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Elaine Rosenblatt, MSN, FNP-BC – Unity Health Insurance
Tami Towne – Unity Health Insurance
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Committee Approvals/Dates:
Respiratory Care Committee (07/14/15)
Clinical Knowledge Management (CKM) Council (07/23/15)

Release Date: July 2015

Expiration Date: July 2017
Executive Summary
Guideline Overview
UW Health has agreed to endorse the 2015 Global Initiative for Asthma (GINA) Global Strategy for Asthma Management and Prevention Guideline (accessed 5/15/15).1

Key Practice Recommendations & Companion Documents
UW Health supports the following key recommendations summarized from GINA1, in addition to those recommendations found within the 2015 GINA quick-reference pocket guides available online (accessed on 5/15/15):
- GINA Pocket Guide for Asthma Management and Prevention (Age 6 or older)
- GINA Pocket Guide for Asthma Management and Prevention (Age 5 or younger)

WHAT IS ASTHMA?
Asthma is a chronic inflammatory disorder of the airways which causes symptoms of wheezing, shortness of breath, tightness in the chest, and cough that may vary in frequency and over time.

ESTABLISHING A DIAGNOSIS
It is recommended to complete a medical history to establish respiratory symptoms, as well as lung function testing using spirometry or peak expiratory flow (PEF) (see Figure 1). A diagnosis of asthma may be made after consideration of a patient’s history and whether the patient exhibits variable expiratory airflow limitations (i.e., difficulty exhaling due to bronchoconstriction, airway wall thickening, and increased mucus).

Figure 1. Summary of Diagnostic Steps

Common Characteristics of Asthma:
- Symptoms of wheezing, shortness of breath, chest tightness, or cough
- Symptoms occur or worsen at night
- Symptoms may be triggered by exercise, infection, allergens, changes in weather, or emotions/hormonal changes

Patient presents with respiratory symptoms
Perform detailed medical history/examination
Symptoms consistent with asthma?
Yes
Perform lung function testing (spirometry or PEF)
Results support diagnosis of asthma?
Yes
Asthma diagnosis
No
Consider alternative diagnosis (outside guideline scope)
No
No

1. GINA (Global Initiative for Asthma) is an international initiative to improve the management and control of asthma.
PROVIDING TREATMENT AND ASSESSMENT

The goals of asthma treatment include:

- Prevention of chronic asthma symptoms and asthma exacerbations;
- Maintenance of normal activity levels;
- Patient satisfaction with asthma care and quality of life (i.e., having normal or near normal lung function, experiencing no or minimal side effects).

Asthma treatment should follow a repeating pattern of assessment of control, adjustment of treatment, and review of response to the treatment.

Assessment

An age-appropriate questionnaire should be used to help determine asthma control and efficacy of the treatment plan. It is recommended to assess asthma control at least annually.

- Asthma Control Test (ACT) for patients age 12 years or older.
- Childhood Asthma Control Test (cACT) for patients age 6-11 years.
- Test for Respiratory and Asthma Control in Kids (TRACK) for patients age 5 years or younger.

Treatment

The age-differentiated Stepwise Approach to Control should be used to guide the prescription of asthma medication (controllers and rescue). A full listing of medications available in the United States is summarized in the Asthma Rescue and Controller Medication Table, and dosing options for inhaled corticosteroids are available in the Asthma Medication Dosing Table.

All patients should have a written asthma action plan, which should include:

- A list of medications and a description of how to use them
- Environmental triggers

Patients age 18 years or older with uncontrolled severe-persistent asthma, despite use of recommended therapeutic regimens and referral to an asthma specialist (Step 5) may be candidates for a non-pharmacological intervention of Bronchial Thermoplasty.
**Review Response**

It is recommended that patients be seen every 1-3 months after initiating treatment and every 3-12 months thereafter.

Patients should be seen by the provider managing their asthma within 1 week following an exacerbation to re-evaluate the patient compliance and treatment plan efficacy.

**MANAGING ASTHMA EXACERBATIONS**

Asthma exacerbations are acute or subacute episodes of progressively worsening asthma symptoms (i.e., shortness of breath, coughing, wheezing, chest tightness).

Treatment algorithms should be followed to guide exacerbation management within the outpatient, emergency department, and inpatient settings:

- **Asthma Exacerbation- Primary Care Algorithm**
- **Asthma Exacerbation- Emergency Department (Pediatric) Algorithm**
- **Asthma Exacerbation- Inpatient (Pediatric) Algorithm**
- **Asthma Exacerbation- Emergency Department (Adult) Algorithm**
- **Asthma Exacerbation- Inpatient (Adult) Algorithm**

The severity of an asthma exacerbation in pediatric patients (age 12 months to 17 years) presenting in the ED or inpatient setting should be assessed using the modified Pediatric Asthma Severity Score (mPASS) (Figure 2). The mPASS is an internally developed assessment tool based upon the Pediatric Asthma Severity Score (PASS).²

