

Association of Asthma Educators
Becoming an Asthma Educator
and Care Manager

**Association of Asthma Educators
Becoming an Asthma Educator
and Care Manager**

August 2011



Association of Asthma Educators
1215 Anthony Avenue
Columbia, SC 29201
www.asthmaeducators.org

Table of Contents

Becoming an Asthma Educator and Care Manager 1

Appendices

Appendix I: Priming and Care Guide for Controller Asthma Inhalational Devices A - 1

Appendix II: Devices for Asthma Care..... A - 3

Association of Asthma Educators

Becoming an Asthma Educator and Care Manager



Association of Asthma Educators

- Becoming An Asthma Educator and Care Manager was developed and is being presented by the Association of Asthma Educators.
- **AAE Mission Statement**
The Association of Asthma Educators is the premier interdisciplinary professional organization raising the competency of individuals who educate patients and families affected by asthma.

Association of Asthma Educators

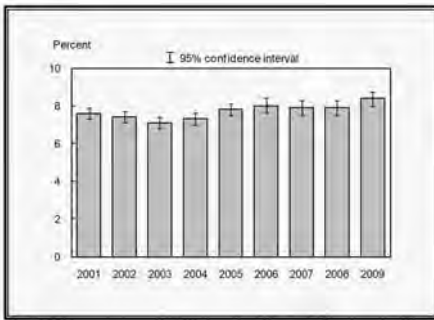
- **Visit us at:**
 - ◆ www.asthmaeducators.org



U.S. Burden of Asthma

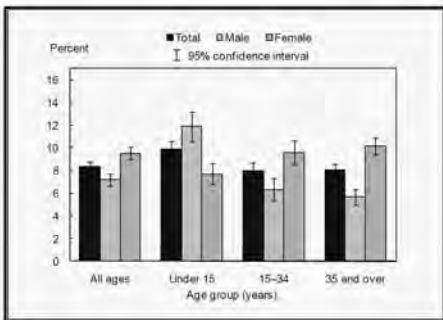
- Current Asthma Prevalence
- Annual burden of illness:
 - ◆ Hospitalizations
 - ◆ Emergency Department Visits
 - ◆ Deaths
 - ◆ Lost School Days/ Lost Workdays
 - ◆ Annual Health Costs

Prevalence of current asthma among persons of all ages: U.S., 2001-2009



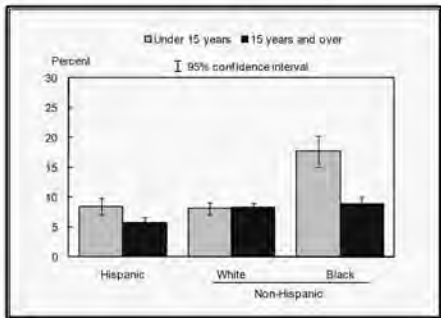
CDC/NCHS, National Health Interview Survey, 1997-2009, combined sample adult and sample child core components. Data based on household interviews of sample civilian non-institutionalized population

Prevalence of current asthma among persons of all ages, by AGE and SEX: U.S., 2009



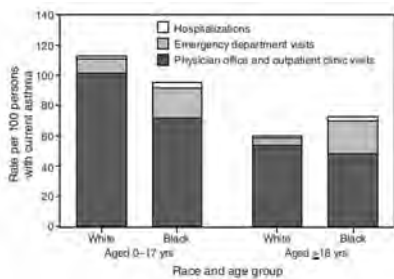
CDC/NCHS, National Health Interview Survey, 1997-2009, combined sample adult and sample child core components. Data based on household interviews of sample civilian non-institutionalized population

Sex-adjusted prevalence of current asthma among persons of all ages, by age group and race/ethnicity: U.S., 2009



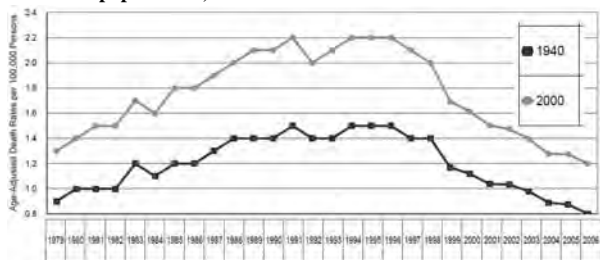
CDC/NCHS, National Health Interview Survey, 1997-2009, combined sample adult and sample child core components. Data based on household interviews of sample civilian non-institutionalized population

Average Annual Rate of Health-Care Visits for Asthma Among Persons with Current Asthma,* by Type of Visit, Black/White Race, and Age Group --- United States, 2004-2006



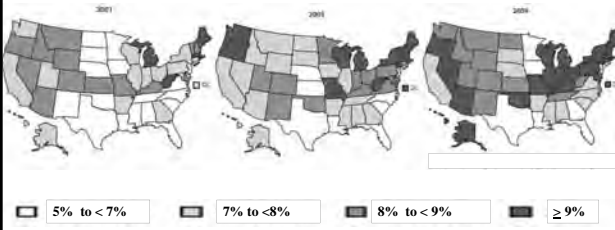
MMWR. 2009;58(28):782

Asthma – age adjusted death rates based on the 1940 and 2000 standard populations, 1979-2006



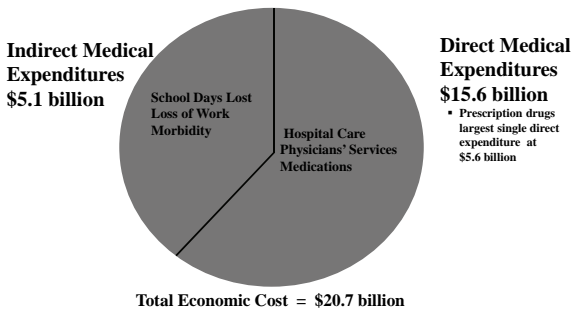
Trends in Asthma Morbidity and Mortality. American Lung Association Epidemiology and Statistics Unit Research and Program Division. February 2010. Available at <http://www.lungusa.org/finding-cures/our-research/trend-reports/asthma-trend-report.pdf>. Accessed July 12, 2010.

Current asthma prevalence among adults --- Behavioral Risk Factor Surveillance System, United States, 2001, 2005, and 2009



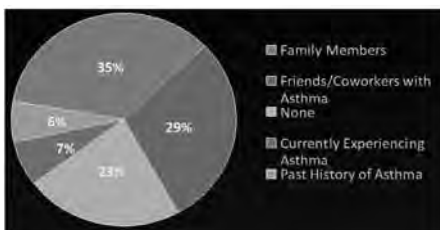
MMWR. 2011; 60(17);547-552

COSTS OF ASTHMA



Trends in Asthma Morbidity and Mortality. American Lung Association Epidemiology and Statistics Unit Research and Program Division. February 2010. Available at <http://www.lungusa.org/finding-cures/our-research/trend-reports/asthma-trend-report.pdf>. Accessed July 12, 2010.

Public Experience With Asthma from Asthma in America™



Impact of Asthma

- Patients
 - ◆ Missed school/work
 - ◆ Impaired ability to concentrate
 - ◆ Limitation of activities, especially sports
 - ◆ Effect on growth, development, behavior, school/work achievement and lifestyle

- Family
 - ◆ Disruption of routine
 - ◆ Effects on sibling/spouse/parent
 - ◆ Economic impact

Guidelines for the Diagnosis and Management of Asthma Expert Panel Report 3, 2007



EPR3 - rigorous, systematic review of the scientific literature (>50,000 articles)

- 10 committees, dozens of national experts
- 3 years screening 15,444 abstracts
- Reviewed full-text of 2,122 articles
- Found 1,654 contributed new evidence
- Constructed 20 evidence tables to analyze data from 316 articles on critical topics.
- EPR3 recommendations are weighted by evidence level (Categories A, B, C, & D).

Implications of the Guidelines

- Large amount of asthma self-care required
- Need for a partnership with children and parents and adults to improve asthma care
- Best practices (including self-care education) differ by setting of care
 - ◆ ER and inpatient
 - ◆ Outpatient (PCP and specialists)
 - ◆ School and Child Care
 - ◆ Home and community

Strategy for Reducing Asthma Burden

- Basic education and training for workforce
- Essential equipment (assess airflow, improve inhalation technique)
- Core competencies, setting specific
- Advanced training for leaders
- Implement best practices (Asthma Ready™)
- Deploy evidence-based self-management education for all, high risk first

State of Self-Management Education

- Among persons (adults and children) with asthma:
 - ◆ 34.2% reported being given a written asthma action plan
 - ◆ 44.3% of children with asthma had received an asthma action plan
 - ◆ 68.1% had been taught the appropriate response to symptoms of an asthma attack.
 - ◆ ~1/3 of children or adults were using long-term control medicine such as inhaled corticosteroids

MMWR. 2011; 60(17):547-552

We have a VERY big job to do!



Ideal Workforce Size

How many competent people do we need to be able to provide appropriate care to those with asthma across the range of settings where asthma services and education for self-care are needed?

Who is at the point of care?

- Who trains the parent or worker who must recognize & manage asthma in the young child?
- Who trains teachers and school staff?
- Who identifies asthma disability at school and manages students' asthma exacerbations?
- Who provides asthma self-care education to students & dependent care education to parents?
- Who provides asthma education to peers?
- Who assists families to improve indoor air quality?

Workforce Factors - Settings

- Licensed child care centers & licensed family child care homes
- Secondary schools in the U.S.
- Primary care providers
- U.S. hospitals

National Asthma Educator Certification Board (NAECB)

- 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."
- An Asthma Educator-Certified (AE-C) is an expert in counseling individuals with asthma and their families how to manage their asthma and to minimize its impact on their quality of life.

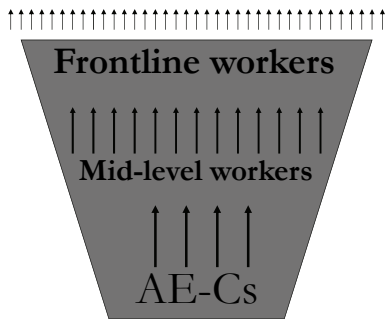
Asthma Educator-Certified, AE-C

- Any health professional or person with documented 1000 hours direct care of persons with asthma
- Successfully pass computerized certification exam
 - ◆ www.naecb.org
 - ◆ Independent preparatory courses are available from AARC, AAE, ALA and other
- Current Pass Rate
- Certification not currently linked to reimbursement

Who is in need of Asthma Education?

