of asthma control would be classified as:

A. Very well Controlled
B. Well controlled
C. Not well controlled
D. Very poorly controlled

Sample question 3. Matrixed at 1A5 application (answer: A)
An adolescent presents with wheezing, coughing, and shortness of breath after aerobic exercise. Which of the following is the MOST likely cause of these symptoms?

A. Bronchospasm
B. Airway inflammation
C. Mucus production
D. Airway edema

Sample question 4. Matrixed at 3A2b application (answer: C)
An adolescent male with persistent asthma tells his asthma educator that his current medications are not controlling his symptoms. He is using albuterol four times daily with a valved-holding chamber. He stopped using his budesonide because he "did not feel better after using it." Which of the following actions by the asthma educator would MOST likely improve his asthma control over the short term?

A. Verify the adequacy of his inhaler technique with a valved-holding chamber
B. Recommend changing budesonide to a different medication
C. Discuss the differences between the use of quick-relief and long-term control medications
D. Advise him about environmental modifications he can employ to avoid asthma triggers.

Sample question 5. Matrixed at 3D5 application (answer: C)
A person with asthma has a predicted peak flow reading of 400 L/min. Today the peak flow reading is 450 L/min. Based on the predicted reading, what is the BEST interpretation of today's peak flow?

A. Red zone
B. Yellow zone
C. Green zone
D. Personal best zone

Sample question 6. Matrixed at 2D9 application (answer: D)
Which of the following communication techniques should be used by an asthma educator to improve rapport when interviewing a woman with asthma?

A. Address the woman by her first name
B. Maintain continuous eye contact
C. Speak clearly and authoritatively
D. Encourage her to set her own asthma goals

Sample question 7. Matrixed at 2C3b analysis (answer: C)
A 16-year-old boy is referred to an asthma educator for review of his asthma. He is currently a quarterback for his high school football team and is hoping to receive a college scholarship to play football. He states that he never coughs, wheezes, or experiences chest tightness or shortness of breath while playing football. He does have an albuterol inhaler which he rarely uses. He states that his asthma is "not that bad." The asthma educator reviews a pulmonary function test the boy recently completed and notices an FEV_1 of 70%. The report shows an improvement of 15% following nebulized albuterol. The asthma educator should recognize that the boy

A. does not need medication to control asthma due to his infrequent symptoms.
B. does not need to take his albuterol unless he has symptoms of coughing or wheezing.
C. has uncontrolled asthma despite not displaying any symptoms.
D. should be taught to recognize subtle symptoms that he may be ignoring now.

Sample question 8. Matrixed at 3B6 application (answer: C)
Which of the following environmental changes would most likely improve the symptoms of a person with dust mite sensitivity?

A. Using a HEPA filter in the living room
B. Running a room ionizer in the bathroom
C. Encasing the mattress and pillows in the bedroom
D. Installing new carpet in the bedroom

Sample question 9. Matrixed at 4D3 analysis (answer: A)
An asthma educator is evaluating the effectiveness of a local asthma program over the last year. There is a discrepancy between patient-reported asthma severity and provider-assessed asthma severity among the program's participants. The asthma educator wishes to evaluate what impact this discrepancy is having on asthma morbidity of the participants in the program. Which of the following would be the BEST measure of asthma morbidity to use?

A. asthma-related emergency department visits
B. prescribing patterns of long-term control asthma medications
C. use of national asthma guidelines by clinicians
D. asthma quality of life survey results

Sample question 10. Matrixed at 3A4d recall (answer D)
The nebulizer cup for a home Pari-nebulizer® should be replaced every:

A. One month
B. Two months
C. Four months
D. Six months

Sample question 11. Matrixed at 4E1 application (answer: A)
An asthma educator is meeting with the parents of a 3-year-old girl with persistent asthma. The parents appear to understand the girl's asthma action plan from her provider, but admit they often do not follow it. Levalbuterol and budesonide nebulizer treatment are given about four times per week and seem to control her symptoms. They do not have medical insurance and sometimes struggle with paying utility and other bills. Currently, medications are obtained through a combination of patient assistance programs and occasional samples. A referral to which provider would likely be most beneficial at this time?

A. Social worker
B. Pharmacist
C. Primary care physician
D. Asthma specialist

Sample question 12. Matrixed at 3B5 application (answer: A)
An asthma educator is volunteering with her local asthma coalition which is addressing asthma triggers in local schools. Which issue would be most appropriate for the group to pursue?

A. Removal of rabbits and guinea pigs from the science classrooms
B. Obtaining high efficiency filters for the ventilation systems
C. Promoting non-dairy substitutions in the cafeteria
D. Recommending non-aerobic exercises during gym classes

REVIEW REFERENCES

Journals:

Allergy
Allergy & Asthma Proceedings
American Journal of Respiratory & Critical Care Medicine
American College of Chest Physicians (CHEST)
European Respiratory Journal
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Wanger, J, Clausen, J, Coates, A, Standardization of the measurement of lung volumes, Eur Resp J 2005; 26:511-522.

Weiler, JM, Brannan JD, SD, Randolph, C et al. Practice Parameter: Exercise induced bronchoconstriction Update 2016. J Allergy Clin Immunol. 2016; 4.e1-36.

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https://www.aaaai.org

American Association for Respiratory Care
https://www.aarc.org

American College of Asthma, Allergy and Immunology
https://acaai.org

American Lung Association https://www.lung.org

American Thoracic Society https://www.thoracic.org

Association of Asthma Educators https://asthmaeducators.org

Asthma and Allergy Foundation of America http://www.aafa.org

Asthma & Allergy Network/ Mothers of Asthmatics
https://www.allergyasthmanetwork.org

Environmental Protection Agency (Managing asthma in school)
https://www.epa.gov/iaq-schools/managing-asthma-school-environment

Guidelines for the Diagnosis and Management of Asthma
https://www.nhlbi.nih.gov/health-pro/guidelines/current/asthma-guidelines

Physician Asthma Care Education (PACE)
https://www.nhlbi.nih.gov/health-pro/resources/lung/physician-asthma-care-education/index.htm

U.S. Department of Health and Human Services
(Office for Civil Rights) HIPPA Privacy and Security Rules
https://www.hhs.gov/hipaa/index.html

ON THE DAY OF YOUR EXAMINATION

On the day of your examination appointment, report to the Test Center no later than your scheduled time. Once you enter the test center, look for the signs indicating PSI Test Center Check-In. **IF YOU ARRIVE MORE THAN 15 MINUTES AFTER THE SCHEDULED EXAMINATION TIME, YOU WILL NOT BE ADMITTED.**

To gain admission to the test center, you must present two forms of identification. The primary form must be government issued, current and include your name, signature and photograph. No form of temporary identification will be accepted. You will also be required to sign a roster for verification of identity.

- Examples of valid primary forms of identification are: driver's license with photograph; state identification card with photograph; passport; military identification card with photograph.
- The secondary form of identification must display your name and signature for signature verification (e.g., credit card with signature, social security card with signature, employment/student ID card with signature).
- If your name on your registration is different than it appears on your identification, you must bring proof of your name change (e.g., marriage license, divorce decree or court order).

You are prohibited from misrepresenting your identity or falsifying information to obtain admission to the Test Center. **YOU MUST HAVE PROPER IDENTIFICATION TO GAIN ADMISSION TO THE TEST CENTER.**

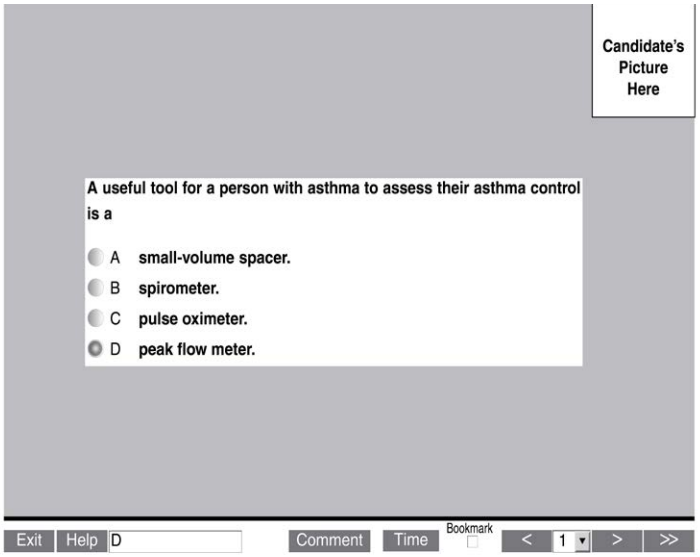
After your identification has been confirmed, you will be directed to a testing carrel. You will be prompted on-screen to enter your Social Security number. Your photograph, taken before beginning the examination, will remain on-screen throughout your examination session. This photograph will also print on your score report.

PRACTICE EXAMINATION

Prior to attempting the timed examination, you will be given the opportunity to practice taking an examination on computer. The time you use for this practice examination is NOT counted as part of your examination time. When you are comfortable with the computer testing process, you may quit the practice session and begin the timed examination.

TIMED EXAMINATION

Following the practice examination, you will begin the timed examination. Before beginning, instructions for taking the examination are provided on-screen. The examination contains 175 questions. Three and one-half hours are allotted to complete the examination. The following is a sample of what the computer screen will look like when you are attempting the examination.



The computer monitors the time you spend on the examination. The examination will terminate if you exceed the time limit. You may click on the "Time" button in the lower right portion of the screen to monitor your time. A digital clock indicates the time remaining for you to complete the examination. The time feature may also be turned off during the examination.

Only one examination question is presented at a time. The question number appears in the lower right portion of the screen. The entire examination question appears on-screen (i.e., stem and four options labeled – A, B, C and D). **Indicate your choice by either entering the letter of the option you think is correct (A, B, C or D) or clicking on the option using the mouse.** To change your answer, enter a different option by typing the letter in the response box or by clicking on the option using the mouse. You may change your answer as many times as you wish during the examination time limit.

To move to the next question, click on the forward arrow (>) in the lower right portion of the screen. This action will move you forward through the examination question by question. If you wish to review any question or questions, click the backward arrow (<) or use the left arrow key to move backward through the examination.

A question may be left unanswered for return later in the examination session. Questions may also be bookmarked for later review by clicking in the blank square to the right of the Time button. Click on the double arrows (>>) to advance to the next unanswered or bookmarked question on the examination. To identify all unanswered and bookmarked questions, repeatedly click on the double arrows (>>). When the examination is completed, the number of questions answered is reported. If not all questions have been answered and there is time remaining, return to the examination and answer those questions. Be sure to answer each question before ending the examination. **There is no penalty for guessing.**

You may make comments for any question by clicking on the Comment button to the left of the Time button. This opens a dialogue box where comments may be entered. Comments will be reviewed, but individual responses will not be provided.

INCLEMENT WEATHER, POWER FAILURE OR EMERGENCY

In the event of inclement weather or unforeseen emergencies on the day of an examination, PSI will determine whether circumstances warrant the cancellation, and subsequent rescheduling, of an examination. The examination will usually not be rescheduled if the Test Center personnel are able to open the Test Center.

You may visit **www.goAMP.com** prior to the examination to determine if PSI has been advised that any Test Centers are closed. Every attempt is made to administer the examination as scheduled; however, should an examination be canceled at a Test Center, all scheduled candidates will receive notification following the examination regarding rescheduling or reapplication procedures.

If power to a Test Center is temporarily interrupted during an administration, your examination will be restarted. The responses provided up to the point of interruption will be intact, but for security reasons the questions will be scrambled.

SECURITY

The NAECB and PSI maintain examination administration and security standards are designed to ensure all candidates are provided the same opportunity to demonstrate their abilities. The Test Center is continuously monitored by audio and video surveillance equipment for security purposes.

The following security procedures apply during the examination:

- Examinations are proprietary. No cameras, notes, tape recorders, pagers or cellular/smart phones are allowed in the testing room. Possession of a cellular/smart phone or other electronic devices is strictly prohibited and will result in dismissal from the examination.
- Only silent, non-programmable calculators without alpha keys or printing capabilities are allowed in the testing room.
- No guests, visitors or family members are allowed in the testing room or reception areas.

PERSONAL BELONGINGS

No personal items, valuables, or weapons should be brought to the Test Center. Only wallets and keys are permitted. Coats must be left outside the testing room. You will be provided a soft locker to store your wallet and/or keys with you in the testing room. The proctor will lock the soft locker prior to you entering the testing room. You will not have access to these items until after the examination is completed. Please note the following items will not be allowed in the testing room except securely locked in the soft locker.

- watches
- hats
- wallets
- keys

Once you have placed your personal belongings into the soft locker, you will be asked to pull your pockets out to ensure they are empty. If all personal items will not fit in the soft locker you will not be able to test. The site will not store or be responsible for your personal belongings.

If any personal items are observed or heard (e.g., cellular/smart phones, alarms) in the testing room after the examination is started, the administration will be forfeited.

EXAMINATION RESTRICTIONS

- Pencils will be provided during check-in.
- You will be provided with one piece of scratch paper at a time to use during the examination, unless noted on the sign-in roster for a particular candidate. You must return the scratch paper to the supervisor at the completion of testing, or you will not receive your score report.
- No documents or notes of any kind may be removed from the Test Center.
- No questions concerning the content of the examination may be asked during the examination.

- Eating, drinking or smoking is not permitted in the Test Center.
- You may take a break whenever you wish, but you will not be allowed additional time to make up for time lost during breaks.

MISCONDUCT

If you engage in any of the following conduct during the examination you may be dismissed, your scores will not be reported and examination fees will not be refunded. Examples of misconduct are when you:

- create a disturbance, are abusive, or otherwise uncooperative;
- display and/or use electronic communications equipment such as pagers, cellular/smart phones;
- talk or participate in conversation with other examination candidates;
- give or receive help or are suspected of doing so;
- leave the Test Center during the administration;
- attempt to record examination questions or make notes;
- attempt to take the examination for someone else;
- are observed with personal belongings, or
- are observed with notes, books or other aids without it being noted on the roster.

COPYRIGHTED EXAMINATION QUESTIONS

All examination questions are the copyrighted property of NAECB. It is forbidden under federal copyright law to copy, reproduce, record, distribute or display these examination questions by any means, in whole or in part. Doing so may subject you to severe civil and criminal penalties.

FAILING TO REPORT FOR AN EXAMINATION

If you fail to report for an examination, you forfeit the application and all fees paid to take the examination. A completed application and examination fee are required to reapply for examination.

FOLLOWING THE EXAMINATION

After completing the examination, you are asked to answer a short evaluation of your examination experience. You are then instructed to report to the examination proctor to receive your score report. Scores are reported in printed form only, in person or by U.S. mail. Scores are not reported over the telephone, by electronic mail or by facsimile.

Your score report will indicate a “pass” or “fail.” Additional detail is provided in the form of raw scores by major content category. A raw score is the number of questions you answered correctly. Your pass/fail status is determined by your raw score. Even though the examination consists of 175 questions, your score is based on 150 questions; 25 questions are “pretest” questions.

SCORING THE EXAMINATION

The methodology used to set the minimum passing score is the Angoff method, in which expert judges estimate the passing probability of each examination question. These ratings are averaged to determine the minimum passing score (i.e., the number of correctly answered questions required to pass the examination).

The performance standard, meaning the skills and abilities required to pass the NAECB exam, is the same. However, candidates may be administered different forms, or groups of items, of the NAECB exam. Because items may differ in how hard or easy they are, the passing score, or the score required to pass the exam, may differ slightly from one form to the next. Standard setting is the process by which the passing performance, or passing score, is determined on an exam. Standard setting for the NAECB exam was completed by a group of subject matter experts (SMEs) selected to represent the field of Asthma educators representing different disciplines. This group was guided through a formal process that included discussing the meaning of passing the exam in regard to the minimum knowledge skills and abilities required of a candidate and then translating that information into performance on the NAECB exam.

As is common practice, the standard setting included one form of the NAECB exam. To apply the passing score to subsequent forms of the exam, a statistical process called equating is employed. Equating accounts for the differences in items and item difficulties on forms and makes adjustments such that the passing score on each form reflects equivalent performance on the exam. This process of equating is essential to the fairness of the NAECB exam program as it provides equivalent expectations of “passing” performance over time and across forms of the exam.

IF YOU PASS THE EXAMINATION

If you pass the NAECB Examination, you are allowed to use the designation AE-C®. Passing candidates will receive a certificate signed by the Chairman of the NAECB by the end of the month following the examination month.

IF YOU DO NOT PASS THE EXAMINATION

If you do not pass the examination, you may reapply by using the re-application form from your score report, by completing the paper application included in this handbook or by submitting an application online and registering for a new testing appointment at **www.naecb.org**. Repeat candidate fees apply ($250) for each time the examination is reattempted. There is a waiting period of ninety (90) days between examination attempts with a maximum of three (3) attempts in a one (1) year period. In the case of extenuating circumstances, candidates may petition the NAECB. If the time has exceeded one year since the date of your application to NAECB, you will need to apply to the NAECB again for permission to take the NAECB examination with all the associated fees ($350). An additional $145 fee is required to schedule an examination appointment outside of the U.S. or at a U.S. Territory.

SCORES CANCELED BY THE NAECB OR PSI

The NAECB is responsible for the integrity of the scores they report. On occasion, occurrences, such as computer malfunction or misconduct by a candidate, may cause a score to be suspect. The NAECB is committed to rectifying such discrepancies as expeditiously as possible. The NAECB may void examination results if, upon investigation, violation of its regulations is discovered.

CONFIDENTIALITY

Information about candidates for testing or renewal of certification and their examination results are considered confidential; however, the NAECB reserves the right to use information supplied by or on behalf of a candidate in the conduct of research. Studies and reports concerning candidates will contain no information identifiable with any candidate, unless authorized by the candidate.

DUPLICATE SCORE REPORT

You may purchase additional copies of your score report at a cost of $25 per copy. Requests must be submitted to PSI, in writing, within 12 months after the examination. The request must include your name, Social Security number, mailing address, telephone number, date of examination and examination taken. Submit this information with the required fee payable to PSI Services Inc. Duplicate score reports will be mailed within approximately five business days after receipt of the request and fee.

RENEWAL OF CERTIFICATION

Attaining certification is an indication of mastery of a well-defined body of knowledge at a point in time. Periodic renewal of the certification is required to maintain certified status. Certification by examination is valid for five (5) years. Certificants may renew their certification only up to one year prior to the expiration of the certification. The recertification examination fee is $300.

Recertification can be obtained in two ways:
1) By re-examination which provides five (5) additional years of certification upon passing; 2) Through earning 35 Continuing Education Units (CEUs) which provides five (5) additional years of certification upon meeting all the requirements. Information about recertification by CEUs is found on the website at **www.naecb.com** in the certificant corner section.

Failure To Renew: A certificant who fails to renew his/her certification is no longer considered certified and may not use the credential awarded for certification in professional communications, such as on letterhead, stationery and business cards, in directory listings and in signature.

NAECB EXAMINATION APPLICATION

Applicants may complete the application process online at www.naecb.org by selecting Examination Application. If you prefer to submit the paper application, please complete all sections of this two-page form. Include credit card information or enclose a cashier's check or money order payable to PSI Services Inc. for the appropriate amount. Mail the application and fee to:

NAECB Examination, PSI, 18000 W. 105th St., Olathe, KS 66061-7543.
For further information, call Candidate Services at 833-333-4755.

PERSONAL INFORMATION *(please print using black or blue ink)*

Name: _____
(Last, First, Middle)

Social Security Number:_____ Date of Birth: _____
If you do not wish to provide your SSN, leave this area blank and PSI will assign an ID number to you.

Daytime Telephone Number:_____ Evening Telephone Number: _____

Fax Number:_____ Email Address: _____

Street Address: _____

City:_____ State: _____ Zip Code/Postal Code: _____ Country:_____

Eligibility Requirements – Please complete one of the following eligibility requirements.

International candidates are only eligible if they meet the 1,000 hours criteria. Please register under the 1,000 hours category.

☐ I am a currently licensed or credentialed U.S. health care professional active and unrestricted in the following profession (please indicate by checking box):

- ☐ Physician (MD, DO)
- ☐ Physician Assistant (PA-C)
- ☐ Nurse (RN, LPN, NP)
- ☐ Respiratory Therapist (RRT, CRT)
- ☐ Pulmonary Function Technologist (CPFT, RPFT)
- ☐ Pharmacist (RPh)
- ☐ Social Worker (CSW)
- ☐ Health Educator (CHES)
- ☐ Physical Therapist (PT)
- ☐ Occupational Therapist (OT)

OR

☐ I am applying for the NAECB Examination with a minimum of 1,000 hours experience providing direct patient asthma education, counseling or coordinating services.

TEST CENTER LOCATION

☐ United States Test Center

☐ U.S. Territory or outside the U.S. Test Center

EXAMINATION INFORMATION

I am including a Special Accommodations Request:

☐ No

☐ Yes *(Complete the form included in this handbook.)*

I am a: ☐ New Applicant
☐ Reapplicant
☐ Recertifier

EXAMINATION FEE

Payment may be made by credit card, cashier's check or money order payable to PSI Services Inc.

	Location of Candidate	
Application Status	United States	U.S. Territories and Outside the U.S.
First attempt	$350	$495
Repeat attempt	$250	$395
Recertification	$300	$445

Total Fee: _____

If payment is made by credit card, complete the following;

☐ VISA ☐ MasterCard
☐ American Express ☐ Discover

_____
Credit Card Number

_____
Expiration Date

_____
Name on Card

_____
Signature

DEMOGRAPHIC QUESTIONS

1. Nature of the Practice setting in which you work:
   - ☐ University
   - ☐ Hospital
   - ☐ Multispecialty Clinic
   - ☐ Physician Office
   - ☐ Academic
   - ☐ Private Practice
   - ☐ Nursing Home/Extended Care Facility
   - ☐ Home Health Agency
   - ☐ Emergency Department
   - ☐ Other _____
2. Number of Hours (per week) in Asthma Education, Coordination or Counseling Services:
   - ☐ Less than 8 hours
   - ☐ 8-16 hours
   - ☐ 17-24 hours
   - ☐ 25-32 hours
   - ☐ 33-40 hours
   - ☐ More than 40 hours
3. Experience as an Asthma Educator, Coordinator or Counselor:
   - ☐ 0-1 year
   - ☐ 2-3 years
   - ☐ 4-5 years
   - ☐ 6-10 years
   - ☐ 11-15 years
   - ☐ 16 years or more
4. Type of Primary Practice Setting:
   (check all that apply to your ONE primary practice setting)
   - ☐ Hospital Inpatient
   - ☐ Hospital Outpatient
   - ☐ Both Hospital Inpatient/Outpatient
   - ☐ Physician's Office
   - ☐ Community Health Agency
5. Location of Primary Practice Setting:
   - ☐ Urban
   - ☐ Rural
   - ☐ Suburban
6. Highest Education Level Achieved:
   - ☐ Diploma (college)
   - ☐ Associate Degree
   - ☐ Baccalaureate Degree
   - ☐ Master's Degree
   - ☐ Doctoral or Medical Degree
7. How did you hear about Certification?
   (check all that apply)
   - ☐ Professional Journal *(specify)* _____
   - ☐ Regional Meeting *(specify)* _____
   - ☐ National Meeting *(specify)* _____
   - ☐ NAECB Mailing
   - ☐ NAECB website
   - ☐ Colleague
   - ☐ Other _____

CODE OF CONDUCT AND SIGNATURE

AE-C® Applicants/Certificants shall abide by the rules and regulations promulgated by the NAECB with regard to applying for and taking the examination. Once notified of successful completion of the examination, applicants shall promptly adopt the designation AE-C® and utilize it as part of their professional activities.

AE-C® Certificants shall immediately cease and desist using the designation in any and all forms in the event they (1) decide not to seek re-certification, or (2) are no longer eligible for any reason including termination by the NAECB. No one shall adopt the designation that has not been so notified by the NAECB.

Applicants and Certificants will hold confidential information regarding the examination that could assist another applicant seeking certification.

Certificants will conduct themselves in a professional manner and provide asthma coordination, counseling and education in a manner that will be in furtherance of the mission of the NAECB and in no way be harmful to the public. Certificants will not engage in any inappropriate or unethical behavior, nor provide asthma coordination, counseling or education while experiencing any physical impairment affecting their performance.

Applicants, through the act of applying for and paying their examination fee, agree to abide by this Code of Conduct, the NAECB Disciplinary Policies, and all rules and regulations of the NAECB.

I certify that I agree to abide by regulations of the NAECB Program and the Code of Conduct described above. I believe that I comply with all admission policies for the NAECB Examination. I certify that the information I have submitted in this application is complete and correct to the best of my knowledge and belief. I understand that, if the information I have submitted is found to be incomplete or inaccurate, my application may be rejected or my examination results may be delayed or voided.

(Sign and date in ink.)

Name (Please Print): _____

Signature: _____ Date: _____

REQUEST FOR SPECIAL EXAMINATION ACCOMMODATIONS

If you have a disability covered by the Americans with Disabilities Act, please complete this form and provide the Documentation of Disability-Related Needs on the next page so your examination accommodations can be processed efficiently. The information you provide and any documentation regarding your disability and your need for examination accommodations will be treated with strict confidentiality.

Candidate Information

Social Security # _____ — _____ — _____

_____
Name (Last, First, Middle Initial, Former Name)

_____
Mailing Address

_____

_____
City State Zip Code

_____
Daytime Telephone Number

Special Accommodations

I request special accommodations for the _____ examination.

Please provide (check all that apply):

_____ Reader
_____ Extended examination time (time and a half)
_____ Reduced distraction environment
_____ Other special accommodations (Please specify.)

_____
_____
_____

Comments: _____

_____

_____

PLEASE READ AND SIGN:

I give my permission for my diagnosing professional to discuss with PSI staff my records and history as they relate to the requested accommodation.

Signed: _____ **Date:** _____

Return this form with your examination application and fee to:
PSI, 18000 W. 105th St., Olathe, KS 66061-7543, Fax: 913-895-4651.
If you have questions, call Candidate Services at 833-333-4755.

DOCUMENTATION OF DISABILITY-RELATED NEEDS

Please have this section completed by an appropriate professional (education professional, physician, psychologist, psychiatrist) to ensure that PSI is able to provide the required examination accommodations.

Professional Documentation

I have known _____ since _____ / _____ / _____ in my capacity
Candidate Name Date

_____.
Professional Title

The candidate discussed with me the nature of the examination to be administered. It is my opinion that, because of this candidate's disability described below, he/she should be accommodated by providing the special arrangements listed on the Request for Special Examination Accommodations form.

Description of Disability: _____

_____

_____

_____

_____

Signed: _____ **Title:** _____

Printed Name: _____

Address: _____

_____

Telephone Number: _____

Date: _____ **License # (if applicable):** _____

Return this form with your examination application and fee to:
PSI, 18000 W. 105th St., Olathe, KS 66061-7543, Fax: 913-895-4651.
If you have questions, call Candidate Services at 833-333-4755.

2021 Reach the Peak.

2021 Reach the Peak Virtual Workbook

Welcome to Reach the Peak Virtual Workbook

There are 8 case discussions and some questions to review. As you read through the case discussions ask yourself:

1. Is the patient's asthma controlled?
2. How would you classify the asthma severity using the EPR-4 guidelines?
3. What are the triggers?
4. What needs to be included on the asthma plan?
5. What are the barriers to successful asthma management?
6. What are the learning needs of the patient, the family?
7. Is it asthma that is causing the symptoms?

There will be an opportunity to discuss the cases within your small group on day #2 of the conference. At the back of the virtual workbook, you will find tools to use as you work through the cases to help you evaluate spirometry results and apply the EPR-4 guidelines to your decision making.

1st case discussion

Juan Gonzalez, 9 year old male seen in the emergency room for the 1st time with increased respiratory symptoms for the past week.

98.2 temp- 120 HR- 40 RR - pulse ox 88%

Suprasternal retractions and nasal flaring, speaking in 2-3 word sentences, scattered expiratory wheezing with diminished air movement bilaterally in lower lobes.

20 minutes after Albuterol given by respiratory staff—

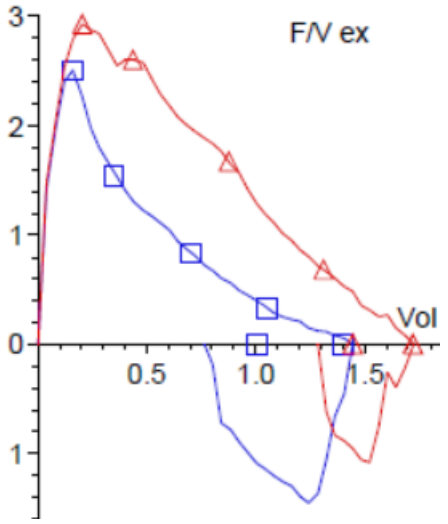
RR- 26 -pulse ox 94% with less wheezing and improved air movement. Juan says he feels better and begins playing with his siblings.

Past medical History:

- Juan has daytime symptoms 3 days a week; night cough 12 times a month and coughs with exercise.
- Juan has a 'red' and 'orange' inhaler at home but forgets where they are and unsure what they are for or when to use them.
- 2 dogs, 1 cat and 3 birds in the home. Father and uncle smoke in the home.

Exhaled nitric oxide 70 ppb (< 20 is expected normal for pediatric; < 25 is expected normal for adults)
Peak Flow personal best = 200
Spirometry results in EMR (Electronic Medical Records) done last month

	Ref	Pre	%Ref Pre	Z-Score Pre	Post	% Ref Post	Z-Score Post	% Chg
FVC L	1.49	1.40	94	-0.48	1.72	115	1.17	22
FEV1 L	1.38	1.01	73	-2.06	1.44	105	0.36	43
FEV1/FVC %	93	72	78	-2.97	84	91	-1.56	17
FEF25-75% L/s	1.99	0.73	37	-3.13	1.46	73	-1.26	100
FEV/FIV_0.5		1.22						
PEF L/min	221	150	68	-2.28	175	79	-1.47	17
VBe%FV %		1.70			1.86			9
eNO		70.00						



Blue = initial test
Red=post bronchodilator test

Spirometry interpretation: Mild reversible obstruction shown in FEV1, FEV1/FVC and FEF 25-75% with significant improvement in all values after albuterol. Elevated exhaled nitric oxide supports ongoing eosinophilic airway inflammation. (allergic)

1) What physical exam findings are concerning?

a) His parents waited 1 week to have him seen by a provider.

b) Hypoxia, wheezing, retractions and not speaking in full sentences.

c) Juan doesn't know where his inhalers are or what they are for.

d) Juan wanted play with his siblings rather than be a patient.

2) Is Juan responding to the ER treatments?

a) Yes and he is ready for discharge.

b) No because parents haven't filled out the paperwork.

c) Partly. His oxygen level has improved, less wheezing, retracting is less, his breathing rate has come down.

d) Hard to tell since he is playing with his siblings.

3) Is his asthma controlled?

a. No because he has frequent day, night and exercise symptoms.
b. This is just a cold and Juan doesn't have asthma.
c. Yes it is controlled, he just forgot to use his inhaler.
d. No because he has allergies and there are pets in his home.

4) Does he need daily asthma medications?

a. No, he can use an over the counter cold and cough medicine until he gets better.
b. Yes, the frequency of his symptoms and his recent spirometry results support the need for daily asthma medication.
c. It depends on whether is parents can afford the medicines.
d. Juan's family should discuss the need for asthma medicines with his primary care provider.

5) What are Juan's asthma triggers?

a. eating junk food & drinking soda
b. playing too much and not wearing a coat or hat when outdoors
c. being tired and not getting enough sleep
d. viruses, secondhand smoke, and pets

6) What discharge learning needs are priorities for Juan and his family?

a. what is asthma, signs and symptoms to monitor for, how to use his asthma medicines and to follow up with their PCP.
b. encourage family members to wash hands frequently and to get a yearly flu vaccine.
c. how to access resources for quitting smoking and resources for help with food and housing.
d. Providing family with work and school excuses.

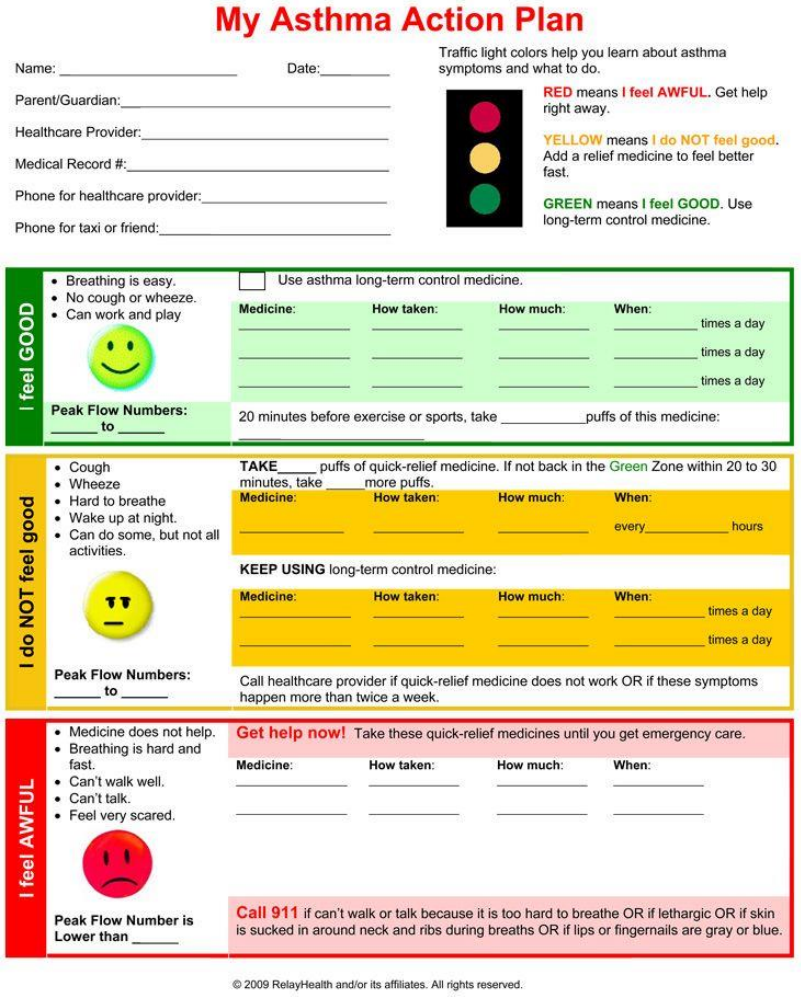
7) What information would you add to Juan's asthma plan?

a. Spirometry results, height & weight.

b. Medications, triggers for symptoms, peak flow range.

c. Teacher's name, grade in school & where his medications are kept.

d. Instructions on how to use and clean a spacer/valved holding chamber.