**Figure 2. Modified Pediatric Asthma Severity Score (mPASS)**

<table>
<thead>
<tr>
<th>POINTS</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Respiratory Rate</strong></td>
<td>Infant (0-1 yr.) &lt; 50</td>
<td>Normal</td>
<td>Above tachypnea threshold</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Child (2-9 yrs.) &lt; 40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adolescent (10-17 yrs.) &lt; 20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Accessory Muscle Use</strong></td>
<td>None</td>
<td>Suprasternal/sub-costal/intercostal retractions or nasal flaring</td>
<td>Neck or abdominal muscles (belly breathing)</td>
<td></td>
</tr>
<tr>
<td><strong>Air Exchange</strong></td>
<td>Normal</td>
<td>Decreased in single lung field</td>
<td>Decreased in multiple lung fields</td>
<td></td>
</tr>
<tr>
<td><strong>Wheezing</strong></td>
<td>None or end expiratory only</td>
<td>Entire expiration</td>
<td>Expiration &amp; inspiration or if no wheezing heard due to poor air entry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Normal ( ≤ 1:2)</td>
<td>Prolonged ( ≥ 1:3)</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td><strong>Coughing</strong></td>
<td>None</td>
<td>Infrequent (Occasional)</td>
<td>Frequent (Consistent)</td>
<td>TOTAL POINTS</td>
</tr>
</tbody>
</table>
Companion Documents
1. GINA Pocket Guide for Asthma Management and Prevention (Age 6 or older)
2. GINA Pocket Guide for Asthma Management and Prevention (Age 5 or younger)
3. GINA Appendices to the Global Strategy for Asthma Management and Prevention

Related UW Health Clinical Practice Guidelines
1. Aerosolized Respiratory Medications – Pediatric/Adult – Inpatient Guideline
2. Omalizumab – Pediatric/Adult – Ambulatory Guideline

Pertinent UW Health Policies & Procedures
1. UWHC Policy 1.53: Respiratory Care Protocol
2. UWHC Policy 2.25: Inhaler Medication Treatment

Patient Resources
1. HFFY #3028: About Asthma
2. HFFY #3171: Severe Asthma Packet
3. HFFY #6129: Adult and Pediatric Asthma Treatment Plan
4. HFFY #4815: Asthma- How to Use Your Spacer
5. HFFY #5122: Asthma and Pregnancy
6. HFFY #6844: Asthma Controller Medicine (Combined Medicines)
7. HFFY #6657: Asthma Controller Medicine Inhaled Corticosteroids
8. HFFY #6843: Asthma Controller Medicine Inhaled Corticosteroids: Respiratory
9. HFFY #6662: Asthma Controller Medicine Leukotriene Modifiers
10. HFFY #6661: Asthma Medicine Oral Corticosteroids
11. HFFY #6660: Asthma Rescue Medicine
12. HFFY #4506: Exercise-Induced Asthma or Bronchospasm in Children
13. HFFY #5125: How to Manage an Asthma Flare or Attack
14. HFFY #6659: Internet Websites for Allergy/Asthma Information
15. HFFY #4300: What is Asthma?
16. HFFY #5121: What is Asthma?
17. HFFY #5040: Corticosteroids (Inhalation) (with or without Long Acting Beta-Agonist)
18. HFFY #5020: Your Peak Flow Meter
19. Healthwise: Asthma: Adult
20. Healthwise: Asthma: General Info
21. Healthwise: Asthma: Pediatric
22. Healthwise: Asthma: Pediatric: 0 to 4 Years
23. Healthwise: Asthma: Pediatric 5 to 11 Years
24. Healthwise: Asthma: Pediatric: 12 Years and Older
25. Healthwise: Asthma: Teen
26. Healthwise: Asthma Attack
27. Healthwise: Asthma Attack: Pediatric
28. Healthwise: Asthma Triggers: General Info
29. Healthwise: Asthma Triggers: Pediatric: General Info
32. Healthwise: Asthma: Asthma Control
33. Healthwise: Asthma: Asthma Control: Pediatric
34. Healthwise: Asthma: Metered-Dose Inhaler With A Mask Spacer: Pediatric
36. Healthwise: Asthma: Using a Dry Powder Inhaler
37. Healthwise: Asthma: Using a Metered-Dose Inhaler
38. Healthwise: Asthma: Using a Metered-Dose Inhaler: Teen
39. Healthwise: Wheezing or Bronchoconstriction
40. Health Information: Asthma
41. Health Information: Asthma Action Plan
42. Health Information: Asthma Action Plan: Green Zone
43. Health Information: Asthma Action Plan: Yellow Zone
44. Health Information: Asthma Action Plan: Red Zone
45. Health Information: Asthma and GERD
46. Health Information: Asthma and Vocal Cord Problems
47. Health Information: Asthma and Wheezing
48. Health Information: Asthma Attack
49. Health Information: Asthma Diary
50. Health Information: Asthma During Pregnancy
51. Health Information: Asthma in Children
52. Health Information: Asthma in Children: Helping a Child Use A Metered-Dose Inhaler and Mask Spacer
53. Health Information: Asthma in Children: Knowing How Bad an Attack Is
Scope
Disease/Condition(s): Asthma

Clinical Specialty: Pulmonary, Allergy, Family Medicine, Internal Medicine, Pediatrics, Hospitalists, Respiratory Therapy, Emergency Medicine

Intended Users: Physicians, Advanced Practice Providers, Respiratory Therapists, Registered Nurses, Pharmacists, Asthma Educators

CPG objective(s): To provide evidence-based recommendations for the management of asthma across age groups and clinical settings.