- Impossible ratios of persons with asthma per certified asthma educator (AE-C)
 - ◆ Across several settings of care expertise is needed among numerous caregivers, both lay and professional
 - ◆ Settings – home, child care, school, work, primary care, hospital, and specialty care
 - ◆ Lay caregivers – parents, other family members, staff at child and adult daycare, & others (institutional)
 - ◆ Health professionals: school, clinic, hospital, community

Persons with Asthma



Overview: Key Components of Asthma Management from EPR-3

- Assessment & monitoring
- Control of environmental factors contributing to asthma & co-morbid conditions
- Medications
- Education for a partnership in care

Expert Panel Report 3 (EPR-3)

Assessment & Monitoring

Assessment & Monitoring

- Impairment and Risk
- Asthma Severity
- Asthma Control

Asthma Impairment & Risk

- Impairment
 - ◆ Symptom frequency & intensity
 - ◆ Functional limitations
- Risk
 - ◆ Likelihood of asthma exacerbation
 - ◆ Decline in lung function
 - ◆ Potential for medication side effects

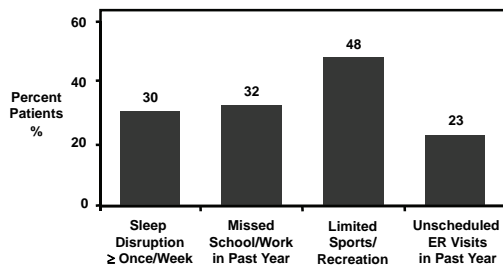
Goals of Asthma Therapy

- Reduce Impairment
 - ◆ Prevent chronic and troublesome symptoms
 - ◆ Require infrequent use (<2 days a week) of inhaled SABA
 - ◆ Maintain normal or near normal pulmonary lung function
 - ◆ Meet patients' and families' expectations of and satisfactions with asthma care

Goals of Asthma Therapy

- Reduce risk
 - ◆ Prevent exacerbations, ER admissions, and hospitalizations
 - ◆ Prevent loss of lung function, for children, prevent reduced lung growth
 - ◆ Provide optimal pharmacotherapy with minimal or no adverse effects of therapy

The Goals of Asthma Therapy Are Inadequately Realized



Rickard K, et al. *J Allergy Clin Immunol*. 1999;103:A655. Asthma in America™ Survey. SRBI. December 1998.

Definition of Asthma

- Asthma is a chronic inflammatory disease of the airway with:
 - ◆ Airway obstruction that is reversible, either spontaneously or with medication
 - ◆ In susceptible individual may become irreversible
 - ◆ Airway inflammation caused by many cellular components
 - ◆ Increased airway hyperresponsiveness

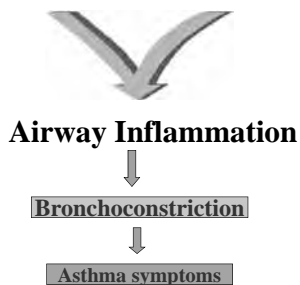
Asthma Pathology

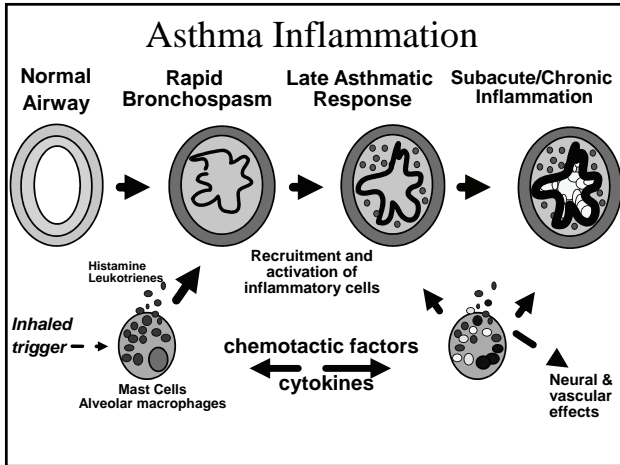
- Airway inflammation produces four forms of airflow limitation:
 - ◆ Acute bronchoconstriction
 - ◆ Swelling of the airway wall
 - ◆ Chronic mucus plug formation
 - ◆ Airway remodeling

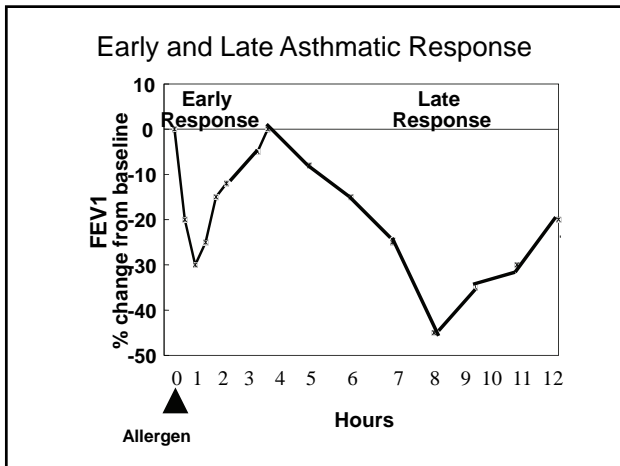
Development of Asthma

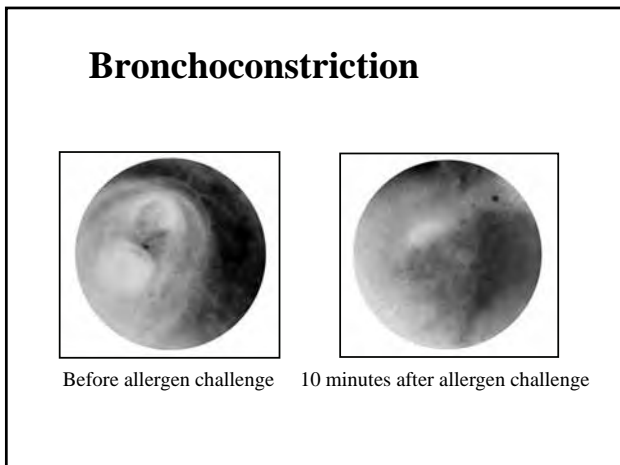
Genetics

Environment









When you see:

- Allergic bronchitis
- Asthmatic bronchitis
- Reactive airway disease
- Chronic cough
- Wheezy bronchitis
- Recurrent pneumonia
- Recurrent bronchiolitis
- Recurrent croup

THINK ASTHMA!

Factors Contributing to Asthma Severity

- Allergens
- Viral respiratory infections
- Tobacco smoke
- Indoor/Outdoor pollutants and irritants
- Weather changes
- Medication sensitivity or interactions
- Occupational exposures

Co-Morbid Conditions Contributing To Asthma Severity

- Rhinitis
- Sinusitis
- Gastroesophageal reflux disease (GERD)
- Obesity
- Obstructive Sleep Apnea (OSA)
- Allergic Bronchopulmonary Aspergillosis (ABPA)

Asthma Predictive Index Children Under 5 Years

- Early Wheezer* Plus at Least One of Two Major Criteria *or* Two of Three Minor

Major Criteria

- Parental Asthma
- Eczema

Minor Criteria

- Allergic rhinitis
- Eosinophilia > 4%
- Wheezing apart from colds or viruses

* > 3 episodes of wheezing in past year lasting > 1 day, affecting sleep

Castro-Rodriguez, et al. Am J Respir Crit Care Med 2000; 162: 1403-1406

Role of Allergy In Asthma

- ~85% of patients with asthma will have a positive skin-test reaction to allergy skin testing
- If this positive reaction correlates with the patient's history, it may be a contributing factor to his/her asthma

Diagnosing Asthma

- Review
 - ◆ Medical History- HPI (symptoms present) medications, allergies, and PMH
 - ◆ Family and Social (Environmental)History
 - ◆ Review of Systems and Physical Exam
 - ◆ Pulmonary Function Testing

Diagnosing Asthma

- To establish a diagnosis of asthma, the clinician should determine:
 - ◆ Symptoms of recurrent episodes of airflow obstruction or airway hyperresponsiveness are present
 - ◆ Airflow obstruction is at least partially reversible
 - ◆ and alternative diagnoses are excluded

- EPR-3, 2007

Diagnosing Asthma

Spirometry used to determine:

- ◆ Presence, location and severity of disease
- ◆ Etiology of disease

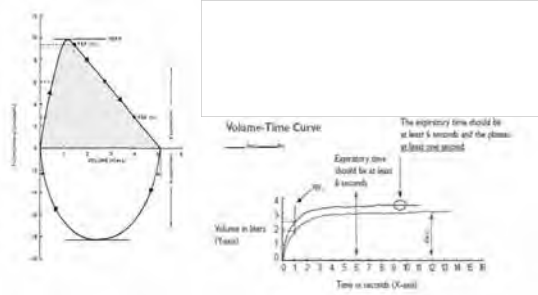
To Evaluate:

- ◆ Reversibility
- ◆ Operability
- ◆ Disability
- ◆ Progression of disease and prognosis
- ◆ Effect of therapy

Diagnosing Asthma

- Spirometry
 - ◆ Essential objective measure to diagnose asthma
 - ◆ FVC – Forced Vital Capacity
 - ◆ FEV₁ – Forced Expiratory Volume in 1 second
 - ◆ FEV₁/FVC – Some times referred to as the “Ratio”

Flow Loop/ Volume -Time Curve



Des Jardins & Burton, 1995

Diagnosing Asthma

- Spirometry
 - ◆ Pre/Post- bronchodilator

Diagnosis Review

- Episodic symptoms of airflow obstruction
- Airflow limitation that is at least partially reversible
- Spirometry is the gold standard for diagnosis
- Peak flow considered to be a monitoring tool

In-depth Medical History

- Symptoms
- Pattern of symptoms
- Precipitating/aggravating factors
- Progression of disease and treatment
- Social history
- Typical exacerbation
- Impact of asthma on patient and family
- Assessment of patient/family's understanding of the disease