My Asthma Action Plan

Name: _____ Date: _____

Parent/Guardian: _____

Healthcare Provider: _____

Medical Record #: _____

Phone for healthcare provider: _____

Phone for taxi or friend: _____

Traffic light colors help you learn about asthma symptoms and what to do.

RED means **I feel AWFUL.** Get help right away.

YELLOW means **I do NOT feel good.** Add a relief medicine to feel better fast.

GREEN means **I feel GOOD.** Use long-term control medicine.

I feel GOOD

- Breathing is easy.
- No cough or wheeze.
- Can work and play

☐ Use asthma long-term control medicine.

Medicine:	How taken:	How much:	When:
			_____ times a day
			_____ times a day
			_____ times a day

Peak Flow Numbers: _____ to _____

20 minutes before exercise or sports, take _____puffs of this medicine: _____

I do NOT feel good

- Cough
- Wheeze
- Hard to breathe
- Wake up at night.
- Can do some, but not all activities.

TAKE_____ puffs of quick-relief medicine. If not back in the Green Zone within 20 to 30 minutes, take _____more puffs.

Medicine:	How taken:	How much:	When:
			every_____ hours

KEEP USING long-term control medicine:

Medicine:	How taken:	How much:	When:
			_____ times a day
			_____ times a day

Peak Flow Numbers: _____ to _____

Call healthcare provider if quick-relief medicine does not work OR if these symptoms happen more than twice a week.

I feel AWFUL

- Medicine does not help.
- Breathing is hard and fast.
- Can't walk well.
- Can't talk.
- Feel very scared.

Get help now! Take these quick-relief medicines until you get emergency care.

Medicine:	How taken:	How much:	When:

Peak Flow Number is Lower than _____

Call 911 if can't walk or talk because it is too hard to breathe OR if lethargic OR if skin is sucked in around neck and ribs during breaths OR if lips or fingernails are gray or blue.

2nd case discussion

Ali Tucker, is an 18-year-old female with chief complaint of asthma with frequent cough & wheeze seen in PCP office for initial evaluation.

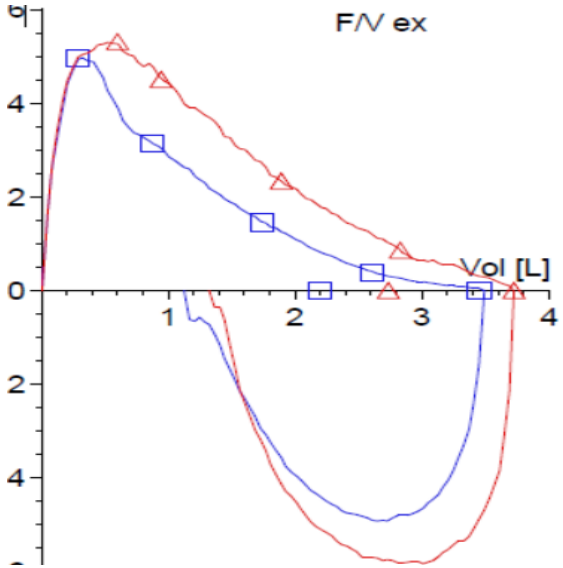
Dry cough off and on during the day, coughs every night. Doesn't like sports because she is always last. Doesn't take asthma medications regularly due to social issues. Runny nose with secondhand smoke exposure, cats, dogs. Tried smoking twice and wants people to stop nagging her about her cough.

Past medical history

Hospitalized last year in the ICU for asthma. Takes medications less than twice a week. Cats in the home that are Ali's best friends. Cockroaches in the apartment. Mother works 2 jobs and Ali babysits her 9-year-old sister often. Ali has missed 2 weeks of school in the first 3 months of the school year. Allergic to pets, pollens and molds.

Exhaled Nitric Oxide= 76 ppb(< 20 is normal in children)
Personal best peak flow = 300
ACT= 12 (asthma control test is a validated tool for adequate asthma symptom control. > 19 = control)

	Ref	Pre	%Ref Pre	Z-Score Pre	Post	% Ref Post	Z-Score Post	% Chg
FVC L	3.68	3.45	94	-0.47	3.72	101	0.09	8
FEV1 L	3.25	2.19	67	-2.46	2.73	84	-1.23	25
FEV1/FVC %	89	64	71	-3.08	73	82	-2.20	15
FEF25-75% L/s	3.80	1.18	31	-3.10	2.10	55	-1.88	79
FEV/FIV_0.5		0.78			0.87			12
PEF L/min	442	298	67	-2.32	319	72	-1.99	7
VBe%FV %		1.58			1.72			9
eNO		76.00						



Blue = initial test
Red =post bronchodilator test

Spirometry interpretation: partially reversible obstruction shown in FEV1, FEV1/FVC and FEF 25-75% with significant improvement in those values after albuterol. Elevated exhaled nitric oxide supports ongoing eosinophilic airway inflammation. (allergic)

1) **What are the best indicators of Ali's poor asthma control?**

a. She is annoyed that everyone nags her about her cough.
b. Her low ACT, obstruction on spirometry, elevated nitric oxide and frequency of symptoms.
c. history of PICU hospitalization last year
d. History of smoking and missed school this year

2) **What is the best initial strategy to engage Ali in her asthma management?**

a. inquire if any of her friend's have asthma
b. ask how often she talks with her parents about her asthma
c. have the school nurse keep her asthma medications
d. assess Ali's expectations for her asthma control.

3) During Ali's 1st visit, what learning needs should be addressed?

a. asthma symptoms, importance of taking medications and how to take them, & avoidance of asthma triggers and to follow up in 6-8 weeks.
b. Child CPR since she frequently babysits her sister
c. Tutor assistance to help her catch up since she has missed a lot of school
d. assertiveness training to help her deal with people who like to nag

4) What is the best advice to help improve Ali's allergy symptoms.

a. Charge her mom for babysitting her sister so she can save money to move out on her own to get away from the cockroaches.
b. Only participate in indoor sports to decrease exposure from seasonal allergens. (pollens, mold)
c. Have the cats sleep outside her bedroom, wash hands after contact and use a daily nasal steroid and antihistamine of needed.
d. Have her see an allergist.

3rd Case Discussion

Mary Nod is a 30-year-old female with breathless in her 1st pregnancy seen in her PCP office. She is 22 weeks pregnant, with nausea and gastric pain.

99.4 Temp, HR 120. RR-18. BP 132/71. pulse ox 91% Weight 162 lbs.

No acute distress, expiratory wheezing and diminished in the bases. Mild tachycardia, normal fetal heart rate. Nebulized albuterol given and patient feels it is easier to breathe. O2 saturations now 97%. Asthma control test = 15. Spirometry showed FEV1 of 42% predicted ($\geq$ 80 is normal). Normal after albuterol given.

Past Medical History

Asthma since childhood. ER visits yearly for asthma the past 3 years. Stopped asthma medications when she learned she was pregnant. Prior to the pregnancy asthma was controlled with budesonide twice a day. Asthma medications stopped 3 weeks ago. Mary quit smoking when she learned she was pregnant.

Works as a hairdresser. She has been taking albuterol several times a day for the past week. Outgrew childhood cat and pollen allergies. No pets in the home.

1) Is Mary's asthma controlled?

a. Yes, her symptoms are due reflux which is common in pregnancy.
b. No because she is continuing to work while she is pregnant.
c. Yes, she is breathless because the baby is pushing up on her diaphragm.
d. No, she is having increased symptoms since being off her daily asthma inhaler, she is responding to bronchodilator in the office, her spirometry and ACT are both low.

2) **What other factors may be contributing to her breathlessness?**

a. Weight gain during the pregnancy
b. Gastroesophageal reflux
c. Exposure to chemical at work
d. All of the above

4th case discussion

Hazel Doolittle is a 4-year-old female with difficulty breathing, swollen mouth, generalized rash being seen in the emergency room.
History of present problem: 4-year-old female with asthma and peanut allergy. At daycare today noted to have wheezing, facial rash and lip swelling after eating trail mix. No Epipen available. Brought in by parents. Dad feels that everyone is overreacting, and Hazel is just having a toddler tantrum.

Well developed female, awake, clinging to mom, audible stridor and wheezing. HR 170, 141/77, RR 36, O2 sats 89% on RA. Weight 19 kg. Lips mildly swollen, flushed face, nasal flaring, subcostal retractions, inspiratory and expiratory wheezing, cries appropriately with exam. Moderate eczema on arms, wrists and lower legs.

Previous allergy testing positive for peanuts, cat, dog, outdoor mold and weed pollens.

Oxygen, EPIPEN Jr, Benadryl and Albuterol SVN given by ED team.

Ten minutes after the interventions above, HR is 132, 112/70, RR 24, O2 sats 97% on RA, wheezing resolved, child is calm and playing with toys.

Prior to this ER visit—night cough 2-3 times a week which awakens her and her parents. Cough with activity.

Has cold symptoms about every 3 weeks. Albuterol blow by nebulizer used during colds with some response.

Takes nebulized budesonide daily– but only when sick and won't wear a mask. Epipen is kept in the refrigerator. Parents haven't checked the expiration date.

1) **What primary barriers are there to Hazel's allergy and asthma care?**

a. Needs behavioral modification due to tantrums triggering symptoms.

b. Poor parental understanding of anaphylaxis, asthma symptoms and triggers and how and when to give medicines.

c. Daycare should not have given the trail mix bar to Hazel.

d. Parents cannot afford multiple medications, raising kids is expensive.

2) Parents feel that Hazel will not cooperate with inhalers. What is an age-appropriate intervention to help Hazel cooperate?

a. Teach her to use a peak flow meter

b. Learn the names of the inhalers

c. Hold the spacer with mask while the parents help administer the inhaler.

d. Hold Hazel down and force the medication – crying gets more medication in the lungs.

5th Case Discussion

Sam Spade, 56-year-old male with poor asthma control seen in PCP office for outpatient evaluation.

History of present problem: Childhood asthma resolved, rare exercise symptoms that responded well to Albuterol. Last 6 months, shortness of breath with activity and Albuterol doesn't seem to help anymore. Sedentary lifestyle and he has put on 30 lbs the past 2 years, BMI 41%. He would like to lose the weight but finds it hard to be more active when he gets out of breath. No other daytime or night symptoms.

Physical examination: Vital signs: 240 lbs, HR 96, RR- 20, BP 168/84, Pulse Ox 94% on RA. Pleasant obese, male, no acute distress. Negative findings ears, nose, throat.

Breath sounds are clear, some shortness of breath with speech. Normal cardiac examination, negative skin exam.

Past medical history: Birth history is non-contributory, no asthma exacerbations since childhood. No allergy symptoms. He does snore and might have sleep apnea.

In the past year was diagnosed with hypertension and started on blood pressure medication and told he was pre-diabetic.

Family social History: Sam was divorced 3 years ago and lives alone in an apartment. Good relationships with his 2 kids who live at home with his ex-wife. The divorce was hard, but Sam wants to improve his health for his kids. Sam took up smoking cigarettes after the divorce. Smokes ½ pack a day. Some financial stressors with providing for his kids. Sam works in law-enforcement, likes his job.

Current medications: Lipitor 20 mg daily, Melatonin 10 mg qhs, Propranolol 40 mg BID, nasal steroid daily for snore, Albuterol 2 puffs via inhaler without spacer as needed. He uses it 1-2 times a day, unclear if it helps.

- CXR done 6 months ago was negative.
- Exhaled nitric oxide 6 ppb. (< 25 normal in adults.)
- Previous allergy testing was negative.
- ACT = 18 (asthma control test, validated tool for symptom control in patients > 4 years of age. 20 or higher suggests asthma is controlled.
- Personal best peak Flow = 500.
- Previous normal spirometry.

	Predicted Values	Measured Values	% Predicted
FVC	5.04 liters	5.98 liters	119 %
FEV1	4.11 liters	4.58 liters	111 %
FEV1/FVC	82 %	77 %	94 %

1) **Are there medicines that might be impacting Sam's asthma control?**
   a. Lipitor
   b. Propranolol
   c. Nasal steroid
   d. Melatonin

2) **What barriers are there to Sam being successful at managing his asthma?**
   a. Men don't like to go to the doctors.
   b. Sam wishes change was easier.
   c. The divorce turned his kids against him
   d. High stress job, decreased financial resources after stressful divorce, smoking, possible OSA, obesity, cost of medications.

6th Case Discussion

Peter Nguyen is a 19-year-old male seen in the Emergency room after collapsing in the shower. He speaks English, parents speak only Vietnamese.

History of present problem: Peter is in his first year at University. He was diagnosed with asthma as a child and has controlled it with use of daily ICS and as needed quick relief inhaler. At a recent party where there was cigarette smoke in the environment, he became extremely short of breath and started coughing.

After a couple of puffs of his rescue inhaler he felt much better and was able to stay at the party an additional three hours. Later at home, he collapsed while taking a shower. His mother heard him fall, and he was rushed to the local ER in the family car.

Physical examination: Alert, anxious, shortness of breath with speech.

T-98, Pulse 140, RR 32, Oximetry 89% on RA. Weight 80 kg.

Some nasal flaring, subcostal and supra-clavicular retractions. Scattered expiratory wheezing throughout lung fields, with diminished air flow in the bases.

Oxygen and Duoneb given, prednisone 60 mg given. 20 minutes after Duoneb O2 sats on RA 94%, HR 98, RR 24.

Upon discharge from the emergency room, the hospital staff recommends he see an asthma educator.

A week later, Peter comes to your office for asthma assessment and education :

Past medical history:
Childhood asthma well controlled on low dose ICS. No ER visits or asthma flares for 5 years. Hasn't been consistent with the ICS due to starting college.

No recent spirometry. Negative environmental allergies. Has noticed some cough in chemistry when working with chemicals. He has never smoked, but most of his friends do. Since starting college has been having heartburn several times a week, worse at night. Also mentions chest tightness with sports.

Chest x-ray done in ER shows changes consistent with asthma, hyperinflation. No evidence of pneumonia.

Peter's personal peak flow best= 500. Today in the ER peak flow was 220 before Duoneb. Rechecked 20 minutes after nebulizer and = 460. *(peak flow of 500; green zone = 400 or higher (80% of personal best) yellow zone = 250-399(50-79% personal best) red zone = less than 250 (< 50% of personal best).*

Spirometry done 3 years ago reported as normal.

ACT= 16.

Family social History: Freshman in college. Lives in college dorms during the week, lives with parents on the weekends. Outdoor dog at home. No SHS at home, but frequent SHS exposure during the week. He has never smoked.

Current medications: QVAR 80. 2 puffs BID. Takes on the weekends. Albuterol MDI as needed. Using 2-3 times a week. Needs more when he hangs out with his friends that smoke.

Tums as needed.

1) **In helping Peter partner in his asthma management what information is most helpful in completing an educational needs assessment?**

a. self management decisions
b. cultural beliefs
c. favorite sports to participate in
d. both a & b

2) Would peak flow monitoring would be helpful for Peter?

a. College students like data and gadgets
b. Peter may be a poor perceiver of his symptoms and monitor peak flows may help him recognize when his asthma is or isn't controlled.
c. He is a busy college student and won't have time to monitor peak flows.
d. If he monitors his peak flows, then he won't have to take medications.

7th Case Discussion

Cooper Scott is a 2-year-old male with wheezing with URIs — initial pulmonary consult

History of present problem: Referred by PCP due to 4 episodes of bronchiolitis with wheezing this winter. 1 episode required 48-hour hospitalization(RSV +) and oxygen. Albuterol seemed to relieve the wheezing. Has also had 2 croup episodes –both treated with decadron. Between colds Cooper is a healthy, active toddler without frequent cough symptoms. No wheezing outside of the URIs.

Physical examination: Active, happy, toddler, no distress. Height and growth at the 60th %, developmentally on target. T=97, HR 128; RR 28. Pulse ox 98% on RA. Negative findings on physical examination except for mild eczema patches behind knees.

Previous chest x-ray when hospitalized showed viral pneumonitis.

Family social History: Lives at home with parents and paternal grandmother. Is in daycare 3 days a week. No pets. No secondhand smoke in the home. Some of the daycare workers smoke, but reportedly only outside.

Current medications: none

Past medical history: Birth history negative. Had some reflux from 3-6 months of age. Resolved. Frequent nasal congestion, snores without concern for obstructive sleep apnea. 1 ear infection. Eczema was worse in the first year of life and now very rarely needs topical steroids for the eczema.

Family medical history: Negative for asthma, allergies and eczema. Maternal grandmother has Type 2 DM, hypertension and elevated lipids.

1) Does Cooper have asthma?

a. No, young children get frequent colds, and this is normal

b. It's a strong possibility that Cooper has intermittent asthma triggered by viral illnesses.

c. It is his allergies that cause him to wheeze.

d. Needs spirometry to confirm the diagnosis.

2) What education should be provided for the family?

a. Keep him out of daycare, so he doesn't get sick as often

b. Try a chiropractic – body manipulation can cure asthma

c. Get him a chihuahua, it will take his breathing trouble away

d. At the onset of symptoms start a daily inhaled steroid along with bronchodilator for 5-7 days until symptoms are gone.

8th Case Discussion

Jeff Star is an 8-year-old male at his PCPs for asthma follow up.

History of present problem: Currently runny nose, cough, wheeze, chest tightness x 4 days. No fevers. Jeff has been using his Albuterol without telling his Mom and they are being seen today because they need an Albuterol refill. Baseline, day and night cough only with colds. Albuterol used only with colds and before exercise. Chronic runny nose – worse in spring and summer.

Physical examination: T= 99/T, HR= 100, RR 28, 110/64. O2 saturations 94% on RA. Well developed, well-nourished male, in no acute distress. Clear runny nose, nasal congestion, nasal voice. Breath sounds clear, UAC. Otherwise, negative physical findings.

Past medical history: Birth history is non-contributory. History of asthma since age 2. No recent ER visits. 2 prednisone courses in the past 12 months. He is on weekly allergy shots. Allergies and exercise trigger his asthma and his asthma always seems worse in the cold air and when the weather changes.

Family medical history: Mother has environmental allergies and is on allergy shots.

Family social History: Lives with his single mother. Dad is not involved. Jeff is a 3rd grader. He has missed 1 week of school. No pets or secondhand smoke exposure. Hardwood floors and carpet.

Current medications: Flovent 110 takes 1-2 puffs once a day with a spacer, Montelukast (Singulair) 5 mg daily. Albuterol prn.

Asthma Control Test (ACT) = 9;

Peak Flow personal best is 250. With current cold = 170

previous allergy testing for cat, dog weed, tree, grass pollens and molds.

Spirometry today:

	Measured Values	% Predicted
FVC	1.84	121%
FEV1	1.52	116%
FEV1/FVC		82%

1) Is his asthma controlled?

a. yes, this is a cold. Spirometry is normal, lungs clear and no hypoxia.

b. No, while this is a cold with mild asthma exacerbation, he has required 2 oral steroids in the past 12 months.

c. Asthma is controlled, allergies are not.

d. No because he missed 1 week of school.

2) How would you adjust Jeff's asthma action plan to improve asthma control?

a. No changes indicated at this time.

b. Add peak flow monitoring to help him know when his asthma is not controlled.

c. Adjust Flovent 110 dose to 2 puffs twice a day with spacer and evaluate MDI with spacer technique.

d. Have his allergist fill out the asthma action plan.

Case discussion #9

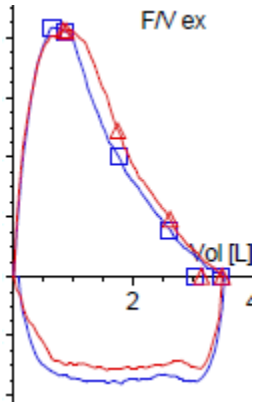
Penny Lane is a 15-year-old athlete with exertional dyspnea. Symptoms start at onset of activity and grabs her throat to show you where she feels she can't take a deep breath. Albuterol inhaler trialed without benefit. Plays competitive Volleyball and Lacrosse. No current medications. Negative family history.

Positive for: 1 dog-- mostly outdoors.

Attends: 12th grade fall 2020 College plans-- will be visiting Yale University. Straight A student, wants to be a trauma surgeon

Spirometry results show normal values without significant bronchodilator response. Flattening of inspiratory loop.

	Ref	Pre	%Ref Pre	Z-Score Pre	Post	% Ref Post	Z-Score Post	% Chg
FVC L	3.56	3.49	98	-0.17	3.48	98	-0.19	-0
FEV1 L	3.17	3.02	95	-0.40	3.14	99	-0.10	4
FEV1/FVC %	90	87	97	-0.49	90	101	0.08	4
FEF25-75% L/s	3.83	3.52	92	-0.39	4.26	111	0.52	21
FEV/FIV_0.5		1.34			1.63			22
PEF L/min	369	499	135	1.81	494	134	1.74	-1
VBe%FV %		3.43			3.16			-8



1. **Penny's history and spirometry results are most consistent with?**

   a. Asthma and she should start a daily inhaled steroid.
   b. Inducible laryngeal obstruction/Vocal cord dysfunction (ILO/VCD)
   c. Deconditioning and she would benefit from working with a trainer.
   d. Hypothyroidism

2. What interventions would be most appropriate for the asthma educator to recommend?

   a. change to less strenuous sports like swimming and golf
   b. Avoid smoking cigarettes or vaping products
   c. continue to use the inhaler as it may help sometimes
   d. Speech therapy for diaphragmatic breathing exercises, manage and treat any underlying nasal allergy symptoms and/or gastroesophageal reflux.

Case discussion # 10

Name: Murray Duran
Age: 12, Caucasian male
Chief complaint: poorly controlled asthma.

HPI: Diagnosed with asthma at 3 years of age. 2 hospitalizations, once required PICU 2 years ago. 2 ED visits required oral steroids past 12 months. Seasonal nasal congestion and sneezing. Baseline symptoms are night cough 4-5 times a week, decreased endurance and excess screen time, random cough during the day.

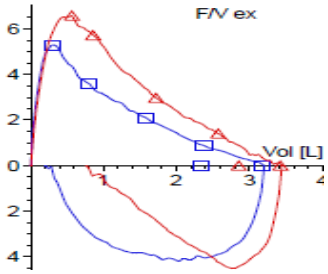
PMH. Term, healthy baby. Anxiety and depression. ADHD. Food allergies, environmental allergies.

Current medications: Budesonide/Formoterol 160/5. 2 puffs twice a day, but sometimes uses the albuterol inhaler instead. He doesn't use spacer, Cetirizine 10 mg daily.

Social & environmental: 8th grader, likes golf. No smokers, 3 cats, 2 dogs and 5 birds in the home.
ACT: 16
ENO= 138 ppb (normal in children is 20 or less) This is a marker for allergic/eosinophilic airway inflammation.

Imaging: none
Labs: CBC with elevated absolute eosinophils, Serum IgE elevated 178 ku/l
Spirometry: Reversible obstruction

		Ref	Pre	%Ref Pre	Z-Score Pre	Post	% Ref Post	Z-Score Post	% Chg
FVC	L	3.40	3.17	93	-0.60	3.42	101	0.05	8
FEV1	L	2.94	2.35	80	-1.67	2.85	97	-0.25	21
FEV1/FVC	%	87	74	86	-1.84	83	96	-0.54	12
FEF25-75%	L/s	3.39	1.83	54	-2.37	2.80	82	-0.82	53
FEV/FIV_0.5			0.81			1.15			41
PEF	L/min	353	318	90	-0.71	395	112	0.60	24
VBe%FV	%		1.47			2.30			57
eNO			138.00						



1. Per EPR- 4 guidelines how would you classify Murray's asthma?

a. Intermittent, not controlled

b. Mild persistent, mostly controlled

c. Childhood asthma that he has grown out of

d. Moderate persistent asthma, not controlled

2. **Per EPR- 4 guidelines what SMART medication plan is recommended?**
    a. High dose daily inhaled steroid and add daily Montelukast for allergies.
    b. Daily and prn combination medium dose ICS + Formoterol. Rationale: decreases overall exacerbation rates.
    c. Daily low dose oral steroid and twice a day albuterol MDI
    d. Medium dose inhaled steroid, nasal saline rinses followed by nasal steroid daily.

3. **Per EPR- 4 guidelines what other therapy would be an appropriate consideration to improve Murray's asthma control and possibly decrease frequency of exacerbations?**
    a. Refer to allergist to consider allergen immunotherapy
    b. Rehome the pets
    c. Proceed with thermoplasty
    d. Have his asthma medications given at school.

Congratulations – you have completed the Virtual Notebook. These case scenarios were designed to help you create an approach to assessment and management of asthma, identifying triggers and creating a partnership with patients and families to set them up for success in their asthma management.

The Asthma Educator Certification exam uses similar case studies and questions.

Please bring any questions regarding these case scenarios to your small groups to discuss on day 2 of Reach the Peak Conference.

3. Management Tools

AGES 0–4 YEARS: STEPWISE APPROACH FOR MANAGEMENT OF ASTHMA

	Intermittent Asthma	Management of Persistent Asthma in Individuals Ages 0–4 Years				
Treatment	**STEP 1**	**STEP 2**	**STEP 3**	**STEP 4**	**STEP 5**	**STEP 6**
Preferred	PRN SABA and At the start of RTI: Add short course daily ICS▲	Daily low-dose ICS and PRN SABA	Daily low-dose ICS-LABA and PRN SABA▲ or Daily low-dose ICS + montelukast,* or daily medium-dose ICS, and PRN SABA	Daily medium-dose ICS-LABA and PRN SABA	Daily high-dose ICS-LABA and PRN SABA	Daily high-dose ICS-LABA + oral systemic corticosteroid and PRN SABA
Alternative		Daily montelukast* or Cromolyn,* and PRN SABA		Daily medium-dose ICS + montelukast* and PRN SABA	Daily high-dose ICS + montelukast* and PRN SABA	Daily high-dose ICS + montelukast*+ oral systemic corticosteroid and PRN SABA
			For children age 4 years only, see Step 3 and Step 4 on Management of Persistent Asthma in Individuals Ages 5–11 Years diagram.			

Assess Control

- First check adherence, inhaler technique, environmental factors,▲ and comorbid conditions.
- **Step up** if needed; reassess in 4–6 weeks
- **Step down** if possible (if asthma is well controlled for at least 3 consecutive months)

Consult with asthma specialist if Step 3 or higher is required. Consider consultation at Step 2.

Control assessment is a key element of asthma care. This involves both impairment and risk. Use of objective measures, self-reported control, and health care utilization are complementary and should be employed on an ongoing basis, depending on the individual's clinical situation.

Abbreviations: ICS, inhaled corticosteroid; LABA, long-acting beta$_2$-agonist; SABA, inhaled short-acting beta$_2$-agonist; RTI, respiratory tract infection; PRN, as needed

▲ Updated based on the 2020 guidelines.

* Cromolyn and montelukast were not considered for this update and/or have limited availability for use in the United States. The FDA issued a Boxed Warning for montelukast in March 2020.

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NOTES FOR INDIVIDUALS AGES 0–4 YEARS DIAGRAM

Quick-relief medications	• Use SABA as needed for symptoms. The intensity of treatment depends on severity of symptoms: up to 3 treatments at 20-minute intervals as needed. • **Caution:** Increasing use of SABA or use >2 days a week for symptom relief (not prevention of EIB) generally indicates inadequate control and may require a step up in treatment. • Consider short course of oral systemic corticosteroid if exacerbation is severe or individual has history of previous severe exacerbations.
Each step: Assess environmental factors, provide patient education, and manage comorbidities▲	• In individuals with sensitization (or symptoms) related to exposure to pests‡: conditionally recommend integrated pest management as a single or multicomponent allergen-specific mitigation intervention.▲ • In individuals with sensitization (or symptoms) related to exposure to identified indoor allergens, conditionally recommend a multi-component allergen-specific mitigation strategy.▲ • In individuals with sensitization (or symptoms) related to exposure to dust mites, conditionally recommend impermeable pillow/mattress covers only as part of a multicomponent allergen-specific mitigation intervention, but not as a single component intervention.▲
Notes	• If clear benefit is not observed within 4–6 weeks and the medication technique and adherence are satisfactory, the clinician should consider adjusting therapy or alternative diagnoses.
Abbreviations	EIB, exercise-induced bronchoconstriction; SABA, inhaled short-acting beta $_2$-agonist. ▲Updated based on the 2020 guidelines. ‡ Refers to mice and cockroaches, which were specifically examined in the Agency for Healthcare Research and Quality systematic review.

AGES 5–11 YEARS: STEPWISE APPROACH FOR MANAGEMENT OF ASTHMA

	Intermittent Asthma	Management of Persistent Asthma in Individuals Ages 5–11 Years				
Treatment	STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6
Preferred	PRN SABA	Daily low-dose ICS and PRN SABA	Daily and PRN combination low-dose ICS-formoterol▲	Daily and PRN combination medium-dose ICS-formoterol▲	Daily high-dose ICS-LABA and PRN SABA	Daily high-dose ICS-LABA + oral systemic corticosteroid and PRN SABA
Alternative		Daily LTRA,* or Cromolyn,* or Nedocromil,* or Theophylline,* and PRN SABA	Daily medium-dose ICS and PRN SABA or Daily low-dose ICS-LABA, or daily low-dose ICS + LTRA,* or daily low-dose ICS +Theophylline,* and PRN SABA	Daily medium-dose ICS-LABA and PRN SABA or Daily medium-dose ICS + LTRA* or daily medium-dose ICS + Theophylline,* and PRN SABA	Daily high-dose ICS + LTRA* or daily high-dose ICS + Theophylline,* and PRN SABA	Daily high-dose ICS + LTRA* + oral systemic corticosteroid or daily high-dose ICS + Theophylline* + oral systemic corticosteroid, and PRN SABA
		Steps 2–4: Conditionally recommend the use of subcutaneous immunotherapy as an adjunct treatment to standard pharmacotherapy in individuals > 5 years of age whose asthma is controlled at the initiation, build up, and maintenance phases of immunotherapy▲			Consider Omalizumab**▲	

Assess Control

- First check adherence, inhaler technique, environmental factors,▲ and comorbid conditions.
- **Step up** if needed; reassess in 2–6 weeks
- **Step down** if possible (if asthma is well controlled for at least 3 consecutive months)

Consult with asthma specialist if Step 4 or higher is required. Consider consultation at Step 3.

Control assessment is a key element of asthma care. This involves both impairment and risk. Use of objective measures, self-reported control, and health care utilization are complementary and should be employed on an ongoing basis, depending on the individual's clinical situation.

Abbreviations: ICS, inhaled corticosteroid; LABA, long-acting $beta_2$-agonist; LTRA, leukotriene receptor antagonist; SABA, inhaled short-acting $beta_2$-agonist

▲ Updated based on the 2020 guidelines.

* Cromolyn, Nedocromil, LTRAs including montelukast, and Theophylline were not considered in this update and/or have limited availability for use in the United States, and/or have an increased risk of adverse consequences and need for monitoring that make their use less desirable. The FDA issued a Boxed Warning for montelukast in March 2020.

** Omalizumab is the only asthma biologic currently FDA-approved for this age range.

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NOTES FOR INDIVIDUALS AGES 5–11 YEARS DIAGRAM

Quick-relief medications

- Use SABA as needed for symptoms. The intensity of treatment depends on severity of symptoms: up to 3 treatments at 20-minute intervals as needed.
- In Steps 3 and 4, the preferred option includes the use of ICS-formoterol 1 to 2 puffs as needed up to a maximum total daily maintenance and rescue dose of 8 puffs (36 mcg).▲
- **Caution:** Increasing use of SABA or use >2 days a week for symptom relief (not prevention of EIB) generally indicates inadequate control and may require a step up in treatment.