Target Population: Any pediatric (0-11 years), adolescent (12-17 years), or adult (18 years or older) patient diagnosed with asthma.

Guideline Metrics:
Inpatient Quality Reporting
CAC-1 Use of Relievers for Inpatient Asthma
CAC-2 Use of Systemic Corticosteroids for Inpatient Asthma
CAC-3 Home Management Plan of Care Given to Patient/Caregiver

CPG-derived
1. Percentage of asthma patients with a completed asthma action plan
2. Percentage of asthma patients with a measurement of control (i.e., ACT score, outpatient use of systemic corticosteroids)
3. Percentage of adult patients with asthma and a lung function test within the last year
4. Attendance rates to follow-up appointments following discharge from the hospital or emergency department.
Methodology
The GINA guideline\(^1\) was produced using the standard methodology of the GINA Science Committee outlined on page vi of the full guideline [http://www.ginasthma.org].

Rating Scheme for the Strength of the Evidence/Recommendations:

<table>
<thead>
<tr>
<th>Sources of evidence</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Randomized controlled trials (RCTs) and meta-analyses. Rich body of data. Evidence is from endpoints of well designed RCTs or meta-analyses that provide a consistent pattern of findings in the population for which the recommendation is made. Category A requires substantial numbers of studies involving substantial numbers of patients.</td>
</tr>
<tr>
<td>B</td>
<td>Randomized controlled trials (RCTs) and meta-analyses. Limited body of data. Evidence is from endpoints of intervention studies that include only a limited number of patients, post hoc or subgroup analysis of RCTs or meta-analysis of such RCTs. In general, Category B pertains when few randomized trials exist, they are small in size, they were under-taken in a population that differs from the target population of the recommendation, or the results are somewhat inconsistent.</td>
</tr>
<tr>
<td>C</td>
<td>Nonrandomized trials. Observational studies. Evidence is from outcomes of uncontrolled or non-randomized trials or from observational studies.</td>
</tr>
<tr>
<td>D</td>
<td>Panel consensus judgement. This category is used only in cases where the provision of some guidance was deemed valuable but the clinical literature addressing the subject was insufficient to justify placement in one of the other categories. The Panel Consensus is based on clinical experience or knowledge that does not meet the above listed criteria.</td>
</tr>
</tbody>
</table>

Cost Analysis: An analysis was completed by the UW Health Drug Policy Program to compare the inpatient and emergency department cost for an inhaler vs. nebulized treatment.
- Inhaler (Ventolin): 60 actuations, 90mcg per puff = $16.50
- Neb: 2.5mg/3mL = $0.20 per neb

Introduction
Asthma is a chronic inflammatory disorder of the airways. In susceptible individuals, this inflammation causes recurrent episodes of coughing (particularly at night or early in the morning), wheezing, breathlessness, and chest tightness. These episodes are usually associated with widespread but variable airflow obstruction that is often reversible either spontaneously or with treatment. The goals of asthma therapy are to prevent chronic asthma symptoms and asthma exacerbations, maintain normal activity levels, have normal or near normal lung function, experience no or minimal side effects and have patient satisfaction with asthma care.
Recommendations

UW Health endorses the recommendations outlined within the 2015 GINA Guideline\(^1\) located online at http://www.ginasthma.org/documents/4 (accessed on 5/15/15).


UW Health Implementation

Implementation Plan/Tools
1. Guideline will be housed on U-Connect in a dedicated folder for CPGs and advertised in the CKM Corner of the Best Practice newsletter.
2. Links to this guideline will be updated and/or added in appropriate Health Link or equivalent tools, including:

Order Sets and Smart Sets
Allergic Rhinitis/Asthma/Conjunctivitis [72]  
Allergy Asthma [3199]  
Asthma ACHC [147]  
Asthma/Wheezing [99]  
Injection- Acute Allergic Reaction/Steroids/Asthma [173]  
Ped Allergy Asthma [3284]  
Ped Pulmonary Asthma [2534]  
IP – Asthma Exacerbation – Pediatric – Admission [997]

Delegation Protocols
Asthma or Recurrent Wheezing – Pediatric – Inpatient [3]  
Respiratory Therapy Treatment – Adult/Pediatric – Inpatient [70]  
Spirometry Ordering – Adult/Pediatric – Allergy [104]

e-Consults
Asthma [5655]  
Shortness of Breath [5664]

Disclaimer
CPGs are described to assist clinicians by providing a framework for the evaluation and treatment of patients. This Clinical Practice Guideline outlines the preferred approach for most patients. It is not intended to replace a clinician’s judgment or to establish a protocol for all patients. It is understood that some patients will not fit the clinical condition contemplated by a guideline and that a guideline will rarely establish the only appropriate approach to a problem.