Symptoms of Asthma

- Cough
- Wheezing
- Shortness of breath
- Chest tightness
- Nocturnal symptoms
- Exertional symptoms

Asthma Severity & Control

- Asthma Severity
 - ◆ The intensity of the disease process
 - ◆ Classified during initial presentation
- Asthma Control
 - ◆ The degree asthma symptoms are minimized by therapy
 - ◆ Classified once therapy has begun
 - ◆ The degree goals of asthma are met

Levels of Asthma Severity

- Intermittent asthma
- Mild persistent asthma
- Moderate persistent asthma
- Severe persistent asthma

Classifying Asthma Severity >12yrs-Adult

Components of Severity		Intermittent	Mild Persistent	Moderate Persistent	Severe Persistent
Impairment	Symptoms	≤2days/wk	>2days/wk	Daily	Throughout the day
	Nighttime awakenings	≤2days/month	3-4x/mth	>1x/wk not nightly	Often 7x/wk
	SABA prn	≤2days/wk	>2days/wk not daily	Daily	Several xs/day
	Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
	Lung function ■FEV ₁ ■FEV ₁ /FVC	FEV ₁ normal between exacerbations FEV ₁ >80% FEV ₁ /FVC = normal	FEV ₁ >80% FEV ₁ /FVC = normal	FEV ₁ >60% but <80% FEV ₁ /FVC reduced 5%	FEV ₁ <60% FEV ₁ /FVC reduced >5%
Risk	Exacerbations requiring oral steroids	0-1/yr	>2/yr		

Expert Panel Report 3 (EPR-3)

Classifying Asthma Severity 5-11 yrs

Components of Severity		Intermittent	Mild Persistent	Moderate Persistent	Severe Persistent
Impairment	Symptoms	≤2days/wk	>2days/wk	Daily	Throughout the day
	Nighttime awakenings	≤2days/month	3-4x/mth	>1x/wk not nightly	Often 7x/wk
	SABA prn	≤2days/wk	>2days/wk not daily	Daily	Several xs/day
	Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
	Lung function ■FEV ₁ ■FEV ₁ /FVC	FEV ₁ normal between exacerbations FEV ₁ >80% FEV ₁ /FVC >85%	FEV ₁ >80% FEV ₁ /FVC >80%	FEV ₁ >60% but <80% FEV ₁ /FVC 75-80%	FEV ₁ <60% FEV ₁ /FVC <75%
Risk	Exacerbations requiring oral steroids	0-1/yr	>2/yr		

Expert Panel Report 3 (EPR-3)

Classifying Asthma Severity 0-4 yrs

Components of Severity		Intermittent	Mild Persistent	Moderate Persistent	Severe Persistent
Impairment	Symptoms	≤2days/wk	>2days/wk	Daily	Throughout the day
	Nighttime awakenings	0	1-2x/mth	3-4x/mth	>1x/wk
	SABA prn	≤2days/wk	>2days/wk not daily	Daily	Several xs/day
	Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
	Lung function	N/A	N/A	N/A	N/A
Risk	Exacerbations requiring oral steroids	0-1/yr	>2/yr		

Expert Panel Report 3 (EPR-3)

Levels of Asthma Control

- Well controlled
- Not well controlled
- Very poorly controlled

Assessing Asthma Control >12yrs-Adult

Components of Control		Well Controlled	Not Well Controlled	Very Poorly Controlled
Impairment	Symptoms	≤2days/wk	>2days/wk	Throughout the day
	Nighttime awakenings	≤2xs/month	1-3xs/month	>4x/mth
	SABA prn	≤2days/wk	>2days/wk	Several xs/day
	FEV1 or peak flow	>80%	60-80%	<60%
	Validated questionnaires ATAQ ACQ ACT	ATAQ-0 ACQ-<0.75 ACT->20	ATAQ-1-2 ACQ-<1.5 ACT-16-19	ATAQ-3-4 ACQ-<N/A ACT-<15
Risk	Exacerbations requiring oral steroids	0-1/yr	>2/yr	

Expert Panel Report 3 (EPR-3)

Assessing Asthma Control 5-11 years

Components of Control		Well Controlled	Not Well Controlled	Very Poorly Controlled
Impairment	Symptoms	≤2days/wk	>2days/wk	Throughout the day
	Nighttime awakenings	≤1x/month	>2xs/mth	>2x/wk
	Interference with normal activity	None	Some limitation	Extremely limited
	SABA prn	≤2days/wk	>2days/wk	Several xs/day
	FEV1 or peak flow	>80%	60-80%	<60%
Risk	Exacerbations requiring oral steroids	0-1/yr	>2/yr	

Expert Panel Report 3 (EPR-3)

Assessing Asthma Control 0-4 years

Components of Control		Well Controlled	Not Well Controlled	Very Poorly Controlled
Impairment	Symptoms	≤2days/wk	>2days/wk	Throughout the day
	Nighttime awakenings	≤1x/month	>1xs/month	>1x/wk
	Interference with normal activity	None	Some limitation	Extremely limited
	SABA prn	≤2days/wk	>2days/wk	Several xs/day
	FEV1 or peak flow	N/A	N/A	N/A
Risk	Exacerbations requiring oral steroids	0-1/yr	2-3xs/yr	>3xs/yr

Expert Panel Report 3 (EPR-3)

Key Education Messages Provided by Clinician



Control of Environmental Factors Contributing to Asthma

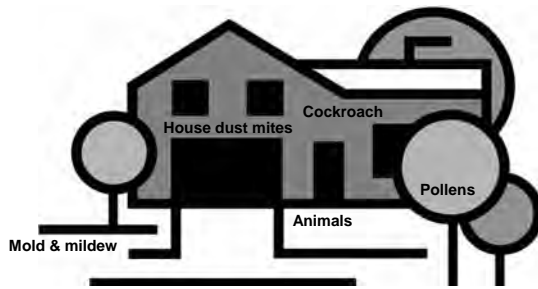
Control of Environmental Factors

- Allergens
- Irritants

Allergens

- Dust mites/cockroaches
- Animals/pet dander
- Pollens
 - ◆ Grass, tree, weed
- Mold spores
- Foods

Indoor/Outdoor Allergens



House Dust Mite Control Measures



- Encase pillows & mattress in allergen proof encasings
- Wash bedding weekly at $\geq 130F^{\circ}$
- Reduce clutter in bedroom
- Avoid upholstered furniture
- Reduce indoor humidity
- Remove carpeting

Cockroach Control Measures



- Eliminate food source: Meticulous cleaning & air tight food storage
- Eliminate moisture: Repair leaks, wrap & improve ventilation
- Place large bait traps in kitchen and bathroom

Control of Animal Allergens

- Remove furry or feathered animals from the home
- Keep animals out of the bedroom
- Use HEPA air filter
- Apply filter to vents to bedroom



Control Measures for Pollen



- Pollen counts
 - ◆ Geographically specific
- Air-conditioning
 - ◆ Keeps pollen out
 - ◆ Cleans and dries the air
- Dry clothing in dryer, not outdoors
- Shower/shampoo after working & playing outdoors

Track Your Local Pollen Counts

- National Allergy Bureau
 - ◆ www.aaaai.org/nab
 - ◆ Receive automatic email alerts with pollen and spore levels from locations you select



Control Measures for Mold

- Clean up the mold and eliminate sources of moisture.
- Wash mold off hard surfaces using soap and water, dry completely. Absorbent materials, such as ceiling tiles and carpet, may have to be replaced if they are contaminated with mold.
- Fix leaky plumbing or other sources of water.
- Keep drip pans in your air conditioner, refrigerator and dehumidifier clean and dry.
- Use exhaust fans or open windows in kitchens and bathrooms when showering, cooking or using the dishwasher.
- Vent clothes dryers to the outside.
- Maintain low indoor humidity, ideally between 30-50% relative humidity.

Mold Remediation in Schools and Commercial Buildings

www.EPA.gov/mold/moldresources.gov

Irritants

Key to control is minimization and/or avoidance

Strong Odors



Air pollution



Tobacco Smoke



Wood smoke

Control Measures for Cigarette Smoke

- Ultimate goal is tobacco cessation

- ◆ QuitLine™

- ◆ 1-800-QUIT-NOW



Key Education Messages Provided by Clinician



Medications

Medications

- Medications classifications
- Stepwise approach
- Inhalation devices

Medication Classification

- Quick Relief Medications
 - ◆ Medications used to treat acute symptoms and exacerbations

- Long Term Control Medications
 - ◆ Medications used every day to achieve and maintain control of persistent asthma

Medication Classification

- Quick Relief Medications
 - ◆ Short Acting β_2 -Agonists (SABA)
 - ◆ Anticholinergics
 - ◆ Oral Steroid “burst” therapy

- Long Term Control Medications
 - ◆ Inhaled Corticosteroids (ICS)
 - ◆ Long Acting β_2 -Agonists (LABA)
 - ◆ Leukotriene Modifiers
 - ◆ Non-Steroidal Anti-inflammatories
 - ◆ Theophylline
 - ◆ Immunomodulator
 - ◆ Daily Oral Steroids

Quick Relief Medications

- Short Acting β_2 -Agonists (SABA)
- Anticholinergics
- Oral Steroid “burst” therapy

Short Acting β_2 -Agonists (SABA)

- **Albuterol**
(**Proventil HFA**[®],
Ventolin HFA[®],
ProAir[®])
 - ◆ Meter Dose Inhaler,
Solution for
Nebulization, Tablets



Short Acting β_2 -Agonists (SABA)

■ Levalbuterol (Xopenex®)

- ◆ Meter Dose Inhaler,
Solution for
Nebulization



Short Acting β_2 -Agonists (SABA)

■ Pirbuterol (Maxair®)

- ◆ Autohaler (Meter
Dose Inhaler)



Short Acting β_2 -Agonists (SABA)

- Affect the lungs by attaching to and relaxing the smooth muscles that wrap around the bronchi to improve asthma control.
- Onset of Action: Rapid ~10 minutes
- Duration of Action: ~ 4 hours

Short Acting β_2 -Agonists (SABA)

- Dosing: 2 puffs q4-6hrs PRN for symptoms. May use 15 minutes before exercise to pre-treat. To be immediately available to the patient at all times.
- Clinically significant side effects associated with SABA are Skeletal Muscle Tremor and Tachycardia.
- Increase use, greater than 1 canister per month, is an indicator of patient over reliance on short acting medication and may increase the risk for life- threatening exacerbations.

