Asthma in Children – Diagnosis and Management

Effective Date: October 28, 2015

Scope

This guideline provides recommendations for the diagnosis and management of asthma in patients aged 1 – 18 years, in the primary care setting. For recommendations regarding asthma in patients aged ≥ 19 years see BCGuidelines.ca – Asthma in Adults – Diagnosis and Management.

Key Recommendations

- Send children aged ≥ 6 years for spirometry when they are symptomatic to improve accuracy.
- Send patients for spirometry regularly as part of the assessment of asthma control.
- Prescribe controller medication daily and not intermittently.
- Controller medication does not need to be increased with an acute loss of asthma control in children.
- At each visit, assess for proper use of asthma medication devices and medication compliance as these are common reasons for poor asthma control.
- Prescribe an age-appropriate spacer device for patients using metered dose inhalers (MDI).
- Send all patients and families to an asthma education center to learn self-management (where available).
- Given that many children aged < 6 years outgrow their asthma symptoms, reassess the persistence of symptoms every 6 months in this age group.
- There is insufficient evidence to recommend one inhaled corticosteroids (ICS) molecule over another with respect to efficacy or safety.
- Ensure children have normal activity levels and do not limit physical activity to control asthma symptoms.*
- Complete a written asthma action plan with all patients and reassess this plan with the patient on a regular basis.

Definition

Asthma is a chronic inflammatory disease of the airways that is characterized by bronchial hyperreactivity and variable airway obstruction which results in recurrent episodes of wheezing, breathlessness, chest tightness and/or coughing that can vary over time and in intensity.

Epidemiology

In British Columbia, the prevalence of asthma in children ranges from 83 – 162 per 1000 and is highest in 5 – 9 year olds although likely there is underestimation of asthma in 0 – 5 years olds due to variable diagnostic labels used.¹


Diagnosis

Clinical History

Patients < 6 years old

Diagnosing children < 6 years is difficult due to:
- lack of pulmonary function testing (as children < 6 typically cannot do the test reliably), and
- overlap of viral symptoms with asthma symptoms.

Diagnosis is based on:
1. a compatible history (recurrent episodes of wheezing, cough, difficulty breathing and chest tightness) (see Table 1. Clinical features to assess the probability of asthma in children),
2. a physical exam confirming airway obstruction (e.g., wheezing) that improves with short acting beta agonist (SABA), and
3. the absence of an alternative explanation (Refer to Appendix A: Differential Diagnosis of Recurrent Respiratory Symptoms).

Wheezing is the most specific sign of asthma
- it is a high-pitched whistling sound typically heard on expiration, and
- confirm with a physical exam since wheezing is a term commonly used to describe many types of noisy breathing unrelated to asthma.

Asthma symptoms can be triggered by irritants, allergens, respiratory infections, and exercise; although the most common trigger in this age group is respiratory infections.

A therapeutic trial can be used to clarify the diagnosis
- Suggest using a daily moderate dose of inhaled corticosteroids (ICS) and SABA as needed
- Trial should be at least 8 – 12 weeks
- Discuss with the family in advance expected clinical improvements
- Suggest that families record symptoms in a diary and discuss this with their care provider when assessing the response of the trial of treatment

Patients 6 – 18 years old

Diagnosis is based on:
1. a compatible clinical history (recurrent episodes of wheezing, cough, difficulty breathing and chest tightness) (see Table 1. Clinical features to assess the probability of asthma in children),
2. documented evidence of reversible obstruction or bronchial hyperreactivity with lung function testing (see Investigations or Tests), and
3. if lung function testing is not available, a physical exam finding of wheezing or signs of increased work of breathing that definitively improves with SABA can be used as a surrogate marker of reversible airway obstruction although lung function testing should be done when available.
### Table 1. Clinical features to assess the probability of asthma in children

<table>
<thead>
<tr>
<th>Clinical Features that...</th>
<th>Increase the Probability of Asthma</th>
<th>Lower the Probability of Asthma</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Episodes of wheeze that are recurrent or severe (requiring urgent care visits, emergency room (ER) visits, hospitalization or use of systemic steroids)</td>
<td>• Isolated cough in absence of wheeze or difficulty breathing</td>
</tr>
<tr>
<td></td>
<td>• Symptoms are worse at night</td>
<td>• History of moist or productive cough</td>
</tr>
<tr>
<td></td>
<td>• Symptoms occur with and without viral illness*</td>
<td>• Normal physical exam and spirometry** when patient is symptomatic</td>
</tr>
<tr>
<td></td>
<td>• History of improvement in symptoms or spirometry** in response to adequate therapy</td>
<td>• No response to a trial of asthma therapy</td>
</tr>
<tr>
<td></td>
<td>• Expiratory wheeze on auscultation</td>
<td>• Symptoms present from birth</td>
</tr>
<tr>
<td></td>
<td>• Personal or first degree relative with diagnosed asthma or atopy</td>
<td>• Finger clubbing</td>
</tr>
<tr>
<td></td>
<td>• Evidence of atopy on physical exam (swollen nasal turbinates, atopic eczema, dark circles under eyes, linear nasal crease)</td>
<td>• Nasal polyps</td>
</tr>
</tbody>
</table>