Each step: Assess environmental factors, provide patient education, and manage

- In individuals with sensitization (or symptoms) related to exposure to pests‡: conditionally recommend integrated pest management as a single or multicomponent allergen-specific mitigation intervention.▲
- In individuals with sensitization (or symptoms) related to exposure to identified indoor allergens, conditionally recommend a multi-component allergen-specific mitigation strategy.▲
- In individuals with sensitization (or symptoms) related to exposure to dust mites, conditionally recommend impermeable pillow/mattress covers only as part of a multicomponent allergen-specific mitigation intervention, but not as a single component intervention.▲

Notes

- The terms ICS-LABA and ICS-formoterol indicate combination therapy with both an ICS and a LABA, usually and preferably in a single inhaler.
- Where formoterol is specified in the steps, it is because the evidence is based on studies specific to formoterol.
- In individuals ages 5–11 years with persistent allergic asthma in which there is uncertainty in choosing, monitoring, or adjusting anti-inflammatory therapies based on history, clinical findings, and spirometry, FeNO measurement is conditionally recommended as part of an ongoing asthma monitoring and management strategy that includes frequent assessment.

Abbreviations [2]

EIB (exercise-induced bronchoconstriction); FeNO (fractional exhaled nitric oxide); ICS (inhaled corticosteroid); LABA (long-acting beta -agonist); SABA (inhaled short-acting beta -agonist).

▲Updated based on the 2020 guidelines.

‡ Refers to mice and cockroaches, which were specifically examined in the Agency for Healthcare Research and Quality systematic review.

AGES 12+ YEARS: STEPWISE APPROACH FOR MANAGEMENT OF ASTHMA

	Intermittent Asthma	Management of Persistent Asthma in Individuals Ages 12+ Years				
Treatment	STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6■
Preferred	PRN SABA	Daily low-dose ICS and PRN SABA or PRN concomitant ICS and SABA▲	Daily and PRN combination low-dose ICS-formoterol▲	Daily and PRN combination medium-dose ICS-formoterol▲	Daily medium-high dose ICS-LABA + LAMA and PRN SABA▲	Daily high-dose ICS-LABA + oral systemic corticosteroids + PRN SABA
Alternative		Daily LTRA* and PRN SABA or Cromolyn,* or Nedocromil,* or Zileuton,* or Theophylline,* and PRN SABA	Daily medium-dose ICS and PRN SABA or Daily low-dose ICS-LABA, or daily low-dose ICS + LAMA,▲ or daily low-dose ICS + LTRA,* and PRN SABA or Daily low-dose ICS + Theophylline* or Zileuton,* and PRN SABA	Daily medium-dose ICS-LABA or daily medium-dose ICS + LAMA, and PRN SABA▲ or Daily medium-dose ICS + LTRA,* or daily medium-dose ICS + Theophylline,* or daily medium-dose ICS + Zileuton,* and PRN SABA	Daily medium-high dose ICS-LABA or daily high-dose ICS + LTRA,* and PRN SABA	
		Steps 2–4: Conditionally recommend the use of subcutaneous immunotherapy as an adjunct treatment to standard pharmacotherapy in individuals ≥ 5 years of age whose asthma is controlled at the initiation, build up, and maintenance phases of immunotherapy▲			Consider adding Asthma Biologics (e.g., anti-IgE, anti-IL5, anti-IL5R, anti-IL4/IL13)**	

Assess Control

- First check adherence, inhaler technique, environmental factors,▲ and comorbid conditions.
- **Step up** if needed; reassess in 2–6 weeks
- **Step down** if possible (if asthma is well controlled for at least 3 consecutive months)

Consult with asthma specialist if Step 4 or higher is required. Consider consultation at Step 3.

Control assessment is a key element of asthma care. This involves both impairment and risk. Use of objective measures, self-reported control, and health care utilization are complementary and should be employed on an ongoing basis, depending on the individual's clinical situation.

Abbreviations: ICS, inhaled corticosteroid; LABA, long-acting beta$_2$-agonist; LAMA, long-acting muscarinic antagonist; LTRA, leukotriene receptor antagonist; SABA, inhaled short-acting beta$_2$-agonist

▲ Updated based on the 2020 guidelines.

* Cromolyn, Nedocromil, LTRAs including Zileuton and montelukast, and Theophylline were not considered for this update, and/or have limited availability for use in the United States, and/or have an increased risk of adverse consequences and need for monitoring that make their use less desirable. The FDA issued a Boxed Warning for montelukast in March 2020.

** The AHRQ systematic reviews that informed this report did not include studies that examined the role of asthma biologics (e.g. anti-IgE, anti-IL5, anti-IL5R, anti-IL4/IL13). Thus, this report does not contain specific recommendations for the use of biologics in asthma in Steps 5 and 6.

■ Data on the use of LAMA therapy in individuals with severe persistent asthma (Step 6) were not included in the AHRQ systematic review and thus no recommendation is made.

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NOTES FOR INDIVIDUALS AGES 12+ YEARS DIAGRAM

Quick-relief medications

- Use SABA as needed for symptoms. The intensity of treatment depends on the severity of symptoms: up to 3 treatments at 20-minute intervals as needed.
- In steps 3 and 4, the preferred option includes the use of ICS-formoterol 1 to 2 puffs as needed up to a maximum total daily maintenance and rescue dose of 12 puffs (54 mcg).▲
- **Caution:** Increasing use of SABA or use >2 days a week for symptom relief (not prevention of EIB) generally indicates inadequate control and may require a step up in treatment.

Each step: Assess environmental factors, provide patient education, and manage

- In individuals with sensitization (or symptoms) related to exposure to pests‡: conditionally recommend integrated pest management as a single or multicomponent allergen-specific mitigation intervention.▲
- In individuals with sensitization (or symptoms) related to exposure to identified indoor allergens, conditionally recommend a multi-component allergen-specific mitigation strategy.▲
- In individuals with sensitization (or symptoms) related to exposure to dust mites,conditionally recommend impermeable pillow/mattress covers only as part of a multicomponent allergen-specific mitigation intervention, but not as a single component intervention.▲

Notes

- The terms ICS-LABA and ICS-formoterol indicate combination therapy with both an ICS and a LABA, usually and preferably in a single inhaler.
- Where formoterol is specified in the steps, it is because the evidence is based on studies specific to formoterol.
- In individuals ages 12 years and older with persistent allergic asthma in which there is uncertainty in choosing, monitoring, or adjusting anti-inflammatory therapies based on history, clinical findings, and spirometry, FeNO measurement is conditionally recommended as part of an ongoing asthma monitoring and management strategy that includes frequent assessment.
- Bronchial thermoplasty was evaluated in Step 6. The outcome was a conditional recommendation against the therapy.

Abbreviations

EIB, exercise-induced bronchoconstriction; FeNO, fractional exhaled nitric oxide; ICS, inhaled corticosteroid; LABA, long-acting beta -agonist; SABA, inhaled short-acting beta -agonist.

▲Updated based on the 2020 guidelines.

‡ Refers to mice and cockroaches, which were specifically examined in the Agency for Healthcare Research and Quality systematic review.

Asthma Management Outline

Key Messages for Asthma Education

What is Asthma?

- Asthma is a chronic inflammatory disorder that affects all the airways in the lungs, from the windpipe (trachea) in the neck to the smallest airways in the lungs (bronchioles).
- Asthma occurs when the airways become irritated from such "triggers" as smoke, viruses, and allergens.
- Asthma narrows the inside of the airways in three ways:
  1. The inside lining of the airways becomes red and swollen (inflammation).
     - ✓ This can last for weeks after an acute episode
     - ✓ May become a condition that never completely goes away
  2. Muscles that are in and around the airways tighten (bronchospasm)
  3. The glands in the airways produce more mucous, often blocking the airways (increased secretions)

Four keys to successful asthma management are:

1. Individualized care and patient education
2. Recognition of warning signs (wheeze, increased cough, retractions) of an acute episode with early treatment.
3. Use of daily controller medication (s)
4. Control of environment and other factors contributing to asthma severity (irritant, allergic, viral and emotional triggers)

Asthma and the environment

- Children with asthma have extra sensitive airways
- Review common triggers
- Help identify personal triggers
- Review ways to limit or eliminate triggers

Tobacco smoke

- Children should never be exposed to smoke of any kind, especially children with asthma
- Second hand smoke from tobacco is harmful to the lungs of children, adolescents & adults
- Children who live in a house with a smoker will be sick more often.
  - ✓ More ear infections, asthma symptoms, allergies, bronchitis and pneumonia and often need to take medications.
  - ✓ More emergency room visits and hospitalizations than people who live in smoke-free homes
- Children whose parents smoke are more likely to smoke themselves when older.
- Review tips for reducing exposure ("ONE Step outside"; smoke-free home and car)
- QuitLine (Colorado quit smoking program) and Second Hand Smoke brochures

Quick relief medication (inhaled bronchodilators)

- Identify various names of common short-acting beta2-agonists (SABA) --Albuterol, ProAir HFA, Proair Respiclick DPI, Ventolin HFA, Proventil HFA, Xopenex HFA
- Describe mechanism of action, explaining that they provide quick relief only, not long term control. These medications are not to be used daily to control asthma symptoms.
- Describe modes of delivery, dosage and potential side effects
- Let them know to talk to their doctor if they are:
  - ✓ Needing to use their quick relief medication more than two times per week
  - ✓ Waking up at night with asthma symptoms more than two times per month
  - ✓ Having symptoms that limit exercise and other activities
- Ensure that quick relief medication is available for all home, school, childcare and sports settings
- Long acting Beta2-agonist (LABA) - Salmeterol and Formoterol, should not be used as an asthma controller medication alone. LABAs need to be used in combination with an inhaled steroid.

Long term control inhaled medications

- Identify the name of the controller being prescribed
- Emphasize difference between quick relief versus long term control medicines
- Long term control medications DO NOT provide quick relief
- Long term control medications must be taken as prescribed under the ongoing care of a health care provider even when symptom-free
- Rinse mouth and spit after inhaled corticosteroid delivery
- For mask treatment: wash face and swab mouth if unable to brush teeth

Asthma Action Plan (AAP)

- Ensure that the AAP is complete and accurate
- Review the plan with the parent and/or patient using the AAP
- Peak flow monitoring should be included, if appropriate for patient
- Assess that parent/caregiver and patient understand the AAP – how to use it and follow it.
- Use teach back method to validate patient and family understanding of the AAP.
- Reinforce having an AAP is in place at school and/or childcare settings

Principles for Optimal Inhaled Medication Delivery

- Device: correct type for patient age and ability to coordinate
  - ✓ valved-holding chamber (VHC) with mouthpiece if able for HFA MDIs.
  - ✓ For nebulized medications, if not able to use mouthpiece then snug-fitting mask that covers mouth and nose only (NO BLOWBY).
  - ✓ Nebulizer with mouth piece-- Breath hold: 10 seconds at end of inhalation; every few breaths with nebulizer if able

- Body position: standing or sitting upright; find a focal point with slight uplift of chin. For a baby or small child, sitting up straight in adult's lap, one of adult's arm wrapped around child's arms, if necessary.
- If possible, keep babies and children calm -breathing pattern with crying decreases medication delivered. (Crying is more exhalation; need inhalation to get lung deposition of medication.
- Priming: Refer to attached "Priming Medications" table for specific manufacturers' recommendations

Metered Dose Inhalers (MDI)

Both quick relief medications and controllers come in MDI devices. (quick relief – Albuterol, Xopenex: Controllers – Flovent, Alvesco, QVAR, Asmanex, Symbicort, Advair HFA, Dulera)

- Most are recommended to be used with a valved holding chamber (VHC or spacer)
- **New QVAR Redi-Haler is the exception. This new device is a HFA MDI that is breath activated and <u>NO VHC/Spacer is required.</u> No priming required.**

Instructions:

1. Remove inhaler cover and insert inhaler into VHC and shake gently several times
2. Exhale fully prior to use
3. Inhale slowly -you will hear a "whistle" from the spacer if inhaled too quickly
4. Hold breath for 10 seconds
5. For children less than 5 years or unable to perform mouthpiece maneuver:
   - ✓ Always use a mask on VHC
   - ✓ Child sitting up straight in adult's lap; if necessary, with one of adult's arms wrapped around the child's arms while actuating the MDI with the other hand
   - ✓ Observe the child taking 5 breaths in (valve will move with each inhalation)
6. MDI with VHC with good technique is as effective as nebulized medication when used Correctly.

Cleaning:

1. VHC—should be cleaned weekly when used on daily basis.
   - Remove end cap(s) from VHC
   - Separate the mouthpiece from the clear chamber by rotating the mouthpiece counter clockwise until it unlocks and pulls off.
   - Wash all parts in warm water with a mild liquid soap. Rinse all parts with water. Shake out excess water and allow all parts to air dry.
   - Reassemble all parts then tum clockwise until it snaps into place.

Nebulized Medications

Quick Relief examples: Albuterol, Xopenex, Duoneb

Controller: Pulmicort Respules/Budesonide Inhalation Solution

- Mouthpiece optimal; if unable to use mouthpiece, must use snug-fitting mask (**NO BLOWBY)**

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Instructions

1. Demonstrate use of compressor and assembly of nebulizer per type
2. If using mask, attach snugly to face, covering mouth and nose
3. Child should be calm during administration of medication. Crying is mostly exhalation and these medications are more effective when they are inhaled
4. Mouthpiece: breathe in slowly **through the mouth**
5. May tap medication reservoir when sputtering; End treatment when there is no more mist being delivered.

Dry-powdered Inhaler (DPI) -None of the DPI s should be kept in the bathroom. Condensation can cause the powder to cake, clog the inhaler and not dispense medication. Approved for 4 years and older with the caveat that most 8-year olds likely have adequate technique.

Dry-powdered Inhaler (DPI) –Diskus

Controller: Advair (Fluticasone + Salmeterol) Diskus, Flovent (Fluticasone) Diskus,

- Must be able to inhale with enough force to dispense the medication -

Instructions:

1. Hold diskus in one hand and place thumb in groove; slide away from body as far as it goes -this opens the diskus and locks the mouthpiece in place
2. Hold the diskus in a horizontal, level position ("like a hamburger") at all times; this will keep the medicine from spilling out
3. Slide the medication until it clicks; this loads the medication. The counter will decrease by one.
4. Turn head away from the mouthpiece and exhale completely.
5. Place mouthpiece in mouth, lips tight, inhale deeply and forcefully (let patient know they might not feel medication being breathed in) hold breath for 10 seconds and then exhale.
6. Place thumb in groove and turn back to close. This resets the diskus for the next dose.

Dry-powder Inhaler (DPI) - Flexhaler

Controller: Pulmicort (Budesonide) Flexhaler

- Must be able to inhale with enough force to dispense the medication
- Dose tracker listed in increments of 20. Flexhaler is empty when solid black line only appears
- Prime with 2 twists when new.

Instructions

1. Must be held in upright position (mouthpiece up - "rocket") whenever dose is being delivered.
2. Twist the cover and lift it off
3. Twist the brown grip on the bottom as far as it will go, and then twist it back again. You will hear a 'click'. Designed to give only one dose no matter how often you click the base/grip on the bottom of the Flexhaler
4. Tilt Flexhaler horizontally ("hotdog position") Do not shake the inhaler after loading it
5. Turn face away and breath out completely.
6. Place mouthpiece in mouth, lips tight, inhale deeply and forcefully (let patient know they might not feel medication being breathed in); hold breath for I 0 seconds and then exhale. Rinse/brush teeth after.
7. Place the cover back on and twist shut

Dry-powdered Inhaler- Twisthaler

Controller : Asmanex Twisthaler

- Must be able to inhale with enough force to dispense the medication
- Recommended 4 years or older if able to perform appropriate technique
- Has counter on inhaler base - 30, 60, and 120 doses
- Once per day dosing for most patients

Instructions:

1. Hold the Twisthaler upright ("like a rocket") with the base at the bottom
2. As cap is lifted off dose counter goes down by one. Taking the cap off is what primes the dose.
3. Turn face away and breath out completely
4. Place mouthpiece in mouth, lips tight, inhale deeply and forcefully (let patient know they might not feel medication being breathed in) hold breath for 10 seconds and then exhale.
5. Replace cap and twist clockwise until it clicks -cap must be closed entirely to load the next dose

Dry-powdered Inhaler-- Ellipta Device (Arnuity Ellipta (fluticasone furoate), Breo Ellipta (fluticasone furoate and vilanterol, Trelegy (fluticasone furoate, umeclidinium & vilanterol).

1. Open the cover when you are ready to take the medicine.
2. Slide the cover down. You should hear a “click” and see the mouthpiece.
3. Hold the inhaler away from your mouth, Breathe the air out of your lungs.
4. Put the mouthpiece between your lips and close your lips tightly around it.
5. Take 1 long, steady, deep breath in through your mouth. Do not block the air vent with your fingers.
6. Take the inhaler out of your mouth and hold your breath for about 10 seconds
7. Breathe out slowly and gently. Close the lid on the inhaler. Remember to brush teeth/rinse mouth.

Dry-powdered Inhaler --Respiclick Device (Proair Respiclick, Armon Air, AirDuo)

1. Hold inhaler upright
2. Open the cap all the way until you hear a “click”
3. Hold the inhaler away from your mouth, Breathe the air out of your lungs.
4. Put the mouthpiece between your lips and close your lips tightly around it.
5. Take 1 long, steady, deep breath in through your mouth.
6. Take the inhaler out of your mouth and hold your breath for about 10 seconds
7. Breathe out slowly and gently. Close the lid on the inhaler. Repeat above steps if second dose is needed.
8. Remember to rinse and brush teeth after all inhaled corticoid steroid medications.

Peak Flow Meter (PFM)

- Measures how fast air can be exhaled in one breath and can represent airway obstruction.
- Can help predict early signs of an acute asthma episode, especially useful for "poor perceivers"
- Peak Flow should represent FEV 1 on spirometry
- Following color zones will guide plan of care on the Asthma Action Plan
- Measure peak flow to monitor asthma symptoms and before/after bronchodilator treatments.

Instructions:

1. Stand up, slight chin lift, find focal point

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2. Check to be sure indicator is a bottom of the scale
3. Empty lungs; take as deep of breath as possible
4. Put mouthpiece between teeth and seal lips Do not stick tongue into mouthpiece
5. Blow out as hard and fast as possible Maintain correct posture throughout maneuver
6. Marker indicates PF measurement
7. Blow 2 more times and record the highest number

Setting personal best:

1. Measure peak flows once a day at the same time for 2 weeks when well. Take the best of 3 tries.
2. Best reading becomes "personal best".
3. Notify healthcare provider of "personal best" value

Color zones

-Green greater than 80% of personal best
-Yellow greater than 50% and less than 80 of personal best
-Red less than 50% signals medical alert
- Record information on the asthma action plan

ASTHMA ACTION PLAN

Asthma and Allergy Foundation of America
aafa.org

Name:	Date:
Doctor:	Medical Record #:
Doctor's Phone #: Day	Night/Weekend
Emergency Contact:	
Doctor's Signature:	

Personal Best Peak Flow: _____

The colors of a traffic light will help you use your asthma medicines.

GREEN means Go Zone! Use preventive medicine.
YELLOW means Caution Zone! Add quick-relief medicine.
RED means Danger Zone! Get help from a doctor.

GO	**Use these daily preventive anti-inflammatory medicines:**		
You have *all* of these: • Breathing is good • No cough or wheeze • Sleep through the night • Can work & play **Peak flow:** from ____ to ____	MEDICINE	HOW MUCH	HOW OFTEN/WHEN
	For asthma with exercise, take:		

CAUTION	**Continue with green zone medicine and add:**		
You have *any* of these: • First signs of a cold • Exposure to known trigger • Cough • Mild wheeze • Tight chest • Coughing at night **Peak flow:** from ____ to ____	MEDICINE	HOW MUCH	HOW OFTEN/ WHEN
	CALL YOUR PRIMARY CARE PROVIDER.		

DANGER	**Take these medicines and call your doctor now.**		
Your asthma is getting worse fast: • Medicine is not helping • Breathing is hard & fast • Nose opens wide • Ribs show • Can't talk well **Peak flow:** reading below ____	MEDICINE	HOW MUCH	HOW OFTEN/WHEN

GET HELP FROM A DOCTOR NOW! Do not be afraid of causing a fuss. Your doctor will want to see you right away. It's important! If you cannot contact your doctor, go directly to the emergency room. DO NOT WAIT. Make an appointment with your primary care provider within two days of an ER visit or hospitalization.

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NEBULIZED MEDICATIONS:

- Need to be given via mask or mouthpiece. When using mask with inhaled steroids, wash face after using as well as rinse/brush teeth.
- Minimize nebulized Budesonide exposure to eyes due to possible increased risk for cataracts.
- Remind families about cleaning mouthpiece or mask → After each treatment, rinse the mask and/or mouthpiece with mild liquid soap under hot, running tap water. Rub off any "stuck on" mucus. Shake off excess water. If the nebulizer is not rinsed after every treatment, the small holes will become clogged and will not make a mist. It is not necessary to rinse the clear connective tubing.

Metered Dose Inhalers (MDI):

- Majority of MDIs should be used with spacer/valved holding chamber/ VHC.
- Need to prime the MDI 2-3 puffs initial use.
- Use with mask until patient can demonstrate ability to take deep inspiration, coordinate it with activation of the MDI and hold their breath for count of 10.
- When using mask—tight seal above nose and on chin. 5-10 breaths per MDI activation. Wait 1 minute between doses.
- When using mouthpiece. Exhale, then take slow deep inspiration, holding breath for count of 10, exhale. Spacer should not make whistling sound. Wait 1 minute and repeat.
- Clean VHC weekly if using daily. Wash all parts in warm water with a mild liquid soap. Rinse all parts. Shake out excess water and allow to air dry.
- New QVAR Redi-Haler is the exception. This device is a HFA MDI that is breath activated and NO VHC/Spacer is required. No priming or cleaning of device is required.

CONTROLLER MEDICATIONS: inhaled steroids

Device Type—Metered Dose inhaler MDI

HFA (hydrofluoroalkane) MDI

- **Alvesco (Ciclesonide**) comes in 2 strengths. 80mcg and 160 mcg. RX is 1 inhalation BID. MDIs have 60 doses + counter.

- **Flovent (fluticasone)** comes in 3 strengths; 44 mcg, 110mcg, 220mcg. MDIs have 120 doses + counter.

- **QVAR (Beclomethasone)— QVAR REDI-Haler** comes in 2 strength: 40mcg , 80mcg. MDIs have 120 doses; + dose counter.
  This device is a HFA MDI that is breath activated and NO VHC/Spacer is required.
  No priming or shaking required. Breathe out, open cap, tightly seal lips around the mouthpiece, forming a tight seal. Breathe in deeply to release the dose of medication. Hold your breath for 5-10 seconds and breathe out slowly. Replace the cap to reload the next dose and repeat. Wipe outside of mouthpiece once a week with a dry tissue or cloth.

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- **ASMANEX® HFA 50, 100 & 200 mcg (mometasone furoate) Inhalation Aerosol** (2 inhalations twice daily) MDIs have 120 doses; + dose counter.

COMBINATION MDI Medications (inhaled steroids + long acting beta-agonist (LABA))

- **Advair MDI(Fluticasone + salmeterol)** 3 strengths; 45/21; 115/21; 230/21; MDI has 120 doses + counter.

- **Dulera MDI (Mometasone + Formoterol) 3** strengths; 50/5, 100/5, 200/5.
- MDI has 120 doses + counter.

- **Symbicort MDI (budesonide+ Formoterol) 2** strengths 80/4.5; 160/4.5. MDI has 120 doses + counter.

Device Type → DRY POWDERED INHALER (DPI):

Hold in upright position after loading dose. Exhale and then take rapid inhalation and hold breath for 10 seconds. Exhale. Rinse/brush after using steroid DPIs. Do not store DPIs in bathrooms or moist environments. Condensation may clog the mechanism.

- **Asmanex (Mometasone) Twisthaler.** 2 strengths. 110; 220. No priming needed. Taking the cap off loads the dose. When Twisthaler is empty, cap will not come off. + dose counter.

- **Pulmicort (Budesonide) Flexhaler or Turbo haler**. 2 strengths 90mcg; 180mcg. Hold upright. Dose is loaded by rotating and clicking bottom disk. Prime with 2 clicks before initial use. 60 & 120 inhalations + dose counter— counts down by increments of 20.

2021 REACH THE PEAK CONFERENCE
DEVICE TEACHING

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Diskus

Flovent (Fluticasone propionate) Diskus . 3 strengths. 50 mcg; 100 mcg; 250 mcg. dose counter.

Ellipta device:

- **Arnuity™ Ellipta® (fluticasone furoate inhalation powder),** once-daily DPI inhaled corticosteroid (ICS) 12 years and older. The approved doses are Arnuity Ellipta 100mcg and 200mcg. Arnuity Ellipta is administered once daily via the dry powder inhaler called' Ellipta' device.

Respiclick DPI Device

- **ArmonAir Respliclick Fluticasone Propionate** ..
- 3strengths. 55 mcg, 113mcg and 232 mcg.
- Dose counter. 1 puff twice a day.

COMBINATION DPI Medications (inhaled steroids + long acting beta-agonist (LABA))

- **Advair Diskus DPI 100/50; 250/50; 500/ 50.**
- Dose counter. 1 puff twice a day

- **Breo Ellipta DPI (fluticasone furoate and the long-acting beta$_2$-agonist (LABA) vilanterol (VI).** Two strengths, 100/25mcg and 200/25mcg, administered once-daily using the Ellipta DPI.

- **AirDuo DPI Respiclick: (Fluticasone Propionate and Salmeterol)** Dose counter. 3 strengths 55/14 mcg; 1114/14 mcg; 232/14 mcg

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Quick Relief Medications:

- **Albuterol MDI (Ventolin, Proair, Proventil)** . Most of these MDIs have 200 inhalations. 2-4 puffs every 4 hours prn. All have dose counters.
- **Xopenex (levalbuterol) MDI;** + dose counter. May have fewer cardiac side effects. 2 puffs q 4 hours prn.

- **ProAir RespiClick** (albuterol)—breath activated DPI albuterol: quick relief inhaler. **No spacer required.** Approved for 4 years and older (good choice for teenagers who hate spacers) . Inhaler is white and red. + dose counter

Other inhalers:

- **Atrovent (ipatroprium) MDI** – relaxes the upper airways.
- Onset is about 30 minutes. 2 puffs up to 4 times a day. + dose counter.

- **SPIRIVA® Respimat® (tiotropium bromide—long acting anticholinergic agent).** Approved by the FDA for the long-term, once-daily, maintenance treatment of asthma in patients 6 years of age and older†. For asthma maintenance, the FDA approved a once-daily dose of 2.5 µg (delivered in two puffs of 1.25 µg each). Must be on other daily asthma control medication—not to be used as solo therapy for asthma. + dose counter. (Spiriva Handi-haler has COPD indication, not asthma indication. Dosing is different between the devices.

- **Trelegy Ellipta DPI** (fluticasone furoate, umeclidinium & vilanterol).administered once-daily using the Ellipta DPI. 2 strengths. ICS + LABA+ LAMA. (COPD indication at this time.)

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- **Combivent Respimat (Ipratropium + Albuterol)** + dose Counter. The recommended dose for RESPIMAT is one inhalation four times a day -- administered as two inhalations four times a day. The total number of inhalations for COMBIVENT RESPIMAT should not exceed six in 24 hours.

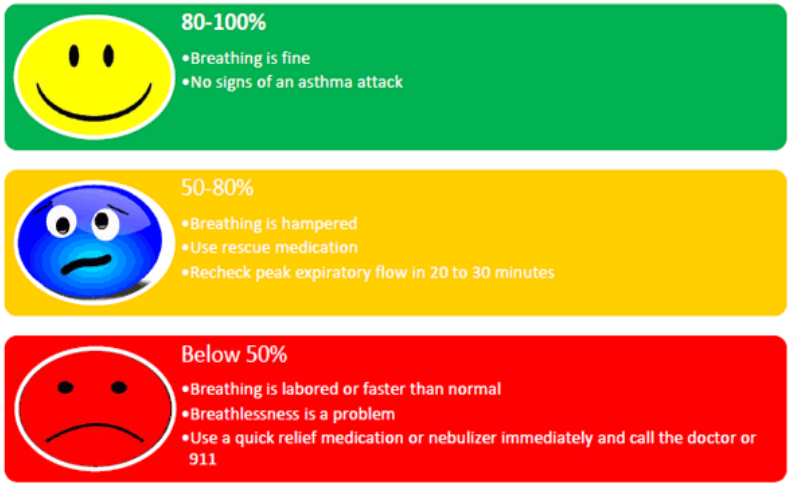
Nasal Steroids: For all of them—initially need to prime with 1-2 sprays. When using, avoid spraying towards the nasal septum—can cause thinning or perforation of nasal septum.

PEAK FLOW METERS: Remember—peak flows are totally effort dependent. Results should represent FEV1 -- numerical values are just as important as the color zone. Patients often report being in the yellow or red zone without being able to tell you the numerical value of their peak flows. During flares, it is important to know the numerical values.

Indications:

- provider recommendations
- poor perceivers of symptoms,
- Generally, 8 years of age have adequate technique
- History of PICU and > 8 years of age
- As a tool when asthma control medications decreased or weaned off

Green Zone is 80 % or greater of patient's personal best
Yellow Zone is between 50-80 % of personal best
Red Zone is < 50% of personal best



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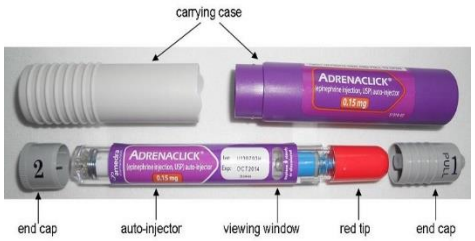
ANAPHYLAXIS: **EPIPENS** (EPINEPHRINE) for anaphylaxis:

Table

KEY DIFFERENCES BETWEEN EPINEPHRINE AUTO-INJECTOR DEVICES[6,8,10]

Auto-Injector Device	Appearance	Preparation for Administration	Administration	Dose Verification
EpiPen/EpiPen Jr (0.3 and 0.15 mg epinephrine) Auto-Injectors	One-step, flip-top carrying case with a blue safety release cap and orange tip at the other end	• Flip open yellow top of the EpiPen or the green top of the EpiPen Jr and slide out pen • Grasp unit with orange tip pointing downward • Form fist around the unit (tip down) and with other hand pull off blue safety release (do not remove until ready to use)	• Hold orange tip near outer thigh • Swing and firmly push orange tip against outer thigh until it clicks • Hold firmly against thigh for ~10 seconds to deliver drug • Remove from thigh and massage injection area for 10 seconds	• Audible click signals that drug is being delivered • After use, window on side of pen is obscured, indicating drug was dispensed • Orange needle cover automatically extends, indicating needle was used • Used device will no longer fit back into the external carrying case
Adrenaclick and Epinephrine Injection, USP Auto-Injector, 0.15 mg and 0.3 mg (authorized generic to Adrenaclick)	Contained in a pull-apart cylindrical case with 2 gray caps on either end (labeled #1 and #2)	• Pull apart cylindrical carrying case • Slide out the pen • Remove gray cap #1—a red tip will be exposed • Remove gray cap #2	• Put red tip against middle of outer side of thigh • Press red injector tip hard against the thigh until needle enters skin • Hold it in place for 10 seconds to deliver the drug	If needle is exposed, dose was received
Twinject	Contained in a pull-apart cylindrical case with 2 green caps (labeled #1 and #2)	• Pull apart cylindrical carrying case • Slide out the pen • Remove green cap #1—a red tip will be exposed • Remove green cap #2	• Put red tip against middle of outer side of thigh • Press red injector tip hard against the thigh until needle enters skin • Hold it in for 10 seconds to deliver the drug	If needle is exposed, dose was received



Auvi-Q

Epinephrine autoinjector: 3 strengths-- 0.1 mg. 0.15 mg & 0.3 mg

FDA-approved epinephrine auto-injector for anaphylaxis with innovative features such as voice instructions that help guide a user with step-by- step instructions through the epinephrine delivery process and an automatic retractable needle system, a first for epinephrine auto-injectors, that injects the epinephrine and retracts the needle back into the device within seconds.

- Patients greater than or equal to 30 kg (66 lbs): AUVI-Q 0.3 mg
- Patients 15 to 30 kg (33 to 66 lbs): AUVI-Q 0.15 mg
- Patients 7.5 to 15 kg (16.5 to 33 lbs): AUVI-Q 0.1 mg (new strength recently added)

2019 Device teaching sheet updated by Bridget Raleigh, NP, AE-C; Children's Hospital Colorado/Breathing Institute

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Inhaler PRIMING TABLE

Medication	Brand Name	Shake *Y / N*	Priming	Dose Counter
Albuterol HFA	Ventolin	Yes	How much: 4 sprays When :New, dropped , >14 days since last use	Yes
Albuterol HFA	Pro Air	Yes	How much: 3 sprays When :New, > 14 days since last use	Yes
Albuterol HFA	Proventil	Yes	How much: 4 sprays When :New, > 14 days since last use	No
Levalbuterol HFA	Xopenex	Yes	How much: 4 sprays When :New, > 3 days since last use	No
Fluticasone HFA	Flovent	Yes	How much : 4 sprays When:New, Or >7 days since last use How much:1 spray	Yes
Beclomethasone Dipropionate HFA Redi-Haler	QVAR	No	No priming needed—breath activated inhaler	Yes
Fluticasone/Salmeterol HFA	Advair MDI	Yes	How much: 4 sprays When:New How much; 2 sprays When : dropped, or > 4 weeks since last use	Yes
Budesonide/Formoterol HFA	Symbicort	Yes	How much : 2 sprays	Yes
Mometasone /formoterol HFA	Dulera	Yes	How much: 2 sprays When :New , > 5 days since last use	Yes
Ciclesonide HFA	Alvesco	Yes	How much: 3 sprays When :New, > 10 days since last use	Yes
Respimat Device	Spiriva or Combivent	No	How much: 4 sprays When :New,	Yes

The only DPI (Dry powdered inhaler) that needs to be primed is Pulmicort Flexhaler. Prime with 2-3 twists when new. DPIs do not need to be shaken prior to inhalation.

