



## Asthma Diagnosis, Education and Management

Effective Date: July 26, 2023

### Scope

This guideline provides recommendations for the diagnosis, education, and management of mild – moderate asthma in the primary care setting, for both pediatric and adult patients. It replaces two previous BC Guidelines, Asthma in Adults (2015) and Asthma in Children (2015).

Severe asthma and severe exacerbations are out of scope of this guideline.

### Navigation

Most asthma diagnosis and management information is consistent across patient age ranges. However, there are some age-specific diagnostic and medication considerations, identified in the circles next to each section.



Example age indicator (years)

### Key Recommendations

#### Diagnosis

- A positive response to a therapeutic trial of salbutamol following an office visit in which the patient presents with audible wheeze is sufficient for a presumptive diagnosis **under age 6**.
- Confirmation with spirometry remains the gold standard for patients **over 6**.

#### Medication

- PRN Budesonide formoterol is recommended as first-line for adults with very mild asthma.
- PRN short acting beta agonists is recommended as first-line for children with very mild asthma who are at lower risk for exacerbations.
- Daily inhaled corticosteroids are recommended as first-line for children with very mild asthma who are at higher risk for exacerbations.
- Assess a patient's asthma management before prescribing systemic steroids. Significant adverse events are associated with as few as 4 short courses of systemic steroids in a lifetime.
- Begin with the step most appropriate to the initial severity of the patient's asthma.
- Reassess asthma control **and** exacerbation risk at least every 6 months and decrease medication doses to the lowest effective dose.

#### Management

- Develop a written asthma action plan with all patients and/or family. Reassess regularly.
- Confirm patient is using inhalers correctly and as prescribed, especially when there is a non-response to treatment.

## Environmental Impact and Climate Change

- Consider lower-environmental impact medication options where appropriate as metered-dose inhalers (MDIs) contribute disproportionately to climate change, which in turn can affect asthma.
- Prepare for climate events such as wildfire, which can exacerbate asthma.

## Epidemiology

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The prevalence of asthma in BC has increased steadily over the last 20 years:<sup>1</sup> from 8% of British Columbians in 2001/02 to (12%) in 2021/22.<sup>2</sup> In 2015, asthma exacerbations resulted in 70,000 hospitalizations and 250 deaths nationally.<sup>3,4</sup> Disease management and primary care follow-up after an acute care episode are key to reduce hospital visitation.<sup>5</sup>

As children grow older and hospitalizations become less frequent, the overall direct cost decreases. The highest cost for asthma care is for individuals with severe or uncontrolled asthma.

## Risk Factors

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Risk factors for developing asthma include but are not limited to:<sup>6</sup>

- Family history
- Allergies
- Exposure to poor air quality
- Early viral respiratory infections
- Obesity

## Diagnosis

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An asthma diagnosis is based on **both** a clinical history and physical examination compatible with asthma **and** objective evidence of reversible airflow obstruction.<sup>7</sup>

In patients with an existing asthma diagnosis, ensure there is documented evidence of variable airflow obstruction.

See [Table 2. Diagnosis of asthma](#) for an overview of the diagnostic criteria of asthma by age.

### History and Physical Examination

Clinical features of asthma (see [Table 1. Clinical features that impact the probability of asthma diagnosis](#)) often mimic or overlap with other respiratory conditions. Ensure other possible diagnoses are considered before diagnosing a patient with asthma (see [Differential Diagnosis](#)).

### Wheezing

Wheezing is the most specific sign of asthma. As there are many types of sounds patients may describe as 'wheezing', this should be clarified and ideally confirmed on physical exam. The wheezing associated with asthma is a high-pitched whistling sound, typically heard on expiration.

**18+** Adults are less likely to present with auscultative wheeze.

### Non-wheezing Symptoms

Other symptoms associated with asthma include chest tightness, dyspnea, and cough.<sup>7</sup> Patients who report more severe symptoms upon waking or overnight are more likely to have asthma.<sup>9</sup>

**Table 1. Clinical Features that Impact the Probability of Asthma Diagnosis**

Increase the Probability of Asthma	Decrease the Probability of Asthma
<ul style="list-style-type: none"> <li>• Episodes of audible wheezing that are recurrent or severe (require urgent care, emergency room visits, hospitalization, or use of systemic steroids)</li> <li>• Symptoms are worse at night</li> <li>• Symptoms occur both with and without viral illness*</li> <li>• History of improvement in symptoms or spirometry in response to adequate therapy**</li> <li>• Expiratory wheeze on auscultation</li> <li>• Evidence of atopy on history or physical exam (swollen nasal turbinates, atopic eczema, dark under-eye circles, linear nasal crease)</li> </ul>	<ul style="list-style-type: none"> <li>• Presence of stridor</li> <li>• Normal physical exam and spirometry** when patient is symptomatic</li> <li>• Non-responsive to trial therapy</li> <li>• Symptoms present from birth</li> <li>• Finger clubbing</li> </ul>
	<p><b>In Children Only:</b></p> <ul style="list-style-type: none"> <li>• Isolated cough in absence of wheeze or difficulty breathing</li> <li>• History of moist or productive cough</li> <li>• Nasal polyps</li> </ul>

< 6

\* Children aged < 6 years with asthma often have viral-induced symptoms only.  
 \*\* Spirometry is not applicable to children under the age of 6.  
 Table adapted from the BTS/Sign British Guideline on the Management of Asthma<sup>8</sup>

Note that signs and symptoms can be transient in nature and may not be present during the physical exam.

**< 6 Diagnostic Considerations for Children Under 6**  
 Children under the age of 6 years with asthma often have viral-induced symptoms only. Other triggers include irritants, allergens, and exercise.

Since children under the age of 6 cannot do spirometry reliably, the diagnosis of asthma is based on physical exam findings and response to medication as objective evidence of reversible airflow obstruction. Once they reach the age of 6, the diagnosis can be confirmed with spirometry.

The age of symptom onset is an important factor in whether a child will continue to have asthma as an adult. If a child has asthma symptoms under the age of 6, there is a 60% chance they will outgrow their asthma. However, if they have asthma symptoms at age 7, there is only a 30% chance they will outgrow their asthma.

**First Line Tests**

**6+ Spirometry (Age 6 and Over)**  
 Spirometry is a test performed to assess an individual's pulmonary function. It can be used to establish a diagnosis, monitor disease progress, or evaluate the effect of therapeutic interventions.<sup>10</sup>

Spirometry is most accurate when a patient is symptomatic. Consider a patient's medical history, including any recent hospitalizations.

Caregivers and children may have questions about what to expect at a spirometry appointment. Please see [Appendix A: Getting Ready for Spirometry](#).