References
### Stepwise Approach to Asthma Symptom Control

#### ASSESS
- Diagnosis
- Symptom control + risk factors
- Inhaler technique + adherence
- Parent or patient preferences

#### REVIEW RESPONSE
- Symptoms and side effects
- Exacerbations
- Parent or patient preferences
- Lung function

#### ADJUST TREATMENT
- Asthma medications
- Non-pharmacological interventions
- Treat modifiable risk factors

#### RESCUE
Prefered: PRN Short-acting Beta₂-agonist (SABA)

- Consider stepping up if uncontrolled symptoms, exacerbations or risks. Always evaluate diagnosis, inhaler technique, and adherence before making therapy changes.
- Consider stepping down if symptoms controlled for 3 months and low risk for exacerbations. Ceasing ICS is not advised.

#### STEP 1
**All Ages**
- Preferred: Low dose ICS
- Alternatives: LTRA or intermittent ICS

**Age 0-5 yrs.**
- Preferred: Low dose ICS
- Alternatives: LTRA or intermittent ICS

**Age 6-11 yrs.**
- Preferred: Low dose ICS
  - Alternatives: LTRA

**Age > 12 yrs.**
- Preferred: Low dose ICS
  - Alternatives: LTRA or theophylline

#### STEP 2
**All Ages**
- Preferred: Low dose ICS
- Alternatives: LTRA or intermittent ICS

**Age 0-5 yrs.**
- Preferred: Low dose ICS
  - Alternatives: LTRA or intermittent ICS

**Age 6-11 yrs.**
- Preferred: Low dose ICS
  - Alternatives: LTRA or intermittent ICS

**Age > 12 yrs.**
- Preferred: Low dose ICS
  - Alternatives: LTRA or theophylline

#### STEP 3
**Age 0-5 yrs.**
- Preferred: Double low dose ICS
  - Alternative: Add LTRA

**Age 6-11 yrs.**
- Preferred: Medium dose ICS or Low dose ICS + LABA
  - Alternative: Low dose ICS + LTRA

**Age > 12 yrs.**
- Preferred: Low dose ICS + LABA
  - Alternatives: Medium dose ICS or Low dose ICS + LTRA + theophylline or add tiotropium*

#### STEP 4
**Age 0-5 yrs.**
- Preferred: Refer to asthma specialist
  - Alternatives: Add LTRA or increase ICS frequency or add intermittent ICS

**Age 6-11 yrs.**
- Preferred: Refer to asthma specialist
  - Alternative: Omalizumab

**Age > 12 yrs.**
- Preferred: Refer to asthma specialist
  - Alternatives: Add tiotropium* or omalizumab or bronchial thermoplasty*

#### STEP 5
**Age 0-5 yrs.**
- Preferred: Refer to asthma specialist

**Age 6-11 yrs.**
- Preferred: Refer to asthma specialist
  - Alternative: Omalizumab

**Age > 12 yrs.**
- Preferred: Refer to asthma specialist
  - Alternatives: Add tiotropium* or omalizumab or bronchial thermoplasty*

---

*For adult patients only. Not indicated or recommended for patients younger than 18 years.*
Asthma Medications - Low, Medium and High Doses of Inhaled Corticosteroids

This table provides an estimate of comparative daily doses for inhaled corticosteroids administered to children and adults with asthma. It may be used in conjunction with the Stepwise Approach to Asthma Symptom Control found within the Asthma Guideline.

<table>
<thead>
<tr>
<th>Medication</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Child (≤ 5 yrs.)</td>
<td>Child (6-11 yrs.)</td>
<td>Adult (≥ 12 yrs.)</td>
</tr>
<tr>
<td>Beclomethasone HFA</td>
<td>100</td>
<td>50-100</td>
<td>80-240</td>
</tr>
<tr>
<td>Budesonide DPI</td>
<td>200</td>
<td>100-200</td>
<td>180-540</td>
</tr>
<tr>
<td>Budesonide (nebule)</td>
<td>250-500</td>
<td>250-500</td>
<td>NA</td>
</tr>
<tr>
<td>Ciclesonide HFA</td>
<td>160</td>
<td>80</td>
<td>80-160</td>
</tr>
<tr>
<td>Flunisolide HFA</td>
<td>NA</td>
<td>160</td>
<td>320</td>
</tr>
<tr>
<td>Fluticasone HFA</td>
<td>100</td>
<td>100-200</td>
<td>44-264</td>
</tr>
<tr>
<td>Fluticasone DPI</td>
<td>NA</td>
<td>100-200</td>
<td>100-300</td>
</tr>
<tr>
<td>Momentasone DPI</td>
<td>NA</td>
<td>110</td>
<td>110-220</td>
</tr>
</tbody>
</table>

Last reviewed/revised: 07/2015
Contact CCKM or Drug Policy Program for revisions.
Asthma – Pediatric/Adult – Inpatient/Ambulatory Guideline

References:
Table 1. Asthma Medications Chart

**NOTE:** The following table objectively outlines selected asthma medications available in the United States, and does not provide recommendations for or against their use. The listing does not indicate inclusion on the UWHC formulary. Prescribing providers should refer to specific formulary listings for status of various agents.