*children aged < 6 years with asthma often have viral induced symptoms only.
**spirometry not applicable to children aged < 6 years.

### Investigations or Tests

1. Spirometry in children aged ≥ 6 years†
   - Forced expiratory volume in 1 second (FEV$_1$/forced vital capacity (FVC) < 80% with a 12% improvement in FEV$_1$ after SABA is specific for the diagnosis of asthma.$^1$
   - **NOTE: Negative spirometry results do not necessarily exclude a diagnosis of asthma, particularly if a child is asymptomatic or is well controlled on asthma medication.**
     - For diagnostic purposes, the most useful time to do this test is when patients are symptomatic.
     - Performing spirometry is an important part of the diagnostic process to ensure an accurate diagnosis, as 30% of patients with a diagnosis of asthma have been found not to have asthma when lung function testing was done.$^2$
     - Spirometry is used as part of asthma control assessment, as patients with poor lung function are at risk for remodeling despite having well-controlled symptoms.

2. Tests of bronchial hyperreactivity
   - If spirometry is normal and asthma is still suspected, methacholine challenge or an exercise challenge can be done, particularly if a child is not responding to standard asthma therapy (see Indications for Referral).
   - Useful for ruling out a diagnosis of asthma in a symptomatic patient.$^2$

3. Peak flow monitoring
   - Not recommended for diagnosing asthma in children.
   - Can be used in patients with an asthma diagnosis who are poor perceivers of their asthma symptoms, as part of an asthma management plan.
   - Given the variability of normal values, determine a patient’s personal best peak flow when well to establish a baseline.

4. Chest x-ray
   - Not useful for diagnosing asthma but is useful to evaluate for an alternative diagnosis.

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*Children aged < 6 years often cannot do spirometry reliably.*
Management

 Care Objectives
At each visit assess the following with the patient and caregivers (see Associated Documents: Asthma Patient Care Flow Sheet: aged < 6 years and Asthma Patient Care Flow Sheet: aged 6 – 18 years):

- asthma control (see table under Asthma Symptom Control),
- medication adherence (confirm through pharmacy records if possible) and inhaler technique (see Asthma Education),
- effectiveness and understanding of patient’s written action plan (see Associated Documents: Asthma Action Plan for Children: aged < 6 years and Asthma Action Plan for Children: aged 6 – 18 years),
- height and weight of patient.

If a treatment plan is initiated or changed, schedule a follow-up visit within 3 months to evaluate the effectiveness of the plan.

Frequency of ongoing visits depends on the patient’s severity of symptoms, their risk of a future asthma attack and their level of asthma symptom control.

 Assessment of Asthma Control
Assess asthma control and risk factors for asthma attacks at the time of diagnosis, when creating/modifying a treatment plan and when monitoring treatment outcomes.

1. Asthma Symptom Control4,8

<table>
<thead>
<tr>
<th>In the past 4 weeks, has the patient had:</th>
<th>Yes [1 point]</th>
<th>No [0 points]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daytime asthma symptoms more than twice/week?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any night symptoms due to asthma?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reliever needed for symptoms more than twice/week?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any activity limitation due to asthma?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FEV₁ or peak flow &lt; 80% of personal best?*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL POINTS**

* Children aged < 6 years often cannot perform spirometry reliably.