Short Acting β_2 -Agonists (SABA)

Baylor's Rules of Two Questions™

- Do your patients use their quick-relief inhaler more than TWO times a WEEK?
- Do they awaken at night with asthma more than TWO times a MONTH?
- Do they refill their quick-relief inhaler more than TWO times a YEAR?
- Has their peak flow drop more than TWO times 10 (20%) from baseline when having asthma symptoms?

If the answer is "yes" to any of these questions, the health care professional should reevaluate patient's current treatment regimen.

Baylor Health Care System

Current Consensus on Short-Acting β_2 s

- Data suggest regular use is associated with asthma morbidity and mortality
- Causal link not yet established
- β_2 -agonists should be prescribed for -Rescue or Quick Relief
- Prevention of exercised-induced asthma
- Increased use (>2 times/ week) signals deteriorating control and need for daily anti-inflammatory therapy

Short Acting β_2 -Agonists (SABA)

Patient to call if:

- Needing more often than q4h for symptoms
- Needing every 4 hours--day & night
- Not responding to treatment within 15 minutes
- Getting worse

Anti-Cholinergics

- Ipratropium (Atrovent®)
- Tiotropin (Spiriva®)-FDA approved only in COPD
- Combination
 - ◆ Albuterol/Ipratropium (Combivent® or DuoNeb®)

Anti-Cholinergics

- Safe
- Approved for COPD and asthma exacerbations
- Synergistic effect with SABA
- Not FDA approved for children

Oral Corticosteroids

- Medrol
- Prednisone
- Prednisolone syrup
- Orapred[®], Prelone[®], PEDIAPRED[®]

Oral Corticosteroids

- May be used for quick relief--burst during an acute exacerbation for 3-10 days
- Long-term control in severe asthma
 - ◆ Daily dosing
 - ◆ Alternate day dosing
 - ◆ Combined with inhaled corticosteroid

Oral Corticosteroids

- Long Term Side Effects:
 - ◆ Osteoporosis
 - ◆ Hypertension
 - ◆ Diabetes
 - ◆ HPA axis suppression
 - ◆ Obesity
 - ◆ Skin thinning
 - ◆ Easy bruising
 - ◆ Muscle weakness

Long Term Control Medications

- Inhaled Corticosteroids (ICS)
- Long Acting β_2 -Agonists (LABA)
- Leukotriene Modifiers
- Non-Steroidal Anti-inflammatories
- Theophylline
- Immunomodulator
- Daily Oral Steroids

Inhaled Corticosteroids (ICS)

“They are the most potent and effective anti-inflammatory medication currently available.”

“ICSs are used in the long-term control of asthma.”

Expert Panel Report 3 (EPR-3)

Inhaled Steroids

Product	Generic Name	Color	Doses/Puff
Aerospan	Flunisolide HFA	Purple w/ gray spacer	80mcg
Asmanex	Mometasone	White w/ gray or pink	110mcg, 220 mcg
Azmacort <small>(Last date for sale 12/31/2010)</small>	Triamcinolone	White with spacer	100 mcg
Aerobid <small>(Last date for sale 6/30/2011)</small>	Flunisolide Flunisolide/menthol	Gray/Purple Gray/Green	250 mcg
Alvesco	Ciclesonide	Tan/Red	80mcg, 160mcg
Flovent	Fluticasone HFA Fluticasone Diskus	Orange/Peach Orange	44 mcg,110 mcg,220 mcg 50 mcg,100mcg, 250mcg
QVAR	Beclomethasone	Tan/Pumpkin	40 mcg,80 mcg
Pulmicort, also Respules	Budesonide Nebulizer suspension	White/Brown	180, 90 mcg .25, 0.5, 1 mg

Inhaled Steroids

Product	Generic Name	Color	Doses/Puff
Alvesco	Ciclesonide	Tan/Red	80mcg, 160mcg

- **Pro-Drug:** administered in an inactive (or significantly less active) form. Once administered is enzymatically activated by the lung mucosal tissue to active form. Potential to reduce oral side effect seen with other inhaled corticosteroids

Inhaled Steroids

Product	Generic Name	Color	Doses/Puff
Pulmicort, also Respules	Budesonide Nebulizer suspension	White/Brown	180, 90 mcg .25, 0.5 , 1mg

- Only inhaled corticosteroid with category B pregnancy rating.
 - ◆ Pharmacotherapy outcomes in pregnancy:
 - ◆ Maximize lung function
 - ◆ Minimize drug side effect
 - ◆ Pregnancy Pearls:
 - ◆ If well controlled on current therapy continue therapy
 - ◆ When starting inhaled corticosteroid therapy consider Budesonide (Pulmicort®) since it is the most studied.

Inhaled Steroids

Product	Generic Name	Color	Doses/Puff
Aerospan	Flunisolide	Purple w/ gray spacer	80mcg
Asmanex	Mometasone	White w/ gray or pink	110mcg, 220 mcg
Alvesco	Ciclesonide	Tan/Red	80mcg, 160mcg
Flovent	Fluticasone Fluticasone Diskus	Orange/Peach Orange	44 mcg,110 mcg,220 mcg 50 mcg,100mcg, 250mcg
QVAR	Beclomethasone	Tan/Pumpkin	40 mcg,80 mcg
Pulmicort	Budesonide	White/Brown	180, 90 mcg

- New generation inhaled corticosteroids
 - ◆ New parent drug: Mometasone, Ciclesonide
 - ◆ New formulation: HFA

Quiz (matching) – ICS Potency for a 5 year old child with Asthma

Assign low, medium, or high dose:

- a) beclomethazone 80 mcg/puff
QVAR 2 puffs BID _____
- b) budesonide 250 mcg neb.
Pulmicort 0.25 mg QID _____
- c) fluticasone 220 mcg
Flovent 220 mcg 1 puff BID _____

Method 1 – “I will count puffs...”

Assign low, medium, or high dose to:

- a) beclomethazone 80 mcg/puff
QVAR 2 puffs BID 4 High?
- b) budesonide 250 mcg neb.
Pulmicort 0.25 mg QID ? No Puffs
- c) fluticasone 220 mcg
Flovent 220 mcg 1 puff BID 2 Low?

Method 2 – “I’ll count mcg...”

Assign low, medium, or high dose to:

- a) beclomethazone 80 mcg/puff
QVAR 2 puffs BID 320 Low?
- b) budesonide 250 mcg neb.
Pulmicort 0.25 mg QID 1000 High?
- c) fluticasone 220 mcg
Flovent 220 mcg 1 puff BID 440 Med.?

Drug	Low Daily Dose			Medium Daily Dose			High Daily Dose		
	Child 0-4 Years of Age	Child 5-11 Years of Age	≥12 Years of Age and Adults	Child 0-4 Years of Age	Child 5-11 Years of Age	≥12 Years of Age and Adults	Child 0-4 Years of Age	Child 5-11 Years of Age	≥12 Years of Age and Adults
Budesonide Inhaled <i>(inhalation suspension for nebulization)</i>	0.25-0.5 mg	0.5 mg	NA	>1.5-4.0 mg	1.0 mg	NA	>1.0 mg	2.0 mg	NA
Fluticasone FUMIC <i>(44, 110, or 220 mcg/act)</i>	176 mcg	88-176 mcg	88-264 mcg	>176-352 mcg	>176-352 mcg	>264-440 mcg	>352 mcg	352 mcg	>440 mcg
Triamcinolone HFA <i>(80 or 160 mcg/act)</i>	NA	80-160 mcg	80-240 mcg	NA	>160-320 mcg	>240-480 mcg	NA	>320 mcg	>480 mcg

Modified from <http://www.nhlbi.nih.gov/guidelines/asthma/asthsumm.pdf>, Figure 18

Inhaled Corticosteroids (ICS)

- Inhaled corticosteroids can be dosed at low, medium or high doses
- Most benefits of ICS occur at low to medium doses

Expert Panel Report 3 (EPR-3)

Inhaled Corticosteroids (ICS)



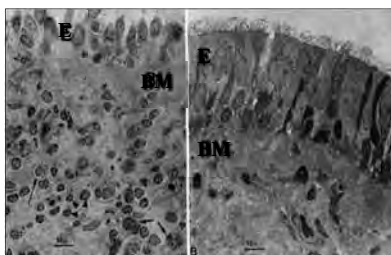
Inhaled Corticosteroids (ICS)



Inhaled Corticosteroids (ICS)

- Effects
 - ◆ Anti-inflammatory, decrease hyper-responsiveness, decrease secretions, and restore integrity
 - ◆ Improve function
 - ◆ Early intervention more effective

Inhaled Corticosteroids (ICS)



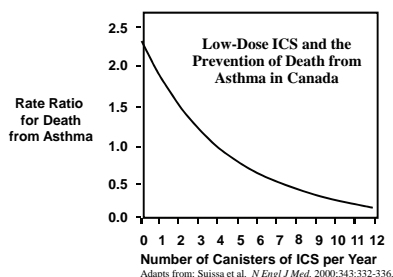
E = Epithelium
BM = Basement Membrane

Pre- and post-3-month treatment with budesonide (BUD) 600 mcg b.i.d. n = 14
Laitinen et al. *J Allergy Clin Immunol*. 1992;90:32-42.