<table>
<thead>
<tr>
<th>Medication</th>
<th>Inhaler</th>
<th>Nebulization Solution</th>
<th>Oral (Injectable products where noted)</th>
<th>Purpose</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Short-acting beta agonists</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Albuterol Sulfate</td>
<td>- ProAir® MDI - Proventil® MDI - Ventolin® MDI - Accuneb® nebulization - VoSpire® ERT</td>
<td>108 mcg/act</td>
<td>0.63 mg/3 mL 1.25 mg/3 mL 2.5 mg/3 mL 5 mg/mL</td>
<td>Tablet: 2 mg, 4 mg Oral Syrup: 2 mg/5 mL ERT: 4 mg, 8 mg</td>
<td>Bronchodilation through smooth muscle relaxation Although available, oral albuterol is not recommended.</td>
</tr>
<tr>
<td>Levalbuterol</td>
<td>- Xopenex® MDI - Xopenex® nebulization</td>
<td>45 mcg/act</td>
<td>0.31 mg/3 mL 0.63 mg/3 mL 1.25 mg/3 mL 1.25 mg/0.5 mL</td>
<td>Tablet: 2.5 mg, 5 mg Injection: 1 mg/mL</td>
<td></td>
</tr>
<tr>
<td>Terbutaline</td>
<td>- tablet - injection</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Short-acting anticholinergics</strong></td>
<td></td>
<td></td>
<td></td>
<td>Bronchodilation through inhibition of muscarinic receptors to reduce intrinsic vagal tone of the airway</td>
<td>May be an alternative to short-acting beta agonists in patients who cannot tolerate short-acting beta agonists</td>
</tr>
<tr>
<td>Ipratropium Bromide</td>
<td>- Atrovent® MDI - Atrovent® nebulization</td>
<td>17 mcg/act</td>
<td>0.5 mg/2.5 mL</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Combination short-acting beta agonist and short-acting anticholinergic</strong></td>
<td></td>
<td></td>
<td></td>
<td>See individual agents</td>
<td></td>
</tr>
<tr>
<td>Albuterol Sulfate/Ipratropium Bromide</td>
<td>- Combivent Respimat® MDI - Duoneb® nebulization</td>
<td>100/20 mcg/act</td>
<td>2.5/0.5 mg/3 mL</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Systemic corticosteroids</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prednisone</td>
<td>- tablet - Rayos® delayed-release tablet - solution - Intensol® concentrated solution</td>
<td></td>
<td></td>
<td>Tablet: 1 mg, 2.5 mg, 5 mg, 10 mg, 20 mg, 50 mg Delayed-release tablet: 1 mg, 2 mg, 5 mg Solution: 5 mg/5 mL 5 mg/1 mL</td>
<td></td>
</tr>
<tr>
<td>Methylprednisolone</td>
<td>- Medrol® tablet - Solu-Medrol® injection</td>
<td></td>
<td></td>
<td>Tablet: 2 mg, 4 mg, 8 mg, 16 mg, 32 mg Pak: 4 mg tablets x 21 Injection: 40 mg, 125 mg, 500 mg, 1000 mg</td>
<td></td>
</tr>
<tr>
<td>Dexamethasone</td>
<td>- Tablet - Solution - Intensol® concentrated solution - Elixir</td>
<td></td>
<td></td>
<td>Tablet: 0.5 mg, 0.75 mg, 1 mg, 1.5 mg, 2 mg, 4 mg, 6 mg Solution: 0.5 mg/5 mL 1 mg/mL Elixir: 0.5 mg/5 mL Injection: 4 mg/mL, 10 mg/mL</td>
<td></td>
</tr>
</tbody>
</table>

MDI: metered dose inhaler inh: inhalation DPI: dry powder inhaler act: actuation ERT: extended-release tablet

Last reviewed/revised: 07/2015 Contact CCKM or Drug Policy Program for revisions. Asthma – Pediatric/Adult – Inpatient/Ambulatory Guideline
<table>
<thead>
<tr>
<th>Medication</th>
<th>Inhaler</th>
<th>Nebulization Solution</th>
<th>Oral (Injectable products where noted)</th>
<th>Purpose</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Long-acting beta agonists</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formoterol Fumarate</td>
<td>- Foradil Aerolizer DPI</td>
<td>12 mcg/inh</td>
<td>20 mcg/2 mL</td>
<td></td>
<td>Bronchodilation</td>
</tr>
<tr>
<td></td>
<td>- Perforomist® nebulization</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Should be used in combination with an inhaled corticosteroid</td>
</tr>
<tr>
<td>Salmeterol Xinafoate</td>
<td>- Serevent Diskus DPI</td>
<td>50 mcg/inh</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Inhaled corticosteroids</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Budesonide</td>
<td>- Pulmicort Flexhaler DPI</td>
<td>90 mcg/inh</td>
<td>0.25 mg/2 mL</td>
<td>MDIs may be used with a spacer</td>
<td>Reduce airway hyperresponsiveness, inhibit inflammatory cell migration and activation, and block late phase reaction to allergen</td>
</tr>
<tr>
<td></td>
<td>- Pulmicort® nebulization</td>
<td>180 mcg/inh</td>
<td>0.5 mg/2 mL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ciclesonide</td>
<td>- Alvesco® MDI</td>
<td>80 mcg/act</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>160 mcg/act</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flunisolide</td>
<td>- Aerospan® MDI</td>
<td>80 mcg/act</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluticasone Furoate</td>
<td>- Arnuity Ellipta® MDI</td>
<td>100 mcg/act</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>200 mcg/act</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluticasone Propionate</td>
<td>- Flovent Diskus® DPI</td>
<td>DPI: 50 mcg/inh</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Flovent® MDI</td>
<td>100 mcg/inh</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>250 mcg/inh</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MDI: 44 mcg/act</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>110 mcg/act</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>220 mcg/act</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mometasone Furoate</td>
<td>- Asmanex® DPI</td>
<td>DPI: 110 mcg/inh</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Asmanex® MDI</td>
<td>220 mcg/inh</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MDI: 100 mcg/act</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>200 mcg/act</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Combination long-acting beta agonists and corticosteroid</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Budesonide/Formoterol Fumarate</td>
<td>- Symbicort® MDI</td>
<td>80/4.5 mcg/act</td>
<td></td>
<td>See individual agents</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>160/4.5 mcg/act</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mometasone Furoate/ Formoterol Fumarate</td>
<td>- Dulera® MDI</td>
<td>100/5 mcg/act</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>200/5 mcg/act</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluticasone Propionate/ Salmeterol Xinafoate</td>
<td>- Advair Diskus® DPI</td>
<td>DPI: 100/50 mcg/inh</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Advair® MDI</td>
<td>250/50 mcg/inh</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>500/20 mcg/inh</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MDI: 45/21 mcg/act</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>115/21 mcg/act</td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>230/21 mcg/act</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Long-acting anticholinergics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tiotropium</td>
<td>- Spiriva® Handihaler DPI</td>
<td>DPI: 18 mcg/inh</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Spiriva® Respimat MDI</td>
<td>MDI: 2.5 mcg/act</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