0 points = well controlled asthma symptoms
1 – 2 points = partly controlled asthma symptoms
≥ 3 points = uncontrolled asthma symptoms

2. Risk of a Future Asthma Attack4,8

Does the patient have any of the following risk factors:

- Uncontrolled asthma symptoms (see above)
- ≥ 1 severe attack (e.g., requiring systemic steroids, ER visit or hospitalization) in last year, previous intubation or intensive care unit (ICU) admission for asthma
- Not prescribed or not taking an ICS properly (used intermittently, poor adherence or inhaler technique)
- Low FEV₁ (especially if < 60%)
- Exposure to tobacco smoke
- Exposure to allergens that the patient is sensitized to
- Food allergy or past history of anaphylaxis

If the patient has any of these risk factors they are at risk for future asthma attacks. Consider strategies to eliminate modifiable risk factors (e.g., tobacco cessation programs, allergen avoidance, etc.).
Self-Management

1. Asthma Education

Ensure patients and their caregivers understand:

- how to take their medication properly (have patient demonstrate this, not just describe it),
- the difference between a reliever and controller medication,
- how to use their written action plan (including when to seek help),
- how to monitor for symptom control, and
- what triggers their asthma and how to avoid their triggers when appropriate (e.g., irritants, allergens, respiratory infections, and exercise, although exercise should never be limited as the goal is to have asthma controlled such that there is no activity limitation). See Appendix B: Timing of Environmental Aeroallergens in British Columbia.

Refer patients and their caregivers to an asthma education program where available (see Patient Resources). Particularly if patients experience the following:

- poor medication compliance,
- poor understanding of proper use of medications,
- poor understanding of their action plans, or
- language barriers.

Tobacco smoke

Consider the following messaging for patients and caregivers regarding a patient’s exposure to tobacco smoke:

- children experience more viral infections,5
- steroid medications decrease in efficacy,6
- smoking outside of the home and car is better than smoking inside,
- third hand smoke (i.e., smoke residue left on clothes, hair etc.) has been found to increase respiratory symptoms in children,5 and
- discuss quitting and offer assistance to patients and families who want to quit (see Patient Resources).

Recommend annual influenza vaccination for the patient and their family. Asthma patients should also receive pneumococcal vaccines‡ as appropriate for their age.

2. Written Asthma Action Plan

Action plans help patients know:

- when to use their medications,
- what to do when asthma symptoms worsen, and
- when to seek medical help (see Asthma Action Plan).

Use symptom monitoring rather than peak flow in children because symptom monitoring has been shown to be as effective as monitoring peak flows. Peak flows are useful for children that are poor perceivers of their asthma symptoms.3 If peak flow meters are used, the child’s personal best peak flow should be used as their baseline as “normal” peak flows differ between devices.

Pharmacological Management

Medication Delivery Devices

- The most important factor in selecting a medication delivery device is to ensure that the patient uses it properly.

Recommend that metered dose inhaler (MDI) **always** be used with a spacer device in children and are as effective as nebulizers.7 Spacers increase the amount of medication in the lungs and decrease side effects from medication (see Table 3. Recommended inhaler device by age).

Table 3. Recommended inhaler device by age

<table>
<thead>
<tr>
<th>Choice of inhaler device</th>
<th>1st line</th>
<th>2nd line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children 2 – 4yrs</td>
<td>MDI plus spacer with facemask</td>
<td>Nebulizer** with face mask</td>
</tr>
<tr>
<td>≥ 4 – 6yrs</td>
<td>MDI plus spacer with mouthpiece*</td>
<td>MDI with spacer plus facemask</td>
</tr>
<tr>
<td>≥ 6yrs</td>
<td>MDI plus spacer with mouthpiece OR Dry powder inhaler***</td>
<td>MDI with spacer plus facemask</td>
</tr>
</tbody>
</table>

*To transition to a spacer with mouthpiece, children must be able to form a seal around the mouthpiece and breathe though their mouths

**MDI with spacer is as effective as a nebulizer

***Children must have enough inspiratory force to use a dry powder inhaler

Stepwise approach to pharmacologic treatment2-4,8

(See Appendix C: Asthma medication table for children aged ≤ 18 years and Appendix D: Asthma Inhaler Guide)

<table>
<thead>
<tr>
<th>Preferred Controller Choice</th>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
<th>Step 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliever</td>
<td>Inhaled short-acting beta agonist (SABA) as required</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily low dose inhaled corticosteroid (ICS)</td>
<td>Add long-acting beta agonists (LABA) to low dose ICS (&gt;12yrs)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily medium dose ICS (1 – 12yrs)</td>
<td>If asthma is not well controlled on step 3, consider referral to a specialist (see Indications for Referral)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily leukotriene receptor antagonist (LTRA) for patients who won’t use ICS</td>
<td>Add ICS to LTRA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LTRA or LABA in combination with medium dose inhaled steroids</td>
<td>AND/OR</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

BCGuidelines.ca: Asthma in Children – Diagnosis and Management (2015)
Ongoing Management

Schedule a follow-up visit within 2 – 4 weeks of any severe exacerbation (requiring ER visit, hospitalization, systemic steroids).