As many as 47% of patients may produce negative spirometry results.<sup>11</sup> Because of this, negative results do not necessarily exclude the diagnosis of asthma, and spirometry should not be used in isolation to establish a diagnosis of asthma only to support the diagnosis in those with a high pre-test probability.<sup>7</sup>

**18+ Spirometry in the Office**  
 For spirometry to qualify for coverage under the Medical Services Plan, testing must be performed at an accredited facility. However, evidence suggests that with correct training and equipment, spirometry performed in a family physician's office is comparable to testing performed in a pulmonary function laboratory in adults.<sup>12</sup>

**Table 2. Diagnosis of Asthma**

Table adapted from the Canadian Thoracic Society, 2021.<sup>7</sup>

STEP 1: Confirm compatible clinical history		
STEP 2: Confirm reversible airflow obstruction with physical exam and lung function testing		
Preferred	<p><b>&lt; 6</b> Health care provider documentation of audible wheeze and other signs of airflow obstruction.</p> <p><b>AND</b></p> <p>Documented improvement with SABA +/- oral corticosteroids.</p>	<p><b>6-18</b> Spirometry showing reversible airflow obstruction (FEV1/FVC below the lower limit of normal/0.8-0.9).</p> <p><b>AND</b></p> <p>Increase in FEV1 of greater than or equal to 12% after a bronchodilator or after a course of controller therapy.</p>
	<p><b>18+</b> Spirometry showing reversible airflow obstruction (FEV1/FVC below the lower limit of normal/0.75-0.8)</p> <p><b>AND</b></p> <p>Increase in FEV1 after a bronchodilator or after a course of controller therapy of greater than or equal to 12% and a minimum of more than 200mL.</p>	<p>Peak expiratory flow improvement of at least 20% after a bronchodilator or after a course of controller therapy.</p>
Alternative	<p>Convincing caregiver report of symptoms.</p> <p><b>AND</b></p> <p>Symptomatic response to a three-month trial of medium-dose ICS and PRN SABA or symptomatic response to SABA.</p>	<p>Peak expiratory flow improvement of 60L/min (minimum <math>\geq 20\%</math>) after a bronchodilator or after a course of controller therapy</p> <p><b>OR</b></p> <p>Diurnal variation <math>&gt;8\%</math><sup>12</sup> based on twice daily readings; <math>&gt;20\%</math> based on multiple daily readings.</p>
Alternative		<p><b>8+</b> Methacholine challenge test* (only for age 8+)</p> <p><b>OR</b></p> <p>Exercise challenge with <math>\geq 10-15\%</math> decrease in FEV1 post-exercise</p>

**Second Line Tests**

When spirometry results are negative and clinical suspicion remains, the following tests may be helpful in diagnosing asthma:

**8+ Methacholine Challenge (Age 8 and Over)**  
 If spirometry is normal and asthma is still suspected, methacholine challenge (MCC) or an exercise challenge can be done.<sup>7</sup> It should be considered if an individual is not responding to standard asthma therapy (see [Indications for Referral](#)). MCC is useful for **ruling out** a diagnosis of asthma in a symptomatic patient.<sup>13</sup>

This test is lengthy and requires a child to be able to do spirometry consistently, so it is typically not possible in children under the age of 8.

**6+ Peak Flow Monitoring (PFM)**  
 PFM may be useful in providing objective evidence of variable airflow obstruction when:

- Evidence is needed quickly, and spirometry is unavailable (e.g., geography and access issues);
- In suspected cases of work-related asthma where PFM can be used at the workplace; and
- A patient is symptomatic, and they have baseline peak flow readings for comparison (see [Associated Document – Asthma Action Plan](#)).

Spirometry is the preferred test as reference values for peak flow readings are not as well standardized, readings are more variable, and the device may malfunction.

Remember to use the same meter is used for PFM as readings can vary substantially by device.

### Other Tests: Allergy Testing

For patients whose symptoms are not well controlled and have symptoms seasonally or with exposure to certain inhaled allergens, it may be helpful to identify which allergens a patient is sensitized to. **Although allergy testing for inhaled allergens can be done at any age, allergens are more likely to cause symptoms after age 4 for indoor allergens and after age 5 for outdoor allergens.**<sup>14</sup>

Inhalant allergen exposures have been shown to lead to asthma attacks in some patients. It is rare for food allergens to cause asthma symptoms unless the allergenic protein is aerosolized and inhaled, or the patient is having anaphylaxis.<sup>9</sup>

### Differential Diagnosis and Misdiagnosis

Up to 30% of patients with a physician diagnosis of asthma are misdiagnosed.<sup>15,16,17</sup> Spirometry is the best first-line test for diagnosis and should be pursued to avoid misdiagnosis. In those that do not respond well to treatment, assuming adherence, inhaler technique and co-morbidities are being treated, reconsider the diagnosis with clinical correlation and obtain objective evidence of variable airflow obstruction.

**Table 3. Pediatric Alternative Diagnoses**

Table adapted from the *Differential Diagnosis of Asthma*, 2019.<sup>18</sup>

Infections	Mechanical Conditions	Congenital Conditions
<ul style="list-style-type: none"> <li>Recurrent respiratory tract infections</li> <li>Persistent bacterial bronchitis</li> <li>Chronic rhinosinusitis</li> <li>Tuberculosis</li> </ul>	<ul style="list-style-type: none"> <li>Foreign body aspiration</li> <li>Gastroesophageal reflux</li> </ul>	<ul style="list-style-type: none"> <li>Cystic fibrosis</li> <li>Immune deficiency</li> <li>Congenital heart disease</li> <li>Bronchopulmonary dysplasia</li> <li>Primary ciliary dyskinesia syndrome</li> <li>Tracheomalacia</li> </ul>

**Table 4. Adult Alternative Diagnoses**

Infections	Mechanical Conditions	Congenital Conditions
<ul style="list-style-type: none"> <li>Chronic Obstructive Pulmonary Disorder (COPD)*</li> <li>Infectious etiologies (bacterial, viral, and fungal)</li> <li>Gastroesophageal reflux (GERD)</li> <li>Chronic rhinosinusitis (CRS)</li> <li>Congestive heart failure (CHF)**</li> <li>Vocal cord dysfunction (VCD) and other disorders of the upper airway</li> </ul>	<ul style="list-style-type: none"> <li>Idiopathic anaphylaxis with predominant respiratory manifestations</li> <li>Aspirin or nonsteroidal exacerbated respiratory disease (AERD or Samter's triad)</li> <li>Malignancy</li> <li>Sarcoidosis and other autoimmune processes</li> <li>Hypersensitivity pneumonitis</li> <li>Pulmonary hypertension</li> <li>Drug induced bronchospasm</li> </ul>	<ul style="list-style-type: none"> <li>Lymphangiomyomatosis (LAM)</li> <li>Cystic fibrosis</li> <li>Loeffler's syndrome and other eosinophilic lung diseases</li> <li>Vasculitides               <ol style="list-style-type: none"> <li>Churg-Strauss vasculitis</li> <li>Granulomatosis with polyangiitis</li> <li>Microscopic polyangiitis</li> </ol> </li> </ul>

\* see BCGuideline.ca – Chronic Obstructive Pulmonary Disease (COPD)

\*\* see BCGuideline.ca – Chronic Heart Failure - Diagnosis and Management

## Work-Related Asthma

**18+** Work-related asthma includes both occupational asthma (asthma symptoms that are a result of exposure to workplace irritant/allergen) and work-aggravated asthma (pre-existing asthma symptoms that worsen due to exposure of workplace irritant/allergen).<sup>19</sup>

Ask all adult patients about potential occupational exposures at the workplace.<sup>15,20</sup> Refer all patients with suspected work-related asthma to a specialist. See [WorkSafeBC](#) for more information.

**Table 5. Common Allergen Exposures by Setting**

Table adapted from *WorkSafe BC*<sup>21</sup>

Setting	Allergen
Bakeries	Flour dust
Health care	Latex
Metalworking	Solder fumes
Office or home	Mold, dust mites, animal dander
Outdoors	Wood dust, pollens
Painting, insulating, manufacturing, and industrial coating	Isocyanates (released by chemical reactions in plastics and polyurethanes)
Pest control	Animal dander, mold
Working with wood and wood products	Wood dust

## Management

The core components of asthma management are:<sup>7</sup>

1. Assessing control and risk of exacerbation
2. Providing asthma self-management education, including a written action plan
3. Identifying triggers and discussing environmental control (if applicable); and
4. Prescribing appropriate pharmacological treatment to achieve and maintain control.

### 1. Assessing Control and Risk

Once the patient's asthma diagnosis is confirmed (or highly probable):

- Assess the patient's asthma symptom control
- Assess the patient's risk for exacerbation<sup>9</sup> and,
- Create/modify the patient's treatment plan – see [Table 6: Assessing asthma symptom control](#).