- Remind patients to watch the dose counter and the expiration date. Using inhalers past their expirations dates may not be as effective.

Medication Dosing Table

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Inhaled Corticosteroids (ICSs)	FDA Approved Age	5-11 Years			≥12 years		
		Low Dose: Total Inhs / Day	Medium Dose: Total Inhs / Day	High Dose: Total Inhs / Day	Low Dose: Total Inhs / Day	Medium Dose: Total Inhs / Day	High Dose: Total Inhs / Day
ArmonAir Respiclick **(fluticasone propionate) 55 mcg DPI**	12+				2		
ArmonAir Respiclick **(fluticasone propionate) 113 mcg DPI**	12+					2	
ArmonAir Respiclick **(fluticasone propionate) 232 mcg DPI**	12+						2
Alvesco (ciclesonide) 80 mcg MDI*	12+				1 – 2	3 – 4	> 4
Alvesco (ciclesonide) 160 mcg MDI*	12+				1	2	> 2
Arnuity Ellipta (fluticasone furorate) 100 mcg DPI	12+					1	2
Arnuity Ellipta (fluticasone furorate) 200 mcg DPI	12+						1
Asmanex Twisthaler (mometasone) 110 mcg DPI	4+	1	2 – 4	> 4	2	4	> 4
Asmanex Twisthaler (mometasone) 220 mcg DPI	12+				1	2	> 2
Asmanex HFA (mometasone) 55 mcg MDI	5+	1	2-4	>4	2	4	>4
Asmanex HFA (mometasone) 100 mcg MDI	12+	1	2-4	>4	2	4	> 4
Asmanex HFA (mometasone) 200 mcg MDI	12+				1	2	> 4
Flovent HFA (fluticasone) 44 mcg MDI*	4+	2 – 4	5 – 10	> 10	2 – 6	7 – 10	> 10
Flovent HFA (fluticasone) 110 mcg MDI*	4+	1	2 – 4	> 4	2	3 – 4	> 4
Flovent HFA (fluticasone) 220 mcg MDI*	4+		1 – 2	> 2	1	2	> 2
Flovent Diskus (fluticasone) 50 mcg DPI	4+	2 – 4	5 – 8	> 8	2 – 6	7 – 10	> 10
Flovent Diskus (fluticasone) 100 mcg DPI	4+	2-4	3 – 4	> 4	1 – 3	4 – 5	> 5
Flovent Diskus (fluticasone) 250 mcg DPI	4+		1 – 2	> 2	1	2	> 2
Pulmicort Flexhaler (budesonide) 90 mcg DPI	6+	2 – 4	5 – 8	> 8	2 – 6	7 – 13	> 13
Pulmicort Flexhaler (budesonide) 180 mcg DPI	6+	1 – 2	3 – 4	> 4	1 – 3	4 – 6	> 6

NOTE: MDI = Metered Dose Inhaler, NEB = Solution for nebulization, DPI= Dry Powder inhaler, Inh(s) = Inhalation(s)
*The use of a spacer is encouraged for optimal technique with any MDI.

Medication Dosing Table

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Pulmicort Respules (budesonide) 0.25, 0.5, or 1 mg NEB	1+	0.5 mg	1 mg	2 mg			
QVAR (beclomethasone) Redihaler 40 mcg MDI*	4+	2 – 4	5 – 8	> 8	1 – 6	7 – 12	> 12
QVAR (beclomethasone) Redihaler 80 mcg MDI*	4+	1 – 2	3 – 4	> 4	1 – 3	4 – 6	> 6
Combination Inhalers (Inhaled Corticosteroids/Long-acting Beta2-agonists)	**FDA Approved Age**	**5-11 Years**			**≥12 years**		
		Low Dose	**Medium Dose**	**High Dose**	**Low Dose**	**Medium Dose**	**High Dose**
Advair Diskus (fluticasone/salmeterol) DPI 100/50, 250/50, 500/50	4+	100/50 1 inh BID		250/50 1 inh BID	100/50 1 inh BID	250/50 1 inh BID	500/50 1 inh BID
Advair HFA (fluticasone/salmeterol) 45/21, 115/21, 230/21 MDI*	12+				45/21 2 inhs BID	115/21 2 inhs BID	230/21 2 inhs BID
AirDuo Respiclick DPI (fluticasone propionate/salmeterol) 55/14, 113/14, 232/14	12+				55/14 1 inh BID	113/14 1 inh BID	232/14 1 inh BID
Breo Ellipta DPI (fluticasone/vilanterol) 100/25, 200/25	18+					100/25 1 inh QD	200/25 1 inh QD
Dulera MDI* (mometasone/formoterol) 50/5	5+	50/5 2 puffs BID					
Dulera MDI* (mometasone/formoterol) 100/5, 200/5	12+					100/5 2 inhs BID	200/5 2 inhs BID
Symbicort MDI* (budesonide/formoterol) 80/4.5	6+				2 inhs BID		
Symbicort MDI* (budesonide/formoterol) 160/4.5	12+					2 inhs BID	

NOTE: MDI = Metered Dose Inhaler, NEB = Solution for nebulization, DPI= Dry Powder inhaler, Inh(s) = Inhalation(s)
*The use of a spacer is encouraged for optimal technique with any MDI.

Medication Dosing Table

Adjunct Asthma inhaler

Spiriva Respimat (tiotropium bromide) 1.25 mcg	6+	2 puffs once a day add-on treatment to improve asthma symptoms.

Therapeutic Options

Leukotriene Modifiers	FDA Approved Age for Asthma	Dosage
Accolate (zafirlukast) 10 mg TABLETS	5 – 11 years	10 mg twice daily
Accolate (zarfirlukast) 20 mg TABLETS	12+	20 mg twice daily
Singulair (montelukast) 4 mg GRANULES	12 – 23 months	4 mg once daily
Singulair (montelukast) 4 mg CHEWABLES	2 - 5 years	4 mg once daily
Singluair (montelukast) 5 mg CHEWABLE	6 – 14 years	5 mg once daily
Singluair (montelukast) 10 mg TABLETS	> 15 years	10 mg once daily

Based on the NAEPP-EPR-3 (http://www.nhlbi.nih.gov/guidelines/asthma/) with some modifications. This guideline is designed to assist the clinician in the management of asthma. This guideline is not intended to replace the clinician's judgment or establish a protocol for all patients with a particular condition.

NOTE: MDI = Metered Dose Inhaler, NEB = Solution for nebulization, DPI= Dry Powder inhaler, Inh(s) = Inhalation(s)
*The use of a spacer is encouraged for optimal technique with any MDI.

Additional Asthma Management Resources

Medication Assistance Programs

1. www.GoodRx.com
   Drug prices vary wildly between pharmacies. GoodRx finds the lowest prices and discounts. Collect and compare prices for every FDA-approved prescription drug at more than 70,000 US pharmacies; Find free coupons to use at the pharmacy; Show the lowest price at each pharmacy near you.

2. www.needymeds.com
   Programs that provide help for those who want to get their medications through pharmaceutical company patient assistance programs. All are free or charge a small amount. Most help people in limited geographic areas.

3. Colorado Drug Card - Free Statewide Prescription ...
   www.coloradodrugcard.com As a resident of Colorado, you have access to a statewide Prescription Assistance Program (PAP). Create and print your *FREE* discount prescription drug card coupon below. This pharmacy coupon card will provide you with Rx medication savings of up to 75% at more than 68,000 pharmacies across the country **i**ncluding Safeway, Walgreens, Albertsons Sav-on, Target, CVS/pharmacy, Kmart, Walmart**,** and many more.

Other General information websites

Food Allergy, Research and Education
www.foodallergy.org
Food Allergy Research & Education (FARE) works on behalf of the 15 million Americans with food allergies, including all those at risk for life-threatening anaphylaxis. This potentially deadly disease affects 1 in 13 children in the United States – or roughly two in every classroom. FARE's mission is to improve the quality of ***life*** and the ***health*** of individuals with food allergies, and to provide them ***hope*** through the promise of new treatments.

American Latex Allergy Association
latexallergyresources.org
Provides resources for people allergic to natural rubber **latex**, including **latex** free alternative product lists, informational packets, support groups, and a newsletter

Asthma & Allergy Foundation of America
www.aafa.org
The Asthma and Allergy Foundation of America (AAFA), a not-for-profit organization founded in 1953, is the leading patient organization for people with asthma and allergies, and the oldest asthma and allergy patient group in the world. AAFA is dedicated to improving the quality of life for people with asthma and allergic diseases through education, advocacy and research.
www.aafa.org/media/AMEO-Registration-Access-Instructions.pdf

The American Academy of Allergy, Asthma &Immunology
http://www.aaaai.org/about-aaaai
The American Academy of Allergy, Asthma & Immunology is dedicated to the advancement of the knowledge and practice of allergy, asthma and immunology for optimal patient care.

American Lung Association
Local and national organization with information about lung disease, smoking and local events.
www.lungcolorado.org
www.lungusa.org

American Association of Respiratory Care
www.aarc.org
Professional site for resources and educational opportunities.

American Thoracic Society
www.thoracic.org
Professional resources for patient education, continuing educational opportunities, research and more.

Association of Asthma Educators
http://www.asthmaeducators.org/
AAE serves as the premier professional organization representing health care professionals who identify themselves as asthma educators.

Allergy & Asthma Network welcomes patients, families and healthcare professionals dedicated to improving health and quality of life for people with asthma or allergies
http://www.allergyasthmanetwork.com

National Asthma Education and Prevention Program (NAEPP)
The goal of the NAEPP is to enhance the quality of life for individuals with asthma and to decrease asthma-related morbidity and mortality
https://www.nhlbi.nih.gov/about/org/naepp/

National Jewish Medical & Research Center offers treatment, information, resources and research for pulmonary, cardiac, immune and related conditions
https://www.nationaljewish.org

Environmental Protection Agency: EPA's coordinated approach on asthma promotes scientific understanding of environmental asthma triggers and ways to manage asthma in community settings through research, education and outreach. With federal, state and local partners, we are building the nation's capacity to control asthma and manage exposure to indoor and outdoor pollutants linked to asthma
https://www.epa.gov/asthma

Drug Costs for Asthma Medications as of March 2020 .

Children's Hospital Colorado
Here, it's different.

ANTICHOLINERGIC RELIEF MEDICATIONS				
Atrovent MDI inhaler $596.00 Walgreens $473.69 Walmart $415.99 Costco	Ipratropium Bromide	Short acting inhaled anticholinergic	MDI use with VHC dose counter	Quick relief for acute exacerbations, slower onset weaker bronchodilator, best
Combivent Respimat inhaler $507.37 Walgreens $485.10 Walmart $447.72 Costco	Albuterol + Ipratropium Bromide	Short acting anticholinergic + Beta2 agonist	An inhaler with slow-moving mist without the need for a propellant	COPD; one inhalation 4 times a day
Duoneb vials (box) $297.78 Walgreens $285.06 Walmart $276.25 Costco	Albuterol + Ipratropium Bromide	Short acting anticholinergic + Beta2 agonist	Small volume nebulizer	Quick relief for acute exacerbations, ED/inpatient settings or with other conditions
Duoneb Generic vials(box) $67.59 Walgreens $42.76 Walmart $14.41 Costco	Albuterol + Ipratropium Bromide	Short acting anticholinergic + Beta2 agonist	Small volume nebulizer	Quick relief for acute exacerbations, ED/inpatient settings or with other conditions
LONG ACTING INHALED ANTICHOLINERGIC				
Spiriva Respimat inhaler $527.75 Walgreens $518.13 Walmart $492.14 Costco	Tiotropium bromide	long lasting ipratropium	1.25 mcg—2 puffs daily	Asthma

Drug Costs for Asthma Medications as of March 2020 .

Children's Hospital Colorado
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Brand Name	Generic Name	Drug Class	Type of device & available strengths	Pediatric Indications
QUICK RELIEF MEDICATIONS				
Generic HFA inhaler (Proair, Ventolin) $50.00 Walgreens $49.51 Walmart $51.47 Costco	Albuterol	Short acting inhaled Beta2 agonist; bronchodilator	MDI: use with VHC	Quick relief for acute exacerbations; pre-treatment for exercise
Proair RespiClick inhaler $89.36 Walgreens $77.92 Walmart $80.15 Costco	Albuterol	Short acting inhaled Beta2 agonist; bronchodilator	DPI: no VHC needed	Quick relief for acute exacerbations; pre-treatment for exercise
Proventil HFA inhaler $96.00 Walgreens $100.00 Walmart $97.16 Costco	Albuterol	Short acting inhaled Beta2 agonist; bronchodilator	MDI: use with VHC	Quick relief for acute exacerbations; pre-treatment for exercise
Albuterol Vials (box) $28.38 Walgreens $9.89 Walmart $17.10 Costco	Albuterol	Short acting inhaled Beta2 agonist	Small volume nebulizer, large volume nebulizer 0.63 mg/3 ml; 1.25 mg/3 ml; 2.5 mg/3 ml	Quick relief for acute exacerbations; pre-treatment for exercise
Xopenex Vials 0.63%(box) $171.89 Walgreens $163.72 Walmart	Levalbuterol	Short acting inhaled Beta2 agonist	Nebulizer solution	Quick relief for acute exacerbations; pre-treatment for exercise
Xopenex MDI inhaler $54.99 Walgreens $63.85 Walmart $68.24 Costco	Levalbuterol	Short acting inhaled Beta2 agonist	MDI: use with VHC	Quick relief for acute exacerbations; pre-treatment for exercise

Drug Costs for Asthma Medications as of March 2020 .

Children's Hospital Colorado
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INHALED CORTICOSTEROIDS				
Pulmicort Respules (box) **30 doses** $319.89 Walgreens $295.45 Walmart	Budesonide	Inhaled corticosteroid	Pari-nebs with mouthpiece or snug-fitting mask 0.25 mg, 0.5 mg, 1 mg	Controller, not acute exacerbations
Budesonide Respules (box)Generic $188.45 Walgreens $262.73 Walmart	Budesonide	Inhaled corticosteroid	Pari-nebs with mouthpiece or snug-fitting mask 0.25 mg, 0.5 mg,	Controller, not acute exacerbations
Pulmicort Flexhaler $417.57 Walgreens $283.03 Walmart $270.99 Costco	Budesonide	Inhaled corticosteroid	Breath-actuated dry powder inhaler (DPI) 90mcg, 180 mcg	Controller, not acute exacerbations. Must be able to breath-actuate
Arnuity Ellipta $211.99 Walgreens $209.73 Walmart $209.54 Costco	Fluticasone Furoate	Inhaled corticosteroid	Breath-actuated dry powder inhaler (DPI) 100 mcg & 200 mcg	Controller, not acute exacerbations. Must be able to breath-actuate
Alvesco inhaler $352.65 Walgreens $312.35 Walmart $337.09 Costco	Ciclesonide	Inhaled corticosteroid	MDI: use with VHC 80 mcg; 160mcg	Controller, not acute exacerbations
Flovent MDI $303.99 Walgreens $301.90 Walmart $276.29 Costco	Fluticasone Propionate	Inhaled corticosteroid	MDI. Use with VHC 44mcg, 110 mcg, 220mcg	Controller, not acute exacerbations
Flovent Rotadisk $262.11 Walgreens $227.30 Walmart	Fluticasone Propionate	Inhaled corticosteroid	Breath-actuated dry powder inhaler (diskus) 50 mcg, 100 mcg, 250 mcg	Controller, not acute exacerbations. Must be able to breath-actuate

Drug Costs for Asthma Medications as of March 2020 .

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QVAR Redi-haler $291.15 Walgreens $292.53 Walmart $267.81 Costco	Beclomethasone dipropionate	Inhaled corticosteroid	Must be able to breath-actuate 40 mcg, 80 mcg;	Controller, not acute exacerbations.
Asmanex HFA inhaler $232.99 Walgreens $228.96 Walmart $242.05 Costco	Mometasone	Inhaled corticosteroid	Must be able to breath-actuate 50 mcg, 100 mcg & 200 mcg	Controller, not acute exacerbations.
Asmanex Twisthaler 220 mcg/60 doses $318.55 Walgreens $268.83 Walmart $293.62 Costco	Mometasone	Inhaled corticosteroid	Breath-actuated dry powder inhaler (DPI) 100 mcg, 220 mcg	Controller, not acute exacerbations. Must be able to breath-actuate
ArmonAir Respiclick DPI $186.82 Walgreens $185.03 Walmart $175.38 Costco	(fluticasone propionate)	Inhaled corticosteroid	Breath-actuated dry powder inhaler (DPI) 55/14 mcg, 113/14 mcg, 232/14 mcg	Controller, not acute exacerbations. Must be able to breath-actuate

Drug Costs for Asthma Medications as of March 2020 .

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LEUKOTRIENE MODIFIERS				
Singulair #30 $161.99 Walgreens $40.96 Walmart $17.66 Costco	Montelukast	Leukotriene modifier	4 mg granules 4 mg chewables 5 mg chewables 10 mg tablet	Prophylaxis & chronic RAD treatment. Allergic rhinitis. Best taken at night for RAD ≤ 6 yo = 4 mg 6-15 yo = 5 mg ≥ 15 yo = 10 mg
Accolate 10 mg #60 $113.36 Walgreens (generic only) $126.59 Walmart (generic only) $99.14 Costco (generic only)	Zafirlukast	Leukotriene modifier	Tablets	Controller, not acute exacerbations. Second line to ICS
Zyflo #120 $4,478.32 Walgreens $4,478.32 Walmart $4,478.32 Costco	Zileuton	Leukotriene modifier	Tablets	Controller, not acute exacerbations. Second line to ICS
Oral ANTIHISTAMINES				
Zyrtec 10 mg OTC $25.08 (30 CT) Walgreens $25.86 (30 CT) Walmart $27.10 (30 CT) Costco	Cetirizine	Antihistamine	Oral solution or tablet 1 mg/1 ml syrup 5 mg or 10 mg tablet	Use for allergic rhinitis/ urticaria. Approved ≥ 6 mos.
Claritin #30 chew tab $32.43 Walgreens OTC only $29.66 Walmart OTC only $32.85 Costco	Loratadine 30 tabs	Antihistamine	Oral solution or tablet 1 mg/1 ml syrup 5 mg or 10 mg tablet	Use for allergic rhinitis/ urticaria. Approved ≥ 6 mos.
Xyzal $104.60 Walgreens $67.08 Walmart $73.45 Costco	Levocetirizine	Antihistamine	Oral solution or tablet 0.5 mg/ml; 2.5 mg/ml 5 mg tablet	Use for allergic rhinitis/ urticaria. Approved ≥ 6 mos.
Allegra 30mg $20.06 Walgreens $15.31 Walmart $20.06 Costco	Fexofenadine	Antihistamine	Oral tablets 30 mg, 60 mg or 180 mg	Dose: Use for allergic rhinitis. Avoid with antacids

Drug Costs for Asthma Medications as of March 2020 .

Children's Hospital Colorado
Here, it's different.

NASAL STEROIDS/ NASAL MAST CELL STABILIZER/Nasal Antihistamines

Flonase Generic: $78.99 Walgreens $45.80 Walmart $25.48 Costco	Fluticasone propionate	Nasal corticosteroid	Nasal spray	Dose 50 mcg, 120 sprays per bottle. Recommended 2 sprays each nostril once daily.
Omnaris $344.49 Walgreens $323.70 Walmart $344.49 Costco	Ciceslonide	Nasal corticosteroid	Nasal aerosol	Dose 50 mcg per spray. Recommended 2 sprays each nostril once daily
Nasonex $176.02 Walgreens $214.65 Walmart $108.95 Costco	Mometasone furoate	Nasal corticosteroid	Nasal spray	Dose 50 mcg, 120 sprays per bottle. Approved ≥ 2 yo. Use for allergic rhinitis prophylaxis and symptom treatment.
Q Nasl $282.85 Walgreens $280.54 Walmart $292.71 Costco	Beclomethasone dipropionate	Nasal corticosteroid	Nasal spray	Dose 80 mcg, 2 sprays each nostril 1-2 times a day
Veramyst $221.09 Walgreens $221.09 Walmart $221.09 Costco	Fluticasone Furoate	Nasal corticosteroid	Nasal spray	Dose 55 mcg, 120 sprays per bottle. Approved ≥ 2 yo. Use for allergic rhinitis prophylaxis and symptom treatment.
Rhinocort $24.62 Walgreens $24.62 Walmart $24.62 Costco	Budesonide	Nasal corticosteroid	Nasal spray	Dose 32 mcg bottle. Use for allergic rhinitis. Start dose 1 spray per nostril 1x/day. Max dose 4 sprays/nostril 1x/day

Drug Costs for Asthma Medications as of March 2020 .

Nasacort $21.48 Walgreens $21.92 Walmart $21.92 Costco	Triamcinolone	Nasal corticosteroid		Dose 55 mcg per spray. 1-2 sprays each nostril 1 x day.

Drug Costs for Asthma Medications as of March 2020 .

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ORAL PREDNISONE				
Decadron $14.92 Walgreens $5.37 Walmart $15.06 Costco	Dexamethasone	Oral corticosteroid. The half-life of prednisone/prednisolone is 12 to 36 hours, while the half-life of dexamethasone is 36 to 72 hours	Tablet	0.6mg/kg with 16 mg max dose. 0.5 mg tablet 1 mg tablet 2 mg tablet 4 mg tablet 6 mg tablet
Prelone, Pediapred, Orapred $17.57 Walgreens $21.85Walmart $27.36 Costco	Prednisolone **5 mg BID x 5 days**	Oral corticosteroid	Liquid or tablet	Dose: 1 mg/kg BID Prelone syrup: 15 mg/5 ml (tsp); tablets come as 2 mg, 4 mg, 8 mg, 12 mg, 16 mg, 24 mg, 32 mg. Orapred ODT 15 mg tab.
Prednisone $9.79 Walgreens $7.80 Walmart $5.60 Costco	Prednisone **20 mg BID x 5 day**	Oral corticosteroid	Tablet	Dose: 1 mg/kg BID Table strength: 2.5 mg, 5 mg, 10 mg, 20 mg and 50 mg.
Medrol, Methyl-pred, $35.99 Walgreens $33.49 Walmart $31.97 Costco	Methylprednisolone **Solumedrol 4 mg BID x 5 day**	Oral corticosteroid	Tablets	Tablet strength: 2 mg, 4 mg, 8 mg, 16 mg, 24 mg, 32 mg. Store at room temperature.
ANAPHYLAXIS TREATMENT				
Auvi-Q $5,094.20 Walgreens $N/A Walmart $N/A Costco	Epinephrine auto injector	Anaphylaxis Treatment	Injection	Three Strengths— dual packs Infant 0.1 mg Peds 0.15 mg Adult 0.3 mg
Epi-pen $735.09 Walgreens $683.47 Walmart $662.25 Costco	Epinephrine auto injector	Anaphylaxis Treatment	Injection	Two Strengths—dual packs Peds 0.15 mg Adult 0.3 mg
Epi-Pen Generic $375.99 Walgreens $364.23 Walmart $363.24 Costco	Epinephrine auto injector	Anaphylaxis Treatment	Injection	Two Strengths—dual packs Peds 0.15 mg Adult 0.3 mg

Drug Costs for Asthma Medications as of March 2020 .

EQUIPMENT FOR ASTHMA				
Aerochamber Valved Holding Chamber + Medium Mask $78.05 Walgreens $59.70 Walmart $67.31 Costco	N/A	N/A	N/A	Valved holding chamber when using an MDI highly recommended
Optichamber Valved Holding Chamber $41.99 Walgreens $23.79 Walmart	N/A	N/A	N/A	Valved holding chamber when using an MDI highly recommended
Optichamber + Small Face Mask $32.09 Walgreens $23.55 Walmart	N/A	N/A	N/A	Valved holding chamber when using an MDI highly recommended
Peak Flow Meter $19.99 Walgreens $20.60 Walmart				Can help monitor asthma control. Peak Flow represents FEV1 on spirometry, when done correctly.

Drug prices were obtained from Walgreens, Walmart and Costco stores or Good RX.Com throughout the Denver Metro area.

Drug Costs for Asthma Medications as of March 2020 .

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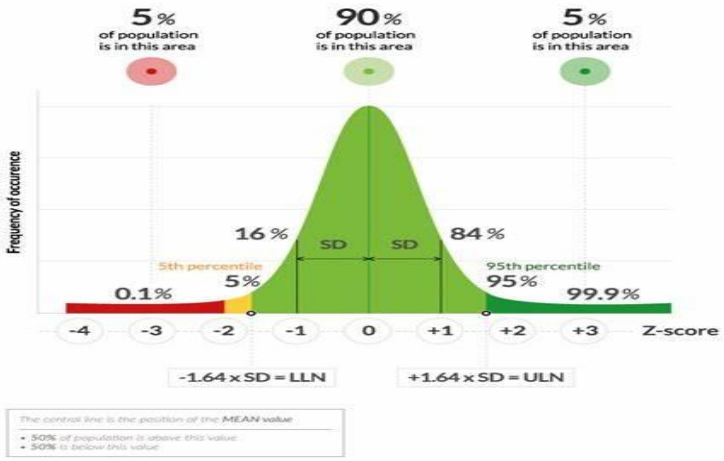
Z-Scores spirometry interpretation:

2012 Global Initiative using z-scores for spirometry interpretation: The Z-score is calculated by the ratio of the difference between the measured value and that predicted with the residual standard deviation. This simple approach has reduced the false positive results found by the conventional limits of 80% compared to a predicted value or 0.70 in absolute value for the definition of bronchial obstruction that is still used. A spirometry value is considered low if it is more than -1.64 standard deviations from the predicted value (which is the same as the lower 5 percentile).



https://www.spirometry.com/articoli-clinici/interpreting-results-with-gli-2012-using-z-score-

Obstruction	Grade	ATS/ERS 2005	Proposed
Mild	1	>70% pred	z-score ≥ -2
Moderate	2	60–69% pred	-2.5≤ z-score < -2
Moderately severe	3	50–59% pred	-3≤ z-score < -2.5
Severe	4	35–49% pred	-4≤ z-score < -3
Very severe	5	<35% pred	z-score < -4

Quanjer PH, Pretto JJ, Brazzale DJ, Boros PW. 'Grading the severity of airways obstruction: new wine in new bottles', Eur Respir J, 2014; 43: 505-512.

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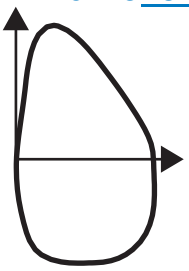
Here, it's different.

Previous spirometry interpretation metrics:

What is *normal* spirometry?

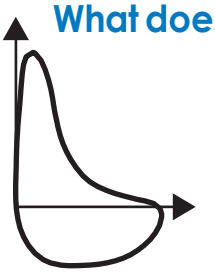


If the shape is normal, there is a range of normality.

FVC: >80% predicted
FEV1: >80% predicted
FEF25-75: 65-100%
FEV1/FVC (FEV 1%): Norms based on age +/-5% (of predicted).

FEV_1/FVC:
5-19 yrs ≥ 85%
20-39 yrs ≥ 80%
40-59 yrs ≥ 75%
60-80 yrs ≥ 70%
(NIH references)

What does *asthma* look like?



(obstructive/concave waveform)

Meets the following criteria:

1. Shape of the curve is concave.
2. FEV1/FVC (FEV1%) is decreased
3. FVC > FEV1 > FEF25-75
4. A 12% and at least 200 ml increase in FEV1 post bronchodilator treatment.

For severity rating, the following criteria are suggested:

- ***Mild***: 0.00 - 0.04* or >80%
- ***Moderate***: 0.05* or 60 - 80%
- ***Severe***: <0.05* or <60%

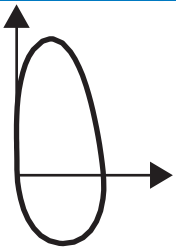
**Note*: This value is sometimes expressed as a percent, but this different than the percent predicted.

The One Minute Interpretation (applies to both methods of spirometry interpretation.)

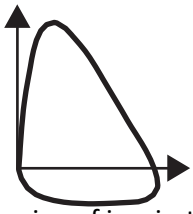
Check five things:

1. ***Is the entry data correct?***
   Check age, height, weight, sex and race
2. ***Evaluate the quality of the blow***
   Good effort with rapid rise to peak flow? Is the curve smooth and **reproducible?**
3. ***What is the shape?***
   Normal, obstructive, restrictive or mixed? Is the inspiratory loop cut off?
4. ***Look at the percentages for the shape chosen***
   Mild, moderate, severe
5. ***State your interpretation***
   e.g. "mild airway obstruction"

Other flow patterns to look for

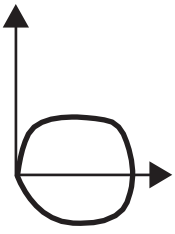


Restrictive
Possible causes:
- Obesity
- Pregnancy
- Kyphoscoliosis
- Pulmonary Fibrosis/ILD

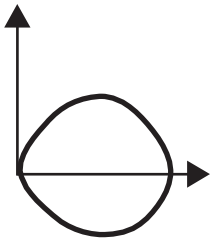


(flattening of inspiratory loop)

Variable Extra thoracic Airway Obstruction
Causes:
- Paradoxical vocal cord dysfunction



Fixed Large Airway Obstruction
Multiple causes:
- Glottic or tracheal stenosis
- Tracheal malacia
- Paratracheal/Intratracheal mass
- Vocal cord paralysis
- Foreign body



Variable Intrathoracic Airway Obstruction
Possible causes:
- Movable mass lesion
- Malingering

Based on the NAEPP-EPR-3 (http://www.nhlbi.nih.gov/guidelines/asthma/) and collaborative efforts of HealthTeamWorks committee. This reference is designed to assist the clinician in the management of asthma and is not intended to replace the clinician's judgment or establish a protocol for all patients with a particular condition. Revised 3/9/2021.

In Care of Kids

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This is to be filled out by your primary care provider.

BREATHING INSTITUTE

Asthma Action Plan

My name:

Healthcare provider: Phone number:

My personal asthma goal(s):

My asthma gets worse around (triggers):

GREEN ZONE

Doing well

I feel good

I play, sleep, and go to school.

Breathing is easy. No coughing or wheezing.

I am using my quick relief medicine less than 2 times per week.

What should I do?

- Avoid my asthma triggers
- See my healthcare provider every 1 to 6 months for asthma check ups
- If needed, take 2-4 puffs of my quick relief inhaler at least 10 minutes before exercise
- Take my daily medicines to stay in control of my asthma

Controller medicines I should be taking every day for long-term control:

Name of Medicine	*How Much*	*How Often*

Quick Relief medicines I may need to take before running, jumping, playing, exercising, etc.

Name of Medicine	*How Much*	*How Often*

YELLOW ZONE

Caution

I don't feel good

I have trouble playing or sleeping.

I am coughing, wheezing, or having trouble breathing or speaking.

I am using my quick relief medicine more than 2 times per week.

What should I do?

- Continue taking my daily controller medicines and add quick relief medicine.
- If symptoms go away within 30 minutes, return to the Green Zone.
- Asthma symptoms can get worse fast. When in doubt, call your healthcare provider for advice.
- If symptoms are not getting better in 24 hours, continue quick relief every 4 hours and call your healthcare provider.

I will continue to take my Controller medicine, ALSO I need to take my Quick Relief medicine

Name of Medicine	*How Much*	*How Often*

RED ZONE

Medical alert!

I feel bad and need help

I cannot play, do activities, or sleep.

My cough or wheeze is not getting better.

I need my quick relief medicine more than every 4 hours.

I need my Quick Relief more than every four hours.

What should I do?

- Take your quick relief inhaler with spacer 4-6 puffs every **20 minutes** while you go to see a healthcare provider **right away**.
- You need help fast. Family or friends should **call 911** if your skin or lips turn blue, if you pass out from asthma, or if you cannot breathe.

Anschutz Medical Campus
13123 East 16th Ave. Aurora, CO 80045
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Author: Breathing Institute | Approved by Patient Education Committe | Valid through 2019

COLORADO ASTHMA CARE PLAN AND MEDICATION ORDER FOR SCHOOL AND CHILD CARE SETTINGS

PARENT/GUARDIAN COMPLETE AND SIGN:

Child Name: _____ School/grade: _____

Parent/Guardian Name: _____ Birthdate: _____

Healthcare Provider Name: _____ Phone: _____

Triggers: ☐ Weather (cold air, wind) ☐ Illness ☐ Exercise ☐ Smoke ☐ Dust ☐ Pollen ☐ Other: _____

☐ Life threatening allergy, specify: _____

I give permission for school personnel to share this information, follow this plan, administer medication and care for my child/youth, and if necessary, contact our healthcare provider. I assume full responsibility for providing the school/program prescribed medication and supplies, and to comply with board policies, if applicable. I am aware 911 may be called if a quick relief inhaler is not at school and my child/youth is experiencing symptoms. I approve this care plan for my child/youth.