Inhaled Corticosteroids (ICS)

- Inadequately prescribed by providers
 - ◆ Inaccurate determination of persistent disease
 - ◆ Safety concerns
- Inadequately taken by patients
 - ◆ Reluctance to use daily therapy
 - ◆ Fear of “steroids” and confusion with anabolic steroids
 - ◆ Lack of perception of effect

Inhaled Corticosteroids (ICS)



Inhaled Corticosteroids (ICS)

- Local Side Effects
 - ◆ Throat irritation, irritative cough, candidiasis, hoarseness
- High Dose Inhaled Side Effects (rare and substantially less than with oral steroids)
 - ◆ May affect growth VELOCITY in children if used long-term, but severe asthma that is uncontrolled also can cause growth suppression
 - ◆ May affect serum osteocalcin levels and skin thickness in elderly
 - ◆ Potential for systemic effects in children at 400 mcg of beclomethasone or budesonide

Inhaled Corticosteroids (ICS)

- High Dose Inhaled Side Effects (rare and substantially less than with oral steroids)
 - ◆ In adults with a family history of Glaucoma and use of ICS has shown a slight increases risk of Glaucoma and Cataract formation. Encourage periodic eye examination.
 - ◆ RARE Adrenal Glad Suppression and elevated blood sugars with greatest risk at high doses.
 - ◆ THEORETICAL risk of disseminated varicella.

Inhaled Corticosteroids (ICS)

- **The provider/educator action is:**
 - ◆ Teach patient about delay onset of action
 - ◆ Teach patient to take **EVERY DAY**
 - ◆ Demonstrate proper technique
 - ◆ Have patient demonstrate technique
 - ◆ Instruct patient to use a spacer for MDI
 - ◆ Instruct patient to rinse & spit after use
 - ◆ Teach patient when to change canister

Long-Acting β_2 -Agonists (LABA)

- Formoterol (Foradil[®])
- Salmeterol (Serevent[®])



- Arformoterol (Brovana[®])=for COPD only
- Performist (Formoterol[®])=for COPD only

Long-Acting β_2 -Agonists (LABA)

Effects

- Long-acting →12 hours for prevention
- Smooth muscle relaxation
- Variable onset of action

Long-Acting β_2 -Agonists (LABA)

- Black Box Warning:
 - ◆ LABAs should only be used long-term in patients with asthma not adequately controlled with inhaled steroids.
 - ◆ The agents should be used for the shortest time possible to achieve symptom control. Once patients are no longer experiencing symptoms, LABAs should be discontinued if possible.
 - ◆ Children and adolescents needing a LABA should use a combination product that also contains an inhaled steroid to ensure compliance with both medications.

Long-Acting β_2 -Agonist (LABA)

- The provider/educator action is:
 - ◆ Teach patient to take EVERY DAY
 - ◆ Use with an inhaled anti-inflammatory
 - ◆ Never use more than every 12 hours
 - ◆ Not to be used to treat **acute** symptoms

Combination Therapy

■ ICS/LABA

- ◆ Fluticasone/Salmeterol (Advair®) in mcg
 - ◆ Dry Powder: 100/50, 250/50, 500/50
 - ◆ MDI: 45/21, 115/21, 230/21
- ◆ Budsonide/Formoterol (Symbicort®) in mcg
 - ◆ MDI: 80/4.5, 160/4.5
- ◆ Mometasone/ Formoterol (Dulera®) in mcg
 - ◆ MDI: 100/5, 200/5

Combination Therapy

“For patients not well controlled on low-dose inhaled corticosteroid (ICS), increasing the dose of ICSs to medium dose is recommended before adding adjunctive therapy in the 0–4 years age group.”

“For other age groups (children 5–11 years of age and youths ≥12 years of age and adults), increasing the dose of ICS to medium dose or adding adjunctive therapy to a low dose of ICS are considered as equal options.”

Expert Panel Report 3 (EPR-3)

Leukotriene Modifiers

- Montelukast (Singulair®)
- Zafirlukast (Accolate®)
- Zileuton (Zyflo CR®)

Leukotriene Modifiers

- Leukotrienes are inflammatory molecules that mediate airflow obstruction, hyperresponsiveness and inflammation through multiple channels.
- Leukotriene D4 is a potent bronchoconstrictor
at least 1000 times more potent than histamine

Leukotriene Modifiers

- Montelukast is available for patients >1 year of age.
- Zafirlukast is available for patients ≥ 7 years of age.
- Zileuton is available for patients ≥ 12 years of age.

Leukotriene Modifiers

- Montelukast (Singulair®)
 - ◆ No known drug-drug interactions
- Zafirlukast (Accolate®)
 - ◆ Take on empty stomach
 - ◆ Inhibits metabolism of warfarin and increases prothrombin time
 - ◆ LFTs prior and during
- Zileuton (Zyflo CR®)
 - ◆ Take on empty stomach
 - ◆ LFTs prior and during

Leukotriene Modifiers

“Leukotriene Receptor Antagonist (LTRAs) are alternative, but not preferred, therapy for the treatment of mild persistent asthma (Step 2 care).”

“LTRAs can also be used as adjunctive therapy with ICSs, but for youths ≥ 12 years of age and adults they are not the preferred adjunctive therapy compared to the addition of LABAs.”

“Zileuton can be used as alternative but not preferred adjunctive therapy in adults.”

Expert Panel Report 3 (EPR-3)

Non-Steroidal Anti-Inflammatories

- Cromolyn

Non-Steroidal Anti-Inflammatories

- Cromolyn
 - ◆ Blocks early & late phase reactions
 - ◆ Mast cell stabilizer
 - ◆ Inhibits acute response to exercise, cold dry air, and sulfur dioxide
 - ◆ 4-6 week trial
 - ◆ Nebulizer form (difficult to obtain product will eventually be removed from market)
 - ◆ Approved for 2 yrs & older

Non-Steroidal Anti-Inflammatories

“They are used as alternative, but not preferred, medication for the treatment of mild persistent asthma.”

“They can also be used as preventive treatment prior to exercise or unavoidable exposure to known allergens.”

Expert Panel Report 3 (EPR-3)

Methlyxanthine

- Theophylline (Theo-24[®], Theochron[®], Theolair[®], Uniphyll[®])

Methlyxanthine

Effects

- ◆ Long-acting bronchodilator with possible anti-inflammatory properties.
- ◆ Narrow therapeutic range (5-15 mcg/ml). Monitor blood level at least annually

Side Effects

- ◆ Nausea, vomiting, reflux
- ◆ Tachycardia, arrhythmias
- ◆ Sleep disorders, seizures in toxic state
- ◆ Interact with many medicines

Methlyxanthine

- Theophylline levels are increased by:
 - ◆ Cimetidine, Propranolol, Erythromycin, Clarithromycin, Zileuton
- Theophylline increases effect of:
 - ◆ Anticoagulants
- Theophylline decreases effect of:
 - ◆ Lithium, Phenobarbital, Phenytoin, Carbamazepine

Methlyxanthines

- The provider action is:
 - ◆ Teach patient to take EVERY DAY
 - ◆ May cause GI irritation--take with food
 - ◆ Annual blood level--5-15 mcg/mL
 - ◆ Do not switch brands without monitoring level
 - ◆ Once daily doses--take at 6-7 PM
 - ◆ Monitor for drug-drug interactions
 - ◆ Side effect may occur at therapeutic doses

Methlyxanthines

“Sustained-release theophylline is a mild to moderate bronchodilator used as alternative, not preferred, adjunctive therapy with ICS.”

Expert Panel Report 3 (EPR-3)

Immunomodulator

- Omalizumab (Xolair®)

Immunomodulator

- Recombinant humanized monoclonal antibody to IgE that may potentially serve as a long-term controller in patients:
 - ◆ 12 years of age or older
 - ◆ Moderate- to Severe Persistent Asthma
 - ◆ Positive skin test or in vitro reactivity to a perennial aeroallergen
 - ◆ Whose symptoms are inadequately controlled by ICS

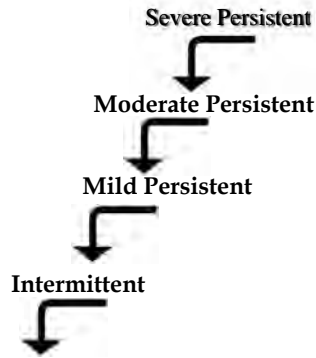
Immunomodulator

“Used as adjunctive therapy for patients ≥ 12 years of age who have allergies and severe persistent asthma . Clinicians who administer omalizumab should be prepared and equipped to identify and treat anaphylaxis that may occur.”

Expert Panel Report 3 (EPR-3)

Stepwise Approach to Asthma

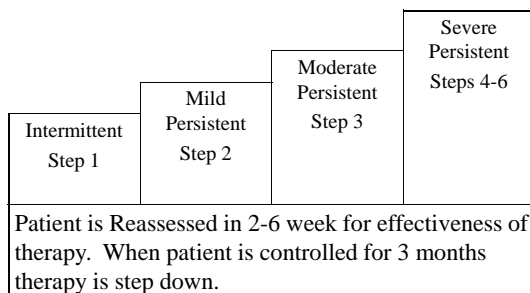
- Stepwise approach to Asthma Therapy emphasizes initiating higher level therapy at the onset to establish prompt control and then stepping down



Stepwise Approach

- Treatment is initiated according to the patient's highest component of severity.

Stepwise Approach



Stepwise Approach

Age	Intermittent Step 1	Mild Persistent Step 2	Moderate Persistent Step 3	Severe Persistent Steps 4-6
0-4 yrs	SABA PRN	Low ICS	Consult Asthma Specialist	Consult Asthma Specialist
5-11 yrs	SABA PRN	Low ICS	Low ICS + LABA, LTRA, or Theophylline OR Medium ICS	Consult Asthma Specialist
12+ yrs	SABA PRN	Low ICS	Low ICS + LABA OR Medium ICS	Consult Asthma Specialist

Best Add-On Therapy Giving Effective Responses (BADGER)

- Asked the question, Which is the best when a child with asthma (5-11 yrs olds) is poorly controlled despite low dose corticosteroid use?
 - ◆ The best response was shown in:
 - ◆ Approximately 40% of the children by adding the LABA
 - ◆ 30% by adding the LTRA
 - ◆ 28% by increasing the dose of ICS.

NEJM. 2010;362:975-985

Allergen Immunotherapy

- May be considered for asthma patients steps 2-4 and/or 5 year to adult:
 - ◆ “When there is clear evidence of a relationship between symptoms and exposure to an allergen to which the patient is sensitive.”
 - ◆ “If use of allergen immunotherapy is elected, it should be administered only in a physician’s office where facilities and trained personnel are available to treat any life-threatening reaction that can, but rarely does, occur.”