**A patient with well-controlled asthma will have no symptoms as listed in the poorly controlled column of Table 6.**<sup>7</sup>

A patient is at higher risk for asthma exacerbations if they have **any** of the following risk factors:

- Previous history of severe asthma exacerbation (requiring systemic steroids, emergency department visit or hospitalization)
- Poorly controlled asthma
- Overuse of SABA (filled more than 2 SABA inhalers in the last year)
- Current smoker

**Table 6. Assessing Asthma Symptom Control**

Symptom	Poorly controlled	Well-controlled
	Frequency	
Daytime symptoms	3 or more days per week	2 or fewer days per week
Nighttime symptoms	1 or more night per week <i>or</i> moderate to severe	Fewer than 1 nights per week <i>and</i> mild*
Physical activity	Below normal	Normal
Exacerbations	Moderate to severe <i>or</i> frequent	Mild* <i>and</i> infrequent**
Absence from work or school due to asthma	One or more days	None
Need for a reliever (SABA or bud/form)	3 or more doses per week	2 or fewer doses per week
FEV1 or PEF	89% or less of personal best	90% or better of personal best
PEF diurnal variation	More than 15%	Less than 10-15%

\* A mild exacerbation does not require systemic steroids, an ED visit, or a hospitalization.

\*\* "Infrequent" means the patient feels there is no impairment to their quality of life.

Adapted from *The Canadian Thoracic Society*, 2021.<sup>7</sup> Circle the frequency of each of the following symptoms.

## Asthma Severity

**Asthma severity can only be assessed retrospectively**, after a patient has well-controlled asthma for at least 3 months.<sup>9</sup> Severe asthma is rare, constituting 3.7% of the total asthmatic population.<sup>9</sup> It is more common to have patients with poorly controlled asthma due to poor adherence to daily medication or issues with inhaler technique.

Asthma severity classifications have changed and no longer include the terms persistent or intermittent as asthma is a chronic disease even though the symptoms may be intermittent. Severity classifications range from very mild to severe:<sup>7</sup>

- **Very mild:** Patient is well-controlled on PRN SABA
- **Mild:** Patient is well-controlled on low-dose ICS (or LTRA) and PRN SABA or PRN bud/form.
- **Moderate:** Patient is well-controlled on low dose ICS +second controller and PRN SABA, or moderate doses of ICS +/- second controller medication and PRN SABA, or low-moderate dose bud/form+ PRN bud/form
- **Severe:** High doses of ICS +second controller for the previous year or systemic steroids for 50% of the previous year to prevent it from becoming uncontrolled or is uncontrolled despite this therapy.

## 2. Self-management Education and Written Action Plans

Establish what the patient already knows about asthma, and then discuss:

- The condition (e.g., asthma as a chronic condition, how asthma attacks occur)
- Goals of treatment (e.g., what well controlled asthma looks like, patient and/or caregiver's concept of quality of life) and
- Treatment options (e.g., patient's and/or caregiver's willingness to use pharmacological therapy and trigger identification and possible lifestyle/environmental modifications).

See [Appendix B: Supporting Patients with Poor Medication Adherence](#)

After this conversation, develop a written asthma action plan with the patient and/or caregiver(s) (see [Asthma Action Plan](#)). Also refer the patient to an [asthma education program](#), if available. Online resources, including the Provincial Health Services Authority's (PHSA) [Guide for Families and Caregivers](#) video, may be useful. See [Physician and Patient Resources](#).

PHSA's Guide for Families and Caregivers video is available in:

- English
- Mandarin
- Cantonese
- Punjabi



## Supporting Patients with Poor Asthma Control

Approach poorly controlled asthma gently, as the patient (or caregiver) may be reluctant to admit to cost concerns, forgetfulness, or physical barriers (e.g., arthritis) that impact adherence to their medication and/or treatment plan.

For additional information on identifying and supporting patients with poor medication adherence, please see [Appendix B: Supporting Patients with Poor Medication Adherence](#).

### 3. Identifying Triggers and Discussing Environmental Control

Environmental factors that trigger a patient's asthma should be identified on their history and avoided, if possible. For adults, consider the work environment as well.

**Table 7. Environmental Factors for Exacerbations**

Seasonal Environmental Factors (Seasonal)	Year-round Environmental Factors
<ul style="list-style-type: none"><li>• Pollens (tree, grass, weeds)</li><li>• Air quality, including wildfire smoke</li><li>• Cold air</li><li>• Viral infections</li><li>• Outdoor mold</li></ul>	<ul style="list-style-type: none"><li>• Indoor mold</li><li>• Dust mites</li><li>• Pet dander</li><li>• Air quality (tobacco, marijuana, etc.)</li><li>• Occupational</li></ul>

## Smoking Cessation

### Active Smoke

Active smoking is associated with increased risks of poor asthma control, hospitalizations, declining lung function, and reduces effectiveness of inhaled and oral corticosteroids.<sup>9</sup> Encourage smokers to quit at every visit and link smoking cessation to the patient's own, self-identified health goals. Please see the [Resources](#) in this guideline and BC Guidelines: [Tobacco Cessation](#).

### Passive Smoke

Exposure to passive smoke increases the risk of poor asthma control and may contribute to hospitalization. Advise the parents and caregivers of patients with asthma not to smoke, but if they are unable or not ready to quit, not to smoke around their children, or in any vehicles or rooms with their children.

### Wildfire Smoke

Wildfire exposure is of particular concern in BC, where the frequency and size of wildfires has increased in recent years.<sup>22</sup> Exposure to wildfire smoke and debris contributes to increased physician visits, emergency room visits, hospitalizations, frequency of respiratory infections, and all-cause mortality.<sup>23-28</sup>

Exposure to wildfire smoke is also associated with increased dispensing of rescue inhalers,<sup>24</sup> a marker for worsening asthma control.

### **Wildfire Smoke and Children with Asthma**

Exposure to wildfire smoke and ash is especially risky for children because their lungs are still developing.<sup>29</sup>



## Minimizing Exposure to Wildfire Smoke

During a wildfire, patients with asthma can minimize the risk of exacerbation by:<sup>30,31</sup>

- Paying attention to local air quality reports (see [Air Quality and Wildfire Resources](#))
- Closing doors, windows, and fireplace dampers
- Using a portable air cleaner in one or more rooms
- Using air conditioners on the recirculation setting so outside air will not be moved inside and
- Avoiding exercising outdoors.

## Environmental Interventions

Evidence supporting interventions around environmental control is lacking.<sup>13</sup> Two or more single-component interventions are more effective than a single intervention alone.<sup>13</sup> Interventions include:

- HEPA filters
- Avoiding cleaning products
- Pest and rodent control
- Carpet removal
- Minimizing pet allergens, e.g., isolate pet to a specific area of the house.

## 4. Prescribing Appropriate Pharmacological Treatment

Asthma medications generally fall into one of the three following categories:

- **Controller medication:** Used to reduce airway inflammation, control future symptoms, and reduce future risks of exacerbation. Controllers must be maintained.
- **Reliever medication:** For as-needed treatment of breakthrough symptoms.
- **Biologics therapies for patients with severe asthma:** These medications are prescribed by asthma specialists. See [Biologics](#) below.

### Choice of Device

The most important factor in selecting a medication delivery device is to ensure the patient can use it properly.