PARENT SIGNATURE	DATE	NURSE/CCHC SIGNATURE	DATE

HEALTHCARE PROVIDER COMPLETE ALL ITEMS, SIGN AND DATE:

QUICK RELIEF (RESCUE) MEDICATION: ☐ Albuterol ☐ Other: _____

Common side effects: ↑ heart rate, tremor ☐ Have child use spacer with inhaler.

Controller medication used at home: _____

IF YOU SEE THIS:		DO THIS:
GREEN ZONE: No Symptoms Pretreat	• No current symptoms • Doing usual activities	Pretreat strenuous activity: ☐ Not required ☐ Routine ☐ Student/Parent request Give QUICK RELIEF MED 10-15 minutes before activity: ☐ 2 puffs ☐ 4 puffs ☐ Repeat in 4 hours, if needed for additional physical activity. ***If child is currently experiencing symptoms, follow YELLOW ZONE.***
YELLOW ZONE: Mild symptoms	• Trouble breathing • Wheezing • Frequent cough • Complains of tight chest • Not able to do activities, but talking in complete sentences • Peak flow: _____ & _____	1. Stop physical activity. 2. Give QUICK RELIEF MED: ☐ 2 puffs ☐ 4 puffs 3. Stay with child/youth and maintain sitting position. 4. **REPEAT** QUICK RELIEF MED, if not improving in 15 minutes: ☐ 2 puffs ☐ 4 puffs 5. Child/youth may go back to normal activities, once symptoms are relieved. 6. Notify parents/guardians and school nurse. ***If symptoms do not improve or worsen, follow RED ZONE.***
RED ZONE: EMERGENCY Severe Symptoms	• Coughs constantly • Struggles to breathe • Trouble talking (only speaks 3-5 words) • Skin of chest and/or neck pull in with breathing • Lips/fingernails gray or blue • ↓ Level of consciousness • Peak flow < _____	1. Give QUICK RELIEF MED: ☐ 2 puffs ☐ 4 puffs ▪ Refer to anaphylaxis plan, if child/youth has life-threatening allergy. 2. Call 911 and inform EMS the reason for the call. 3. Stay with child/youth. Remain calm, encouraging slower, deeper breaths. 4. Notify parents/guardians and school nurse. 5. If symptoms do not improve, **REPEAT** QUICK RELIEF MED: ☐ 2 puffs ☐ 4 puffs every 5 minutes until EMS arrives. *School personnel should not drive student to hospital.*

PROVIDER INSTRUCTIONS FOR QUICK RELIEF INHALER USE: CHECK APPROPRIATE BOX(ES)

☐ Student needs supervision or assistance to use inhaler. Student will not self-carry inhaler.

☐ Student understands proper use of asthma medications, and in my opinion, can carry and use his/her inhaler at school independently with approval from school nurse and completion of contract.

☐ Student will notify school staff after using quick relief inhaler, if symptoms do not improve with use.

HEALTH CARE PROVIDER SIGNATURE	PRINT PROVIDER NAME	DATE	FAX	PHONE

Copies of plan provided to: ☐Teacher(s) ☐PhysEd/Coach ☐Principal ☐Main Office ☐Bus Driver Other_____

COLORADO Department of Education

Revised: March 2018

Asthma Care **Quick Reference**

DIAGNOSING AND MANAGING ASTHMA

Guidelines from the National Asthma Education and Prevention Program

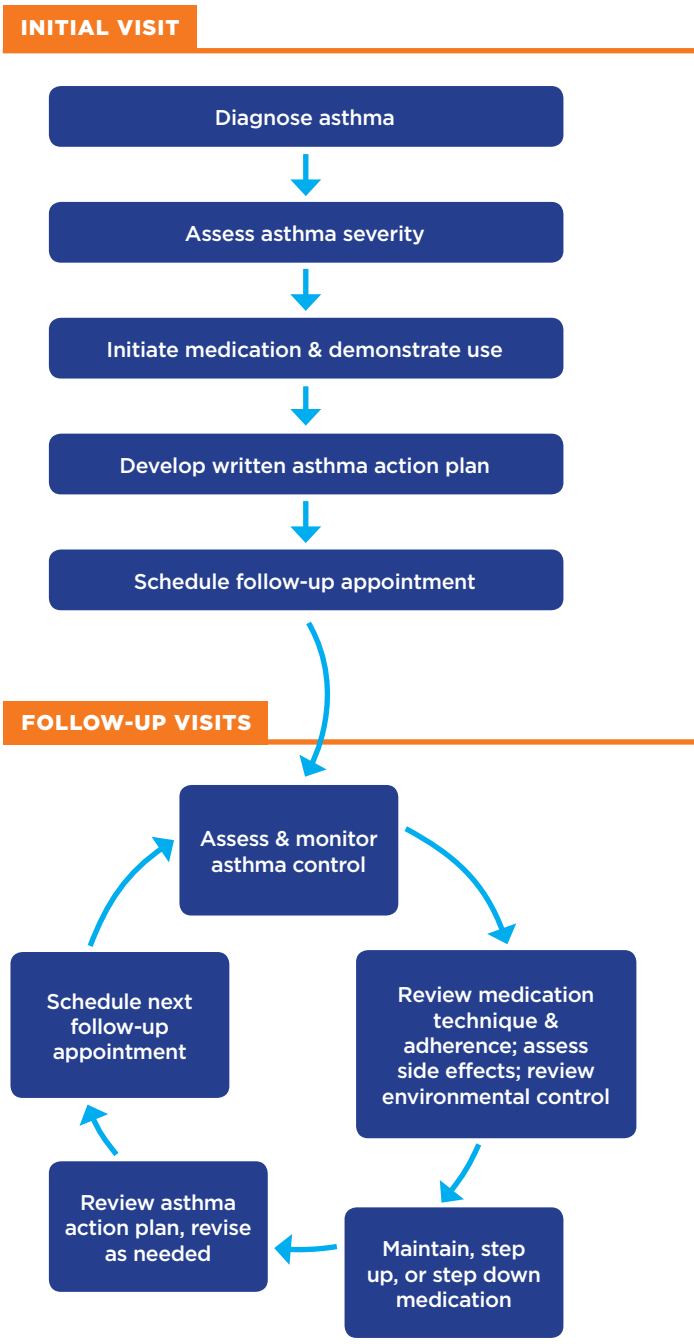
The goal of this asthma care quick reference guide is to help clinicians provide quality care to people who have asthma.

Quality asthma care involves not only initial diagnosis and treatment to achieve asthma control, but also long-term, regular follow-up care to maintain control.

Asthma control focuses on two domains: (1) **reducing impairment**—the frequency and intensity of symptoms and functional limitations currently or recently experienced by a patient; and (2) **reducing risk**—the likelihood of future asthma attacks, progressive decline in lung function (or, for children, reduced lung growth), or medication side effects.

Achieving and maintaining asthma control requires providing appropriate medication, addressing environmental factors that cause worsening symptoms, helping patients learn self-management skills, and monitoring over the long term to assess control and adjust therapy accordingly.

The diagram (right) illustrates the steps involved in providing quality asthma care.



U.S. Department of Health and Human Services
National Institutes of Health
National Heart, Lung, and Blood Institute

KEY CLINICAL ACTIVITIES FOR QUALITY ASTHMA CARE

(See complete table in *Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma* [EPR-3])

Clinical Issue	Key Clinical Activities and Action Steps
➡ ASTHMA DIAGNOSIS	

	Establish asthma diagnosis.
	▪ Determine that symptoms of recurrent airway obstruction are present, based on history and exam.
	  • History of cough, recurrent wheezing, recurrent difficulty breathing, recurrent chest tightness
	  • Symptoms occur or worsen at night or with exercise, viral infection, exposure to allergens and irritants, changes in weather, hard laughing or crying, stress, or other factors
	▪ In all patients ≥5 years of age, use spirometry to determine that airway obstruction is at least partially reversible.
	▪ Consider other causes of obstruction.

➡ LONG-TERM ASTHMA MANAGEMENT	
GOAL: Asthma Control	**Reduce Impairment** ▪ Prevent chronic symptoms. ▪ Require infrequent use of short-acting beta$_2$-agonist (SABA). ▪ Maintain (near) normal lung function and normal activity levels. **Reduce Risk** ▪ Prevent exacerbations. ▪ Minimize need for emergency care, hospitalization. ▪ Prevent loss of lung function (or, for children, prevent reduced lung growth). ▪ Minimize adverse effects of therapy.

Assessment and Monitoring	**INITIAL VISIT: Assess asthma severity to initiate treatment** (see page 5)**.**
	FOLLOW-UP VISITS: Assess asthma control to determine if therapy should be adjusted (see page 6)**.**
	▪ Assess at each visit: asthma control, proper medication technique, written asthma action plan, patient adherence, patient concerns.
	▪ Obtain lung function measures by spirometry at least every 1–2 years; more frequently for asthma that is not well controlled.
	▪ Determine if therapy should be adjusted: Maintain treatment; step up, if needed; step down, if possible.
	
	Schedule follow-up care.
	▪ Asthma is highly variable over time. See patients:
	  • Every 2–6 weeks while gaining control
	  • Every 1–6 months to monitor control
	  • Every 3 months if step down in therapy is anticipated

Use of Medications	**Select medication and delivery devices that meet patient's needs and circumstances.** ▪ Use stepwise approach to identify appropriate treatment options (see page 7). ▪ Inhaled corticosteroids (ICSs) are the most effective long-term control therapy. ▪ When choosing treatment, consider domain of relevance to the patient (risk, impairment, or both), patient's history of response to the medication, and willingness and ability to use the medication. **Review medications, technique, and adherence at each follow-up visit.**

KEY CLINICAL ACTIVITIES FOR QUALITY ASTHMA CARE *(continued)*

Clinical Issue	Key Clinical Activities and Action Steps
Patient Education for Self-Management	**Teach patients how to manage their asthma.** ▪ Teach and reinforce at each visit: • Self-monitoring to assess level of asthma control and recognize signs of worsening asthma (either symptom or peak flow monitoring) • Taking medication correctly (inhaler technique, use of devices, understanding difference between long-term control and quick-relief medications) - ***Long-term control medications*** (such as inhaled corticosteroids, which reduce inflammation) prevent symptoms. Should be taken daily; will not give quick relief. - ***Quick-relief medications*** (short-acting beta$_2$-agonists or SABAs) relax airway muscles to provide fast relief of symptoms. Will not provide long-term asthma control. If used >2 days/week (except as needed for exercise-induced asthma), the patient may need to start or increase long-term control medications. • Avoiding environmental factors that worsen asthma **Develop a written asthma action plan** in partnership with patient/family (sample plan available at *www.nhlbi.nih.gov/health/public/lung/asthma/asthma_actplan.pdf*). ▪ Agree on treatment goals. ▪ Teach patients how to use the asthma action plan to: • Take daily actions to control asthma • Adjust medications in response to worsening asthma • Seek medical care as appropriate ▪ Encourage adherence to the asthma action plan. • Choose treatment that achieves outcomes and addresses preferences important to the patient/family. • Review at each visit any success in achieving control, any concerns about treatment, any difficulties following the plan, and any possible actions to improve adherence. • Provide encouragement and praise, which builds patient confidence. Encourage family involvement to provide support. **Integrate education into all points of care involving interactions with patients.** ▪ Include members of all health care disciplines (e.g., physicians, pharmacists, nurses, respiratory therapists, and asthma educators) in providing and reinforcing education at all points of care.
Control of Environmental Factors and Comorbid Conditions	**Recommend ways to control exposures to allergens, irritants, and pollutants that make asthma worse.** ▪ Determine exposures, history of symptoms after exposures, and sensitivities. (In patients with persistent asthma, use skin or in vitro testing to assess sensitivity to perennial indoor allergens to which the patient is exposed.) • Recommend multifaceted approaches to control exposures to which the patient is sensitive; single steps alone are generally ineffective. • Advise all asthma patients and all pregnant women to avoid exposure to tobacco smoke. • Consider allergen immunotherapy by trained personnel for patients with persistent asthma when there is a clear connection between symptoms and exposure to an allergen to which the patient is sensitive. **Treat comorbid conditions.** ▪ Consider allergic bronchopulmonary aspergillosis, gastroesophageal reflux, obesity, obstructive sleep apnea, rhinitis and sinusitis, and stress or depression. Treatment of these conditions may improve asthma control. ▪ Consider inactivated flu vaccine for all patients >6 months of age.

ASTHMA CARE FOR SPECIAL CIRCUMSTANCES

Clinical Issue	Key Clinical Activities and Action Steps
Exercise-Induced Bronchospasm	**Prevent EIB.*** ▪ Physical activity should be encouraged. For most patients, EIB should not limit participation in any activity they choose. ▪ Teach patients to take treatment before exercise. SABAs* will prevent EIB in most patients; LTRAs,* cromolyn, or LABAs* also are protective. Frequent or chronic use of LABA to prevent EIB is discouraged, as it may disguise poorly controlled persistent asthma. ▪ Consider long-term control medication. EIB often is a marker of inadequate asthma control and responds well to regular anti-inflammatory therapy. ▪ Encourage a warm-up period or mask or scarf over the mouth for cold-induced EIB.
Pregnancy	**Maintain asthma control through pregnancy.** ▪ Check asthma control at all prenatal visits. Asthma can worsen or improve during pregnancy; adjust medications as needed. ▪ Treating asthma with medications is safer for the mother and fetus than having poorly controlled asthma. Maintaining lung function is important to ensure oxygen supply to the fetus. ▪ ICSs* are the preferred long-term control medication. ▪ Remind patients to avoid exposure to tobacco smoke.

MANAGING EXACERBATIONS

Clinical Issue	Key Clinical Activities and Action Steps
Home Care	**Develop a written asthma action plan** (see Patient Education for Self-Management, page 3)**.** **Teach patients how to:** ▪ Recognize early signs, symptoms, and PEF* measures that indicate worsening asthma. ▪ Adjust medications (increase SABA* and, in some cases, add oral systemic corticosteroids) and remove or withdraw from environmental factors contributing to the exacerbation. ▪ Monitor response. ▪ Seek medical care if there is serious deterioration or lack of response to treatment. Give specific instructions on who and when to call.
Urgent or Emergency Care	**Assess severity by lung function measures (for ages ≥5 years), physical examination, and signs and symptoms.** **Treat to relieve hypoxemia and airflow obstruction; reduce airway inflammation.** ▪ Use supplemental oxygen as appropriate to correct hypoxemia. ▪ Treat with repetitive or continuous SABA,* with the addition of inhaled ipratropium bromide in severe exacerbations. ▪ Give oral systemic corticosteroids in moderate or severe exacerbations or for patients who fail to respond promptly and completely to SABA. ▪ Consider adjunctive treatments, such as intravenous magnesium sulfate or heliox, in severe exacerbations unresponsive to treatment. **Monitor response with repeat assessment of lung function measures, physical examination, and signs and symptoms, and, in emergency department, pulse oximetry.** **Discharge with medication and patient education:** ▪ Medications: SABA, oral systemic corticosteroids; consider starting ICS* ▪ Referral to follow-up care ▪ Asthma discharge plan ▪ Review of inhaler technique and, whenever possible, environmental control measures

***Abbreviations:** EIB, exercise-induced bronchospasm; ICS, inhaled corticosteroid; LABA, long-acting beta$_2$-agonist; LTRA, leukotriene receptor antagonist; PEF, peak expiratory flow; SABA, short-acting beta$_2$-agonist.

INITIAL VISIT: CLASSIFYING ASTHMA SEVERITY AND INITIATING THERAPY

(in patients who are not currently taking long-term control medications)

Level of severity (Columns 2–5) is determined by events listed in Column 1 for both impairment (frequency and intensity of symptoms and functional limitations) and risk (of exacerbations). Assess impairment by patient's or caregiver's recall of events during the previous 2–4 weeks; assess risk over the last year. Recommendations for initiating therapy based on level of severity are presented in the last row.

Components of Severity		Intermittent			Persistent								
					Mild			Moderate			Severe		
		Ages 0–4 years	Ages 5–11 years	Ages ≥12 years	Ages 0–4 years	Ages 5–11 years	Ages ≥12 years	Ages 0–4 years	Ages 5–11 years	Ages ≥12 years	Ages 0–4 years	Ages 5–11 years	Ages ≥12 years
Impairment	Symptoms	≤2 days/week			>2 days/week but not daily			Daily			Throughout the day		
	Nighttime awakenings	0	≤2x/month		1–2x/month	3–4x/month		3–4x/month	>1x/week but not nightly		>1x/week	Often 7x/week	
	SABA* use for symptom control (not to prevent EIB*)	≤2 days/week			>2 days/week but not daily	>2 days/week but not daily and not more than once on any day		Daily			Several times per day		
	Interference with normal activity	None			Minor limitation			Some limitation			Extremely limited		
	Lung function												
	→ FEV_1* (% predicted)	Not applicable	Normal FEV_1 between exacerbations >80%	Normal FEV_1 between exacerbations >80%	Not applicable	>80%	>80%	Not applicable	60–80%	60–80%	Not applicable	<60%	<60%
	→ FEV_1/FVC*		>85%	Normal†		>80%	Normal†		75–80%	Reduced 5%†		<75%	Reduced >5%†
Risk	Asthma exacerbations requiring oral systemic corticosteroids‡	0–1/year			≥2 exacerb. in 6 months, or wheezing ≥4x per year lasting >1 day AND risk factors for persistent asthma	≥2/year		*Generally, more frequent and intense events indicate greater severity.*					
		*Consider severity and interval since last asthma exacerbation. Frequency and severity may fluctuate over time for patients in any severity category. Relative annual risk of exacerbations may be related to FEV_1.**											
Recommended Step for Initiating Therapy *(See "Stepwise Approach for Managing Asthma Long Term," page 7)* *The stepwise approach is meant to help, not replace, the clinical decisionmaking needed to meet individual patient needs.*		Step 1			Step 2			Step 3	Step 3 medium-dose ICS* option	Step 3	Step 3	Step 3 medium-dose ICS* option or Step 4	Step 4 or 5
								Consider short course of oral systemic corticosteroids.					
		In 2–6 weeks, depending on severity, assess level of asthma control achieved and adjust therapy as needed. For children 0–4 years old, if no clear benefit is observed in 4–6 weeks, consider adjusting therapy or alternate diagnoses.											

* **Abbreviations:** EIB, exercise-induced bronchospam; FEV_1, forced expiratory volume in 1 second; FVC, forced vital capacity; ICS, inhaled corticosteroid; SABA, short-acting $beta_2$-agonist.

† Normal FEV_1/FVC by age: 8–19 years, 85%; 20–39 years, 80%; 40–59 years, 75%; 60–80 years, 70%.

‡ Data are insufficient to link frequencies of exacerbations with different levels of asthma severity. Generally, more frequent and intense exacerbations (e.g., requiring urgent care, hospital or intensive care admission, and/or oral corticosteroids) indicate greater underlying disease severity. For treatment purposes, patients with ≥2 exacerbations may be considered to have persistent asthma, even in the absence of impairment levels consistent with persistent asthma.

FOLLOW-UP VISITS: ASSESSING ASTHMA CONTROL AND ADJUSTING THERAPY

Level of control (Columns 2–4) is based on the most severe component of impairment (symptoms and functional limitations) or risk (exacerbations). Assess impairment by patient's or caregiver's recall of events listed in Column 1 during the previous 2–4 weeks and by spirometry and/or peak flow measures. Symptom assessment for longer periods should reflect a global assessment, such as inquiring whether the patient's asthma is better or worse since the last visit. Assess risk by recall of exacerbations during the previous year and since the last visit. Recommendations for adjusting therapy based on level of control are presented in the last row.

Components of Control		Well Controlled			Not Well Controlled			Very Poorly Controlled		
		Ages 0–4 years	Ages 5–11 years	Ages ≥12 years	Ages 0–4 years	Ages 5–11 years	Ages ≥12 years	Ages 0–4 years	Ages 5–11 years	Ages ≥12 years
Impairment	Symptoms	≤2 days/week	≤2 days/week but not more than once on each day	≤2 days/week	>2 days/week	>2 days/week or multiple times on ≤2 days/week	>2 days/week	Throughout the day		
	Nighttime awakenings	≤1x/month		≤2x/month	>1x/month	≥2x/month	1–3x/week	>1x/week	≥2x/week	≥4x/week
	Interference with normal activity	None			Some limitation			Extremely limited		
	SABA* use for symptom control (not to prevent EIB*)	≤2 days/week			>2 days/week			Several times per day		
	Lung function ➡ FEV_1* (% *predicted*) or peak flow (% *personal best*) ➡ FEV_1/FVC*	Not applicable Not applicable	>80% >80%	>80% Not applicable	Not applicable Not applicable	60–80% 75–80%	60–80% Not applicable	Not applicable Not applicable	<60% <75%	<60% Not applicable
	Validated questionnaires† ➡ ATAQ* ➡ ACQ* ➡ ACT*	Not applicable Not applicable	Not applicable Not applicable	0 ≤0.75‡ ≥20	Not applicable Not applicable	Not applicable Not applicable	1–2 ≥1.5 16–19	Not applicable Not applicable	Not applicable Not applicable	3–4 Not applicable ≤15
Risk	Asthma exacerbations requiring oral systemic corticosteroids§	0–1/year			2–3/year	≥2/year		>3/year	≥2/year	
		Consider severity and interval since last asthma exacerbation.								
	Reduction in lung growth/Progressive loss of lung function	Not applicable	Evaluation requires long-term follow-up care.		Not applicable	Evaluation requires long-term follow-up care.		Not applicable	Evaluation requires long-term follow-up care.	
	Treatment-related adverse effects	*Medication side effects can vary in intensity from none to very troublesome and worrisome. The level of intensity does not correlate to specific levels of control but should be considered in the overall assessment of risk.*								
Recommended Action for Treatment *(See "Stepwise Approach for Managing Asthma Long Term," page 7)* *The stepwise approach is meant to help, not replace, the clinical decisionmaking needed to meet individual patient needs.*		*Maintain current step.* *Regular follow-up every 1–6 months.* *Consider step down if well controlled for at least 3 months.*			Step up 1 step	Step up at least 1 step	Step up 1 step	*Consider short course of oral systemic corticosteroids.* *Step up 1–2 steps.* *Reevaluate in 2 weeks to achieve control.*		
					Reevaluate in 2–6 weeks to achieve control. *For children 0–4 years, if no clear benefit observed in 4–6 weeks, consider adjusting therapy or alternative diagnoses.*					
					Before step up in treatment: *Review adherence to medication, inhaler technique, and environmental control. If alternative treatment was used, discontinue and use preferred treatment for that step. For side effects, consider alternative treatment options.*					

* **Abbreviations:** ACQ, Asthma Control Questionnaire®; ACT, Asthma Control Test™; ATAQ, Asthma Therapy Assessment Questionnaire®; EIB, exercise-induced bronchospasm; FVC, forced vital capacity; FEV_1, forced expiratory volume in 1 second; SABA, short-acting $beta_2$-agonist.

† Minimal important difference: 1.0 for the ATAQ; 0.5 for the ACQ; not determined for the ACT.

‡ ACQ values of 0.76–1.4 are indeterminate regarding well-controlled asthma.

§ Data are insufficient to link frequencies of exacerbations with different levels of asthma control. Generally, more frequent and intense exacerbations (e.g., requiring urgent care, hospital or intensive care admission, and/or oral corticosteroids) indicate poorer asthma control.

2020 FOCUSED UPDATES TO THE Asthma Management Guidelines

AT-A-GLANCE GUIDE

This At-A-Glance Guide describes a treatment management approach based on recommendations from the *2020 Focused Updates to the Asthma Management Guidelines: A Report from the National Asthma Education and Prevention Program Coordinating Committee Expert Panel Working Group*.[1] Step diagrams from the 2007 Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma (EPR-3) were updated with the new recommendations. The diagrams are intended to help clinicians integrate the new recommendations into clinical care, and are meant to assist, and not replace, clinical judgment or decision-making for individual patient management, with input from individuals with asthma about their preferences.

AGES 0–4 YEARS: STEPWISE APPROACH FOR MANAGEMENT OF ASTHMA

	Intermittent Asthma	Management of Persistent Asthma in Individuals Ages 0–4 Years				
Treatment	**STEP 1**	**STEP 2**	**STEP 3**	**STEP 4**	**STEP 5**	**STEP 6**
Preferred	PRN SABA and At the start of RTI: Add short course daily ICS▲	Daily low-dose ICS and PRN SABA	Daily medium-dose ICS and PRN SABA	Daily medium-dose ICS-LABA and PRN SABA	Daily high-dose ICS-LABA and PRN SABA	Daily high-dose ICS-LABA + oral systemic corticosteroid and PRN SABA
Alternative		Daily montelukast* or Cromolyn,* and PRN SABA		Daily medium-dose ICS + montelukast* and PRN SABA	Daily high-dose ICS + montelukast* and PRN SABA	Daily high-dose ICS + montelukast*+ oral systemic corticosteroid and PRN SABA
			For children age 4 years only, see Step 3 and Step 4 on Management of Persistent Asthma in Individuals Ages 5–11 Years diagram.			

Assess Control

- First check adherence, inhaler technique, environmental factors,▲ and comorbid conditions.
- **Step up** if needed; reassess in 4–6 weeks
- **Step down** if possible (if asthma is well controlled for at least 3 consecutive months)

Consult with asthma specialist if Step 3 or higher is required. Consider consultation at Step 2.

Control assessment is a key element of asthma care. This involves both impairment and risk. Use of objective measures, self-reported control, and health care utilization are complementary and should be employed on an ongoing basis, depending on the individual's clinical situation.

Abbreviations: ICS, inhaled corticosteroid; LABA, long-acting beta$_2$-agonist; SABA, inhaled short-acting beta$_2$-agonist; RTI, respiratory tract infection; PRN, as needed

▲ Updated based on the 2020 guidelines.

* Cromolyn and montelukast were not considered for this update and/or have limited availability for use in the United States. The FDA issued a Boxed Warning for montelukast in March 2020.

[1]The full-length report, *2020 Focused Updates to the Asthma Management Guidelines: A Report from the National Asthma Education and Prevention Program Coordinating Committee Expert Panel Working Group*, can be accessed at **nhlbi.nih.gov/asthmaguidelines**.

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National Institutes of Health
National Heart, Lung, and Blood Institute

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NOTES FOR INDIVIDUALS AGES 0–4 YEARS DIAGRAM

Quick-relief medications	• Use SABA as needed for symptoms. The intensity of treatment depends on severity of symptoms: up to 3 treatments at 20-minute intervals as needed. • **Caution:** Increasing use of SABA or use >2 days a week for symptom relief (not prevention of EIB) generally indicates inadequate control and may require a step up in treatment. • Consider short course of oral systemic corticosteroid if exacerbation is severe or individual has history of previous severe exacerbations.
Each step: Assess environmental factors, provide patient education, and manage comorbidities▲	• In individuals with sensitization (or symptoms) related to exposure to pests‡: conditionally recommend integrated pest management as a single or multicomponent allergen-specific mitigation intervention.▲ • In individuals with sensitization (or symptoms) related to exposure to identified indoor allergens, conditionally recommend a multi-component allergen-specific mitigation strategy.▲ • In individuals with sensitization (or symptoms) related to exposure to dust mites, conditionally recommend impermeable pillow/mattress covers only as part of a multicomponent allergen-specific mitigation intervention, but not as a single component intervention.▲
Notes	• If clear benefit is not observed within 4–6 weeks and the medication technique and adherence are satisfactory, the clinician should consider adjusting therapy or alternative diagnoses.
Abbreviations	EIB, exercise-induced bronchoconstriction; SABA, inhaled short-acting beta$_2$-agonist. ▲Updated based on the 2020 guidelines. ‡ Refers to mice and cockroaches, which were specifically examined in the Agency for Healthcare Research and Quality systematic review.

WHAT'S NEW (AGES 0–4 YEARS)

- **Step 1:** In children ages 0–4 years with recurrent wheezing, a short (7–10 day) course of daily ICS with as-needed SABA for quick-relief therapy is recommended starting at the onset of a respiratory tract infection.
  - ✓ Recurrent wheezing is defined as at least three episodes of wheezing triggered by apparent infection in their lifetime, or two episodes in the past year, and no symptoms between infections.
  - ✓ One regimen, used in two reviewed studies, is budesonide inhalation suspension, 1 mg twice daily for 7 days at the first sign of respiratory tract infection-associated symptoms.
  - ✓ The main benefit during respiratory tract infections is a reduction in exacerbations requiring systemic corticosteroids.
  - ✓ Caregivers can initiate intermittent ICS treatment at home without a visit to a health care provider when they have clear instructions.
  - ✓ This treatment could affect growth. Carefully monitor growth in children who use this treatment.
- **Steps 3 and 4:** For children age 4 years only with persistent asthma, see Steps 3 and 4 on Management of Persistent Asthma in Individuals Ages 5–11 Years.
- **Each step:**
  - ✓ Consider the severity of an individual's asthma, the small potential benefit, and the extent of previous symptoms and exacerbations when recommending allergen mitigation interventions.

AGES 5–11 YEARS: STEPWISE APPROACH FOR MANAGEMENT OF ASTHMA

	Intermittent Asthma	Management of Persistent Asthma in Individuals Ages 5–11 Years				
Treatment	**STEP 1**	**STEP 2**	**STEP 3**	**STEP 4**	**STEP 5**	**STEP 6**
Preferred	PRN SABA	Daily low-dose ICS and PRN SABA	Daily and PRN combination low-dose ICS-formoterol▲	Daily and PRN combination medium-dose ICS-formoterol▲	Daily high-dose ICS-LABA and PRN SABA	Daily high-dose ICS-LABA + oral systemic corticosteroid and PRN SABA
Alternative		Daily LTRA,* or Cromolyn,* or Nedocromil,* or Theophylline,* and PRN SABA	Daily medium-dose ICS and PRN SABA or Daily low-dose ICS-LABA, or daily low-dose ICS + LTRA,* or daily low-dose ICS +Theophylline,* and PRN SABA	Daily medium-dose ICS-LABA and PRN SABA or Daily medium-dose ICS + LTRA* or daily medium-dose ICS + Theophylline,* and PRN SABA	Daily high-dose ICS + LTRA* or daily high-dose ICS + Theophylline,* and PRN SABA	Daily high-dose ICS + LTRA* + oral systemic corticosteroid or daily high-dose ICS + Theophylline* + oral systemic corticosteroid, and PRN SABA
		Steps 2–4: Conditionally recommend the use of subcutaneous immunotherapy as an adjunct treatment to standard pharmacotherapy in individuals ≥ 5 years of age whose asthma is controlled at the initiation, build up, and maintenance phases of immunotherapy▲			Consider Omalizumab**▲	

Assess Control

- First check adherence, inhaler technique, environmental factors,▲ and comorbid conditions.
- **Step up** if needed; reassess in 2–6 weeks
- **Step down** if possible (if asthma is well controlled for at least 3 consecutive months)

Consult with asthma specialist if Step 4 or higher is required. Consider consultation at Step 3.

Control assessment is a key element of asthma care. This involves both impairment and risk. Use of objective measures, self-reported control, and health care utilization are complementary and should be employed on an ongoing basis, depending on the individual's clinical situation.

Abbreviations: ICS, inhaled corticosteroid; LABA, long-acting beta$_2$-agonist; LTRA, leukotriene receptor antagonist; SABA, inhaled short-acting beta$_2$-agonist

▲ Updated based on the 2020 guidelines.

* Cromolyn, Nedocromil, LTRAs including montelukast, and Theophylline were not considered in this update and/or have limited availability for use in the United States, and/or have an increased risk of adverse consequences and need for monitoring that make their use less desirable. The FDA issued a Boxed Warning for montelukast in March 2020.

** Omalizumab is the only asthma biologic currently FDA-approved for this age range.

National Heart, Lung, and Blood Institute

NIH Publication No. 20-HL-8142
December 2020

NOTES FOR INDIVIDUALS AGES 5–11 YEARS DIAGRAM

Quick-relief medications	• Use SABA as needed for symptoms. The intensity of treatment depends on severity of symptoms: up to 3 treatments at 20-minute intervals as needed. • In Steps 3 and 4, the preferred option includes the use of ICS-formoterol 1 to 2 puffs as needed up to a maximum total daily maintenance and rescue dose of 8 puffs (36 mcg).▲ • **Caution:** Increasing use of SABA or use >2 days a week for symptom relief (not prevention of EIB) generally indicates inadequate control and may require a step up in treatment.
Each step: Assess environmental factors, provide patient education, and manage comorbidities▲	• In individuals with sensitization (or symptoms) related to exposure to pests‡: conditionally recommend integrated pest management as a single or multicomponent allergen-specific mitigation intervention.▲ • In individuals with sensitization (or symptoms) related to exposure to identified indoor allergens, conditionally recommend a multi-component allergen-specific mitigation strategy.▲ • In individuals with sensitization (or symptoms) related to exposure to dust mites, conditionally recommend impermeable pillow/mattress covers only as part of a multicomponent allergen-specific mitigation intervention, but not as a single component intervention.▲
Notes	• The terms ICS-LABA and ICS-formoterol indicate combination therapy with both an ICS and a LABA, usually and preferably in a single inhaler. • Where formoterol is specified in the steps, it is because the evidence is based on studies specific to formoterol. • In individuals ages 5–11 years with persistent allergic asthma in which there is uncertainty in choosing, monitoring, or adjusting anti-inflammatory therapies based on history, clinical findings, and spirometry, FeNO measurement is conditionally recommended as part of an ongoing asthma monitoring and management strategy that includes frequent assessment.
Abbreviations	EIB (exercise-induced bronchoconstriction); FeNO (fractional exhaled nitric oxide); ICS (inhaled corticosteroid); LABA (long-acting beta$_2$-agonist); SABA (inhaled short-acting beta$_2$-agonist). ▲Updated based on the 2020 guidelines. ‡ Refers to mice and cockroaches, which were specifically examined in the Agency for Healthcare Research and Quality systematic review.