Expert Panel Report 3 (EPR-3)

Allergen Immunotherapy

- Mechanisms of Action:
 - ◆ Decreases allergen specific IgE production
 - ◆ Inhibits seasonal rise in allergen-specific IgE
 - ◆ Produces allergen-specific IgG
 - ◆ Decreases organ-specific inflammatory cells

Allergen Immunotherapy

- Demonstrated reduction in asthma symptoms caused by exposure to grass, cat, house-dust mite, ragweed, Cladosporium and Alternaria
- Course of allergy immunotherapy typically 3-5 years' duration
- Should be administered in a physician's office with trained personnel

Expert Panel Report 3 (EPR-3)

Drug Hypersensitivity

- Patients with asthma may be more sensitive to the following medications:
 - ◆ Aspirin/NSAIDs
 - ◆ Anaphylaxis
 - ◆ Nonselective Beta-blockers
 - ◆ Bronchospasm
 - ◆ ACE inhibitors
 - ◆ Cough

Key Education Messages Provided by Clinician



Inhalation Devices

Asthma Devices: Medication Administration



- Correct inhalation technique is important
- AAE Inhalation Device Handouts support your education

Asthma Devices: Medication Administration

Metered dose inhalers (MDIs):

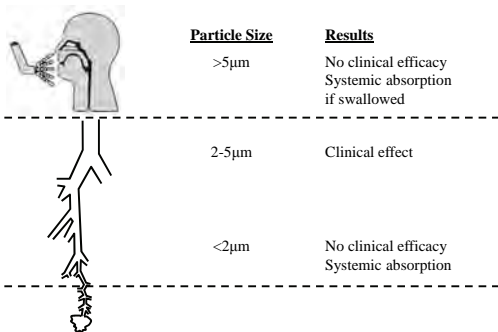
- Closed mouth technique or holding chamber
- Open mouth technique no longer recommend due to new HFA formulation
- Infants and children may use MDIs with a one way valve holding chamber with mask
- Reassess device administration technique at every visit
- Teach patients when to refill MDIs

Asthma Devices: Medication Administration

- One way valve holding chambers:
 - ◆ Available with a mouthpiece
or
 - ◆ Available with facemask in three sizes:
 - ◆ Small for infants
 - ◆ Medium for toddlers
 - ◆ Large teens/adults/elderly



Particle Size and Airway Deposition



Importance of Optimum Inspiratory Flow

Optimum Inspiratory Flow

<u>Device</u>	<u>Optimum Inspiratory Flow</u>
Diskus	30 to 90 L/min
Flexhaler	60 to 90 L/min
Autohaler	30 to 60 L/min
Common MDI	25 to 60 L/min
Aerolizer	25 to 90 L/min
Twisthaler	30 to 60 L/min
Handihaler	20 to 90 L/min

In-Check Dial™



Freeflow

DPI
Flexhaler



MDI
Autohaler

Part Ref: 3109910 - Original In-Check DIAL.
Green Bar info Scale and Chart, and Multi-language booklet (EU)

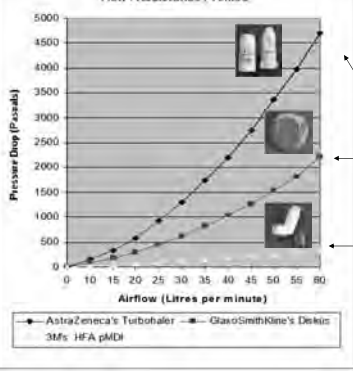
In-Check DIAL help you teach correct technique for several different inhalers



A multiple-use instrument where each patient uses a new, disposable, one-way check valve



Flow / Resistance Profiles



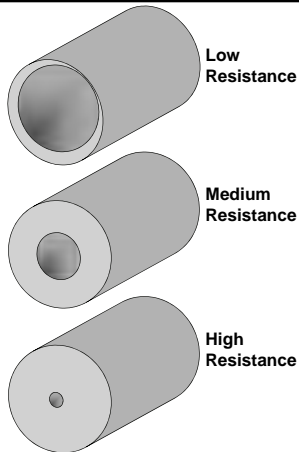
Resistance of 3 Common Inhalers at different flow rates (placebo versions)

Dry powder device

pMDI aerosol "puffer"

Ref: J Bell 2004, data on file: jon@canday.freeserve.co.uk

Imagine the effect when drinking through a straw.....



Common MDI Inhalation Errors

- Failure to exhale fully prior to dose resulting in inadequate volume of inhaled air with lower net dose
- Inhalation too rapid, leading to impaction of drug against pharynx and bifurcations of the airway

EPR3 Specifies IFR and IFT

- IFR= inspiratory flow rate
- IFT= inspiratory flow time

- MDI – 30 LPM for 3-5 seconds (p. 250)
- DPI – 60 LPM for 2-3 seconds (p. 249)

How do you measure IFR & IFT?

Take Time to Check Inhalation

- Asthma therapy hinges on inhalation
- Your patients/families know they have not been adequately trained
- You can bill for this important service – 94664
- See “Inhalation Instructions Guide”

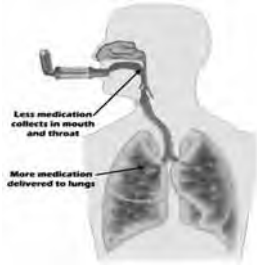
Asthma Devices: Medication Administration

- One way valve holding chambers



Asthma Devices: Medication Administration

- One way valve holding chambers





Asthma Devices: Medication Administration

Dry powder inhalers (DPIs):

- Aerolizer (Foradil)
- Diskus (Advair and Serevent)
- Flexhaler (Pulmicort)
- Twisthaler (Asmanex)
- HandiHaler (Spiriva)=for COPD only

Asthma Devices: Medication Administration

- Dry powder inhalers (DPIs)



Asthma Devices Medication Administration

- Dry Powder Inhalers (DPIs)



Spiriva

Asthma Devices: Medication Administration

- Advantages of dry powder inhalers (DPIs)
 - ◆ No HFA propellant
 - ◆ Improved lung deposition
 - ◆ Eliminates need for holding chamber
 - ◆ Easy to teach/learn administration technique
 - ◆ No need to count doses or guess when the device is empty

Asthma Devices: Medication Administration

- Disadvantages of dry powder inhalers (DPIs)
 - ◆ Can be affected by humid air (should not be stored in the bathroom or allowed to get wet)
 - ◆ Patients will still need another device for quick relief medication
 - ◆ Different administration technique (requires a fast 30-90L/M deep inhalation)

Asthma Devices: Medication Administration

- Nebulizers:
 - ◆ Can be used by patients of all ages
 - ◆ Recommended by the NIH Guidelines for all children under 2 years of age
 - ◆ Teach proper maintenance
 - ◆ Teach proper technique including:
 - ◆ Take deep breaths
 - ◆ Do not use blow-by, use a proper fitting mask or mouthpiece

Asthma Devices: Medication Administration



Pulmicort
Respules



Xopenex Nebulizer
Solution



Albuterol Nebulizer
Solution

Nebulizer With Mask or Mouthpiece



Perceived Advantages and Disadvantages of Nebulized Delivery

Advantages:

- Minimal cooperation needed
- Use while sleeping
- Easy to use when unwell
- Drug to lower resp tract possibly superior to pMDI in uncooperative patients
- Higher doses delivered
- Close facial seal still delivers
- No unpleasant taste
- No propellant
- Fosters confidence

Disadvantages:

- Less portable than pMDI
- More time consuming per dose delivered
- Requires equipment
- Requires power source
- More expensive?
- Requires training
- Variability of delivery

Adapted from: Brownlee KG: Eur Resp Rev 1997;7:177-9

So: What do we know about Nebulizers?

- Delivery of aerosol drugs from Nebs: for some drugs, less variability between machines than between spacers
- In-vitro assessments of Nebs also dependent on test conditions.
- **BOTH** MDI + spacer and Neb in-vivo lung deposition is limited by AGE. All other variables (flow rate, weight of patient etc) related to AGE.
- Under IDEAL conditions, **BOTH** systems make drug AVAILABLE to the patient.

Use Objective Measures of Airflow

Spirometric parameters improve assessment of severity, control, exacerbations and response to therapy (FEV1, FEV1/FVC ratio and PEF). Symptom reports are also useful, but under-estimate the degree of airway obstruction in many individuals. (EPR-3 pg. 43-45)

Pop Quiz (matching)- may use more than once

- 1) Usually normal with asthma _____
- 2) Diagnosis of Asthma _____
- 3) Exacerbation parameter _____
- 3) Assessing control _____
- 4) Best for home monitoring _____

a) FEV1, b) FVC, c) FEV1/FVC, d) PEF

**Key Education Messages
Provided by Clinician**



**Education
For a
Partnership in Care**

Education for a partnership in care

- Provide self management education about
 - ◆ Monitoring asthma
 - ◆ Written asthma action plan
 - ◆ Medication technique
 - ◆ Environmental control

Monitoring Asthma

- Asthma symptoms
- Peak flow

Asthma Symptoms

- Cough
- Wheeze
- Shortness of breath
- Chest tightness

Severe Asthma Symptoms

- Cough, wheeze, shortness of breath, chest tightness worsen
- Trouble walking, talking, thinking
- Hunched shoulders, retractions

Acute Respiratory Failure

■ Initial Signs and Symptoms

- ◆ Elevated respiratory and heart rate
 - ◆ Pulse Paradox
- ◆ Use of accessory breathing muscles
 - ◆ Person often feels short of breath and anxious
- ◆ Alteration of consciousness
- ◆ Clinical setting: ABG abnormalities

1. Calhoun W. Management of Respiratory Failure: The Rising Problem of Asthma; Mechanisms and Management. Chest 1992; 101:410s-414s.
2. Khasnis A, Lokhandwala Y. Clinical signs in medicine: pulse paradoxus. J Postgrad Med 2002;48:46