MDI: metered dose inhaler  inh: inhalation  DPI: dry powder inhaler  act: actuation  ERT: extended-release tablet
<table>
<thead>
<tr>
<th>Medication</th>
<th>Inhaler</th>
<th>Nebulization Solution</th>
<th>Oral (Injectable products where noted)</th>
<th>Purpose</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mast cell stabilizers</strong></td>
<td></td>
<td></td>
<td></td>
<td>the airway</td>
<td></td>
</tr>
<tr>
<td>Cromolyn</td>
<td></td>
<td></td>
<td></td>
<td>Stabilize mast cells</td>
<td></td>
</tr>
<tr>
<td>- nebulization</td>
<td></td>
<td>20 mg/2 mL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Methylxanthines</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aminophylline</td>
<td></td>
<td>Injection:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- injection</td>
<td></td>
<td>25 mg/mL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Theophylline</td>
<td></td>
<td>12-hour ERT:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Theochron&lt;sup&gt;®&lt;/sup&gt; 12-hour ERT</td>
<td></td>
<td>100 mg, 200 mg, 300 mg, 450 mg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Theo-24&lt;sup&gt;®&lt;/sup&gt; 24-hour ERT</td>
<td></td>
<td>240 mg, 600 mg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- oral solution</td>
<td></td>
<td>100 mg, 200 mg, 300 mg, 400 mg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Elixophyllin&lt;sup&gt;®&lt;/sup&gt; elixir</td>
<td></td>
<td>80 mg/15 mL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- injection</td>
<td></td>
<td>0.8 mg/mL, 1.6 mg/mL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Leukotriene Modifiers</strong></td>
<td></td>
<td>Tablet:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Montelukast</td>
<td></td>
<td>10 mg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Singulair&lt;sup&gt;®&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zafirlukast</td>
<td></td>
<td>Tablet:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Accolate&lt;sup&gt;®&lt;/sup&gt;</td>
<td></td>
<td>10 mg, 20 mg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zileuton</td>
<td></td>
<td>Tablet:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Zyflo&lt;sup&gt;®&lt;/sup&gt;</td>
<td></td>
<td>600 mg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Zyflo ER&lt;sup&gt;®&lt;/sup&gt;</td>
<td></td>
<td>12-hour ERT:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Immunomodulators</strong></td>
<td></td>
<td>Injection:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Omalizumab</td>
<td></td>
<td>150 mg vial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Xolair&lt;sup&gt;®&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CONTROLLER Medications**

MDI: metered dose inhaler  inh: inhalation
DPI: dry powder inhaler  act: actuation
ERT: extended-release tablet
Bronchial Thermoplasty Summary for Primary Care Providers

Overview: Bronchial Thermoplasty (BT) is an innovative procedure for the treatment of severe persistent asthma. This procedure is performed in an outpatient setting under moderate sedation, and is accomplished in three separate bronchoscopic sessions scheduled approximately 3 weeks apart. In the first procedure, airways under direct vision and reachable by the bronchoscope in the right lower lobe are treated. During the second procedure, targeted airways in the left lower lobe are treated, and in the third and final procedure, targeted airways in both upper lobes are treated.1-2

Target Population: A potential treatment option for highly-selected patients aged 18 years and older with uncontrolled asthma, despite use of recommended therapeutic regimens and referral to an asthma specialist (Step 5).3 (GINA Evidence B)

Technology Assessment Review: Alair™ BT has been reviewed multiple times by the UW Health Technology Assessment Committee since 2010. In that time, the reimbursement picture has become clearer and the long term clinical and safety benefits have been maintained. In January 2015, the committee recommended adoption of Alair Thermoplasty for use at UW Health. Insurance prior authorization was suggested and once in use, the program’s performance will be reviewed after one year (or 12 patients).