### Pressurized Meter Dose Inhaler (MDI)

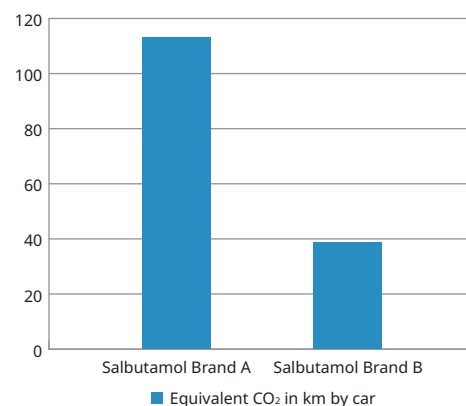
A pressurized cannister in a plastic holder with a mouthpiece. Metered dose inhalers rely on a propellant to distribute medication. The propellant is a liquefied, compressed gas called hydrofluoroalkane (HFA). HFAs have been identified as a gas with “a high global warming potential”.<sup>19</sup> MDIs contribute significantly to healthcare’s overall carbon footprint.<sup>32</sup>

In BC, over 1.7 million inhalers are dispensed every year. In 2021, this contributed about 22,000 tonnes of CO<sub>2</sub>e or the equivalent of driving 86 million km in a standard gasoline powered vehicle. That’s 14,000 cars driven from Vancouver to Halifax. Of these greenhouse gas emissions, virtually all are caused by MDIs – yet MDIs represent 6 out of 10 inhalers dispensed in BC.<sup>47</sup>

When a metered dose inhaler is the best course of treatment, consider prescribing a low-volume HFA inhaler over a high-volume HFA inhaler.<sup>19</sup> **One brand of salbutamol inhaler generates the same carbon emissions per inhaler as driving a car 113 km, while a different brand of the same medication, with the same coverage, generates the same carbon emissions per inhaler as driving a car 38.8km** (see [Figure 1](#)).<sup>32</sup>

The leaf icon (🌿) in [Appendix C: Asthma Medication Table](#) indicates lower environmental impact medication options. For detailed information about the impact of specific medications, please see the [Inhaler Coverage and Environmental Impact Guide](#).

**Figure 1. Comparative CO<sub>2</sub> output of salbutamol MDIs<sup>32</sup>**



## Spacer Devices for MDIs

Spacer devices (valved holding chamber) must be bought separately; however, spacers make it easier for a patient to use their MDI and they distribute medication to the lungs more effectively. Spacer devices are recommended for **all ages** of patients prescribed a MDI, particularly with inhaled corticosteroids.

### **8+** Dry Powder Inhaler (DPI)

DPIs rely on the force a patient generates to inhale their medication rather than a propellant, which makes them a more environmentally friendly option. DPIs are contraindicated for young children or adult patients with comorbidities such as neuromuscular weakness or frailty.

Propellant-free devices may also have an impact in other environmental spheres.<sup>33</sup> One of the reasons correct diagnosis is so important is to avoid prescribing needless medication including containers and chemicals.<sup>33</sup>

**Nebulizers** are **no longer recommended** for any age group. MDI with spacer is as effective as a nebulizer<sup>34</sup> and spacer devices carry lower infection risk than nebulizers.

**Table 8. Recommended Inhaler Device by Age**

Choice of inhaler device	First Line	Second Line
Children 2-4yrs	MDI plus spacer with facemask	
≥4 to 6yrs	MDI plus spacer with mouthpiece*	MDI with spacer plus facemask
≥6yrs	MDI plus spacer with mouthpiece OR Dry powder inhaler**	MDI with spacer plus facemask

\* To use a spacer with mouthpiece, children must be able to form a seal around the mouthpiece and breathe through their mouths.

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

## Stepwise Approach

**Begin with the step most appropriate to the initial severity of the patient's asthma.** If symptom control is insufficient (see [Table 6. Assessing asthma symptom control](#)), the reasons for poor control should be assessed prior to or in conjunction with proceeding to the next step up. This includes assessment of:

- Adherence
- Inhalation technique (including whether they have been using an empty inhaler)
- Environmental exposures
- Comorbidities (e.g., rhinosinusitis, GERD, etc.) that may worsen or mimic asthma symptoms

If symptom control is maintained and exacerbation risks are well-managed over at least 3 months, consider stepping down to the previous step. Ensure the patient has had no exacerbations in the past year before stepping down treatment.

## Ages Under 6

Step	First-line Treatment	Alternative Therapy	Notes
<b>One</b> Well-controlled asthma and lower risk for exacerbation	<b>Controller:</b> None <b>Reliever:</b> PRN SABA		
<b>Two</b> After failing step one	<b>Controller:</b> Daily low-dose ICS <b>Reliever:</b> PRN SABA	<b>Controller:</b> Daily LRTA <b>Reliever:</b> PRN SABA	<b>Step 2 onwards:</b> Before moving on to the next step of treatment, review medication adherence and inhaler technique.  If unable to maintain <b>Step 3</b> , refer to a specialist for further treatment.
<b>Three</b> After failing step two	<b>Controller:</b> Daily medium-dose ICS <b>Reliever:</b> PRN SABA	<b>Controller:</b> Daily LTRA + daily low-medium dose ICS <b>Reliever:</b> PRN SABA	

## Ages 6 – 11

Step	First-line Treatment	Alternative Therapy	Notes
<b>One</b> Well-controlled asthma and lower risk for exacerbation	<b>Controller:</b> None <b>Reliever:</b> PRN SABA	<b>Controller:</b> Consider daily low-dose ICS <b>Reliever:</b> PRN SABA	
<b>Two</b> After failing step one	<b>Controller:</b> Daily low-dose ICS <b>Reliever:</b> PRN SABA	<b>Controller:</b> Daily low-dose LRTA <b>Reliever:</b> PRN SABA	<b>Step 2 onwards:</b> Before moving on to the next step of treatment, review medication adherence and inhaler technique.  If unable to maintain <b>Step 3</b> , refer to a specialist for further treatment.
<b>Three</b> After failing step two	<b>Controller:</b> Daily medium-dose ICS <b>Reliever:</b> PRN SABA	<b>Controller:</b> Daily LTRA + daily low-medium dose ICS <b>Reliever:</b> PRN SABA	

## Inhaled Corticosteroid Dosing (Fluticasone Propionate equivalent)

Age	Low Dose	Medium Dose	High Dose	Max
<b>6 – 11</b>	100 – 200 mcg/day	226 – 400 mcg/day	400mcg/day	400 mcg/dy
<b>&lt; 6</b>	100mcg/day	200-250mcg/day	Refer	1 – 4 years: 200 mcg/day

## Ages 12 - 17

Step	First-line Treatment	Alternative Therapy	Notes
<b>One</b> Well-controlled asthma and lower risk for exacerbation	<b>Controller:</b> None <b>Reliever:</b> PRN SABA Please see <a href="#">Controversies of Care</a>	<b>Controller:</b> Consider daily low-dose ICS or PRN budesonide-formoterol*	
<b>Two</b> After failing step one	<b>Controller:</b> Daily low-dose ICS <b>Reliever:</b> PRN SABA	<b>Controller:</b> PRN budesonide-formoterol <b>Reliever:</b> PRN budesonide-formoterol	PRN budesonide-formoterol is first-line treatment for patients not adherent to daily ICS despite adequate asthma education
<b>Three</b> After failing step two	<b>Controller:</b> Daily medium dose ICS or daily low dose ICS+LABA <b>Reliever:</b> PRN SABA or PRN budesonide-formoterol if controller is budesonide/formoterol		<b>Step 2 onwards:</b> Before moving on to the next step of treatment, review medication adherence and inhaler technique.
<b>Four</b> After failing step three	<b>Controller:</b> Daily low-medium dose ICS+LABA <b>Reliever:</b> PRN SABA or PRN budesonide-formoterol if controller is budesonide/formoterol		If unable to maintain <b>Step 4</b> , refer to a specialist for further treatment.