WHAT'S NEW (AGES 5–11 YEARS)

- For individuals with mild to moderate persistent asthma who are taking daily ICS treatment (likely adherent with prescribed daily ICS) as a controller, increasing the regular daily ICS dose for short periods is not recommended when symptoms increase or peak flow decreases.
- **Steps 2–4:** Subcutaneous immunotherapy (SCIT) is recommended as an adjunct treatment for individuals who have demonstrated allergic sensitization and evidence of worsening asthma symptoms after exposure to the relevant antigen or antigens.
  - ✓ Do not initiate, increase, or administer maintenance SCIT doses while individuals have asthma symptoms.
  - ✓ Do not administer SCIT in individuals with severe asthma.
- **Steps 3 and 4:** For individuals with moderate to severe persistent asthma already taking low- or medium-dose ICS, the preferred treatment is a single inhaler with ICS-formoterol (referred to as single maintenance and reliever therapy, or "SMART") used both daily and as needed.
  - ✓ Individuals with a severe exacerbation in the prior year are particularly good candidates for SMART to reduce exacerbations.
  - ✓ Do not use ICS-formoterol as reliever therapy in individuals taking ICS-salmeterol as maintenance therapy.
  - ✓ Individuals whose asthma is uncontrolled on maintenance ICS-LABA with SABA as quick-relief therapy should receive the preferred SMART if possible before moving to a higher step of therapy.
  - ✓ In children ages 4–11 years, there may be a lower risk of growth suppression among those taking SMART versus daily higher-dose ICS treatment.
- **Steps 5 and 6:** Consider Omalizumab, the only FDA-approved asthma biologic for this age group.
- **Each step:**
  - ✓ Consider the severity of an individual's asthma, the small potential benefit, and the extent of previous symptoms and exacerbations when recommending allergen mitigation interventions.

AGES 12+ YEARS: STEPWISE APPROACH FOR MANAGEMENT OF ASTHMA

Treatment	Intermittent Asthma: STEP 1	Management of Persistent Asthma in Individuals Ages 12+ Years: STEP 2	STEP 3	STEP 4	STEP 5	STEP 6■
Preferred	PRN SABA	Daily low-dose ICS and PRN SABA or PRN concomitant ICS and SABA▲	Daily and PRN combination low-dose ICS-formoterol▲	Daily and PRN combination medium-dose ICS-formoterol▲	Daily medium-high dose ICS-LABA + LAMA and PRN SABA▲	Daily high-dose ICS-LABA + oral systemic corticosteroids + PRN SABA
Alternative		Daily LTRA* and PRN SABA or Cromolyn,* or Nedocromil,* or Zileuton,* or Theophylline,* and PRN SABA	Daily medium-dose ICS and PRN SABA or Daily low-dose ICS-LABA, or daily low-dose ICS + LAMA,▲ or daily low-dose ICS + LTRA,* and PRN SABA or Daily low-dose ICS + Theophylline* or Zileuton,* and PRN SABA	Daily medium-dose ICS-LABA or daily medium-dose ICS + LAMA, and PRN SABA▲ or Daily medium-dose ICS + LTRA,* or daily medium-dose ICS + Theophylline,* or daily medium-dose ICS + Zileuton,* and PRN SABA	Daily medium-high dose ICS-LABA or daily high-dose ICS + LTRA,* and PRN SABA	
		Steps 2–4: Conditionally recommend the use of subcutaneous immunotherapy as an adjunct treatment to standard pharmacotherapy in individuals ≥ 5 years of age whose asthma is controlled at the initiation, build up, and maintenance phases of immunotherapy▲			Consider adding Asthma Biologics (e.g., anti-IgE, anti-IL5, anti-IL5R, anti-IL4/IL13)**	

Assess Control

- First check adherence, inhaler technique, environmental factors,▲ and comorbid conditions.
- **Step up** if needed; reassess in 2–6 weeks
- **Step down** if possible (if asthma is well controlled for at least 3 consecutive months)

Consult with asthma specialist if Step 4 or higher is required. Consider consultation at Step 3.

Control assessment is a key element of asthma care. This involves both impairment and risk. Use of objective measures, self-reported control, and health care utilization are complementary and should be employed on an ongoing basis, depending on the individual's clinical situation.

Abbreviations: ICS, inhaled corticosteroid; LABA, long-acting beta$_2$-agonist; LAMA, long-acting muscarinic antagonist; LTRA, leukotriene receptor antagonist; SABA, inhaled short-acting beta$_2$-agonist

▲ Updated based on the 2020 guidelines.

* Cromolyn, Nedocromil, LTRAs including Zileuton and montelukast, and Theophylline were not considered for this update, and/or have limited availability for use in the United States, and/or have an increased risk of adverse consequences and need for monitoring that make their use less desirable. The FDA issued a Boxed Warning for montelukast in March 2020.

** The AHRQ systematic reviews that informed this report did not include studies that examined the role of asthma biologics (e.g. anti-IgE, anti-IL5, anti-IL5R, anti-IL4/IL13). Thus, this report does not contain specific recommendations for the use of biologics in asthma in Steps 5 and 6.

■ Data on the use of LAMA therapy in individuals with severe persistent asthma (Step 6) were not included in the AHRQ systematic review and thus no recommendation is made.

National Heart, Lung, and Blood Institute

NIH Publication No. 20-HL-8142
December 2020

NOTES FOR INDIVIDUALS AGES 12+ YEARS DIAGRAM

Quick-relief medications	• Use SABA as needed for symptoms. The intensity of treatment depends on the severity of symptoms: up to 3 treatments at 20-minute intervals as needed. • In steps 3 and 4, the preferred option includes the use of ICS-formoterol 1 to 2 puffs as needed up to a maximum total daily maintenance and rescue dose of 12 puffs (54 mcg).▲ • **Caution:** Increasing use of SABA or use >2 days a week for symptom relief (not prevention of EIB) generally indicates inadequate control and may require a step up in treatment.
Each step: Assess environmental factors, provide patient education, and manage comorbidities▲	• In individuals with sensitization (or symptoms) related to exposure to pests‡: conditionally recommend integrated pest management as a single or multicomponent allergen-specific mitigation intervention.▲ • In individuals with sensitization (or symptoms) related to exposure to identified indoor allergens, conditionally recommend a multi-component allergen-specific mitigation strategy.▲ • In individuals with sensitization (or symptoms) related to exposure to dust mites, conditionally recommend impermeable pillow/mattress covers only as part of a multicomponent allergen-specific mitigation intervention, but not as a single component intervention.▲
Notes	• The terms ICS-LABA and ICS-formoterol indicate combination therapy with both an ICS and a LABA, usually and preferably in a single inhaler. • Where formoterol is specified in the steps, it is because the evidence is based on studies specific to formoterol. • In individuals ages 12 years and older with persistent allergic asthma in which there is uncertainty in choosing, monitoring, or adjusting anti-inflammatory therapies based on history, clinical findings, and spirometry, FeNO measurement is conditionally recommended as part of an ongoing asthma monitoring and management strategy that includes frequent assessment. • Bronchial thermoplasty was evaluated in Step 6. The outcome was a conditional recommendation against the therapy.
Abbreviations	EIB, exercise-induced bronchoconstriction; FeNO, fractional exhaled nitric oxide; ICS, inhaled corticosteroid; LABA, long-acting beta$_2$-agonist; SABA, inhaled short-acting beta$_2$-agonist. ▲Updated based on the 2020 guidelines. ‡ Refers to mice and cockroaches, which were specifically examined in the Agency for Healthcare Research and Quality systematic review.

WHAT'S NEW (AGES 12+ YEARS)

- For individuals with mild to moderate persistent asthma who are taking daily ICS treatment (likely adherent with prescribed daily ICS) as a controller, increasing the regular daily ICS dose for short periods is not recommended when symptoms increase or peak flow decreases.
- **Step 2:** For individuals with mild persistent asthma, either of the following two treatments are recommended as part of Step 2 therapy: 1) a daily low-dose ICS and as-needed SABA for quick-relief therapy, or 2) intermittent as-needed SABA and ICS used one after the other for worsening asthma.
  - ✓ One approach to intermittent therapy is two to four puffs of albuterol followed by 80–250 mcg of beclomethasone equivalent every 4 hours as needed for asthma symptoms.
  - ✓ Intermittent therapy can be initiated at home with regular provider follow-up to ensure that the intermittent regimen is still appropriate.
  - ✓ Individuals with either low or high perception of symptoms may not be good candidates for as-needed ICS therapy. Daily low-dose ICS with as-needed SABA may be preferred.
- **Steps 2–4:** Subcutaneous immunotherapy (SCIT) is recommended as an adjunct treatment for individuals who have demonstrated allergic sensitization and evidence of worsening asthma symptoms after exposure to the relevant antigen or antigens.
  - ✓ Do not initiate, increase, or administer maintenance SCIT doses while individuals have asthma symptoms.
  - ✓ Do not administer SCIT in individuals with severe asthma.
- **Steps 3 and 4:** For individuals with moderate to severe persistent asthma already taking low- or medium-dose ICS, the preferred treatment is a single inhaler with ICS-formoterol (referred to as single maintenance and reliever therapy, or "SMART") used both daily and as needed.
  - ✓ Individuals with a severe exacerbation in the prior year are particularly good candidates for SMART to reduce exacerbations.
  - ✓ Do not use ICS-formoterol as reliever therapy in individuals taking ICS-salmeterol as maintenance therapy.
  - ✓ Individuals whose asthma is uncontrolled on maintenance ICS-LABA with SABA as quick-relief therapy should receive the preferred SMART if possible before moving to a higher step of therapy.
- **Each step:**
  - ✓ Consider the severity of an individual's asthma, the small benefit, and the extent of previous symptoms and exacerbations when recommending allergen mitigation interventions.

EDUCATIONAL RESOURCES

National Heart, Lung, and Blood Institute

- Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma (EPR-3) www.nhlbi.nih.gov/guidelines/asthma
- Physician Asthma Care Education (PACE): www.nhlbi.nih.gov/health/prof/lung/asthma/pace/
- National Asthma Control Initiative (NACI): http://naci.nhlbi.nih.gov

Allergy & Asthma Network Mothers of Asthmatics
800-878-4403
www.aanma.org

American Academy of Allergy, Asthma, and Immunology
414-272-6071
www.aaaai.org

American Academy of Pediatrics
847-434-4000
www.aap.org

American Association of Respiratory Care
972-243-2272
www.aarc.org

American College of Chest Physicians
847-498-1400
www.chestnet.org

American College of Allergy, Asthma & Immunology
847-427-1200
www.acaai.org

American Lung Association
800-LUNG-USA (800-586-4872)
www.lungusa.org

American School Health Association
800-445-2742
www.ashaweb.org

Asthma and Allergy Foundation of America
800-7-ASTHMA (800-727-8462)
http://aafa.org

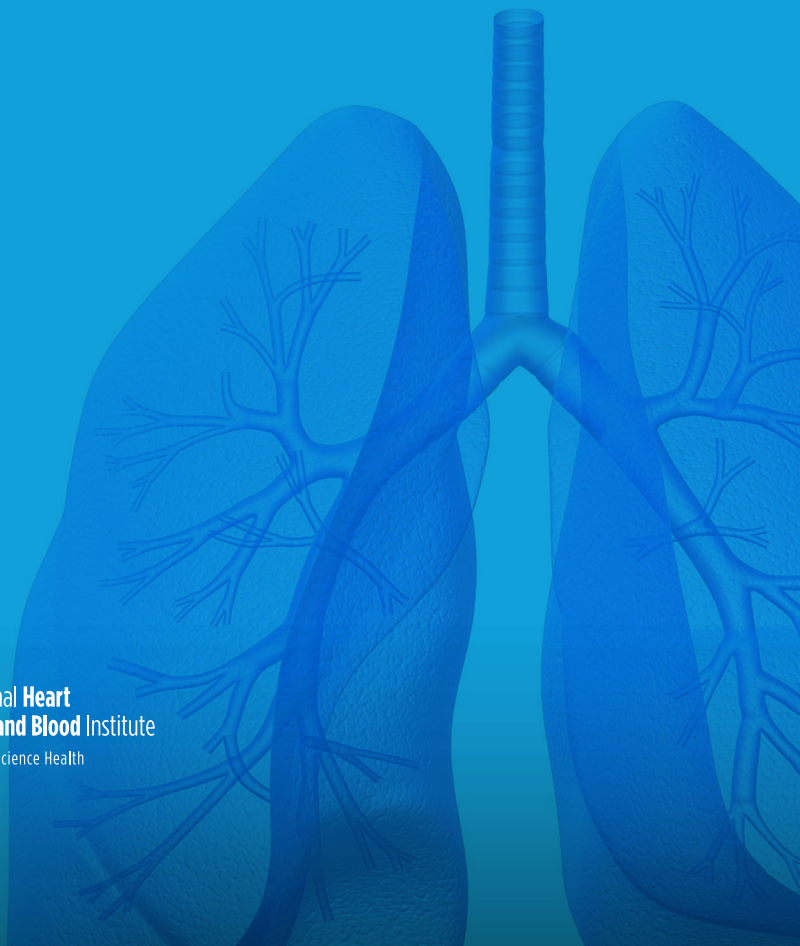
Centers for Disease Control and Prevention
800-CDC-INFO (800-232-4636)
www.cdc.gov/asthma

Environmental Protection Agency/ Asthma Community Network
www.asthmacommunitynetwork.org
800-490-9198 (to order EPA publications)
www.epa.gov/asthma/publications.html

National Association of School Nurses
240-821-1130
www.nasn.org

For more information contact:

NHLBI Information Center
P.O. Box 30105
Bethesda, MD 20824-0105
Phone: 301-592-8573
Fax: 301-592-8563
Web site: www.nhlbi.nih.gov



U.S. Department of Health and Human Services
National Institutes of Health

National Heart Lung and Blood Institute
People Science Health

NIH Publication No. 12-5075
Originally Printed June 2002
Revised September 2012

Today's Date: _____

Patient's Name: _____

FOR PATIENTS:

Take the Asthma Control Test™ (ACT) for people 12 yrs and older.

Know your score. Share your results with your doctor.

Step 1 Write the number of each answer in the score box provided.

Step 2 Add up each score box for your total.

Step 3 Take the test to the doctor to talk about your score.

1. In the past **4 weeks**, how much of the time did your **asthma** keep you from getting as much done at work, school or at home?

All of the time	1	Most of the time	2	Some of the time	3	A little of the time	4	None of the time	5

Score ☐

2. During the past **4 weeks**, how often have you had shortness of breath?

More than once a day	1	Once a day	2	3 to 6 times a week	3	Once or twice a week	4	Not at all	5

☐

3. During the past **4 weeks**, how often did your **asthma** symptoms (wheezing, coughing, shortness of breath, chest tightness or pain) wake you up at night or earlier than usual in the morning?

4 or more nights a week	1	2 or 3 nights a week	2	Once a week	3	Once or twice	4	Not at all	5

☐

4. During the past **4 weeks**, how often have you used your rescue inhaler or nebulizer medication (such as albuterol)?

3 or more times per day	1	1 or 2 times per day	2	2 or 3 times per week	3	Once a week or less	4	Not at all	5

☐

5. How would you rate your **asthma** control during the past **4 weeks**?

Not controlled at all	1	Poorly controlled	2	Somewhat controlled	3	Well controlled	4	Completely controlled	5

☐

AMERICAN LUNG ASSOCIATION.

The Ameican Lung Association suppports the Asthma Control Test and does not endorse products.

Total ☐

If your score is 19 or less, your asthma may not be controlled as well as it could be. Talk to your doctor.

FOR PHYSICIANS:

The ACT is:

- Clinically validated by spirometry and specialist assessment[1]
- Supported by the American Lung Association
- A self-administered, brief, 5-question assessment that can help you assess your patients' asthma during the past 4 weeks

Reference: 1. Nathan RA et al. *J Allergy Clin Immunol.* 2004;113:59-65.

GlaxoSmithKline

Today's Date: _____

Patient's Name: _____

Childhood Asthma Control Test for children 4 to 11 years old. Know the score.

This test will provide a score that may help your doctor determine if your child's asthma treatment plan is working or if it might be time for a change.

How to take the Childhood Asthma Control Test

Step 1 Let your child respond **to the first four questions (1 to 4)**. If your child needs help reading or understanding the question, you may help, but let your child select the response. Complete the remaining **three questions (5 to 7)** on your own and without letting your child's response influence your answers. There are no right or wrong answers.

Step 2 Write the number of each answer in the score box provided.

Step 3 Add up each score box for the total.

Step 4 Take the test to the doctor to talk about your child's total score.

19 or less If your child's score is 19 or less, it may be a sign that your child's asthma is not controlled as well as it could be. Bring this test to the doctor to talk about the results.

Have your child complete these questions.

SCORE

1. How is your asthma today?

 0 Very bad	 1 Bad	 2 Good	 3 Very good

2. How much of a problem is your asthma when you run, exercise or play sports?

 0 It's a big problem, I can't do what I want to do.	 1 It's a problem and I don't like it.	 2 It's a little problem but it's okay.	 3 It's not a problem.

3. Do you cough because of your asthma?

 0 Yes, all of the time.	 1 Yes, most of the time.	 2 Yes, some of the time.	 3 No, none of the time.

4. Do you wake up during the night because of your asthma?

 0 Yes, all of the time.	 1 Yes, most of the time.	 2 Yes, some of the time.	 3 No, none of the time.

Please complete the following questions on your own.

5. During the last 4 weeks, how many days did your child have any daytime asthma symptoms?

5 Not at all	4 1-3 days	3 4-10 days	2 11-18 days	1 19-24 days	0 Everyday

6. During the last 4 weeks, how many days did your child wheeze during the day because of asthma?

5 Not at all	4 1-3 days	3 4-10 days	2 11-18 days	1 19-24 days	0 Everyday

7. During the last 4 weeks, how many days did your child wake up during the night because of asthma?

5 Not at all	4 1-3 days	3 4-10 days	2 11-18 days	1 19-24 days	0 Everyday

TOTAL

Pediatric/Adolescent Asthma Therapy Assessment Questionnaire

Patient Name: _____

ID Number: _____

Physician Name: _____ Date: _____

Please have the parent or guardian complete this questionnaire.

INSTRUCTIONS: Check 1 answer to each question and enter point value (0 or 1) on line

	Control Issues	Other Issues

1. In the *past 4 weeks*, did the child:

a) Have wheezing or difficulty breathing when exercising?	☐ Yes (1)	☐ No (0)	☐ Unsure (1)	____
b) Have wheezing during the day when **not** exercising?	☐ Yes (1)	☐ No (0)	☐ Unsure (1)	____
c) Wake up at night with wheezing or difficulty breathing?	☐ Yes (1)	☐ No (0)	☐ Unsure (1)	____
d) Miss days of school because of his/her asthma?	☐ Yes (1)	☐ No (0)	☐ Unsure (1)	____
e) Miss any daily activities (such as playing, going to a friend's house, or any family activity) because of asthma?	☐ Yes (1)	☐ No (0)	☐ Unsure (1)	____

2. Does your child use an inhaler or a nebulizer for *quick relief* from asthma symptoms?* ☐ Yes ☐ No ☐ Unsure

(If Yes) In the **past 4 weeks**, what was the **greatest number of times** in 1 day your child used this inhaler/nebulizer?

0	☐ (0)	5 to 6	☐ (1)
1 to 2	☐ (0)	More than 6	☐ (1)
3 to 4	☐ (1)*	**Enter score** →	____

3. Has your child ever had a prescription for an asthma medicine that is NOT used for quick relief but is used to *control* his/her asthma? ☐ Yes ☐ No ☐ Unsure

(If Yes or Unsure) What best describes how your child takes this medicine now?

Takes it every day	☐ (0)	Only takes it when he/she has symptoms	☐ (1)
Takes it some days, but not other days	☐ (1)	Never takes it	☐ (1)
Used to take it, but now does not	☐ (1)	**Enter score**	

4. Are you dissatisfied with any part of your child's *current* asthma treatment? → ☐ Yes (1) ☐ No (0) ☐ Unsure (1) ____

5. Do you believe that:

a) Your child's asthma was well controlled in the **past 4 weeks**?	☐ Yes (0)	☐ No (1)	☐ Unsure (1)	____
b) Your child is able to take his/her asthma medicine(s) as directed?	☐ Yes (0)	☐ No (1)	☐ Unsure (1)	____
c) Your child's medicine(s) is useful for controlling his/her asthma?	☐ Yes (0)	☐ No (1)	☐ Unsure (1)	____

6. During this office visit, would you like the doctor to discuss:

a) Different types of drugs available to control asthma?	☐ (1)	
b) Your child's asthma treatment options?	☐ (1)	
c) How your child prefers to take his/her asthma medicine(s)?	☐ (1)	
d) Other issues?	☐ (1)	
Enter score →		____

Add numbers in the light blue area and enter total SCORE here. TOTAL → ____

Add numbers in the dark blue area and enter total SCORE here. TOTAL → ____

If either SCORE is 1 or greater, discuss questionnaire with your doctor.

*This reflects a lower threshold to identify potential control problems than was used in the ATAQ validation studies. This modification was designed to encourage patients and providers to discuss how asthma medications are being used.

MERCK

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4. Educational Tools

Allergy & Asthma NETWORK

Respiratory Treatments

2017

American College of Allergy, Asthma & Immunology

Allergy & Asthma Network is a national nonprofit organization dedicated to ending needless death and suffering due to asthma, allergies and related conditions through outreach, education, advocacy and research

Learn More at

AllergyAsthmaNetwork.org
800.878.4403

123 = DOSE INDICATOR ★ = BUILT-IN SPACER G = GENERIC AVAILABLE DISEASE STATES: A = ASTHMA C = COPD

Short-acting beta$_2$-agonist bronchodilators relax tight muscles in airways and offer quick relief of symptoms such as coughing, wheezing and shortness of breath for 3-6 hours

- **ProAir® HFA** albuterol sulfate — 123 A
- **ProAir® RespiClick** albuterol sulfate inhalation powder — 123 A
- **Proventil® HFA** albuterol sulfate — A
- **Ventolin® HFA** albuterol sulfate — 123 A
- **Xopenex HFA®** levalbuterol tartrate — A G

Long-acting beta$_2$-agonist bronchodilators relax tight muscles in airways and offer lasting relief of symptoms such as coughing, wheezing and shortness of breath for at least 12 hours

- **Arcapta™ Neohaler™** indacaterol inhalation powder — C
- **Serevent® Diskus®** salmeterol xinafoate inhalation powder — 123 A C
- **Striverdi® Respimat®** olodaterol hydrochloride — 123 C

Inhaled corticosteroids reduce and prevent swelling of airway tissue; they do not relieve sudden symptoms of coughing, wheezing or shortness of breath

- **Aerospan®** 80 mcg flunisolide — ★ A
- **Alvesco® HFA** 80 mcg, 160 mcg ciclesonide — 123 A
- **Arnuity® Ellipta®** 100 mcg, 200 mcg fluticasone furoate inhalation powder — 123 A
- **Asmanex® HFA** mometasone furoate — 123 A
- **Asmanex® Twisthaler®** 110 mcg, 220 mcg mometasone furoate inhalation powder — 123 A
- **Flovent® Diskus®** 50 mcg, 100 mcg, 250 mcg fluticasone propionate inhalation powder — 123 A
- **Flovent® HFA** 44 mcg, 110 mcg, 220 mcg fluticasone propionate — 123 A
- **Pulmicort Flexhaler®** 90 mcg, 180 mcg budesonide inhalation powder — 123 A
- **QVAR® Redihaler™** 40 mcg, 80 mcg beclomethasone dipropionate — 123 A C

Combination medications contain both inhaled corticosteroid and long-acting beta$_2$-agonist (LABA)

- **Advair Diskus®** 100/50, 250/50, 500/50 fluticasone propionate and salmeterol inhalation powder — 123 A C G
- **Advair® HFA** 45/21, 115/21, 230/21 fluticasone propionate and salmeterol xinafoate — 123 A
- **AirDuo™ RespiClick®** 55/14 mcg, 113/14 mcg, 232/14 mcg fluticasone propionate and salmeterol inhalation powder — 123 A G
- **Breo® Ellipta®** 100/25 mcg, 200/25 mcg fluticasone furoate and vilanterol inhalation powder — 123 A C
- **Dulera®** 100/5, 200/5 mometasone furoate and formoterol fumarate dihydrate — 123 A
- **Symbicort® (HFA)** 80/4.5, 160/4.5 budesonide and formoterol fumarate dihydrate — 123 A C

contain both long-acting muscarinic antagonist (LAMA) and long-acting beta$_2$-agonist (LABA)

- **Anoro® Ellipta®** 62.5 mcg/25 mcg umeclidinium and vilanterol inhalation powder — 123 C
- **Bevespi Aerosphere®** 9 mcg/4.8mcg glycopyrrolate and formoterol fumarate inhalation aerosol — 123 C
- **Stiolto™ Respimat®** 2.5 mcg/2.5 mcg tiotropium bromide and olodaterol — 123 C
- **Utibron™ Neohaler®** 27.5 mcg/15.6 mcg indacaterol and glycopyrrolate inhalation powder — C

Muscaranic antagonist (anticholinergic) bronchodilators relieve cough, sputum production, wheeze and chest tightness associated with chronic lung diseases

Short-acting

- **Atrovent® HFA** ipratropium bromide — 123 C

Long-acting

- **Seebri™ Neohaler®** glycopyrrolate inhalation powder — C
- **Incruse® Ellipta®** umeclidinium inhalation powder — 123 C
- **Spiriva® HandiHaler®** tiotropium bromide inhalation powder — C
- **Spiriva® Respimat®** tiotropium bromide — 123 A C
- **Tudorza™ Pressair™** aclidinium bromide inhalation powder — 123 C

Combination muscarinic antagonist and beta$_2$-agonist

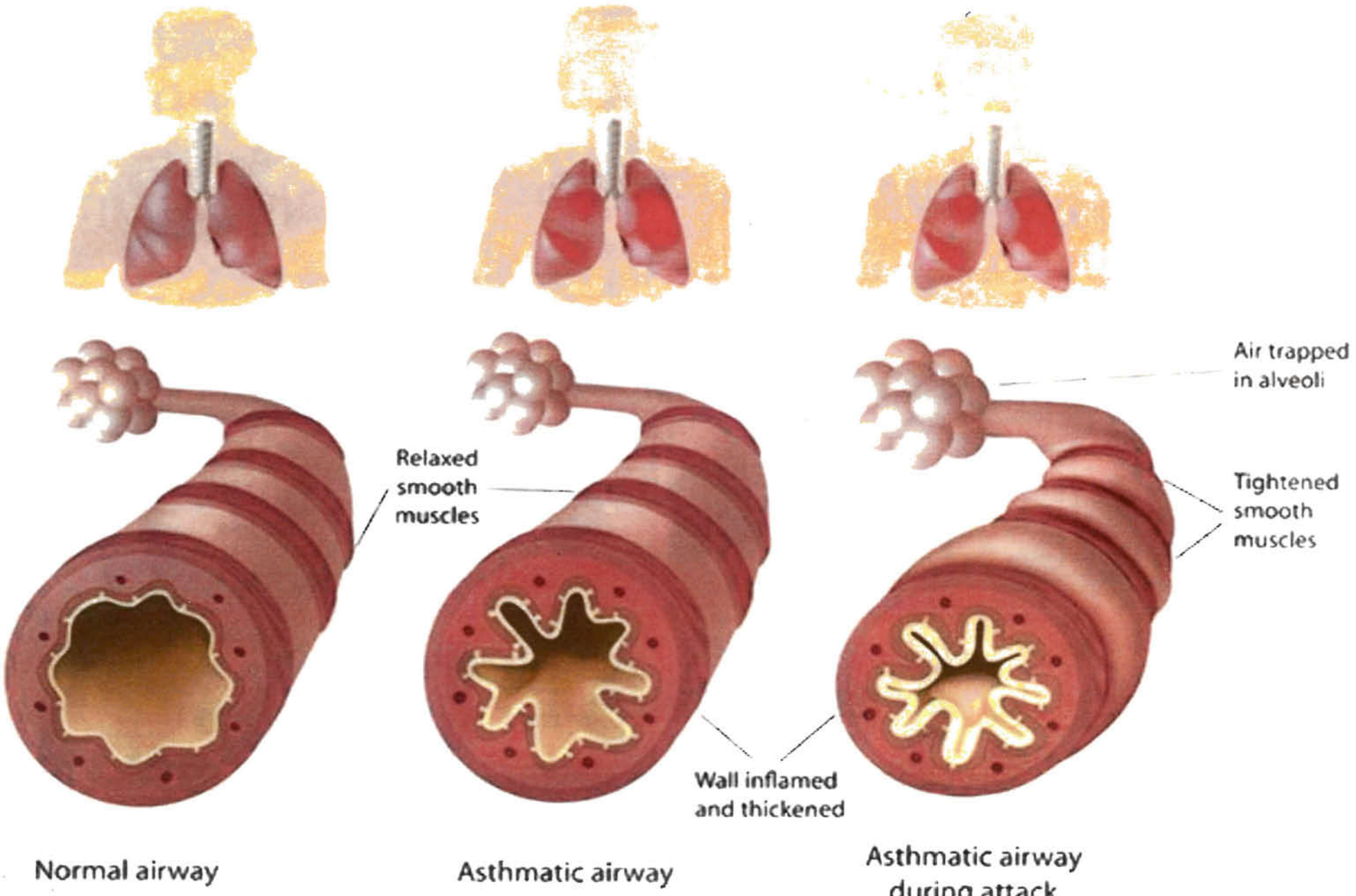
Short-acting

- **Combivent® Respimat®** ipratropium bromide and albuterol — 123 C

Severe asthma treatments

- **Cinqair** reslizumab — A
- **Nucala** mepolizumab — A
- **Xolair** omalizumab — A
- **Bronchial Thermoplasty** A minimally invasive procedure that uses mild heat to reduce airway smooth muscle, leading to fewer severe asthma flares, ER visits, and days lost from activities. www.btforasthma.com — A

Asthma and Your Airways



THE BREATHING INSTITUTE

Dedicated to Breathing Better Day and Night

The physicians and care teams of the Breathing Institute at Children's Hospital Colorado provide comprehensive clinical care and consultation for children with common and complex breathing disorders. Our world-class team of pediatric pulmonologists is always available to care for children with shortness of breath, wheezing, cough, noisy breathing, oxygen dependency, recurrent pneumonia and other general lung disorders. Special areas of expertise include asthma, cystic fibrosis, airway anomalies and disease, pulmonary hypertension, apnea, aspiration, ventilator dependency, chronic lung disease of infancy, sleep-disordered breathing and other high acuity breathing disorders.

The Breathing Institute provides care for many different Breathing specialties under one division.

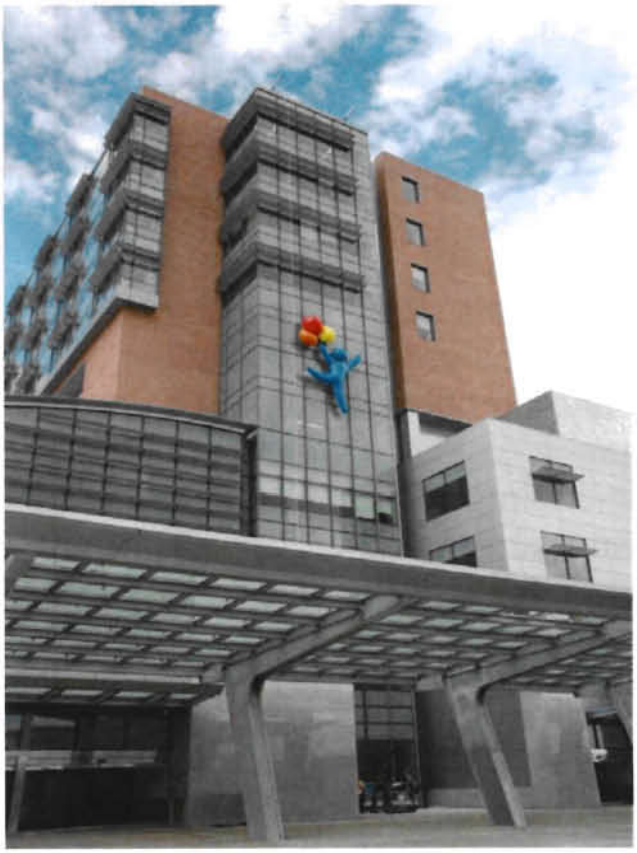
Children's Hospital Colorado

Affiliated with
University of Colorado
Anschutz Medical Campus

https://www.childrenscolorado.org/doctors-and-departments/departments/breathing-institute/

Some of Our Programs & Specialties Are:

- AeroDigestive Program
- Asthma Program
- Cystic Fibrosis
- Community Outreach Projects
- Diffuse Lung Disease (ILD, PCD)
- Pulmonary Hypertension & Vascular Disease
- Network of Care
- Respiratory Care
- Sleep Program
- Ventilator Care Program



CONTACT US

Pediatric Heart Lung Center
Phone: 720-777-5821

Breathing Institute
Phone: 720-777-6181

Asthma Clinic
Phone: 720-777-6181

Aerodigestive Program
Phone: 720-777-6181

Interstitial Lung Disease (chILD) Program
Phone: 720-777-6181

Mike McMorris Cystic Fibrosis Research and Care Center
Phone: 720-777-6181

Sleep Center
Phone: 720-777-6181

Ventilator Care Program
Phone: 720-777-6181

CHCO Enduring Education Modules related to asthma

These online courses offer CME and are free to take after you register for the course.