Outcomes: Bronchial thermoplasty has been studied in four clinical studies in patients with asthma; three of which were randomized controlled clinical trials and the results for which have been published in peer-reviewed journals. Most notably, published data from the Asthma Intervention Research 2 (AIR2) clinical trial demonstrates that bronchial thermoplasty continues to show benefits in adult patients with severe uncontrolled asthma out to at least five years.4 Bronchial thermoplasty was shown to provide long term asthma control, demonstrated by a sustained reduction in the rate of severe exacerbations (asthma attacks) and emergency room (ER) visits over a five year period after treatment.5

Risk assessment: The most common side effect found in the clinical studies was an expected transient increase in the frequency and worsening of respiratory-related symptoms, including asthma (multiple symptoms), respiratory tract infections, wheezing, dyspnea, and chest pain. Long-term follow-up out to 5 years has been completed in 4 studies: the safety profile for the BT treated patients has demonstrated consistency over time based on the percent of subjects reporting respiratory adverse events, the number of respiratory adverse events per subject, and the number of hospitalizations and emergency room visits due to respiratory symptoms per subject.

Pre-Approval Needs: While non-coverage policies exist, there is a need to request pre-approval to the insurer by submitting documentation that supports a severe asthma diagnosis. This documentation is inclusive of differentiating other respiratory-related disorders (i.e., COPD, bronchiectasis, vocal cord dysfunction, obstructive sleep apnea), management of comorbidities (i.e., allergic rhinitis, sinusitis, GERD), and observations of compliance and/or attempts to manage their asthma with current standard medications (i.e., minimum of ICS+LABA) over at least a 3 month period yet still demonstrating evidence of exacerbations, activity limitation and/or risk of future exacerbations. As coverage policies get implemented, a shorter, more specific pre-authorization form may be required.

* Note: Acquisition of the technology is considered separately in the capital budgeting process.

References:
Management of Asthma Exacerbation in Primary Care (Age 2 years or older)

**Patient presentation with acute or sub-acute asthma exacerbation**

- **Assess the Patient**
  - Is it asthma?
  - What is the exacerbation severity?
  - Does the patient exhibit risk factors for asthma-related death?*

**Mild or Moderate Exacerbation**

- Initiate Treatment
  - Short-acting beta₂-agonist (SABA) by pMDI with spacer or nebulizer
  - Administer O₂ to maintain SpO₂ ≥ 90%

**Assess Response**
- Have symptoms improved (not needing SABA)?
- Is O₂ saturation (on room air) > 90%?
- Are resources at home adequate?

**Severe Exacerbation**

- **TRANSFER TO ED**
  - While waiting, give dual therapy (SABA + ipratropium bromide), administer O₂, and/or oral corticosteroid (OCS)

**Continue Treatment**
- Administer Short-acting beta₂-agonist (SABA) as needed
- If no resolution after initial treatment, give dual therapy (SABA + ipratropium bromide)
- Consider oral corticosteroid (OCS)

**Assess Response**
- Symptoms Resolved?
  - Yes
  - No

**Follow-up** within 2-7 days to assess stabilization
- **Rescue Medication**: reduce to as-needed
- **Controller Medication**: continue higher dose for short term (1-2 weeks) or long term (3 months), depending on background to exacerbation
- Continue oral corticosteroid (OCS) as needed (5-7 days in adults; 3-5 days in pediatrics)
- **Risk factors for exacerbation**: provide patient education, including inhaler technique/adherence
- Print and review Asthma Action Plan (Note: If pediatric patient, print 2 copies for home/school)

---

**Determine Exacerbation Severity**

<table>
<thead>
<tr>
<th>Mild/Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavioral characteristics</td>
<td>Talks in phrases, prefers sitting to lying, not agitated</td>
</tr>
<tr>
<td>Respiratory rate</td>
<td>Increased</td>
</tr>
<tr>
<td>Accessory muscle use</td>
<td>Not in use</td>
</tr>
<tr>
<td>O₂ saturation (on room air)</td>
<td>90-95%*</td>
</tr>
<tr>
<td>Heart rate</td>
<td>100-120 bpm*</td>
</tr>
</tbody>
</table>

*Values listed in table are for patients age 6 yrs. or older. Patients age ≤ 5 yrs. exhibit slightly different vital signs:
- O₂ saturation > 90% (mild); < 92% (severe)
- Heart rate < 100 bpm (mild); > 200 bpm (severe 0-3 yrs.); > 180 bpm (4-5 yrs.)