• At this visit assess:
  • modifiable risk factors for the exacerbation (e.g., compliance with medication, inhaler technique),
  • whether they used their action plan correctly, and
  • whether changes need to be made to their action plan.

Assessing persistence of asthma symptoms in children < 6yrs

• 50% of preschool age children with wheeze outgrow this condition by age 6, therefore the need for ongoing therapy should be re-evaluated every 6 – 12 months.
• Risk factors for the presence of asthma symptoms at 6 years of age include:
  • a personal or family history of atopy,
  • onset of symptoms after 2 years of age, and
  • frequent or severe episodes of wheezing in childhood.

• Indications for Referral §
  • Atypical asthma symptoms or diagnosis in question
  • Poor asthma control (poor lung function, persistent asthma symptoms) or severe asthma exacerbations (≥ 1 course of systemic steroids per year) despite moderate doses of inhaled corticosteroids (with proper technique and good compliance)
  • Patient requires detailed assessment and management of potential environmental triggers
  • ICU admission for asthma

• Controversies in Care

1. Intermittent vs. Daily Inhaled Corticosteroids (ICS)

In children with persistent asthma, daily use of inhaled steroids is strongly recommended as it improves asthma control and lung function and decreases frequency of reliever medication use.9-15

In children with intermittent asthma (brief exacerbations of symptoms with no interim symptoms), there is a weak recommendation to use daily inhaled steroids. Although a popular strategy, intermittent use of low-high doses of intermittent inhaled steroids have not been shown to be of benefit.

Trials of intermittent ICS have used very high doses (e.g., fluticasone 1500ug/day) and have found a decrease in systemic steroid use and duration of symptoms.19-21 These studies have found a decrease in height and there are concerns about widely recommending this approach given the potential use of multiple courses of very high dose ICS in young children with frequent viral induced exacerbations.16, 21, 22 In this group of children, there is only one comparative trial of intermittent versus daily ICS which did not find a benefit of daily ICS.24 However, multiple trials of daily ICS versus placebo have shown an improvement in exacerbation rate and lung function,16 with mixed results on symptom free days and symptom scores.16-18

2. Increasing ICS with flares and viruses

It is strongly recommended that children on ICS do not increase their dose during acute loss of asthma control (i.e., in the yellow zone of an action plan), as this has not been shown to decrease the need for oral corticosteroids.23-29

3. Choice of ICS

There is currently not enough evidence in terms of improved efficacy or safety profile to recommend one ICS molecule over another.30-37

1 Asthma specialists typically include pediatricians, pediatric respirologists, pediatric allergists, and pediatric asthma clinics.


References


Patient Resources

BC Children's Hospital – website provides handouts on trigger avoidance, use of asthma devices, asthma symptom diaries.
Website: www.bcchildrens.ca/KidsTeensFam/A-ZPamphlets/default.htm

The Asthma Society of Canada – website provides a variety of free educational materials about asthma.
Website: www.asthma.ca/

About Kids Health – website provides comprehensive information about asthma in children.
Website: www.aboutkidshealth.ca

Alberta Health Services – ICAN – website that provides asthma information including trigger avoidance and device instructions in 13 languages.
Website: www.ucalgary.ca/icancontrolasthma/languages

The Canadian Lung Association – Provides listings of available Asthma Clinics across the province and videos on how to use asthma devices.
Website: www.lung.ca/lung-health/get-help

QuitNow – an internet based quit smoking service, available free of charge to B.C. residents.
Website: www.quitnow.ca

BC Smoking Cessation program – A PharmaCare program that helps patients stop smoking or using other tobacco products by helping with the cost of smoking cessation aids.
Website: www.health.gov.bc.ca/pharmacare/stop-smoking/

Cartoon for children on what asthma is and how medications work.
URL: www.youtube.com/watch?v=Et_alsghel8

Diagnostic Code: 493 (Asthma)

Appendices

- Appendix A: Differential Diagnosis of Recurrent Respiratory Symptoms
- Appendix B: Timing of Environmental Aeroallergens in British Columbia
- Appendix C: Asthma Medication Table for Children and Youth Aged ≤ 18 Years
- Appendix D: Asthma Inhaler Guide

Associated Documents

The following documents accompany this guideline:
- Asthma Action Plan for Children: aged < 6 years
- Asthma Action Plan for Children: aged 6 – 18 years
- Asthma Patient Care Flow Sheet: aged < 6 years
- Asthma Patient Care Flow Sheet: aged 6 – 18 years
This guideline is based on scientific evidence current as of the Effective Date.