## Ages 18+

Step	First-line Treatment	Alternative Therapy	Notes
<b>One</b> Well-controlled asthma and lower risk for exacerbation	<b>Controller:</b> PRN low-dose budesonide-formoterol* <b>Reliever:</b> PRN low-dose budesonide-formoterol*	<b>Controller:</b> Low-dose maintenance ICS <b>Reliever:</b> PRN SABA*	
<b>Two</b> After failing step one	* budesonide/formoterol formulation approved to be used alone as PRN is the 200ug/6ug inhaler		<b>Step 2 onwards:</b> Before moving on to the next step of treatment, review medication adherence and inhaler technique.
<b>Three</b> After failing step two	<b>Controller:</b> Low-dose maintenance budesonide-formoterol <b>Reliever:</b> PRN low-dose budesonide-formoterol	<b>Controller:</b> Low-dose maintenance ICS-LABA <b>Reliever:</b> PRN SABA	
<b>Four</b> After failing step three	<b>Controller:</b> Medium-dose maintenance budesonide-formoterol <b>Reliever:</b> PRN low-dose budesonide-formoterol	<b>Controller:</b> Medium- to high-dose maintenance ICS-LABA <b>Reliever:</b> PRN SABA	If unable to maintain <b>Step 4</b> , refer to a specialist for further treatment.

\* = SABA in isolation is not recommended in adults. Please see [Controversies of Care](#).

### Inhaled Corticosteroid Dosing (Fluticasone Propionate equivalent)

Age	Low Dose	Medium Dose	High Dose	Max
<b>12+</b>	100 – 200 mcg/day	226 – 500 mcg/day	> 500 mcg/day	2000mcg/dy
<b>12 – 18</b>	100 – 200 mcg/day	226 – 500 mcg/day	500mcg/day	12 – 16 years: 400mcg/day 16+ years: 2000mcg for 16-17yo

### Asthma Management During Pregnancy

#### Pregnant patients should not stop their medication during pregnancy.

- **Medication:** Most asthma treatments are considered safe during pregnancy, but budesonide is considered the safest inhaled corticosteroid for pregnant patients.<sup>35</sup> The risks of untreated asthma symptoms during pregnancy is much higher than with those associated with asthma medications.<sup>36</sup>
- **Action plan:** Part of a pregnant patient's action plan should include contacting their obstetrical care provider during exacerbations to monitor fetal well-being. Consider involving both an obstetrical care provider and an asthma specialist.
- **Monthly asthma assessment:** As many as 1/3 may experience worsening asthma symptoms during pregnancy and would benefit from closer (monthly) monitoring.<sup>37</sup>

#### Pregnant patients with uncontrolled or severe asthma should be managed by a specialist.

#### **18+** Biologics and Add-on Therapies

The biologics used in asthma are reserved for patients with severe asthma and should be prescribed by asthma specialists *after*:

- Confirming that a patient requires high dose inhaled steroids **and**
- A second controller medication to control their asthma (or remain uncontrolled despite those medications).

Biologics should not be prescribed until their need is confirmed by a specialist. They are given by subcutaneous injection and target different parts of the inflammatory pathway.<sup>38</sup>

For patients to be eligible for PharmaCare coverage of asthma biologics, good adherence to asthma controllers (as assessed by prescription refills in PharmaNet) is needed, so it is useful to ensure that patients are appropriately filling their controller prescription prior to referring them to a specialist.

## Navigating an Exacerbation – the “Yellow Zone”

Individuals having increased asthma symptoms are typically in the “yellow zone” of their asthma action plan (See [Associated Documents: Asthma Action Plans](#)). The yellow zone can be taken as a symptom-based caution sign that a patient is at risk of experiencing an exacerbation and that their medicine needs to be increased.

Symptoms indicative of the yellow zone are in [Table 9](#), below. Early recognition of the yellow zone and intervention are important to successfully stabilizing asthma.<sup>1</sup>

Patients who experience “Mild to Severe” symptoms are encouraged to follow their action plan and/or to book an **urgent appointment** with their health care provider. An exacerbation could be imminent, and early support could prevent it. Patients who are having symptoms of a life-threatening asthma exacerbation should seek immediate attention.

**Table 9. Yellow Zone Indications (All Ages)**<sup>39</sup>

Mild to Severe Exacerbation	Life-Threatening Exacerbation
<ul style="list-style-type: none"> <li>Disrupted sleep due to asthma symptoms and difficulty breathing</li> <li>Daytime symptoms 2 or more times per week</li> <li>Inability to exercise normally without difficulty breathing</li> <li>Decreased physical activity due to asthma symptoms</li> <li>Getting a cold/flu</li> </ul>	<ul style="list-style-type: none"> <li>Excessive cough, wheeze, and chest tightness not responding to reliever medication</li> <li>Difficulty speaking due to asthma symptoms</li> <li>Shortness of breath at rest not responding to reliever medication</li> <li>Lips or nail beds turning blue</li> <li>Reliever (rescue) medication isn't helping or lasting 4 hours</li> <li>Sweating</li> <li>Feeling anxiety or fear</li> </ul>

### Yellow Zone Management

**<18** In children, it is **not** recommended to increase the dose of inhaled corticosteroids in the yellow zone as this can lead to increased side-effects and hasn't been shown to be effective.<sup>7</sup>

**18+** In adults who have had an exacerbation in the last year, a trial of a 4- or 5-fold increase in maintenance ICS dose for 7-14 days is suggested.<sup>7</sup> **Please note:** this dose exceeds product monograph total daily dose limits intended for chronic daily use. A short-term dose increase beyond these limits is unlikely to carry any significant safety risks, however formal safety testing data are not available and the decision to pursue this approach should be based on patient and clinician comfort. Prescribers should be aware of the maximum doses of ICS and LABA approved for use in Canada (see [Appendix C: Asthma Medication Table](#)).

There are significant adverse events associated with as few as 4 short courses of systemic steroids in a lifetime. Requiring a course of systemic steroids should trigger a thorough assessment of a patient's asthma.<sup>46</sup>

## Ongoing Care

Review the following with the patient at regular office visits:\*

1. Medication adherence
2. Inhaler technique (e.g., have patient demonstrate how they take their inhalers)
3. How to monitor symptoms
4. Level of symptom control and ability to follow lifestyle modifications
5. Asthma action plan (modify if necessary)

### After a Severe Exacerbation

Schedule follow-up visits within 2-4 weeks of any severe exacerbation that required an ER visit, hospitalization, or systemic steroid use. At this visit, assess:

1. Modifiable risk factors for the exacerbation (e.g., medication adherence, inhaler technique)
2. Whether they used their action plan correctly
3. Whether changes need to be made to their action plan

Patients with risk factors associated with near-fatal asthma attacks (see [Table 10. Risk factors associated with near-fatal asthma](#), below) require careful follow-up. See the [Resources](#) section of this guideline.

**Table 10. Risk Factors Associated with Near-Fatal Asthma**

Adapted from *The Canadian Thoracic Society, 2021*<sup>7</sup>

Clinical Factors	Environmental and Social Factors
<ul style="list-style-type: none"><li>• Any previous near-fatal asthma exacerbation (e.g., previous ICU admission, ventilation, respiratory acidosis)</li><li>• Recurrent hospitalizations or ED visits in last year</li><li>• Severe asthma</li><li>• Overuse of short-acting beta-agonists</li><li>• Obesity</li><li>• Depression, anxiety, or other psychiatric illness</li></ul>	<ul style="list-style-type: none"><li>• Alcohol or other substance use</li><li>• Severe domestic, marital, employment, or other stress</li><li>• Denial of illness or severity of illness</li><li>• Poor adherence to treatment plans</li><li>• Failure to attend clinic appointments</li></ul>

### Reassessing Persistence of Asthma Symptoms in Children <6yrs

**<6** 50% of preschool age children with wheezing outgrow their asthma by age 6.<sup>40</sup> Therefore, the need for ongoing therapy in children < 6 should be re-evaluated every 6-12 months.

A trial off controller medication may be considered for children who have been well-controlled (with no exacerbations) during exposure to their typical triggers for the past 6 to 12 months.<sup>7</sup> Monitor closely during the trial period.