Risk Factors for asthma-related death

■ Asthma History

- ◆ Previous severe exacerbations (e.g. Intubation, ICU admission)
- ◆ Two or more hospitalization for asthma in the past year
- ◆ Three or more ED visits for asthma in the past year
- ◆ Hospitalization or ED visits for asthma in the past month
- ◆ Using > 2 canisters of SABA per month
- ◆ Difficulty perceiving asthma symptoms or severity of exacerbations
- ◆ Other: Lack of written action plan, Sensitivity to Alternaria (type of mold)

http://www.nhlbi.nih.gov/guidelines/asthma/11_sec5_exacerb.pdf . Fig. 5-2a

Risk Factors for asthma-related death

■ Social History

- ◆ Low socioeconomic status or inner-city residence
- ◆ Illicit drug use
- ◆ Major psychosocial problems

■ Co-morbidities

- ◆ Cardiovascular disease
- ◆ Other chronic lung disease
- ◆ Chronic psychiatric disease

http://www.nhlbi.nih.gov/guidelines/asthma/11_sec5_exacerb.pdf . Fig. 5-2a

Asthma Symptom Zones

- **Green Zone**
 - ◆ Goals of asthma therapy met
- **Yellow Zone**
 - ◆ Cough, wheeze, shortness of breath, chest tightness
- **Red Zone**
 - ◆ Cough, wheeze, shortness of breath, chest tightness worsen
 - ◆ Trouble walking, talking, thinking
 - ◆ Hunched shoulders, retractions

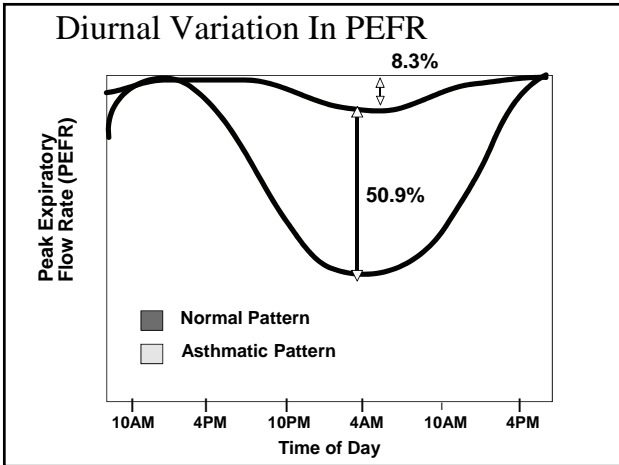
Peak Flow Monitoring

- May be useful for patients with
 - ◆ Moderate to severe asthma
 - ◆ Severe exacerbations
 - ◆ Poor perceivers

Role of Peak Flow Monitoring in Monitoring Asthma



- Provides objective data to assist care provider
- Documents personal best and flow variability
- Detects deterioration in control
- Indicates the need for increasing or decreasing medications
- Aids in trigger identification



Peak Flow Monitoring

- Measure first reading in the morning BEFORE medications
- Second reading, if needed at dinner time
- If Peak flow low, recheck 15-20 minutes after taking quick reliever medication to assess change
- Keep Peak flow and symptom diary

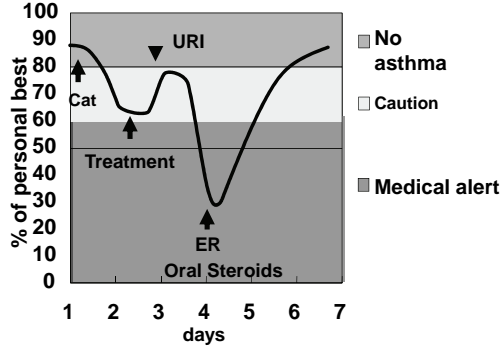
Terminology

- **PERSONAL BEST:** The best number the patient is able to achieve when well. Developed over a 2 - 3 week period.
- **PREDICTED/EXPECTED:** Corresponds to a chart of people without asthma. Based on height, age and sex.
- **ACTUAL:** The number achieved after blowing into peak flow meter.

Peak Flow Zones

- **Green Zone**
 - ◆ 80 - 100% of personal best or predicted
- **Yellow Zone**
 - ◆ 50 - 80% of personal best or predicted
- **Red Zone**
 - ◆ < 50% of personal best or predicted

Zone System for Monitoring Changes in PEF



How To Use a Peak Flow Meter

- Move indicator to base of PFM
- Stand up straight and take a deep breath
- Place mouth tightly around mouthpiece
- Blow out as fast and as hard as you can
- The number opposite indicator is the actual PEF
- Repeat above steps for a total of three times
- Document the highest of the three readings

Pitfall To Peak Flow Use

- Poor effort
- Inadequate seal around mouthpiece
- Hand placement (can interfere with indicator or occlude air outlet port)
- “Coughing” or “spitting” into the peak flow meter

Spirometry vs. Peak Flow Meter

- Spirometer is used for DIAGNOSING and monitoring
- Peak Flow Meter is used for MONITORING only!
 - ◆ Measures only large airway function
 - ◆ No graphic display or printout available
 - ◆ No regular calibration

Written Asthma Action Plan

- Manage asthma every day
- Manage asthma with increased asthma symptoms and/or decreases in peak flow

Asthma Action Plan

- **Green Zone**
 - ◆ Goals of asthma therapy met
 - ◆ 80 - 100% of personal best or predicted
- **Yellow Zone**
 - ◆ Cough, wheeze, shortness of breath, chest tightness
 - ◆ 50 -80% of personal best or predicted
- **Red Zone**
 - ◆ Cough, wheeze, shortness of breath, chest tightness worsen
 - ◆ Trouble walking, talking, thinking
 - ◆ Hunched shoulders, retractions
 - ◆ < 50% of personal best or predicted

Written Asthma Action Plan Should Include:

- Medicines, dose, frequency and duration
- Monitoring- symptoms and/or PEF
- Guidelines for changes in medication based upon monitoring
- When to seek emergency care
- How to seek emergency care

Provider + patient + Family Partnership: Written Asthma Care Plan



- Specifies long-term control medications and quick relief medications
- How and when to take them (by symptom monitoring and/or peak flow)

Managing an Asthma Exacerbation

- Home
 - ◆ 4-8 puffs of albuterol with spacer by MDI or nebulized treatment
 - ◆ Repeat in 20 minutes
- Poor response
 - ◆ Call health care provider and proceed to ED or call 911

Managing an Asthma Exacerbation

- Emergency Department
 - ◆ Objective assessment of symptoms
 - ◆ 4-8 puffs of albuterol with spacer by MDI or nebulized treatment
 - ◆ Repeat at 20 minute intervals three times
 - ◆ Combination albuterol and ipatropium may be used instead, repeat at 20 minute intervals three times or continuously
 - ◆ Oral corticosteroid burst

Asthma Symptom Diary

- Symptoms
- Precipitating factors
- Interventions (medications)
- Response to interventions
- Bring to follow-up appointments

Assessment of Asthma Control

- Asthma Control Test (ACT)
 - ◆ <http://www.asthmacontrol.com>
- Asthma Control Questionnaire (ACQ)
 - ◆ <http://www.qoltech.co.uk/acq.html>
 - ◆ Used mostly in research
- Asthma Therapy Assessment Questionnaire (ATAQ)
 - ◆ <http://www.asthmacontrolcheck.com>

Asthma Therapy Assessment Questionnaire



<http://www.asthmacontrolcheck.com>

Asthma Control Questionnaire

Table 1. Asthma Control Questionnaire¹⁹

1. On average, how often do you wake up at night because of your asthma during the night?	0 Never 1 Hardly ever 2 A few times 3 Several times 4 Many times 5 A great many times 6 Usually every weekend or during of waking	4. In general, during the past week, how much sleep have all family members had because of your asthma?	0 None 1 A very little 2 A little 3 A moderate amount 4 Quite a bit 5 A great deal 6 A very great deal
2. On average, during the past week, how bad were your asthma symptoms when you woke up in the morning?	0 No symptoms 1 Very mild symptoms 2 Mild symptoms 3 Moderate symptoms 4 Quite severe symptoms 5 Severe symptoms 6 Very severe symptoms	5. In general, during the past week, how much do you suffer from "wheezing"?	0 Never 1 Hardly any of the time 2 A little of the time 3 A moderate amount of the time 4 A lot of the time 5 Most of the time 6 All the time
3. In general, during the past week, how limited were you in your activities because of your asthma?	0 Not limited at all 1 Very slightly limited 2 Slightly limited 3 Moderately limited 4 Very limited 5 Extremely limited 6 Totally limited	6. On average, during the past week, how many puff inhalations of short-acting beta ₂ -agonists (e.g., albuterol) have you used each day?	0 None 1-2 puff inhalations most days 2-4 puff inhalations most days 5-8 puff inhalations most days 9-12 puff inhalations most days 13-16 puff inhalations most days 17 more than 16 puff inhalations most days

Ann Fam Med 2008;6(suppl 1):s16-s22.

Barriers to Learning and Adherence

- Socioeconomic issues
- Financial
- Cultural differences
- Educational level
- Language barriers
- Lack of understanding regarding chronicity of disease

Barriers To Learning and Adherence

- Complete resolution of symptoms between attacks
- Poor understanding of long term consequences of uncontrolled disease
- Poor understanding of role of medications
- Safety concerns regarding treatment

Barriers To Learning and Adherence

- Complex treatment regimens
- Lack of knowledge and skills
- Psychological factors
- Lack of partnership
- Patient and family not ready to change management of disease

Adherence Can Be Increased

- If the patient believes that he/she is at risk.
- If the patient believes that the treatment is safe.
- If the patient feels in control.
- If there is good communication between patient and health care professional.