This guideline was developed by Child Health BC and the Guidelines and Protocols Advisory Committee, approved by the British Columbia Medical Association, and adopted by the Medical Services Commission.

THE GUIDELINES AND PROTOCOLS ADVISORY COMMITTEE

The principles of the Guidelines and Protocols Advisory Committee are to:

• encourage appropriate responses to common medical situations
• recommend actions that are sufficient and efficient, neither excessive nor deficient
• permit exceptions when justified by clinical circumstances

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Disclaimer
The Clinical Practice Guidelines (the “Guidelines”) have been developed by the Guidelines and Protocols Advisory Committee on behalf of the Medical Services Commission. The Guidelines are intended to give an understanding of a clinical problem, and outline one or more preferred approaches to the investigation and management of the problem. The Guidelines are not intended as a substitute for the advice or professional judgment of a health care professional, nor are they intended to be the only approach to the management of clinical problem. We cannot respond to patients or patient advocates requesting advice on issues related to medical conditions. If you need medical advice, please contact a health care professional.
Appendix A: Differential Diagnosis of Recurrent Respiratory Symptoms

<table>
<thead>
<tr>
<th>Infections</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Recurrent respiratory tract infections</td>
</tr>
<tr>
<td>• Chronic rhino-sinusitis</td>
</tr>
<tr>
<td>• Tuberculosis</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Congenital problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Tracheomalacia</td>
</tr>
<tr>
<td>• Cystic fibrosis</td>
</tr>
<tr>
<td>• Bronchopulmonary dysplasia</td>
</tr>
<tr>
<td>• Congenital malformation causing narrowing of the intrathoracic airways</td>
</tr>
<tr>
<td>• Primary ciliary dyskinesia syndrome</td>
</tr>
<tr>
<td>• Immune deficiency</td>
</tr>
<tr>
<td>• Congenital heart disease</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanical problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Foreign body aspiration</td>
</tr>
<tr>
<td>• Gastroesophageal reflux</td>
</tr>
</tbody>
</table>

Source: Table from the Global Strategy for Asthma Management and Prevention in Children 5 Years and Younger, 2009, © Global Initiative for Asthma (GINA) all rights reserved
Appendix B: Timing of Environmental Aeroallergens in British Columbia¹,²

- **Grasses**: Late spring through summer, Peak in May/June
- **Indoor allergens (present all year)**: Cat, Dog, Mould
- **Trees**: Late winter through spring, Peak in March/April
- **Weeds**: Late summer through fall

**References:**
## Appendix C: Asthma Medication Table for Children and Youth Aged ≤18 Years

Note: see Appendix D: Asthma Inhaler Guide for pictures of the medications listed below.