### Influenza and COVID-19

Influenza and COVID-19 can contribute to acute asthma exacerbations.<sup>9</sup> Vaccination reduces the risk of infection. Encourage patients to maintain their regular influenza and COVID-19 vaccinations.

Mask wearing can reduce the spread of viral illness and is not a risk factor for exacerbations.<sup>41</sup>

\* Visits also include follow-up visits after a patient has an asthma attack.

## Indications for Referral<sup>†</sup>

- Atypical asthma symptoms or diagnostic uncertainty
- Poorly controlled asthma or asthma exacerbations despite asthma control (poor lung function, persistent asthma symptoms) despite good adherence to step 3 or 4 treatment (see [Stepwise approach](#))
- Frequent asthma exacerbations despite moderate doses of inhaled corticosteroids (with proper technique and good adherence)
- Need for allergy testing to assess the possible role of environmental allergens in those with a suggestive clinical history
- Occupational asthma may be indicated
- Patient is pregnant and has severe asthma
- Any asthma hospitalization,  $\geq 2$  ED visits, or  $\geq 2$  courses of systemic steroids
- A life-threatening event such as ICU admission for asthma

## Environmental Impact and Climate Change

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### Climate and Asthma Management

While asthma exacerbations can occur at any time during the year, there are seasonal patterns.<sup>42</sup>

In children, exacerbation rates are highest in the fall. The “September Epidemic” has been attributed to an increased in rhinovirus respiratory infections among children when they return to school. Environmental factors (pollen, temperature, and air pollutants) also contribute to this phenomenon.

Climate change impacts the seasonal asthma cycle in two ways

- By shifting weather patterns, which can lead to a prolonged pollen season<sup>43</sup>
- Through increasingly common climate events, such as wildfires<sup>22</sup>

Other climate events, such as heat domes<sup>44</sup> and flooding<sup>43</sup> may also present exacerbation risks for patients with asthma. Consider climate events when developing their Asthma Action Plans.

## Controversies of Care

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**18+** **Use of Short-acting Beta-agonists Alone as a Treatment Option in Very Mild Asthma**  
Some guidelines recommend that no patient with asthma should be prescribed a SABA alone given the evidence for decreasing exacerbations in patients with mild to severe asthma. Others leave PRN SABA as an option for those with very mild asthma (see [Asthma severity](#)) who are at lower risk for exacerbations (see [Assessing control and risk](#)).

**12+** **Preference for Daily Inhaled Corticosteroids for those with Mild Asthma**  
Some guidelines advise adults with mild asthma be prescribed PRN ICS-formoterol regimens as patients generally do not adhere to daily medication. Others recommend daily ICS as first-line (as this leads to better asthma control and improved lung function) and PRN ICS-formoterol regimens only as first-line treatment in patients ages **12+** with poor adherence to daily medication despite adequate asthma education and support.

### Physical Activity, Healthy Diet, and Breathing Exercises

Evidence that physical activity, healthy diet, and breathing exercises mitigate asthma is inconclusive, but the evidence that these practices improve quality of life is fair.<sup>9</sup>

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<sup>†</sup> Asthma specialists typically include internal medicine specialists, pediatricians, pediatric respirologists/allergists, pediatric asthma clinics



## **Wait Times and Accessibility**

Wait times and location for spirometry vary across the province. In some regions, the distance to a facility may be prohibitive, or the amount of time between referral and procedure may fall outside the recommended testing interval.

## **Asthma-COPD Overlap Syndrome (ACOS)**

Asthma-COPD Overlap Syndrome (ACOS) was mentioned in previous guidelines. While asthma and COPD do share similarities, ACOS has not been clearly defined.<sup>45</sup>

Practitioners are discouraged from diagnosing patients with ACOS.

# Resources

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## Abbreviations:

<b>FABA</b>	Fast-acting beta agonist
<b>LABA</b>	Long-acting beta agonist
<b>SABA</b>	Short-acting beta agonist
<b>Bud/form</b>	A single inhaler containing both budesonide and formoterol
<b>PRN</b>	“Pro re neta”, or “as needed”
<b>ICS</b>	Inhaled corticosteroid
<b>HFA</b>	Hydrofluoroalkane
<b>LTRA</b>	Leukotriene receptor antagonist
<b>MDI</b>	Metered dose inhaler
<b>DPI</b>	Dry powder inhaler

## Practitioner Resources

- **RACE Line:** Rapid Access to Consultative Expertise Program: a phone app for physicians, nurse practitioners and medical residents. [raceconnect.ca/](https://raceconnect.ca/)
- **PathwaysBC:** An online resource that allows GPs and nurse practitioners and their office staff to quickly access current and accurate referral information, including wait times and areas of expertise, for specialists and specialty clinics. See: <https://pathwaysbc.ca/login>
- **Health Data Coalition:** An online, physician-led data sharing platform that can assist you in assessing your own practice in areas such as chronic disease management or medication prescribing. See: [Health Data Coalition – Better Information. Better Care. Better Patient Outcomes. \(hdcbc.ca\)](https://hdcbc.ca)
- **General Practice Services Committee: Home page | GPSC (gpscbc.ca)**
  - o **Practice Support Program:** offers focused, accredited training sessions for BC physicians to help them improve practice efficiency and support enhanced patient care.
  - o **Chronic Disease Management and Complex Care Incentives:** compensates GPs for the time and skill needed to work with patients with complex conditions or specific chronic diseases.
- **British Columbia Centre of Disease Control: [bccdc.ca/](https://bccdc.ca/)**
- **BC Children’s Hospital: [bcchildrens.ca/](https://bcchildrens.ca/)**
- **Work Safe BC: [worksafebc.com/en](https://worksafebc.com/en)**
- **Creating A Sustainable Canadian Health System In A Climate Crisis (CASCADES):**
  - o [Patient Inhaler Disposal Poster \(cascadescanada.ca\)](https://cascadescanada.ca)
  - o [Patient-Facing Inhaler Infographic September 2022 \(cascadescanada.ca\)](https://cascadescanada.ca)
  - o [Primer - Inhalers - Cascades Canada](https://cascadescanada.ca)
  - o [Inhaler Coverage Reference Chart](https://cascadescanada.ca)
- **Emergency Management and Planning:**
  - o [Gov.bc.ca: Emergency Management](https://gov.bc.ca)
  - o [Building Resilient Rural Communities: Responding to Climate Change & Ecosystem Disruption](https://gov.bc.ca)

## Patient, Family and Caregiver Resources

- **Health Link BC:** You may call HealthLinkBC at 8-1-1 toll-free in B.C., or for the deaf and the hard of hearing, call 7-1-1. You will be connected with an English-speaking health-service navigator, who can provide health and health-service information and connect you with a registered dietitian, exercise physiologist, nurse, or pharmacist. See: [healthlinkbc.ca/](https://healthlinkbc.ca/)
- **Doctors of BC: [doctorsofbc.ca/](https://doctorsofbc.ca/):** Stay Active, Stay Safe

- **BC Children’s Asthma Resources for Families:** [bcchildrens.ca](http://bcchildrens.ca)
- **PHSA Asthma Education Videos**
  - [A Guideline for Families and Caregivers \(English\)](#)
  - [儿童哮喘：家人和看护人员指南 \(Mandarin\)](#)
  - [兒童哮喘：給家人和照顧者的指引 \(Cantonese\)](#)
  - [ਬਚਪਨ ਵਿੱਚ ਹੋਣ ਵਾਲਾ ਐਸਥਮਾ \(ਦਮਾ\): ਪਿਰਵਾਰ ਅਤੇ ਦੇਖਭਾਲ ਪੌਦਾਨ ਕਰਨ ਵਾਲਿਆਂ ਲਈ ਇੱਕ ਗਾਈਡ \(Punjabi\)](#)
  - [How to use your Turbuhaler \(English\)](#)
- **British Columbia Centre of Disease Control:** [bccdc.ca/](http://bccdc.ca/) - repeated from above
- **Creating A Sustainable Canadian Health System In A Climate Crisis (CASCADES):**
  - [Correct Inhalers Usage Resources English \(cascadescanada.ca\)](#)
  - [Tools & Templates - Cascades Canada](#)