Encourage Adherence

- Promote open communication
- Elicit concerns, perceptions, and unresolved questions
- Assess patient and family perceptions of the severity level of the disease
- Assess the level of social support
- Encourage family involvement
- Identify barriers/ supports to adherence

Encourage Adherence

- Agree on goals for therapy
- Clarify patient expectations and address concerns at each visit
- Simplify the treatment plan
- Provide written instructions--review daily self-management vs. acute care
- Observe patient's inhaler and peak flow meter techniques
- Reinforce patient's efforts

Developing An Active Partnership in Care

- Open Communication
- Agreement on goals/expectations of treatment
- JOINT development of treatment plan
- Encouragement of family efforts to control asthma



Key Education Messages Provided by Clinician

Resources

- Guidelines for the Diagnosis and Management of Asthma Expert Panel Report 3, 2007, may be read and downloaded from www.nhlbi.nih.gov/guidelines/asthma
- Guidelines: Global Strategy for Asthma Management and Prevention may be read and downloaded from www.ginasthma.com
- Environmental Protection Agency: www.epa.gov/asthma

Case Studies



Association of Asthma Educators

- Thanks for attending Becoming An Asthma Educator and Care Manager
- Visit us at:
 - ◆ www.asthmaeducators.org



Priming and Care Guide for Corticosteroid and Combination Product Controller Asthma Inhalational Devices

Medication	Type	Priming	Cleaning/Storage	When to discard
Advair™	Diskus, DPI	No priming necessary.	Wipe mouthpiece with dry cloth	Built in counter: numbers turn red when 5 doses left. Discard 1 month after pouch opened or counter shows "0".
Advair™	HFA, MDI	New: 4 test sprays away from face shaking well for 5 seconds before each spray. If not used for more than 4 weeks or if dropped; shake for 5 seconds, spray twice into the air.	Remove mouthpiece cap. Clean circular opening where medication comes from with dry cotton swab. Gently twist swab to remove any medicine. Wipe inside of mouthpiece with damp tissue and allow to dry. Do not remove canister from actuator. Store inhaler in an upright position.	Count doses.
Alvesco™	HFA, MDI	No shaking necessary. New or when not used for 10 days: 3 test sprays	Wipe mouthpiece with dry cloth. Store inhaler in an upright position.	Built in counter moves every 10 doses. Discard when counter shows "0" or by expiration date.
Aerospan™	HFA, MDI	Before 1 st dose and not used for 2 wks: 2 test sprays	No cleaning is required	Count doses.
Asmanex™	Twisthaler, DPI	No Priming necessary.	Wipe mouthpiece with dry cloth.	Built in counter; cannot remove cap when empty. Discard 45 days after pouch open or counter shows "0".
Dulera™	HFA, MDI	Before 1 st dose and not used for 5 days: 4 test sprays	Dry wipe mouthpiece every 7 days	Built in counter.
Flovent™	Diskus, DPI	No priming necessary.	Wipe mouthpiece with dry cloth.	Built in counter: numbers turn red when 5 doses left. Discard 6 weeks after pouch open or counter shows "0".
Flovent™	HFA, MDI	New: 4 test sprays away from face shaking well for 5 seconds before each spray. Not used for more than 7 days or if dropped; shake well for 5 seconds before each spray and release 1 test spray. When new only: Hold upright, twist and click brown grip at bottom two times.	Remove mouthpiece cap. Clean circular opening where medication comes from with cotton swab dampened with water. Gently twist swab to remove any medicine; repeat with a clean, damp swab to remove any medicine still at the opening. Wipe inside of mouthpiece with damp tissue and allow to dry. Do not remove canister from actuator.	Built in counter.
Pulmicort™	Flexhaler, DPI	When new only: Hold upright, twist and click brown grip at bottom two times.	Wipe mouthpiece with dry cloth.	Built in counter.
Qvar™	HFA, MDI	New and when not used for 10 days: 2 test sprays.	Clean sleeve weekly by running water through, allow to dry before using. Store inhaler in an upright position.	Count doses.
Symbicort™	HFA, MDI	New, not used for 7 days, or if dropped: Two test sprays, shaking well before each spray.	Wipe inside and outside of mouthpiece with clean, dry cloth. Do not take inhaler apart.	Built in counter. Discard 3 months after taken out of foil pouch.

Priming and Care Guide for Reliever/Rescue Asthma Inhalational Devices

Medication	Type	Priming	Cleaning/Storage	When to discard
Maxair™	Breath Actuated, MDI	New and not used for 48 hours: Push lever up. Push white test fire slide on bottom of the mouthpiece in direction of arrow to release a spray away from face. Return lever to down position. Repeat this once.	At least once per week: Remove cover. Turn autohaler upside down. Wipe mouthpiece with dry cloth. Visualize spray hole by tapping back of inhaler. Clean surface of the flap and spray hole with dry cotton swab. Store inhaler in an upright position.	Count doses.
ProAir™	HFA, MDI	New and when not used for 2 weeks: 3 test sprays into air away from face.	Clean sleeve weekly with warm water, shake, allow to dry before using.	Count doses.
Proventil™	HFA, MDI	New and when not used for 2 weeks: 4 test sprays.	Clean sleeve weekly by running water through, allow to dry before using.	Count doses.
Ventolin™	HFA, MDI	New, not used for 14 days or if dropped. Shake well, 4 sprays away from face.	Clean sleeve weekly by running water through, allow to dry before using.	Dose counter in newest device; If not present, count doses. Discard 6 months after taken out of foil pouch.
Xopenex™	HFA, MDI	New and when not used for 3 days: Shake well and release 4 test sprays.	Clean sleeve weekly by running water through, allow to dry before using.	Count doses.

Priming and Care Guide for Miscellaneous Inhalation Devices

Medication	Type	Priming	Cleaning/Storage	When to discard
Foradil™	DPI	Place a capsule in the well of the Aerolizer, then press and release the buttons on the side of the device. This will pierce the capsule.	No cleaning is required	When capsules are finished discard Aerolizer.
Atrovent™	HFA, MDI	New and not used for 3 days: 2 test sprays away from face.	Clean sleeve weekly with warm, running water; allow to completely dry before using.	Count doses.
Combivent™	CFC, MDI	New and when not used for 24 hours: Shake vigorously for 10 seconds; release 3 test sprays away from face.	Clean sleeve weekly with warm, running water; allow to completely dry before using.	Count doses.
Serevent™	Diskus, DPI	No priming necessary.	Wipe mouthpiece with dry cloth.	Built in counter: numbers turn red when 5 doses left.

In-Check™ DIAL

Now health care professionals can quickly help patients achieve optimal delivery from MDIs and DPIs with the In-Check™ DIAL.



“The In-Check Dial is a useful tool in teaching proper technique and monitoring the patient’s ability to correctly use inhalation devices.”¹

“Results of these studies consistently showed lack of skill in using metered-dose inhalers, spacers and dry powered inhalers by a majority of health care professionals.”²



This accurate low-range inspiratory flow meter simulates the air flow resistance of the most popular inhalers. It enables clinicians to train patients to use more or less inspiratory force, to achieve their optimal flow rate with a particular MDI or DPI device. This provides best deposition of medication into the lungs.

- Identifies the inhaler type and corresponding optimal flow rate
- Trains patients to achieve optimal flow rates in a matter of minutes
- Ideal for children or adults having difficulty achieving optimal flow rates
- One-way valved mouthpiece is adaptable for adult or pediatric use
- The one-way valved mouthpiece protects both the dial and the next patient

With the In-Check DIAL you can quickly identify whether your patient has the correct technique for their device to achieve their optimal flow rate.

¹ Journal of Asthma, 44:209-212, 2007
ISSN: 0227-0903, Vol 44, No. 3, April 2007

² Journal of Asthma, 44:593-598, 2007
ISSN: 0227-0903, Vol 44, No. 8, October 2007



Alliance Tech Medical, Inc.™

www.alliancetechmedical.com

Disposable Mouthpieces

Economical and convenient. Reduce risk of cross-infection, helping to protect patient and equipment of contamination. One-way valve mouthpieces are available for expiratory and inspiratory use.

Filters

Provide protection against possible cross-infection helping to protect patient and equipment.



Accuracy

Every In-Check DIAL is individually calibrated to ensure a high degree of accuracy. Inspiratory flows in the range of 15 L/min to 120 L/min can be measured. The In-Check Dial is accurate to +/- 10% or 10 L/min (whichever is greater).

The In-Check DIAL has been tested by AEA Technology P.L.C. in the U.K. for accuracy, and has been verified as providing similar resistances to inhaler devices.

The In-Check DIAL has been calibrated using an ATS pulmonary waveform generator. In-Check DIAL complies with the AS/NZS standard for back pressure in flow meters.



Cleaning

The In-Check DIAL should be cleaned by washing in warm soapy water, rinsed and dried thoroughly.

The In-Check DIAL is a hand held inspiratory flow measurement device with a dial top. The DIAL orifices have been designed to stimulate the resistance of popular inhaler devices such as MDI's, DPI's, Turbuhaler® and Diskus®. Custom resistance adapters are available by calling Alliance Tech Medical.

The In-Check DIAL is supplied with a sterilizable plastic mouthpiece and an adapter which enables you to use a pediatric mouthpiece if necessary.

The transparent body permits a visual inspection before use, and if required, one-way disposable mouthpiece or a bacterial/viral filter can be used to minimize the risk of cross infection.

Ordering Information

Product	Order #	Description/Quantity	NHRIC#
In-Check DIAL	3109912	each	3 8462109912 5
HandiHaler	3103859	Resistance Adapter - each	3 8462109859 3
Aerolizer	3109783	Resistance Adapter - each	3 8462109783 1
Disposable Mouthpieces	3122200	Adult - 100/bag	3 8462122200 4
	3123200	Pediatric - 100/bag	3 8462123200 3
	3122061	One-way inspiratory - 100/box	3 8462123200 3
	3122069	One-way inspiratory - 200/box	3 8462122069 7
	3122065	One-way inspiratory - 500/box	3 8462122065 9
Filters	5551000	each	3 8462551000 8
Disposable Adapters	3122120	Pediatric/Small Mouth Adult bag of 20	3 8462122120 5
	3122220	Pediatric/Small Mouth Adult box of 100	3 8462122220 2
Startup Kit	3579912	In-Check DIAL Device, Mouthpiece, Foradil Adapter, HandiHaler Adapter, Small Mouth Adapter, Video	3 8462579912 0

Distributed by:

PO Box 6024
 Granbury, TX 76049
 1.800.848.8923 / 512.446.5320
 Fax: 512.446.9849

Eastern Office: 302.838.2638
 Central Office: 630.910.0993
 Southern Office: 817.326.3183
 Western Office: 661.588.5102



Alliance Tech Medical, Inc.™

www.alliancetechmedical.com