<table>
<thead>
<tr>
<th>Generic Name</th>
<th>Trade name (formulation), Doses per device. Dose per inhalation.</th>
<th>Pediatric Dosage Information (ages &lt; 6 years old)</th>
<th>Pediatric Dosage Information (ages 6 – 18 years old)</th>
<th>Cost per device (cost per dose)</th>
<th>PharmaCare Coverage</th>
<th>Therapeutic Considerations†</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RELIEVER MEDICATIONS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Short acting beta-agonists</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Salbutamol</strong></td>
<td>Airomir™, Ventolin®, Generics (pMDI), 200 doses. 100mcg/dose.</td>
<td>1 – 4 puffs up to q4h prn*</td>
<td>1 – 4 puffs up to q4h prn*</td>
<td>$6.50 ($0.03)</td>
<td>MDI: Regular Coverage</td>
<td>If ventolin is required every 4 hours, patient should be instructed to see a practitioner within 24 – 48 hours, if needed more than every 4 hours patient should go to the closest ER Regular need for ventolin (&gt;1 time/week) indicates poor asthma control.</td>
</tr>
<tr>
<td><strong>Salbutamol</strong></td>
<td>Ventolin® Diskus® (DPI), 60 doses. 200mcg/dose.</td>
<td>DPI not recommended for children &lt;6y</td>
<td>1 – 2 puffs up to q4h prn*</td>
<td>$13 ($0.22)</td>
<td>Diskus: No Coverage</td>
<td>Regular need for ventolin (&gt;1 time/week) indicates poor asthma control.</td>
</tr>
<tr>
<td><strong>Terbutaline</strong></td>
<td>Bricanyl Turbuhaler® (DPI), 100 or 200 doses. 500mcg/dose.</td>
<td>DPI not recommended for children &lt;6y</td>
<td>1 – 2 puffs up to q4h prn</td>
<td>$8 ($0.80)</td>
<td>Regular Coverage</td>
<td>If terbutaline is required every 4 hours, patient should be instructed to see a practitioner within 24 – 48 hours. Regular need for terbutaline (&gt;1 time/week) indicates poor asthma control.</td>
</tr>
</tbody>
</table>
| Generic Name | Trade name (formulation), Doses per device. Dose per inhalation. | Pediatric Dosage Information (ages < 6 years old) | Pediatric Dosage Information (ages 6 – 18 years old) | Cost per device (cost per dose) | PharmaCare Coverage* | Therapeutic Considerations
|--------------|-------------------------------------------------|--------------------------------------------------|--------------------------------------------------|-------------------------------|----------------------|--------------------------
| **CONTROLLER MEDICATIONS** | | | | | | |
| **Inhaled Corticosteroid (ICS)** ** | | | | | | |
| beclomethasone dipropionate | Qvar™ HFA (pMDI), 200 doses. 50mcg, 100mcg/dose. | Low 50mcg bid  
Med 100mcg bid  
High refer to specialist Approved age by Health Canada ≥ 5y | Low 50-100mcg bid  
Med >100mcg bid  
High >200mcg bid | 50mcg: $34  
100mcg: $67  
(0.34) | Regular Coverage | Symptom improvement is usually evident within 1 – 2 weeks after start of therapy, pulmonary function can take months to improve.  
Once asthma is well controlled for 3 months, consider stepping down to lowest effective dose.  
Dysphonia, oral thrush (low with ciclesonide and can be reduced by rinsing mouth or using spacer device), sore mouth, sore throat.  
High dose treatment should not be stopped abruptly, but tapered. |
| Budesonide | Pulmicort Turbuhaler® (DPI), 200 doses. 100, 200, 400 mcg/dose. | DPI not recommended for children <6y | Low 100mcg bid  
Med 200-400mcg bid  
High >400mcg bid Approved age by Health Canada ≥ 6y | 100mcg: $34  
200mcg: $69  
(0.34)  
400mcg: $100  
(0.50) | Regular Coverage | |
| Ciclesonide | Alvesco® (pMDI), 120 doses. 100, 200 mcg/dose. | Low 100mcg once daily  
Med 200mcg daily  
High refer to specialist | Low 100mcg once daily  
Med 200-400mcg daily  
High >400mcg daily Approved age by Health Canada ≥ 6y | 100mcg: $49  
200mcg: $81  
(0.68) | Regular Coverage | |
| fluticasone propionate | Flovent® HFA (pMDI), 120 doses. 50, 125, 250mcg/dose.  
Flovent Diskus (DPI), 60 doses. 50, 100, 250, 500mcg/dose. | Low 50mcg bid  
Med 100-125mcg bid  
High refer to specialist Approved age by Health Canada ≥ 1y for MDI, ≥ 4y for Diskus | Low ≤100mcg bid  
Med >100-200mcg bid  
High ≥200mcg bid | For 120 dose MDI:  
50 mcg: $26  
(0.22)  
125mcg: $45  
(0.37)  
250mcg: $89  
(0.74)  
50mcg: $16.35  
(0.27)  
For 60 dose Diskus:  