## Air Quality and Wildfire Resources

- **Gov.bc.ca:**
  - [Current Wildfire Activity](#)
  - [Air Quality Health Index](#)
  - [Air Quality Subscription Service](#)
  - [Wildfire Smoke: Frequently Asked Questions \(gov.bc.ca\)](#)
  - **BC Wildfire Dashboard:** [BC Wildfire Dashboard \(arcgis.com\)](#)
- **BC CDC:**
  - [Wildfire Smoke Response Planning \(bccdc.ca\)](#)
  - [British Columbia Asthma Prediction System \(BCAPS\): <https://maps.bccdc.ca/bcaps/>](#)
- **Videos:**
  - [What kind of mask protects you from smoke? - YouTube](#)
  - [Protect your health from wildfire smoke - YouTube](#)
- **Quit Smoking:** It provides one-on-one support and valuable resources in multiple languages to help you plan your strategy and connect with a Quit Coach. See: [Community and Support | QuitNow](#). Phone: 1-877-455-2233 (toll-free) Email: [quitnow@bc.lung.ca](mailto:quitnow@bc.lung.ca)
- **Smokers’ Helpline** at 1-866-366-3667 or visit [Home \(smokershelpline.ca\)](#)

## Diagnostic Codes

495 Asthma

## Appendices

- [Appendix A: Getting Ready for Spirometry](#)
- [Appendix B: Supporting Patients with Poor Medication Adherence](#)
- [Appendix C: Asthma Medication Table](#)

## Associated Documents

The following documents accompany this guideline:

- [Asthma Action Plans](#)
- [Inhaler Coverage and Environmental Impact Guide](#)

## List of Contributors

This guideline is based on scientific evidence current as of the effective date.

This guideline was developed by the Guidelines and Protocols Advisory Committee in collaboration with the Provincial Laboratory Medicine Services and adopted under the *Medical Services Act* and the *Laboratory Services Act*.

## 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: Getting Ready for Spirometry

Spirometry is a non-invasive breathing test that can help your primary care provider diagnose or monitor conditions like asthma. Set yourself up for success with this appointment checklist.

For more information on what to expect, see [Childhood Asthma: A Guide for Families and Caregivers](#)

### At Least 3 Days Before Your Test

- Talk about your appointment.

Where are you going? \_\_\_\_\_

What time? \_\_\_\_\_

What should you expect? During a spirometry appointment, a clip is placed on a patient's nose, and they take big breaths into a tube as advised by a medical provider. Some dizziness is normal because of the effort involved.

**If your child is sick, please contact the lab to see if test needs to be rescheduled.**

- Pick out a comfortable, loose outfit together. Maybe a stuffed animal friend would like to come along.
- Nervous? Practice by breathing into a balloon. Don't forget to hold your nose!

### The Day of Your Test

- Pack and bring your medications and a symptom tracking journal if you have been using one.

### Immediately Before Your Test

- Use the bathroom! Spirometry tests aren't long, but they're more comfortable on an empty bladder.

*Adapted from [https://www.nps.org.au/assets/NPS2279a\\_SpirometryFactSheetKids\\_v6-v2-jg-280121-INT-ACC.PDF](https://www.nps.org.au/assets/NPS2279a_SpirometryFactSheetKids_v6-v2-jg-280121-INT-ACC.PDF)*



## Appendix B: Supporting Patients with Poor Medication Adherence

Factors that may contribute to poor medication adherence	
Clinical Factors	Environmental and Social Factors
<ul style="list-style-type: none"> <li>• Difficulty using inhaler device (e.g., arthritis, cerebral palsy, Parkinson's)</li> <li>• Burdensome regimen (e.g., multiple administrations per day)</li> <li>• Multiple different inhalers</li> <li>• Cost</li> </ul>	<ul style="list-style-type: none"> <li>• May misunderstand instructions</li> <li>• Forgetfulness</li> <li>• Absence of a daily routine</li> <li>• Perception that treatment isn't necessary</li> <li>• Denial or anger about diagnosis or treatment</li> <li>• Inappropriate expectations</li> <li>• Concerns about side effects</li> <li>• Dissatisfaction with healthcare (system or provider)</li> <li>• Stigmatization</li> <li>• Cultural or religious concerns (e.g., no dairy, natural remedies only)</li> </ul>

### Step 1: Check the medication and its usage.

Consider checking PharmaNet or the date of the last controller prescription and the date and dose counter on the inhaler.

### Step 2: Ask an empathetic question.

Acknowledge the likelihood of incomplete adherence and open a non-judgemental discussion. Examples include:

- *"Do you find it easier to remember to use your inhaler in the morning, or in the evening?"*
- *"Many patients use their inhaler more (or less) often than prescribed. In the last month, how many days per week have you been taking your inhaler: 1, 2, 3, or more times?"*
- *"Sometimes patients will spread out the doses of their more expensive medications. Would a less expensive alternative be easier to take daily?"*

### Step 3: Involve the patient in identifying an appropriate solution.







Explain that the most effective medication is the one that can be taken as prescribed. Acknowledge that medication is not a one-size-fits-all solution, and ask the patient what would make it easier for them to adhere. Possible solutions include:



- Setting an alarm reminder on the patient's phone (ask them to do this in the office).
- Switching to a once-daily medication.
- Switching to a lower cost medication.
- Identifying an aid or tool to help the patient take their medication comfortably.












## Appendix C: Asthma Medication Table




Generic Name Trade name Dose per inhalation Doses per device	Usual Dosage				Cost per device <sup>A</sup>	PharmaCare Coverage <sup>B</sup>	Adverse Effects	Therapeutic Considerations
	< 6 years	6 - 11 years	12 - 17 years	≥ 18 years				
<b>RELIEVER MEDICATION</b>								
<b>Short acting beta-agonists (SABA)</b>								
<b>Salbutamol</b> <i>Airomir™, Ventolin®, G (pMDI)</i> 100mcg/puff 200 doses  to   <i>Ventolin® Diskus (DPI)</i> 200mcg/inh 60 doses 	1 – 4 puffs (100 – 400mcg) up to q4h prn	1 – 4 puffs (100 – 400mcg) up to q4h prn	1 – 4 puffs (100 – 400mcg) up to q4h prn	1 – 4 puffs (100 – 400mcg) up to q4h prn	\$6.50	Regular benefit	Tremor (up to 38%; particularly in the hands, usually disappears as treatment continues, frequency increases with age), nervousness, pharyngitis, tachycardia (dose-related, more likely in susceptible patients)	SABAs are for symptom relief and should not be regularly used “to open the airways” before daily controller therapy as this increases risk of exacerbations.  Regular use of SABA may indicate poor asthma control (e.g., > 2X per week; > 2 SABA inhalers per year).  Paradoxical bronchospasm is unusual (~4%) and may be related to the propellant. DPI may be considered.
<b>Terbutaline</b> <i>Bricanyl Turbuhaler® (DPI)</i> 500mcg/inh 120 doses 	DPI not recommended for children <6y	1 – 2 inh (500 – 1000mcg) up to q4h prn  (max 3000mcg/day may be increased in action plan)	1 – 2 inh (500 – 1000mcg) up to q4h prn  (max 3000mcg/day may be increased in action plan)	1 – 2 inh (500 – 1000mcg) up to q4h prn  (max 3000mcg/day may be increased in action plan)	\$11.00	Regular benefit	Transient metabolic disturbances are well-known but rarely of clinical significance  ↓ in serum potassium, phosphate  ↑ in serum glucose	Use with caution in patients with cardiovascular disease (coronary artery disease, arrhythmias, hypertension); seizure disorders; hypothyroidism.   Low-volume HFA MDIs: Airomir™ and TEVA-Salbutamol   High-volume HFA MDIs: Ventolin®, APO-Salbutamol; SANIS-Salbutamol