1. https://ce.childrenscolorado.org/content/evaluation-poorly-controlled-asthma

2. https://ce.childrenscolorado.org/content/inhaled-medications-children-asthma

3. https://ce.childrenscolorado.org/content/spirometry-testing

ASTHMA ACTION PLAN

For: _____ Doctor: _____ Date: _____

Doctor's Phone Number: _____ Hospital/Emergency Department Phone Number: _____

GREEN ZONE

DOING WELL

- No cough, wheeze, chest tightness, or shortness of breath during the day or night
- Can do usual activities

And, if a peak flow meter is used,

Peak flow: more than _____
(80 percent or more of my best peak flow)

My best peak flow is: _____

Daily Medications

Medicine	How much to take	When to take it
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
Before exercise	❑ _____	❑ 2 or ❑ 4 puffs	5 minutes before exercise

YELLOW ZONE

ASTHMA IS GETTING WORSE

- Cough, wheeze, chest tightness, or shortness of breath, or
- Waking at night due to asthma, or
- Can do some, but not all, usual activities

–Or–

Peak flow: _____ to _____
(50 to 79 percent of my best peak flow)

1st

Add: quick-relief medicine—and keep taking your GREEN ZONE medicine.

_____ (quick-relief medicine)

_____ Number of puffs
or ❑ Nebulizer, once

Can repeat every _____ minutes
up to maximum of _____ doses

2nd

If your symptoms (and peak flow, if used) return to GREEN ZONE after 1 hour of above treatment:

❑ Continue monitoring to be sure you stay in the green zone.

–Or–

If your symptoms (and peak flow, if used) do not return to GREEN ZONE after 1 hour of above treatment:

❑ Take: _____ (quick-relief medicine) _____ Number of puffs **or** ❑ Nebulizer

❑ Add: _____ (oral steroid) mg per day For _____ (3–10) days

❑ Call the doctor ❑ before/ ❑ within_____ hours after taking the oral steroid.

RED ZONE

MEDICAL ALERT!

- Very short of breath, or
- Quick-relief medicines have not helped,
- Cannot do usual activities, or
- Symptoms are same or get worse after 24 hours in Yellow Zone

–Or–

Peak flow: less than _____
(50 percent of my best peak flow)

Take this medicine:

❑ _____ (quick-relief medicine) _____ Number of puffs **or** ❑ Nebulizer

❑ _____ mg (oral steroid)

Then call your doctor NOW. Go to the hospital or call an ambulance if:

- You are still in the red zone after 15 minutes AND
- You have not reached your doctor.

DANGER SIGNS

- **Trouble walking and talking due to shortness of breath**
- **Lips or fingernails are blue**

- **Take _____ puffs of _____ (quick relief medicine) AND**
- **Go to the hospital or call for an ambulance _____ (phone) NOW!**

See the reverse side for things you can do to avoid your asthma triggers.

HOW TO CONTROL THINGS THAT MAKE YOUR ASTHMA WORSE

This guide suggests things you can do to avoid your asthma triggers. Put a check next to the triggers that you know make your asthma worse and ask your doctor to help you find out if you have other triggers as well. Keep in mind that controlling any allergen usually requires a combination of approaches, and reducing allergens is just one part of a comprehensive asthma management plan. Here are some tips to get started. These tips tend to work better when you use several of them together. Your health care provider can help you decide which ones may be right for you.

ALLERGENS

❒ Dust Mites

These tiny bugs, too small to see, can be found in every home—in dust, mattresses, pillows, carpets, cloth furniture, sheets and blankets, clothes, stuffed toys, and other cloth-covered items. If you are sensitive:

- Mattress and pillow covers that prevent dust mites from going through them should be used along with high efficiency particulate air (HEPA) filtration vacuum cleaners.
- Consider reducing indoor humidity to below 60 percent. Dehumidifiers or central air conditioning systems can do this.

❒ Cockroaches and Rodents

Pests like these leave droppings that may trigger your asthma. If you are sensitive:

- Consider an integrated pest management plan.
- Keep food and garbage in closed containers to decrease the chances for attracting roaches and rodents.
- Use poison baits, powders, gels, or paste (for example, boric acid) or traps to catch and kill the pests.
- If you use a spray to kill roaches, stay out of the room until the odor goes away.

❒ Animal Dander

Some people are allergic to the flakes of skin or dried saliva from animals with fur or hair. If you are sensitive and have a pet:

- Consider keeping the pet outdoors.
- Try limiting to your pet to commonly used areas indoors.

❒ Indoor Mold

If mold is a trigger for you, you may want to:

- Explore professional mold removal or cleaning to support complete removal.
- Wear gloves to avoid touching mold with your bare hands if you must remove it yourself.
- Always ventilate the area if you use a cleaner with bleach or a strong smell.

❒ Pollen and Outdoor Mold

When pollen or mold spore counts are high you should try to:

- Keep your windows closed.
- If you can, stay indoors with windows closed from late morning to afternoon, when pollen and some mold spore counts are at their highest.
- If you do go outside, change your clothes as soon as you get inside, and put dirty clothes in a covered hamper or container to avoid spreading allergens inside your home.
- Ask your health care provider if you need to take or increase your anti-inflammatory medicine before the allergy season starts.

IRRITANTS

❒ Tobacco Smoke

- If you smoke, visit smokefree.gov or ask your health care provider for ways to help you quit.
- Ask family members to quit smoking.
- Do not allow smoking in your home or car.

❒ Smoke, Strong Odors, and Sprays

- If possible, avoid using a wood-burning stove, kerosene heater, or fireplace. Vent gas stoves to outside the house.
- Try to stay away from strong odors and sprays, such as perfume, talcum powder, hair spray, and paints.

❒ Vacuum Cleaning

- Try to get someone else to vacuum for you once or twice a week, if you can. Stay out of rooms while they are being vacuumed and for a short while afterward.
- If you must vacuum yourself, using HEPA filtration vacuum cleaners may be helpful.

❒ Other Things That Can Make Asthma Worse

- Sulfites in foods and beverages: Do not drink beer or wine or eat dried fruit, processed potatoes, or shrimp if they cause asthma symptoms.
- Cold air: Cover your nose and mouth with a scarf on cold or windy days.
- Other medicines: Tell your doctor about all the medicines you take. Include cold medicines, aspirin, vitamins and other supplements, and nonselective beta-blockers (including those in eye drops).

U.S. Department of Health and Human Services
National Institutes of Health

NIH National Heart, Lung, and Blood Institute

NIH Publication No. 20-HL-5251
February 2021

For more information and resources on asthma, visit *nhlbi.nih.gov/BreatheBetter*.

LEARN MORE BREATHE BETTER℠

5. Asthma Patient Resources

Asthma Triggers

Children with asthma have extra sensitive airways and many things around them can make their asthma worse. The things around your child that cause an asthma attack are called triggers. Triggers are different for each child. Your doctor can help you figure out your child's triggers. Try to keep your child away from their triggers, especially at home and at school where your child spends most of their time.

If your child has asthma symptoms such as cough, trouble breathing or wheezing, follow his or her "Asthma Action Plan" instructions.

Irritants

Smoke Being around smoke can be very harmful to a child with asthma and increases the chance of having an asthma attack.

Tobacco or Marijuana Smoke

- DO NOT let anyone smoke inside your house or in your car
- If you can, quit smoking
  - Call 1-800-QUIT-NOW (1-800-784-8669) for help from the Colorado Quitline
- You should only smoke outside
  - Wear a "smoking jacket" and leave the "smoking jacket" outside
- Wash your hands after smoking
- Keep your child away from places where people smoke
- Also avoid electronic cigarettes and vaping

Wood Smoke

- Don't use a wood burning stove for heat or a wood fireplace
- Avoid campfires

Strong Smells

- Don't use air fresheners, perfume, cologne, room spray, or hair spray
  - The strong smells can trigger an asthma attack
- Use unscented household cleaning products

Pollution

- When the pollution is high, have your child stay indoors

Illness

- Your child should avoid people who are sick
- Make sure your child gets a flu shot every year
- Follow your child's "Asthma Action Plan"

Cold Air

- Have your child wear a clean scarf or pulled up turtle neck around their face
- Tell your child to breathe through their nose when they are outside in the cold air

Allergens

Pollen & Outdoor Mold

- Keep house and car windows closed during allergy season
- Use central air conditioning or fans when you can
- Mow your lawn often and keep the grass short to cut down on pollen
  - If your child is allergic to grass, they should not mow the lawn
- You can check pollen counts online or in local weather reports

- Stay indoors when pollen and mold counts are high
- Have your child take a shower and change their clothes right after being outside during high-pollen seasons
- Don't hang your clothes outside to dry
- Talk to your doctor about allergy medicines and saline nasal rinses

Indoor Mold

- Keep your bathrooms and kitchen clean and well ventilated
- Use a bleach solution (1 part bleach and 10 parts water) to clean mold
- Keep indoor humidity at less than 40%
- Fix all water leaks and remove any standing water
- Have your heating, ventilation and air conditioning systems cleaned and repaired often

House Dust

- Wash stuffed toys and bedding in hot water (130°F) every week
- Don't keep a lot of stuffed animals on the bed
- Cut down on clutter
- Bare floors are best
  - If you have carpet, vacuum it often
- Take down drapes and blinds when possible
- Put mattresses, pillows and box springs in allergen proof coverings
- If you have a forced-air furnace, change the dust filters regularly during the heating season

Animals All furred and feathered animals can cause allergic reactions. There are no hypoallergenic dogs or cats.

- Pets can bring outdoor pollens inside
  - It's best to keep your pets outside
- Keep your pets out of your child's bedroom at all times
- Have your child wash their hands and change their clothes after playing with pets
- Brush your pets outside every day and give them a bath every week
- Use high-efficiency particulate air (HEPA) filters and vacuums
- If your child's asthma or allergy symptoms still don't get better, you may need to think about having your pet live somewhere else

Cockroaches

- Don't leave food and garbage out
- Put out bait traps or call a professional exterminator to get rid of cockroaches

Other Triggers

Exercise

- Give your child their quick relief medication (albuterol or levalbuterol) 15 minutes before they exercise

Strong Emotions Laughing or crying can trigger an asthma attack

- Teach your child relaxation or calming methods like deep breathing (take a breath slowly through your nose and then blow out slowly through your mouth)

Author: Asthma Education Standard Committee | Approved by Patient Education Committee | Valid through 2021

What is an Asthma Action Plan?

An asthma action plan is a written plan that explains how to take care of your child's asthma. All children with asthma should have an asthma action plan. Your child's asthma action plan:

- Lists what medicines to take and when to take them
- Describes what triggers to avoid
- Explains how to treat worsening symptoms or attacks
- Outlines when you should call your doctor
- Explains when you should go to the emergency room or urgent care

All of your child's caregivers should know about and have a copy of their asthma action plan. Caregivers can be parents, grandparents, babysitters/nanny, neighbors, stepparents, and so on. The caregivers can help the child to follow the plan, manage their asthma and take the right actions if they have asthma symptoms. If your child goes to school, daycare, preschool, after school programs, or camps they may need for your child to have a School Asthma Care Plan.

An asthma action plan is split into three zones (green, yellow, red) based on the child's symptoms.

The **Green Zone** is where you want your child to be daily. They have no asthma symptoms and they feel good. This is when asthma is well controlled.

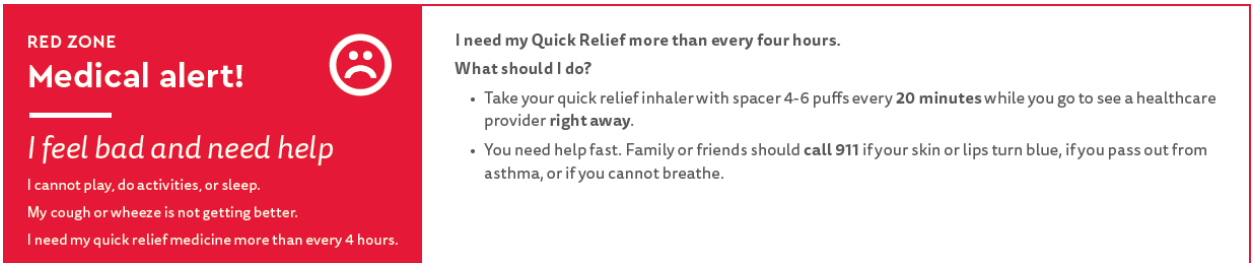
- They should not need to take quick relief medicine more than two times a week (outside of taking before exercise if needed). If your child is taking quick reliever more often than this, please let your doctor know.
- Your child should take their controller medicines as prescribed by their doctor everyday. **Don't stop taking the controller until your doctor has told you or your child to do so, even if their asthma is well controlled**.
- A controller medicine makes asthma symptoms better and stops asthma symptoms.
- If your child has asthma symptoms with exercise, your doctor may recommend your child pretreat with a quick relief medicine, like albuterol, 10-30 minutes before running or playing.

The **Yellow Zone** means that your child is having asthma symptoms.

- **Your child should use the quick-relief medicine, albuterol, as recommended by your doctor.**
- **Keep on taking daily controller medicines.**
- Your doctor may recommend an oral steroid by mouth (prednisone or dexamethasone).

The **Red Zone** means your child is having severe asthma symptoms or an asthma attack and the quick relief medicine isn't helping enough.

- Follow the steps in your child's asthma action plan and **get medical attention right away!**



We will talk to you about which medicines your child's doctor has prescribed before your child goes home from the hospital.

Author: Asthma Education Standardization Committee | Approved by Patient Education Committee | Valid through 2023

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This is to be filled out by your primary care provider.

BREATHING INSTITUTE

Asthma Action Plan

My name: _____

Healthcare provider: _____ Phone number: _____

My personal asthma goal(s): _____

My asthma gets worse around (triggers): _____

GREEN ZONE
Doing well

I feel good

I play, sleep, and go to school.

Breathing is easy. No coughing or wheezing.

I am using my quick relief medicine less than 2 times per week.

What should I do?

- Avoid my asthma triggers
- See my healthcare provider every 1 to 6 months for asthma check ups
- If needed, take 2-4 puffs of my quick relief inhaler at least 10 minutes before exercise
- Take my daily medicines to stay in control of my asthma

Controller medicines I should be taking every day for long-term control:

Name of Medicine	*How Much*	*How Often*

Quick Relief medicines I may need to take before running, jumping, playing, exercising, etc.

Name of Medicine	*How Much*	*How Often*

YELLOW ZONE
Caution

I don't feel good

I have trouble playing or sleeping.

I am coughing, wheezing, or having trouble breathing or speaking.

I am using my quick relief medicine more than 2 times per week.

What should I do?

- Continue taking my daily controller medicines and add quick relief medicine.
- If symptoms go away within 30 minutes, return to the Green Zone.
- Asthma symptoms can get worse fast. When in doubt, call your healthcare provider for advice.
- If symptoms are not getting better in 24 hours, continue quick relief every 4 hours and call your healthcare provider.

I will continue to take my Controller medicine, ALSO I need to take my Quick Relief medicine

Name of Medicine	*How Much*	*How Often*

RED ZONE
Medical alert!

I feel bad and need help

I cannot play, do activities, or sleep.

My cough or wheeze is not getting better.

I need my quick relief medicine more than every 4 hours.

I need my Quick Relief more than every four hours.

What should I do?

- Take your quick relief inhaler with spacer 4-6 puffs every **20 minutes** while you go to see a healthcare provider **right away**.
- You need help fast. Family or friends should **call 911** if your skin or lips turn blue, if you pass out from asthma, or if you cannot breathe.

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Author: Breathing Institute | Approved by Patient Education Committe | Valid through 2019

BI_130742A2_2017-11

Asthma

Asthma occurs when the airways in the lungs become inflamed (swollen) and constrict (become smaller), making breathing difficult. No two people with asthma are alike.

Asthma affects the airways in three ways:

- All people with asthma have inflammation (irritation and swelling) of the lining of the airways. When the airway lining is inflamed, there is less room for air to flow in and out.
- Bronchospasm is caused by a tightening of the muscles that surround the airways. This narrows the airway and prevents air from getting in or leaving the lungs.
- Extra mucus is produced and often blocks the airways.

Asthma triggers are anything that can make asthma worse. Each person has his or her own types of triggers. These include:

- Tobacco smoke
- Viral infections in the lungs (colds, flu)
- Exercise
- Perfumes and other strong odors
- Cold air
- Air pollution
- Weather/climate changes
- Pollens
- House dust
- Molds
- Animal dander
- Emotional triggers
- Allergies

Many people with asthma need a daily asthma controller medicine to manage symptoms and prevent flare-ups. The best asthma control medicine is an inhaled steroid because it treats the inflammation of the airways. This medicine must be taken as prescribed by your healthcare provider to keep asthma under control.

Tools for Managing Asthma

Partner with your Healthcare Provider Partner to manage your asthma and see them at least once a year.
Medicine:

1. Take your asthma control medicine every day as prescribed by your healthcare provider, whether you are having symptoms or not.
2. Use a quick relief medication such as albuterol to treat acute symptoms and to pretreat for exercise when that is a trigger. Your child should always have the quick relief medication at school and anywhere else he/she goes just in case of an asthma attack.

Tobacco smoke exposure:

3. Quit smoking: call the Colorado QuitLine (1-800-QUITNOW) and ask your healthcare provider about other resources to help you quit.
4. Keep the home and car smoke-free and avoid smoke exposure of any type.

Control the environment: recognize triggers and talk to your healthcare provider about ways to avoid them.

Written Asthma Action Plan: Ask your healthcare provider to complete an Asthma Action Plan to tell you what to do daily and what to do in case of an asthma flare-up.

Spirometry: Shows how well your lungs are functioning. This test should be done by your healthcare provider at least once a year.

Allergy tests: May show that you have allergies that trigger your asthma. It is important to identify allergy triggers, use medication as prescribed and try to avoid your allergic triggers.

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Esto debe ser llenado con su médico personal.

BREATHING INSTITUTE

Mi plan de acción para el asma

Mi nombre: _____

Su Proveedor: _____ Número de Teléfono: _____

Mis metas personales para el asma: _____

Mi asma empeora alrededor de (desencadenantes): _____

ZONA VERDE
Estoy bien

Me siento bien

Juego, duermo y voy a la escuela.

Me resulta fácil respirar. No tengo tos ni sibilancia.

Uso mi medicamento de alivio rápido menos de 2 veces por semana.

¿Qué debo hacer?

- Evito las cosas que me provocan asma.
- Asistir a una cita con mi médico cada 1 a 6 meses para que revisar el asma.
- Si es necesario, inhalar 2-4 atomizaciones del medicamento de alivio rápido (albuterol xxopenex) por lo menos 10 minutos antes de hacer ejercicio.
- Tomar mis medicamentos diarios para mantener el asma bajo control.

Medicamentos de control que debo tomar cada día para el control a largo plazo:

Nombre del medicamento	*Dosis*	*Frecuencia*

Medicamentos de alivio rápido que quizás deba usar antes de correr, saltar, hacer ejercicio, etc.

Nombre del medicamento	*Dosis*	*Frecuencia*

ZONA AMARILLA
Precaución

No me siento bien

Se me diÿculta jugar y dormir.

Tengo tos, sibilancia o problemas para respirar o hablar.

Uso mi medicamento de alivio rápido más de 2 veces por semana.

¿Qué debo hacer?

- Continuar tomando mis medicinas diarias y agregar la medicina de alivivo rápido enlistado abajo.
- Si los síntomas desaparecen dentro de 30 minutos regresa a la zona verde.
- Los síntomas de asma pueden empeorar rápidamente. Si tiene dudas llame a su proveedor para que le aconseje.
- Si los síntomas no mejoran en 24 horas, continuar medicamento de alivio rápido cada 4 horas y llame a su proveedor.

Continuaré usando mi medicamento de control, TAMBIÉN debo usar mi medicamento de alivio rápido

Nombre del medicamento	*Dosis*	*Frecuencia*

ZONA ROJA
Medical alert!

Me siento mal y necesito ayuda

No puedo jugar, hacer actividades o dormir. Mi tos o sibilancia no mejora.

Necesito usar mi medicamento de alivio rápido más que cada 4 horas.

Necesio mi medicamento de alivio rápido más que cada cuatro horas.

¿Qué debo hacer?

- Usa su inhalador de alivio rápido con espaciador 4-6 inhalaciones cada **20 minutos**, mientras que ir a ver a un proveedor atención médica **immediatamente**.
- Necesita ayuda **rápido**. Sus familia o amigos deben **llamar al 911** si tu piel o tus labios se toman morados o si no puedes respirar.

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El asma

El asma ocurre cuando las vías respiratorias en los pulmones se inflaman (hinchan) y se comprimen (se hacen más angostas) dificultando la respiración. No hay dos pacientes asmáticos que respondan de igual manera. Los síntomas del asma pueden ir y venir pero la afección del asma nunca se va del todo.

El asma afecta las vías respiratorias de tres maneras:

- Todas las personas que padecen de asma presentan inflamación (irritación e hinchazón) del revestimiento de las vías respiratorias. Cuando el revestimiento de éstas se inflama, hay menos espacio para que el aire circule hacia adentro y hacia fuera.
- Broncoespasmo — lo causa una contracción de los músculos que rodean las vías respiratorias. Esto estrecha las vías respiratorias y previene que el aire entre a o salga de los pulmones.
- Se produce mucosidad adicional que con frecuencia bloquea las vías respiratorias.

Los detonadores del asma son aquellos que pueden empeorar el asma. Cada persona tiene sus propios tipos de detonadores. Estos incluyen:

- el humo del cigarro
- las infecciones pulmonares víricas (resfriados, gripe)
- el ejercicio
- los perfumes y otros olores fuertes
- los cambios climáticos
- la caspa de los animales
- el aire frío
- la contaminación ambiental
- el polen
- el polvo en casa
- el moho

Mucha gente con asma necesita medicamento diario para el control del asma a fin de atender los síntomas y prevenir los accesos. El mejor medicamento de control para el asma es un corticoesteroide inhalado puesto que trata la inflamación de las vías respiratorias. Esta medicina debe tomarse todos los días como lo recete el médico para mantener el asma bajo control.

Fuentes disponibles para el tratamiento del asma

Proveedor de atención médica: Forma equipo con él para el tratamiento de tu asma y acude a verlo al menos una vez al año.

Medicina:

- Toma el medicamento de control: corticosteroide inhalado todos los días como tu médico lo indique ya sea que tengas o no síntomas.
- Restringe el uso de un medicamento de rápido alivio como el "albuterol" para los síntomas graves y para un tratamiento previo al ejercicio cuando éste sea el detonador.

Limita la exposición del humo de tabaco:

- Deja de fumar: llama a Colorado QuitLine (1-800-QUITNOW) y pregúntale a tu médico sobre otros recursos para ayudarte a dejar de fumar
- Mantén la casa y el auto libres de humo de tabaco y evita la exposición al humo de cualquier procedencia.

Control del medio ambiente: Reconoce los detonadores y habla con tu proveedor sobre cómo evitarlos.

Plan de acción d el asma por escrito: Pídele a tu médico llenar el plan de acción del asma al dorso de esta página para que te diga qué hacer todos los días y qué hacer cuando tienes un ataque de asma.

Medidor de flujo máximo: Úsalo para medir cuan abiertas o estrechas están las vías respiratorias. El número del flujo máximo se usa como parte del plan de acción del asma para ayudar a controlarlo.

Espirometría: Demuestra qué tan bien están funcionando tus pulmones. Esta prueba debería realizártela tu médico por lo menos una vez al año.

Pruebas de alergias: Las pruebas identifican tus alergias para que puedas reducir la exposición y obtener tratamiento.

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Combination Controller Medicines
(Inhaled steroid and long acting bronchodilator)

What are other names for these medicines?

Generic: fluticasone and salmeterol, mometasone and formoterol, budesonide and formoterol

Brand Name: ADVAIR, DULERA, SYMBICORT, AirDUo, Breo

What do these medicines do?

These are combination medicines that contain both an inhaled steroid and a long acting bronchodilator. These medicines lessen swelling in the airways and relax tight muscles around the airways to make it easier to breathe and prevent asthma symptoms. These are asthma controller medications and must be taken every day to work.

These medicines do not work quickly enough to stop an asthma attack.

How are these medicines taken?

These medicines are breathed in with an inhaler. There are two types of inhalers:

- Traditional Metered dose inhaler (MDI). Always use with a valved holding chamber or spacer.
- Dry powder inhaler (DPI).

What are the side effects of these medications?

- The effects of poorly controlled asthma are worse for your child than the possible side effects of inhaled steroids. To avoid side effects, your healthcare provider will prescribe the lowest dose of inhaled steroid possible to control asthma symptoms.
- Thrush, a yeast infection in the mouth and throat, occurs rarely. Thrush causes a white coating on the tongue or inside the cheeks. Your child should brush their teeth and rinse and spit after taking an inhaled steroid to reduce these side effects.
- If your child uses high doses of inhaled steroids over long periods, side effects may include growth delay, weak bones (osteopenia), and vision changes.
- Please talk to your child's healthcare provider if you have any concerns about medicine side effects or if your child has any side effect symptoms.

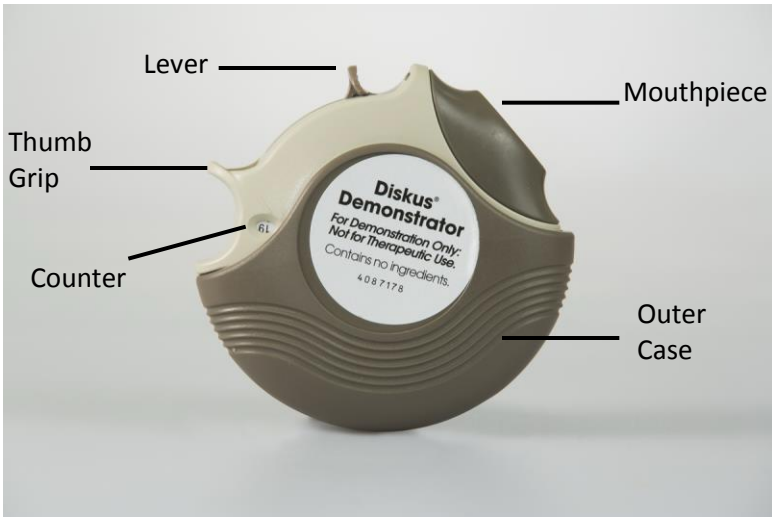
What special instructions should be followed?

Don't not stop this medicine without talking to your child's healthcare provider.

Author: Asthma Education Standards Committee | Approved by Patient Education Committee | Valid through 2021

Diskus

Medicines names: fluticasone (**FLOVENT**), fluticasone and salmeterol (**ADVAIR**)



The Diskus puts a fine dry powder medicine into the lungs. You must breathe in quickly and deeply to get the medicine into the lungs.

Step 1: Hold the Diskus flat in your left hand like a hamburger and put your right thumb on the thumb grip. Push the thumb grip away from you as far as it will go until it snaps in place and opens the Diskus. This will uncover the mouthpiece.

Step 2: Slide the lever until you hear it click. The number on the counter will count down by 1. The Diskus is now ready to use. Make sure you do not drop, close or tilt the Diskus before you breathe in the medicine. If you do, repeat steps 1 and 2 to load a new dose of medicine.

Step 3: Inhaling the medicine. Breathe out (exhale) as long as you can while holding the Diskus level and away from your mouth. Put the mouthpiece up to your mouth and make a tight seal with your lips. Breathe in fast and deep until your lungs are full. Remove the Diskus from your mouth and hold your breath for 10 seconds. You may or may not taste or feel the medicine. Do NOT take an extra dose from the Diskus even if you do not taste or feel the medicine. If you accidently blow into the Diskus, follow steps 1-2 to load a new dose of medicine.

Step 4: Close the Diskus. Put your thumb in the thumb grip and slide it back towards you as far as it will go until you hear it click. This covers the mouthpiece and resets the Diskus for the next scheduled dose. Keep your Diskus in a dry place at room temperature and do not get it wet. Make sure to brush your teeth and rinse your mouth with water after using the Diskus.

To watch a video on how to use the Diskus, visit: http://www.childrenscolorado.org/Diskus

Author: Asthma Education Standardization | Approved by Patient Education Committee | Valid through 2019

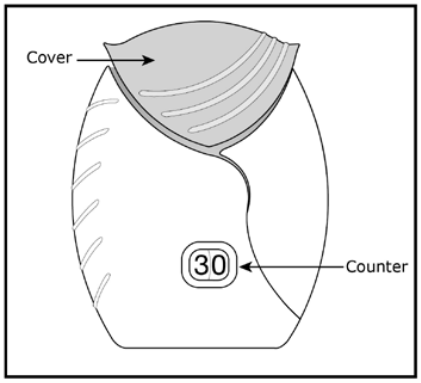
Children's Hospital Colorado

IN CARE OF KIDS

Ellipta Inhaler

Medicine: Arnuity Ellipta (fluticasone furoate), Breo Ellipta (fluticasone furoate and vilanterol)

The Ellipta inhaler puts medicine into the lungs. You must take a deep breath for the powder to reach all of your lungs.

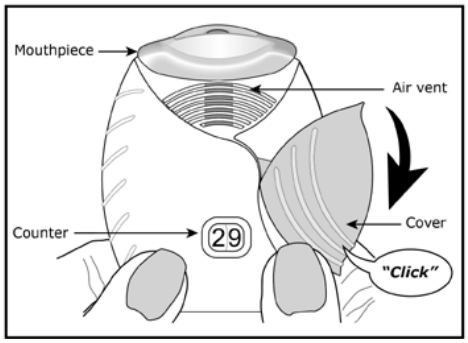


How to use the Ellipta inhaler:

- Open the cover when you are ready to take the medicine.
  - Do not shake the inhaler

Step 1. Open the cover of the inhaler.

- Slide the cover down. You should hear a "click" and see the mouthpiece. The inhaler is now ready to use.
- There is a counter on the inhaler. Each time the inhaler is used the number should go down
  - If the counter does not count down when you hear the click, the inhaler will not give you the medicine.
  - If the inhaler is not working call your doctor or pharmacist



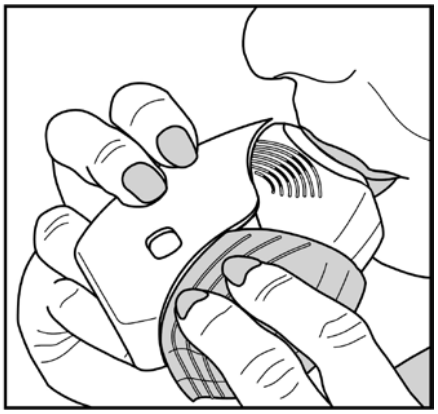
Author: Asthma Education Standardization Committee Approved by Patient Education Committee Valid through 2019

Step 2. Breathe out.

- Hold the inhaler away from your mouth,
  - **Breathe the air out of your lungs.**

Step 3. Inhale your medicine.

- Put the mouthpiece between your lips and close your lips tightly around it. Your lips should fit over the curved shape of the mouthpiece.
- Take 1 long, steady, deep breath in through your mouth.
  - Do not breathe in through your nose.
- Do not block the air vent with your fingers.
  - Take the inhaler out of your mouth and hold your breath for about 10 seconds (or as long as comfortable for you).



Step 4. Breathe out slowly and gently.

Step 5. Close the inhaler.

- Put the cover up and over the mouthpiece as far as it will go.

Step 6. Rinse your mouth.

- Rinse your mouth with water after you have used the inhaler and spit the water out.

Care of the Ellipta:

- Never get the Ellipta wet.
- Store it in a dry place at room temperature with the cover on.
- Clean the mouthpiece if needed by wiping it with a dry cloth. Routine cleaning is not recommended.

Reminders:

- Never blow INTO the mouthpiece.
- The Ellipta cannot be used after it is empty. Do not take the inhaler apart.
- The inhaler should be thrown away 6 weeks after it was first opened or when the counter is at 0. Write the date you open the tray on the label of the inhaler. Pick up a new Ellipta inhaler from your pharmacy.
- When using a dry powder inhaler you may not taste the powder and you may not feel the medicine being delivered.

Author: Asthma Education Standardization Committee Approved by Patient Education Committee Valid through 2019

Flexhaler

Brand name: Pulmicort

Generic name: budesonide

A Flexhaler is a device that puts a very fine dry power medicine into the lungs. You must take a deep and forceful breath for the powder to reach all of your lungs.