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**Risk Factors for Asthma-related Death**

- History of near-fatal asthma requiring intubation and mechanical ventilation
- Hospitalization or emergency care visit for asthma in the past year
- Currently using or recently stopped using oral corticosteroids
- Not currently using inhaled corticosteroids
- Over-use of SABAs, especially use of more than one canister of monthly
- A history of psychiatric disease or psychosocial problems
- Poor adherence with asthma medications and/or poor adherence with (or lack of) a written asthma action plan
- Food allergy in a patient with asthma

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**Medications**

<table>
<thead>
<tr>
<th>Medications</th>
<th>Dose &amp; Frequency</th>
<th>Route</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Short-acting Beta₂-agonist (SABA)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>albuterol</td>
<td>(age &lt; 12 yrs.) 2.5 mg Q20min x3 (age ≥ 12 yrs.) 5 mg Q20min x3</td>
<td>Nebulizer</td>
</tr>
<tr>
<td></td>
<td>4-8 puffs Q20min x3</td>
<td>pMDI + spacer</td>
</tr>
<tr>
<td>Ipratropium</td>
<td>methylprednisolone (age &lt; 12 yrs.)</td>
<td>Oral</td>
</tr>
<tr>
<td>ipratropium bromide</td>
<td>1-2 mg/kg in 2 divided doses; max 60 mg per day</td>
<td>Nebulizer</td>
</tr>
<tr>
<td>(age &lt; 5 yrs.) 250 mcg Q20min x3 (age &gt; 5 yrs.) 500 mcg Q20min x3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral</td>
<td>prednisone (age ≥ 12 yrs.)</td>
<td>Oral</td>
</tr>
<tr>
<td>(age &lt; 12 yrs.)</td>
<td>1 mg/kg/day PO in 1-2 divided doses; max 50 mg/day</td>
<td>Oral</td>
</tr>
<tr>
<td>Corticosteroid Alternative (age &gt; 12 yrs.)</td>
<td>dexamethasone (age ≥ 18 yrs. only)</td>
<td>Oral</td>
</tr>
<tr>
<td></td>
<td>0.6 mg/kg per dose 36-48 hrs. apart; max 16 mg/dose</td>
<td></td>
</tr>
</tbody>
</table>

---

Last reviewed/revised: 07/2015
Contact CCKM for revisions.
Asthma – Pediatric/Adult – Inpatient/Ambulatory Guideline
Asthma – Pediatric/Adult - Discharge Check List
Emergency Department to Home

Note: This checklist does not replace individual clinical judgement and/or consideration for patient tolerance of specific medications or therapies.

<table>
<thead>
<tr>
<th>Discharge Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients who meet the following criteria may be discharged:</td>
</tr>
<tr>
<td>• On room air</td>
</tr>
<tr>
<td>• Receiving albuterol treatments (Q4 hours with no increasing frequency)</td>
</tr>
</tbody>
</table>

☐ Print the Asthma Action Plan in Health Link (GINA Evidence B- patients 6 years or older; GINA Evidence D- patients 5 years or younger)
  • Note: For pediatric patients, print two color copies (home and school).

☐ Prescribe oral corticosteroids, inclusive of doses given during admission (pediatric patients: 1-2 mg/kg once daily or divided BID with max dose 60 mg/day).
  Common options:
  • 4-7 additional days of prednisolone
  • 1 additional dose of dexamethasone to be given 36-48 hours after discharge

☐ Prescribe inhaled corticosteroid (controller medication) via pMDI with spacer

☐ Prescribe bronchodilator (rescue medication) via pMDI with spacer

☐ Schedule Follow-up Appointment (within 2-7 days of discharge) (GINA Evidence B)
  • UW Health recommends scheduling an appointment with the PCP within 2-7 days.
  • An appointment with the Allergy or Pulmonary Clinic may be made within 2-3 weeks (if indicated).

☐ Provide Patient Education (GINA Evidence B) which includes:
  • Basics of asthma pathophysiology
  • Triggers and signs and symptoms
  • Rescue vs. controller medications
  • Review what to do in an emergency
  • Inhaler technique
  • Review Asthma Action Plan with patient and family.

Last revised/reviewed: 07/2015 | Contact CCKM for revisions.

References:
# Asthma – Pediatric/Adult - Discharge Check List

**Inpatient to Home**

*Note: This checklist does not replace individual clinical judgement and/or consideration for patient tolerance of specific medications or therapies.*

## Discharge Criteria

Patients who meet the following criteria may be discharged:
- On room air
- Receiving albuterol treatments (Q4 hours with no increasing frequency)

## Print the Asthma Action Plan in Health Link

*(GINA Evidence B- patients 6 years or older; GINA Evidence D- patients 5 years or younger)*
- For pediatric patients, print two color copies (home and school).
- Consider stepping up the Green Zone maintenance therapy for 4-6 weeks after discharge.

## Prescribe a total of 5-7 days of oral corticosteroids, inclusive of doses given during admission
*(pediatric patients: 1-2 mg/kg once daily or divided BID with max dose 60 mg/day)*

## Schedule Follow-up Appointment (within 2-7 days of discharge) *(GINA Evidence B)*
- UW Health recommends scheduling an appointment with the PCP within 2-7 days.
- An appointment with the Allergy or Pulmonary Clinic may be made within 2-3 weeks (if indicated).

## Provide Patient Education *(GINA Evidence B)* which includes:
- Basics of asthma pathophysiology
- Triggers and signs and symptoms (i.e., environmental triggers)
- Rescue vs. controller medications
- Review what to do in an emergency (i.e., yellow and red zones)
- Inhaler technique (i.e., mask and spacer)
- PEF meter technique (if used)
- Review Asthma Action Plan with patient and family.

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Last revised/reviewed: 07/2015 | Contact CCKM for revisions.

**UW Health Asthma – Pediatric/Adult – Inpatient/Ambulatory Guideline**

**References:**