100mcg: $26  
(0.43)  
250mcg: $45  
(0.74)  
500mcg: $76  
(1.49) | Regular Coverage | |
| Mometasone | Asmanex Twisthaler™(DPI), 60 doses. 200, 400mcg per dose. | DPI is not recommended for children <6y | Low ≤200 daily  
Med >100-200mcg bid  
High >200mcg bid Approved age by Health Canada ≥ 12y | 200mcg $35  
400mcg $69  
(1.15) | Regular Coverage | |
<table>
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<tr>
<th>Generic Name</th>
<th>Trade name (formulation), Doses per device</th>
<th>Pediatric Dosage Information (ages &lt; 6 years)</th>
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<tbody>
<tr>
<td>Montelukast</td>
<td>Singulair®, Generic (4 chew, granules, 5mg chew) (10mg tab)</td>
<td>4mg po daily Approved age by Health Canada ≥ 2y</td>
<td>5mg po daily (6 – 14y) 10mg po daily (≥15y)</td>
<td>4mg: $36 ($1.18) 5mg: $39 ($1.31) 10mg: $58 ($1.91) per 30 days (unit dose)</td>
<td>No Coverage</td>
<td></td>
</tr>
<tr>
<td>Fluticasone/salmeterol</td>
<td>Advair® (pMDI), 60 doses, 100/50, 250/50, 500/50 mcg per dose.</td>
<td>Refer to specialist Approved age by Health Canada ≥ 4y for Diskus</td>
<td>Low 100mcg/50mcg bid Med &gt;100-200mcg bid High ≥250/50mcg bid Approved age by Health Canada ≥ 12y for MDI</td>
<td>For 120 dose MDI: 125/25mcg: $105 ($0.88) 250/25mcg: $149 ($1.25) For 60 dose DPI: 100/50mcg: $88 ($1.47) 250/50mcg: $105 ($1.75) 500/50mcg: $149 ($2.49)</td>
<td>Limited Coverage Special Authority Criteria: PLUS</td>
<td>inhaled corticosteroid PLUS inadequate response on optimal dose of inhaled corticosteroid. See: <a href="http://www.health.gov.bc.ca/pharmacare/saindex.html">www.health.gov.bc.ca/pharmacare/saindex.html</a> list</td>
</tr>
<tr>
<td>Fluticasone/salmeterol</td>
<td>Advair® Diskus® (DPI), 120 doses, 100/6mcg, 200/6mcg per dose.</td>
<td>Refer to specialist Approved age by Health Canada ≥ 4y</td>
<td>Low 100/6mcg 1 doses bid Med 100/6 2 doses bid, 200/6mcg 1-2 doses bid High &gt;200/6mcg 2 doses bid Approved age by Health Canada ≥ 12y</td>
<td>100/6mcg: $69 ($0.57) 200/6mcg: $90 ($0.75) per 120 dose turbuhaler (unit dose)</td>
<td>Limited Coverage Special Authority Criteria: Diagnosis of asthma</td>
<td>Only prescribe for patients not adequately controlled on daily ICS treatment. High dose treatment should not be stopped abruptly, but tapered.</td>
</tr>
<tr>
<td>Fluticasone/salmeterol</td>
<td>Advair® (pMDI), 50 doses, 100/50, 250/50, 500/50 mcg per dose.</td>
<td>Refer to specialist Approved age by Health Canada ≥ 4y</td>
<td>Low 100mcg/50mcg bid Med &gt;100-200mcg bid High ≥250/50mcg bid Approved age by Health Canada ≥ 12y for DPI</td>
<td>For 120 dose DPI: 125/25mcg: $105 ($0.88) 250/25mcg: $149 ($1.25) For 60 dose DPI: 100/50mcg: $88 ($1.47) 250/50mcg: $105 ($1.75) 500/50mcg: $149 ($2.49)</td>
<td>Limited Coverage Special Authority Criteria: PLUS</td>
<td>inhaled corticosteroid PLUS inadequate response on optimal dose of inhaled corticosteroid. See: <a href="http://www.health.gov.bc.ca/pharmacare/saindex.html">www.health.gov.bc.ca/pharmacare/saindex.html</a> list</td>
</tr>
<tr>
<td>Mometasone/formoterol</td>
<td>Zenhale™(pMDI), 120 doses, 50/5, 100/5, 200/5mcg per dose.</td>
<td>Refer to specialist</td>
<td>Low 50/5 µg -100/5 µg 1 dose bid Med 100/5mcg 2 doses bid 200/5mcg 1-2 doses bid High 200/5 µg Approved age by Health Canada ≥ 12y</td>
<td>50/5mcg: $66 ($0.88) 100/5mcg: $86 ($0.55) 200/5mcg: $105 ($0.72)</td>
<td>Limited Coverage Special Authority Criteria: PLUS</td>
<td>inhaled corticosteroid PLUS inadequate response on optimal dose of inhaled corticosteroid. See: <a href="http://www.health.gov.bc.ca/pharmacare/saindex.html">www.health.gov.bc.ca/pharmacare/saindex.html</a> list</td>
</tr>
<tr>
<td>Inhaled Corticosteroid / Long-acting Beta-2 Agonist Combination (ICS/LABA)**</td>
<td>budesonide/formoterol</td>
<td>Symbicort® (DPI), 120 doses, 100/6, 200/6mcg per dose.</td>
<td>Refer to specialist</td>
<td></td>
<td>Limited Coverage Special Authority Criteria: PLUS</td>
<td>inhaled corticosteroid PLUS inadequate response on optimal dose of inhaled corticosteroid. See: <a href="http://www.health.gov.bc.ca/pharmacare/saindex.html">www.health.gov.bc.ca/pharmacare/saindex.html</a> list</td>
</tr>
</tbody>
</table>