How to use the Flexhaler

1. Hold the Flexhaler upright so the white cover points up.
2. Hold the grip in one hand and use your other hand to unscrew the cover and remove it.
3. Keep the Flexhaler upright, twist the colored wheel to the right as far as it will go, then twist it all the way back to the left until it clicks.
    - The Flexhaler is now ready to use.
4. Turn away from the Flexhaler and breathe out.
5. Holding the Flexhaler in a flat position, place the mouthpiece in your mouth and seal your lips around the Flexhaler.
6. Breathe in fast and deep through your mouth until you feel your lungs are full. Hold your breath for 10 seconds.
    - Prime the Flexhaler the first time it is used by repeating step 3.
    - If a second dose is prescribed, repeat steps 3 through 6.
    - If you tip or drop the Flexhaler, repeat step 3 to load a new dose of medicine.
    - Brush your teeth and rinse your mouth after using the Flexhaler

To watch a video on how to use the Flexhaler, visit: **http://www.childrenscolorado.org/Flexhaler**

Care of the Flexhaler

- Never get it wet.
- Store it in a dry place with the cover on.
- Clean the mouthpiece 2 times a week by wiping it with a dry cloth.

Reminders

- Never blow INTO the mouthpiece.
- It is not reusable.
- Never take it apart.
- There is a counter at the top of the window, underneath the mouthpiece. When the counter reads 0, the Flexhaler is empty and should be thrown away and replaced with a new Flexhaler.
- When using a dry powder inhaler, you may not taste the powder and you may not feel the medicine being delivered.

Author: Asthma Education Standard Committee | Approved by Patient Education Committee | Valid through 2021

Home "Acorn" Nebulizer

How do I use the Nebulizer?

1. Plug the compressor machine into an electrical outlet.
2. Open the nebulizer cup by twisting the top counter clockwise.
3. Pour the medication into the nebulizer cup. Then add saline, if recommended.
4. Replace the nebulizer top by twisting it clockwise until secure.
5. Plug one side of the clear plastic tubing into the compressor machine and the other side into the nebulizer cup.
6. Assemble the mouthpiece and attach it to the nebulizer (see Figure A). If using a mask, attach the mask to the nebulizer mask (see Figure B).
7. Place the mouthpiece in the child's mouth or put the mask on the child's face (make sure you have a tight seal).
8. Turn on the air compressor machine. A fine mist will come out of the nebulizer.
9. Breathe in and out normally, until the medicine is finished. This should take about 10 minutes.
    - If the child is able, instruct them to take an extra deep breath and hold it for 5-10 seconds every 10 breaths.

Key Points:

- The child should sit upright and be awake during the nebulizer treatment.
- If the nebulizer is not creating mist, pour out the medicine, rinse with sterile water and start over.
- When you hear the nebulizer make a sputtering noise, tap the cup so the droplets of medicine on the side can be nebulized.

Figure A. Mouthpiece attached to the nebulizer.

Figure B. Mask attached to the nebulizer.

To watch a video on how to use the Acorn Nebulizer, visit:
http://www.childrenscolorado.org/Acornneb

Equipment Maintenance:

1. **Cleaning:** After each treatment, take the nebulizer apart and wash with warm water and liquid dish soap. This includes the mask and/or mouthpiece. Rub off any "stuck on" mucus. Rinse all parts. Shake off the excess water and allow to air dry.
   - If the nebulizer is not rinsed after each treatment, the small holes inside the nebulizer will become clogged and will not make a mist.
   - It is not necessary to rinse the clear compressor tubing.

2. **Disinfecting:** At least once a week the nebulizer, mask, and/or mouthpiece should be disinfected by using the following method:
   - Soak in a solution of 1 part distilled white vinegar and 3 parts hot tap water for 1 hour.
     - After soaking, rinse all of the parts with sterile water and air dry.
     - You can make sterile water by boiling tap water for 10 minutes.

For any questions, please call 720-777-6181 and ask for a Respiratory Therapist.

Author: Asthma Education Standardization Committee | Approved by Patient Education Committee | Valid through 2019

How to Use a Peak Flow Meter

A peak flow meter is a portable, easy to use tool that measures how well your lungs are working. A peak flow meter is a tool to help see if your asthma is controlled.

1. **Before each use, make sure the sliding marker is at the bottom of the numbered scale.**

2. **Stand or sit up straight. Take a deep breath. Put the mouthpiece between your teeth and close your lips tight. Do not put your tongue into the mouthpiece.**

3. **In one breath, blow out as hard and fast as you can. The sliding marker will move up the scale. Repeat this test 3 times. Record the HIGHEST of the 3 numbers on your peak flow chart.**

To watch a video on how to use the peak flow meter, visit:
http://www.childrenscolorado.org/Peak

When to use your peak flow meter

- When you first start checking your peak flow readings, take them daily for 2-3 weeks at the same time in the afternoon, to help find out what your “personal best” number is.
- When you have asthma symptoms like a cold, or other sickness that changes your breathing.
- When you need to use quick-relief (rescue) medicine, like albuterol. Check your peak flow before you take your quick-relief medicine. Then check your peak flow again 20 minutes after you take your quick-relief medicine.

Your peak flow measurement is part of your “Asthma Action Plan”

Your “Asthma Action Plan” lists what medicines to take and when to take them. It uses 3 color coded zones: green, yellow and red, like a stoplight. Symptoms and peak flow numbers can help you judge whether your asthma is controlled or not.

- **Green Zone**: 80% to 100% of your “personal best” peak flow number. All systems "go." You are relatively free of symptoms. Keep up your current daily asthma plan.
- **Yellow Zone**: 50% to 80% of your “personal best” peak flow number. "Use Caution," as your asthma is worsening. Use your quick-relief (rescue) medicine, like albuterol, then check your peak flow again. If you are still in the yellow zone, call your doctor for help.
- **Red Zone**: Below 50% of your “personal best” peak flow number. **HEALTH ALERT!** Repeat the use of your quick-relief (rescue) medicine, like albuterol. If you are still in the red zone, call your doctor right away or go to an ER (emergency room).

Author: Asthma Education Standardization Committee | Approved by Patient Education Committee | Valid through 2021

Inhaled Bronchodilators (Short-Acting Beta2-Agonists)

What are other names for inhaled bronchodilator medicines?

Generic names: albuterol, levalbuterol

Brand names: ProAir (red inhaler), Ventolin (blue inhaler), Proventil (yellow inhaler), Xopenex (light blue inhaler)

Common terms: quick-relief, rescue, fast-acting, albuterol

What do inhaled bronchodilators do?

Inhaled bronchodilators are often called rescue medicines because they work fast to open the airways and make it easier to breathe. **These medicines should be used to treat asthma attacks (coughing, wheezing or feeling short of breath).** They work by relaxing or stopping bronchospasms (the tightening of the muscles around the airways). Bronchospasms happen when the airways come into contact with an asthma trigger. Common triggers are cold or flu viruses, cigarette smoke, pollen, animal dander, cold air, air pollution, and exercise. Your doctor may recommend your child use a bronchodilator before exercise to stop bronchospasms triggered by exercise.

How are inhaled bronchodilators taken?

Inhaled bronchodilators come in a form that are inhaled (breathed in) either through a nebulizer or from a metered-dose inhaler (MDI) with a spacer.

What are the side effects of inhaled bronchodilators?

The most common side effects are shakiness, jittery feeling or fast heart rate. These symptoms usually go away after 15 minutes.

What special instructions should be followed when taking inhaled bronchodilators?

- Give your child an inhaled bronchodilator as recommended by their doctor, usually as needed for frequent cough, wheezing, or shortness of breath. Your doctor may also recommend using it before exercise.
- Call your doctor or go to the ER (emergency room) if your child's symptoms don't get better after giving an inhaled bronchodilator, or if your child needs an inhaled bronchodilator more than every 4 hours because of having trouble playing, sleeping, breathing, or speaking from coughing or wheezing.
- Tell your doctor if your child uses an inhaled bronchodilator more than 2 times week during the day or more than 2 times a month at night. This may be a sign that your child needs more medicines to manage their symptoms, or there may be something else going on.
- Be sure to have medication refilled when there are less than 20 puffs left on the inhaler. If there aren't any refills left, you need to call your child's pediatrician for a new prescription.

Author: Asthma Education Standardization Committee | Approved by Patient Education Committee | Valid through 2021

Inhaled Steroids

What are the names of inhaled steroid medicines?

Generic names: fluticasone, beclometasone, budesonide, ciclesonide, mometasone

Brand names: Flovent, Qvar, Pulmicort, Alvesco, Asmanex

What do inhaled steroids do?

Inhaled steroids reduce inflammation (swelling) in the airways. Inhaled steroids are often called controller medications. When taken daily, they help to prevent symptoms of asthma. They do not work quickly enough to stop an asthma attack.

How are inhaled steroids taken?

Inhaled steroids are breathed in using a metered dose inhaler (MDI), a dry powder inhaler (DPI) or a nebulizer. Always use a valved holding chamber or spacer with an MDI.

What are the side effects of inhaled steroids?

- Thrush is a yeast infection in the mouth and throat, and rarely happens when using inhaled steroids. Thrush causes a white coating on the tongue or inside the cheeks. Sore throat, hoarse voice, and dry mouth may also happen. Your child should brush his or her teeth and rinse and spit after taking an inhaled steroid to reduce the risk of getting thrush.
- If your child uses high doses of inhaled steroids for a long period of time, side effects may include growth delay, osteopenia (weak bones), and vision changes.

The effects of poorly controlled asthma are worse for your child than the possible side effects of inhaled steroids. To avoid side effects of inhaled steroids, your doctor will prescribe the lowest dose possible to control asthma symptoms.

Please talk to your child's doctor if you have any concerns about side effects or if your child has any side effects.

What special instructions should be followed when taking inhaled steroids?

- Do not stop taking inhaled steroids without talking to your child's doctor.
- If your child uses inhaled steroids with a nebulizer and mask, make sure the mask fits snuggly and completely covers the nose and mouth. Do not use the nebulizer without a mask or mouth piece because the medication will not get into the lungs and could irritate the eyes.
- Be sure to have medication refilled when there are less than 20 puffs left on the inhaler. If there aren't any refills left, you need to call your child's pediatrician for a new prescription.

Author: Asthma Education Standard Committee | Approved by Patient Education Committee | Valid through 2021

Leukotriene Modifiers

What are other names for these medications?

Generic: montelukast sodium, zafirlukast, zileuton
Brand Name: SINGULAIR, ACCOLATE, ZYFLO

What do these medications do?

Leukotriene (loo-koh-TRY-een) modifiers work by blocking chemicals made in the body called leukotrienes. Leukotrienes cause asthma symptoms by tightening the muscles around the airways and making it hard to breathe. Leukotrienes also cause swelling in the airway. This makes the airway smaller which makes it hard to breathe. Leukotriene modifiers are long term control medications that keep asthma symptoms from happening. You must take them every day for them to work. **These medicines do not work quickly enough to stop an asthma attack.**

How are these medications taken?

SINGULAIR comes in three forms: coated tablet, chewable tablet and oral granules. ACCOLATE and ZYFLO are available in tablet form.

What are the side effects of this medication?

Side effects are rare. The most common side effects are headache or stomach pain. Very rarely behavior or mood changes have been reported. Please let your health care provider know if you have any side effect concerns or questions.

What special instructions should be followed?

- Leukotriene modifiers must be taken every day, even if asthma symptoms are better.
- Take this medication at the same time every day.
- Do not stop taking your medicine unless your doctor tells you to.

Author: Asthma Education Standardization Committee | Approved by Patient Education Committee | Valid through 2021

Metered Dose Inhaler (MDI) with Spacer/Valve Holding Chamber and Mouthpiece

1. Remove caps from the spacer/valve holding chamber and metered dose inhaler (MDI)
2. Shake the inhaler for 3-5 seconds
3. Connect the inhaler to the spacer/valve holding chamber
4. Stand or sit up straight
5. Breathe out, insert mouthpiece between teeth and make a tight seal with your lips
6. Press down on the inhaler once to spray into the spacer/valve holding chamber
7. Breathe in deeply through your mouth for about 5 seconds
   - You should not hear a whistle
   - If you hear a whistle, you are breathing in **too fast**
8. Hold your breath for 10 seconds
9. Breathe out normally
10. Wait 1 minute and repeat steps 2-9 for each puff prescribed
11. Remove the inhaler from the spacer/valve holding chamber
12. Replace the cap on your inhaler when finished

If you are using an inhaled steroid, wash your face, and rinse your mouth or brush your teeth after each use

If the inhaler is new, has not been used in a while, or has been dropped, it needs to be primed

- Spray 2-4 times to prime
- This does not count as a dose of medication

To watch a video on how to use the MDI, visit: http://www.childrenscolorado.org/MDI

Cleaning Instructions

- Clean spacer/valve holding chamber once a week
- Take apart the spacer/valve holding chamber
- Rinse in warm soapy water
- Rinse with clean water and air dry
- Do not put in the dishwasher
- Clean the small hole in the inhaler once a week with a wet Q-tip
- Replace the inhaler when the counter reaches 000
  - It may continue to spray, but no medicine is coming out

Metered Dose Inhaler (MDI) with Spacer/Valve Holding Chamber and Facemask

Note: The facemask and spacer should be used with patients **under the age of 7** or who cannot coordinate pressing down on the inhaler, making a tight seal around the mouthpiece, and/or inhaling and holding their breath for a count of 10 seconds.

1. Remove the caps from the spacer/valve holding chamber and inhaler
2. Shake the inhaler for 3-5 seconds
3. Connect the inhaler to the spacer/valve holding chamber
4. Attach the mask to the mouthpiece of the spacer/valve holding chamber
5. Have your child stand or sit up straight
6. Place the mask over your child's nose and mouth to make a tight seal
7. Have your child breathe out
8. Press down on the inhaler once to spray into the spacer/valve holding chamber
9. Have your child slowly breathe in and out **for a total of 10 breaths**
10. Wait 1 minute and repeat steps 2-9 for each puff prescribed
11. Remove the inhaler from the spacer/valve holding chamber
12. Replace the cap on the inhaler when finished

If your child used an inhaled steroid, have them wash their face, rinse their mouth or brush their teeth after each use

If the inhaler is new, has not been used in a while, or has been dropped, it needs to be primed

- Spray 2-4 times to prime
- This does not count as a dose of medication

Cleaning Instructions

- Clean spacer/valve holding chamber once a week
- Remove the facemask mask and take apart the spacer/valve holding chamber
- Rinse in warm soapy water
- Rinse with clean water and air dry
- Do not put in the dishwasher
- Clean the small hole in the inhaler once a week with a wet Q-tip
- Replace the inhaler when the counter reaches 000
    - It may continue to spray but no medicine is coming out

Author: Asthma Education Standardization Committee | Approved by Patient Education Committee | Valid through 2024

Nasal Steroid Spray

Nasal steroid sprays are sometimes used to treat stuffy noses, allergy symptoms and/or snoring.

Preparation

1. Gently blow your nose, or use a nasal saline rinse to clear out any mucus before using the nasal steroid spray
2. Wash your hands with soap and water for 15 seconds, about as long as it takes to sing "Happy Birthday"
3. Gently shake the nasal steroid spray bottle
4. Remove cover
5. Prime nasal steroid spray bottle if needed
    - To prime: press down on the spray bottle 2 times, spraying the medicine into the air
    - Note: You'll need to prime your spray bottle before taking your dose if:
        - This is the first time you are using it
        - You haven't used it for 7 days or more

To use

1. Place your middle finger and your pointer finger on the sides of the spray tip. Place your thumb on the bottom of the spray bottle.
2. Insert the spray tip into one nostril. Point the spray bottle away from the middle of your nose.
3. Use your opposite hand to press the other nostril closed.
4. Keep your head upright. Press down on the spray bottle as you begin to breathe in slowly through your nose. Breathe out slowly through your mouth.
5. If you are using more than 1 spray in each nostril, follow steps 1 through 3 again.
6. Repeat these steps for the other nostril.
    - Do not to sneeze or blow your nose right after using the spray.
    - If any spray runs out of your nose, you can wipe it away with a tissue.

Author: Asthma Education Standard Committee | Approved by Patient Education Committee | Valid through 2021

Oral Steroids

What are other names for oral steroid medicines?

Generic: prednisone, prednisolone, dexamethasone, methylprednisolone

Brand Name: Deltasone, Orapred, Decadron, Medrol

What do oral steroids do?

This medicine lessens swelling in the airways. It can also help quick relief medicines (like albuterol) work better.

Why do oral steroids help with asthma?

When your child has serious asthma symptoms, it means that the lining of the airway is irritated and swollen. Symptoms include:

- coughing that is hard to stop
- difficulty breathing
- wheezing
- a tight feeling in the chest.

An oral steroid will help lessen the swelling in the airways so air can get in and out of the lungs more easily.

How is an oral steroid different from an inhaled steroid?

Oral steroids are taken in from your stomach, then get into the bloodstream and circulate through your entire body. Oral steroids are stronger and reduce swelling quicker than inhaled steroids.

How do you know when to give oral steroids?

Your child's doctor will tell you when to give an oral steroid burst. Your child may need it if their asthma symptoms don't go away after giving albuterol (or other quick relief medicines) every 4 hours. Follow your child's asthma action plan.

What is an oral steroid burst?

This term means the medicine is given for a short period of time. It's usually taken for 3 to 7 days.

What are the side effects of oral steroids?

Oral steroids are used to help your child recover from serious asthma symptoms. There can be side effects if they are given for more than 2 weeks or given more than twice a year. Side effects include:

- weight gain
- mood changes
- bone loss
- acne
- difficulty fighting infections

It is common for children with long-term asthma to need an occasional oral steroid burst, but if your child needs it more than once a year, it is a sign that your child's asthma is poorly controlled.

The steroids used to treat asthma are not the same as anabolic steroids, used illegally by some athletes for bodybuilding.

Author: Asthma Education Standardization Committee | Approved by Patient Education Committee | Valid through 2021

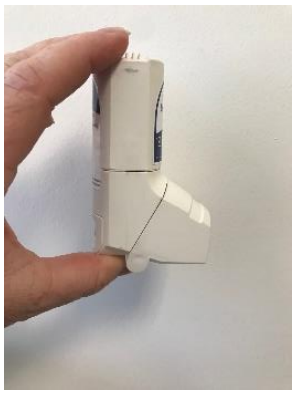
RediHaler

Medicines: Qvar

The RediHaler is a breath-triggered inhaler that sprays medicine into your lungs when you take a deep breath in. **You don't need a spacer with this type of inhaler.**

How to use the RediHaler:

1. Cap must be closed before you use the inhaler or you will not get any medicine.



2. Open the cap when you are ready to take your medicine.

3. Face away from the RediHaler and breath out fully. Never breath out into the inhaler mouthpiece.
4. Hold the inhaler upright, place mouthpiece in your mouth and close your lips around it to form a tight seal.
5. Inhale deeply and fully.
6. Remove inhaler from your mouth and hold your breath for 5 to 10 seconds
7. Close cap.
8. Repeat steps 2-7 if more than 1 puff are recommended by your provider.

More Information about the RediHaler:

- Don’t use with a spacer (or valved holding chamber)
- Don’t shake RediHaler
- Don’t prime RediHaler if you have not used it in several weeks
- Make sure the cap is closed before each dose
- Don’t open the cap until you are ready to take your dose
- Store at room temperature with the cap closed. Don’t keep it somewhere very hot or very cold.
- Don’t wash or put any part of the RediHaler in water
- Clean mouthpiece weekly with a clean, dry tissue or cloth
- Call your pharmacy or provider to refill your RediHaler when it gets to 20 inhalations
- When the counter reads 0, the RediHaler is empty and should be thrown away

Author: Asthma | Approved by Patient Education Committee | Valid through 2022

RespiClick Inhaler

Medicines: ProAir (Albuterol sulfate)

The RespiClick is an inhaler that puts a dry powdered medicine into your lungs. **You don't need to use a spacer with this type of inhaler.**

How to use the RespiClick inhaler:

1. OPEN

- Hold the inhaler upright as you open the cap fully
- Open the cap all the way back until you hear a "CLICK"
- Your RespiClick is now ready to use

2. INHALE

- Don't let your lips or fingers block the vent above the mouthpiece.
- Hold your breath for 10 seconds.
- Remove the inhaler from your mouth and check the counter on the back of the inhaler to make sure you got the dose

3. CLOSE

- Always close the cap after each inhalation so your inhaler will be ready for your next dose.
- If you need another dose, close the cap and repeat all the steps.

ADDITIONAL INFORMATION ABOUT THE RESPICLICK INHALER:

- **Don’t use a spacer (or valved holding chamber) with the RespiClick inhaler.**
- Make sure the cap is closed before each dose.
- Don’t open the cap unless you are taking a dose.
- When using a dry powder inhaler, you may not taste the powder and you may not feel the medicine being delivered.
- If the mouthpiece needs cleaning, wipe it with a dry cloth or tissue. Don’t wash.
- The RespiClick contains a powder and must be kept dry. Store at room temperature and avoid exposure to extreme heat, cold or humidity.
- There is a counter at the back of the inhaler. When the counter reads 0, the RespiClick is empty and should be thrown away and replaced with a new RespiClick.

Author: Asthma Education Standards Committee | Approved by Patient Education Committee | Valid through 2020

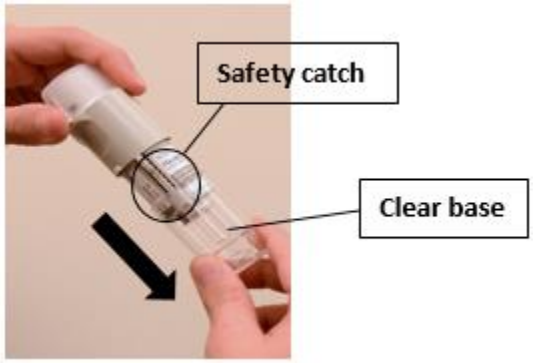
Respimat Soft Mist Inhaler

Medicines: COMBIVENT RESPIMAT (ipratropium bromide and albuterol), SPIRIVA RESPIMAT (tiotropium bromide)

The Respimat is an inhaler that puts a very fine mist of medicine into the lungs.

Load the medicine cartridge into the inhaler

1. Keep cap closed
2. Press safety catch and pull off clear base



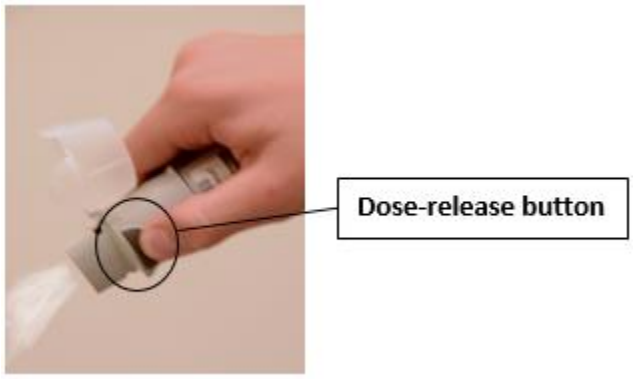
3. Insert narrow end of cartridge into inhaler and gently push against a firm surface to ensure that it has gone all the way in

4. Replace clear base

5. Turn base in direction of the arrows on label until you hear a click (half a turn counter clockwise).

6. Flip cap open until it clicks into open position

7. Point Respimat® inhaler toward ground and press dose release button to prime the inhaler



8. Close cap
9. Repeat steps 5-8 until a cloud of spray is visible
10. Then repeat 3 more times before first use

Author: Asthma Education Standards Committee | Approved by Patient Education Committee | Valid through 2020

How to use the Respimat inhaler:

1. "Turn"

Hold the inhaler upright with the cap closed. Turn base in direction of the arrows on label until you hear a click (half a turn counterclockwise).

2. "Open"

Flip cap OPEN until it clicks into open position.

3. "Press"

- Close your lips around the mouthpiece end without covering air vents.
- Press dose release button while taking in a slow, deep breath
- Keep breathing in slowly until your lungs are full
- Close cap
- Repeat Turn, Open, Press (T.O.P.) for a total of 2 puffs

Care of Respimat Inhaler

- Wipe the mouthpiece inside and out once a week with a damp cloth
- Any slight discoloration of the mouthpiece will not affect the performance of the inhaler.
- Do not take the inhaler apart or remove the transparent base once the cartridge has been inserted.
- Store at room temperature and keep the inhaler dry.

Author: Asthma Education Standards Committee | Approved by Patient Education Committee | Valid through 2020

Children's Hospital Colorado

IN CARE OF KIDS

Twisthaler

Medicine name: Mometasone (ASMANEX)

The Twisthaler puts a very fine dry powder into the lungs. You must take a deep and forceful breath in for the powder to reach your lungs.

When you get a new Twisthaler, remove it from the foil pouch and write the date on the cap. The Twisthaler will need to be thrown away 45 days after it is opened or when the dose counter reads "00."

How to use the Twisthaler:

1. Hold the Twisthaler upright, with the pink or grey base at the bottom. Twist the cap counter-clockwise (to the left) to remove it.
2. When you twist and lift off the cap, the dose counter will go down by one and the medicine will be loaded into the device. The medicine is now ready to be inhaled (breathed in).

Author: Asthma Education Standardization Committee Approved by Patient Education Committee Valid through 2019

3. Turn away from the Twisthaler and breathe out.
4. Hold the Twisthaler flat (horizontally) and place the mouthpiece in your mouth and seal your lips around it.

5. Breathe in fast and deep through your mouth until your lungs are full.
6. Hold your breath for 10 seconds. Then breath out normally.
7. Put the cap back on and twist clockwise (to the right) until you hear it click and close.
8. Repeat steps 3 through 7 for each dose ordered.
9. Brush your teeth and rinse your mouth after each use.

To watch a video on how to use the Twisthaler, visit:
http://www.childrenscolorado.org/Twisthaler

How to care for your Twisthaler:

Use a dry cloth to wipe the mouthpiece after use. Never get the Twisthaler wet.

The Twisthaler has a dose counter that counts down the dose by itself when the cap is removed. This also loads the dose of medicine. When the counter reads "00" there is no medicine left in the Twisthaler, throw it out and get a refill from the pharmacy.

1. Keep your Twisthaler in a dry place at room temperature.
2. Never breathe INTO the mouthpiece.
3. Never use a spacer with your Twisthaler.
4. Don't lose the cap or you won't be able to load the device with medicine.

Unlike other inhaled medicines, you may not taste or feel the dry powder. You may not know if the medicine is getting into your lungs. As long as you follow the directions, you will get the full dose of medicine.

What is Asthma?

Asthma is a lung disease. There is no cure, but asthma can be well controlled so that your child can be healthy and join in all their favorite activities.

Asthma causes the airways (breathing tubes in the lungs) to get smaller, making it hard to breathe. Common symptoms of asthma are:

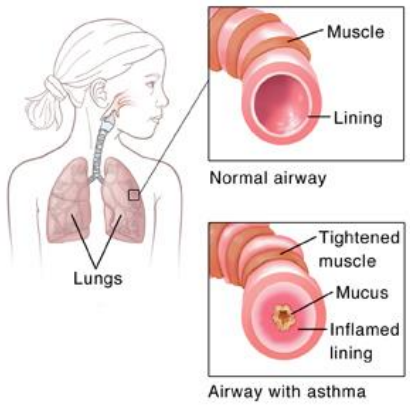
- coughing
- wheezing
- chest tightness and
- trouble breathing

These symptoms are ongoing and get better with asthma medicines.

How does asthma make it hard to breathe?

Asthma affects your child's airways in three ways:

1. **Inflammation (swelling)** inside of the airway means there is less room for air to get in and out.
2. **Bronchospasms** are muscles around the airway tightening down. This also means there is less room for air to get in and out.
3. **Too much mucus** is made and it can block the airways.



What are triggers and how do they cause an asthma attack?

Lots of things can cause an asthma attack. The things that cause asthma attacks are called triggers. Each child has different triggers for their asthma. Some common triggers are:

- cigarette (tobacco, marijuana, e-cig) smoke
- colds and other viruses that affect the nose, throat, airways and lungs
- exercise
- perfumes and other strong smells
- cold air, weather changes
- air pollution
- worry, stress, emotions
- pollen, dust, molds, animal dander

What other comorbidities (conditions) can occur along with asthma?

- allergies
- eczema
- obstructive sleep apnea
- obesity
- GERD (gastroesophageal reflux disease)
- stress, anxiety, depression

Medicines

Medicines are used to treat asthma. They make symptoms better by lessening swelling and bronchospasm. There are three main types of medicine for asthma.

1. **Quick relief inhalers,** like albuterol or levalbuterol, quickly relax the muscles around the airways and should make the asthma attack better within 5-10 minutes. These medicines are also called bronchodilators.
2. **Controller medicines** can be either inhaled steroids or non-steroidal anti-inflammatory medicines. They need to be taken every day, even when your child feels good, because they prevent asthma symptoms and attacks. These medicines help to lessen swelling inside the airways but they won't work quickly enough to stop symptoms during an asthma attack.
3. **Oral steroids** may be needed for asthma symptoms that don't get better with albuterol alone.

All medications may have side effects. Tell your child's doctor about any worries you have about side effects from your child's medicines. It is very important to follow the directions on when and how to use your child's asthma medicines to keep asthma well controlled.

Asthma control

Asthma is well controlled when:

- Your child can run and play as much as they want
- Your child doesn't miss school, work or activities
- Your child sleeps well at night
- You can't remember the last time your child had to visit the ER (emergency room) for asthma

Remember the Rules of Two® to check for asthma control

Does your child:

- Have asthma symptoms or take their quick-relief inhaler more than two times a week?
- Wake up at night with asthma symptoms more than two times a month?
- Refill their quick relief inhaler more than two times a year?

If you answered "yes" to any of these questions, then your child's asthma is not well controlled. Please talk with your child's doctor.

Follow your "Asthma Action Plan" and get EMERGENCY CARE for asthma if your child has these symptoms

- It's hard to breathe while walking or talking
- The muscles in your child's neck, chest, or ribs are pulling in or your child's nostrils are flaring with each breath
- The quick relief inhaler isn't working and your child is getting worse
- Your child's peak air flow is below 50% of their normal
- Your child's skin or lips look blue, they pass out, or they cannot breathe. **If this happens, call 911 right away.**

Author: Asthma Education Standard Committee | Approved by Patient Education Committee | Valid through 2021

Nasal Irrigations

Why do nasal rinses?

Rinsing your nose with saline once or twice a day has many benefits, especially for people who always have a nose that is either runny or stuffed up. Rinsing your nose with saltwater (saline) gets rid of debris, built up and dried mucus, pollen grains and other allergens. Getting all the gunk out of your nose can make it less runny or stuffy, helps stop infections and you'll need less medicines to keep it clear. People with asthma may have fewer attacks and may need fewer medicines if you rinse your nose every day.

What do I need to do nasal rinses in children 1 year and older?

Sinus Rinse Kit:

- 8 oz. bottle (you can buy it at most drug stores)
- Premixed sinus rinse packets/Premade saltwater
    - To make: use 8 ounces of lukewarm distilled (or boiled and cooled water) add ½ teaspoon of non-iodized salt and a pinch of baking soda. If your child's nose gets irritated, you can used to ¼ teaspoon of salt.
- Distilled or previously boiled water

How to do nasal rinse in older children

Note: If your doctor has prescribed a medicated nasal spray, you want to do the nasal rinse before using your nasal spray. Wait 15 to 20 minutes after doing nasal rinses, before using your nasal spray.

1. The nasal rinse is done over the bathroom sink or in the shower.
2. Put one packet and water as directed into the bottle
3. Lean your head forward with your chin going toward your chest.
4. Fill the sinus rinse bottle with the saltwater (packet or pre-made)
5. Put the tip up to one nostril and gently squeeze the bottle. The goal is to have the saline solution come out of the other nostril.
6. Some of the saltwater may go down the back of your throat but by leaning forward it should be a small amount, rinse your mouth as needed.
    - Tip: Singing or breathing through the mouth during the rinse will help keep you from getting water down your throat.
7. Repeat these steps in the other nostril. Keep doing these steps until all the solution is gone.
8. Gently blow your nose after rinsing.

What equipment do I need to do nasal rinses in children under 1 year's old?

- A bulb syringe, which you can buy at your local drug store.
- Saltwater (saline). You can either make your own or buy saline solution. If you make your own, make a fresh batch every day to keep bacteria from growing in it.
    - To make: use 8 ounces of lukewarm distilled (or boiled and cooled water) add ½ teaspoon of non-iodized salt and a pinch of baking soda. If your child's nose gets irritated, you can used to ¼ teaspoon of salt.

- Measuring cup and spoons.
- Kleenex.
- Rubbing alcohol.

1. Put 10-20 drops of the saline solution into each nostril. (you can make your own or use readymade)
2. Use a bulb syringe to suck out the mucus and the saline.
3. Repeat this step as needed.
4. You may need to gently twist a tissue into a point and put it in each nostril to get rid of the extra solution and remaining debris.

Be careful not to over suction the baby's nose

How do I clean the bulb syringe?

1. First rinse: draw up hot soapy water into the bulb syringe, shake, and squeeze.
2. Rinse thoroughly with clear tap water.
3. Second rinse: draw up rubbing alcohol into the syringe, shake, and squeeze.
4. Rinse thoroughly with clear tap water.
5. Store the syringe with the tip down to drain completely.

Author: Sleep | Approved by Patient Education Committee | Valid through 2023