**Dosing categories for ICS and ICS/LABA combinations are approximate and are based on a combination of approximate dose equivalency as well as safety and efficacy data.1,2

† Information on which products PharmaCare covers can be obtained using the B.C. PharmaCare Formulary Search (www.health.gov.bc.ca/pharmacare/benefitslookup). In all cases, coverage is subject to drug price limits set by PharmaCare and to the patient’s PharmaCare plan rules and deductibles. See: www.health.gov.bc.ca/pharmacare/plans/index.html and www.health.gov.bc.ca/pharmacare/policy.html for further information.

PharmaCare Coverage Definitions

- **Limited Coverage**: requires Special Authority for coverage. Limited Coverage benefits approved by Special Authority may be fully or partially covered.
- **No Coverage**: also known as non-benefit; does not fit the above categories.
- **Limited Coverage**: requires Special Authority for coverage. Limited Coverage benefits approved by Special Authority may be fully or partially covered.
- **Limited Coverage**: also known as non-benefit; does not fit the above categories.
- **Limited Coverage**: also known as non-benefit; does not fit the above categories.

References

Appendix D: Asthma Inhaler Guide

### RELIEVER MEDICATIONS

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dosage</th>
<th>Doses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salbutamol</td>
<td>100mcg/dose</td>
<td>200 doses</td>
</tr>
<tr>
<td>Ventolin</td>
<td>100mcg/dose</td>
<td>200 doses</td>
</tr>
<tr>
<td>Ventolin Diskus</td>
<td>200mcg/dose</td>
<td>60 doses</td>
</tr>
<tr>
<td>Airomir™</td>
<td>100mcg/dose</td>
<td>200 doses</td>
</tr>
<tr>
<td>Bricanyl Turbuhaler®</td>
<td>0.5mcg/dose</td>
<td>100 or 200 doses</td>
</tr>
</tbody>
</table>

### Controller Medications

#### Inhaled Corticosteroids

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dosage</th>
<th>Doses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beclomethasone DP</td>
<td>50mcg, 100mcg/dose</td>
<td>200 doses</td>
</tr>
<tr>
<td>Budesonide</td>
<td>100*, 200, 400mcg/dose</td>
<td>200 doses</td>
</tr>
<tr>
<td>Ciclesonide</td>
<td>100, 200mcg/dose</td>
<td>120 doses</td>
</tr>
<tr>
<td>Fluticasone propionate</td>
<td>50, 125*, 250mcg/dose</td>
<td>120 doses</td>
</tr>
<tr>
<td>Mometasone</td>
<td>50, 100, 250*, 500mcg/dose</td>
<td>60 doses</td>
</tr>
<tr>
<td>Asthmanex™</td>
<td>Twisthaler 200, 400mcg/dose</td>
<td>60 doses</td>
</tr>
</tbody>
</table>
### Inhaled Corticosteroid/ Long-acting Beta-2 Agonist Combination

<table>
<thead>
<tr>
<th>Budesonide/formoterol</th>
<th>Fluticasone/ salmeterol</th>
<th>Mometasone/formoterol</th>
</tr>
</thead>
<tbody>
<tr>
<td>†Symbicort®</td>
<td>†Advair®</td>
<td>†Advair® Diskus</td>
</tr>
<tr>
<td>100/6, 200/6*mcg/dose</td>
<td>125/25*, 250/25mcg/dose</td>
<td>100/50, 250/50*, 500/50mcg/dose</td>
</tr>
<tr>
<td>120 doses</td>
<td>120 doses</td>
<td>60 doses</td>
</tr>
<tr>
<td>†Advair® Diskus</td>
<td></td>
<td>†Zenale™</td>
</tr>
<tr>
<td>100/50, 250/50*, 500/50mcg/dose</td>
<td>50/5, 100/5*, 200/5mcg/dose</td>
<td></td>
</tr>
<tr>
<td>60 doses</td>
<td></td>
<td>120 doses</td>
</tr>
</tbody>
</table>

### Leukotriene Receptor Antagonist

<table>
<thead>
<tr>
<th>Montelukast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generic (e.g., apo-Montelukast) 4mg granules, 4, 5mg chewable, 10mg tab*</td>
</tr>
<tr>
<td>Singulair* 4mg granules, 4, 5mg chewable, 10mg tab*</td>
</tr>
</tbody>
</table>

**Notes:**
- *dose is depicted in picture
- †dispenser has dose counter