Generic Name Trade name Dose per inhalation Doses per device	Usual Dosage				Cost per device <sup>A</sup>	PharmaCare Coverage <sup>B</sup>	Adverse Effects	Therapeutic Considerations
	< 6 years	6 - 11 years	12 - 17 years	≥ 18 years				
<b>CONTROLLER MEDICATION</b>								
<b>Inhaled Corticosteroids (ICS)</b>								
<b>Beclomethasone dipropionate</b> <i>Qvar® HFA (pMDI)</i> 50, 100mcg/puff 200 doses 	<b>Low</b> 50mcg bid  <b>Med</b> 100mcg bid  <b>High</b> refer to specialist  <i>Approved age by Health Canada ≥ 5y</i>	<b>Low</b> 50 - 100mcg bid  <b>Med</b> 150 - 200mcg bid  <b>High</b> >200mcg bid	<b>Low</b> 50 - 100mcg bid  <b>Med</b> 150 - 250mcg bid  <b>High</b> >250mcg bid	<b>Low</b> 50 - 100mcg bid  <b>Med</b> 150 - 250mcg bid  <b>High</b> >250mcg bid (max 800mcg/day)	50mcg: \$40 100mcg: \$80 (\$10 - \$95)	Regular benefit	Headache, upper respiratory tract infection, pharyngitis, dysphonia, oral thrush (can be reduced by rinsing mouth or using spacer device with an MDI)	Symptom improvement is usually evident within 1 - 2 weeks, pulmonary function may take months to improve.  Use safest and minimum effective ICS dose to minimize side effects in all groups.  Children not achieving asthma control despite adherence to low dose ICS should be increased to medium dose ICS.  Children < 6 years of age, not achieving control on medium dose ICS should be referred to an asthma specialist.  Once asthma is well controlled for 3 months, consider stepping down to lowest effective dose.  High dose treatment should be tapered rather than stopped abruptly.  Contraindications: Status asthmaticus; active pulmonary tuberculosis; untreated respiratory fungal, bacterial, or viral infections
<b>Budesonide</b> <i>Pulmicort Turbuhaler® (DPI)</i> 100, 200, 400mcg/inh 200 doses 	<i>DPI not recommended for children &lt; 6y</i>	<b>Low</b> 100 - 200mcg bid  <b>Med</b> 300 - 400mcg bid  <b>High</b> >400mcg bid	<b>Low</b> 100 - 200mcg bid  <b>Med</b> 300 - 400mcg bid  <b>High</b> >400mcg bid	<b>Low</b> 100 - 200mcg bid  <b>Med</b> 300 - 400mcg bid  <b>High</b> >400mcg bid (max 2400mcg/day)	100mcg: \$36 200mcg: \$74 400mcg: \$107 (\$10 - \$95)	Regular benefit		



Generic Name Trade name Dose per inhalation Doses per device	Usual Dosage				Cost per device <sup>A</sup>	PharmaCare Coverage <sup>B</sup>	Adverse Effects	Therapeutic Considerations
	< 6 years	6 - 11 years	12 - 17 years	≥ 18 years				
<b>Inhaled Corticosteroids (ICS)</b>								
<b>Ciclesonide</b> <i>Alvesco® (pMDI)</i> 100, 200mcg/puff 120 doses 	<b>Low</b> 100mcg once daily  <b>Med</b> 200mcg once daily  <b>High</b> refer to specialist	<b>Low</b> 100 - 200mcg once daily  <b>Med</b> 400mcg once daily  <b>High</b> >400mcg once daily  <i>Approved age by Health Canada ≥ 6y</i>	<b>Low</b> 100 - 200mcg once daily  <b>Med</b> 400mcg once daily  <b>High</b> >400mcg once daily	<b>Low</b> 100 - 200mcg once daily  <b>Med</b> 400mcg once daily  <b>High</b> >400mcg once daily (max 800mcg/day)	100mcg: \$52 200mcg: \$86 (\$15 - \$85)	Regular benefit	See above	See above
<b>Fluticasone furoate</b> <i>Arnuity Ellipta (DPI)</i> 100, 200mcg/inh 30 doses 	<i>Not approved by Health Canada</i>	<i>Not approved by Health Canada</i>	<b>Low</b> 100mcg once daily  <b>High</b> 200mcg once daily  <i>Approved age by Health Canada ≥ 12y</i>	<b>Low</b> 100mcg once daily  <b>High</b> 200mcg once daily (max 200mcg/day)	100mcg: \$46 200mcg: \$92 (\$45 - \$90)	Regular benefit		

Generic Name Trade name Dose per inhalation Doses per device	Usual Dosage				Cost per device <sup>A</sup>	PharmaCare Coverage <sup>B</sup>	Adverse Effects	Therapeutic Considerations
	< 6 years	6 - 11 years	12 - 17 years	≥ 18 years				
<b>Inhaled Corticosteroids (ICS)</b>								
<b>Fluticasone propionate</b> <i>Flovent® HFA (pMDI), G</i> 50, 125, 250mcg/puff 120 doses  <i>Flovent Diskus® (DPI)</i> 100, 250, 500mcg/inh 60 doses  <i>Aermony Respiclick® (DPI)</i> 55, 113, 232mcg/inh 60 doses 	<b>Low</b> 50mcg bid  <b>Med</b> 100 - 125mcg bid  <b>High</b> refer to specialist  (max 200mcg/day for 1- 4yo and 400mcg for 5yo)  <i>DPI not recommended for children &lt; 6y</i>	<b>Low</b> 50 - 100mcg bid  <b>Med</b> 113 - 200mcg bid  <b>High</b> >200mcg bid  (max 400mcg/day)	<b>Low</b> 50 - 100mcg bid  <b>Med</b> 113 - 250mcg bid  <b>High</b> >250mcg bid  (max 400mcg/day for 12-16 yo and 2000mcg for 16-17yo)  <i>Approved age by Health Canada ≥ 12y for Aermony Respiclick</i>	<b>Low</b> 50 - 100mcg bid  <b>Med</b> 113 - 250mcg bid  <b>High</b> >250mcg bid  (max 2000mcg/day)	For 120 dose MDI: 50 mcg: \$30 125mcg: \$43 250mcg: \$49 (\$15- \$95) For 60 dose Diskus: 100mcg: \$30 250mcg: \$53 500mcg: \$82 (\$30- \$165) For 60 dose Respiclick: 55mcg: \$18 113mcg: \$33 232mcg: \$52 (\$20 - \$50)	Regular benefit	See above	See above
<b>Mometasone furoate</b> <i>Asmanex®</i> <i>Twisthaler® (DPI)</i> 200, 400mcg/inh 60 doses  100, 400 mcg/inh 30 doses 	<i>DPI not recommended for children &lt; 6y</i>	<b>Low</b> 100mcg/day  <b>Med</b> 200 - 300mcg/day  <b>High</b> ≥400mcg/day  Given once daily or bid	<b>Low</b> 100 - 200mcg/day  <b>Med</b> 300 - 400mcg/day  <b>High</b> >400mcg/day  Given once daily or bid	<b>Low</b> 100 - 200mcg/day  <b>Med</b> 300 - 400mcg/day  <b>High</b> >400mcg/day (max 800mcg/day)  Given once daily or bid	100mcg: \$40 200mcg: \$40 400mcg: \$80 (\$20 - \$80)	Regular benefit  100mcg: non benefit	See above	See above

Generic Name Trade name Dose per inhalation Doses per device	Usual Dosage				Cost per device <sup>A</sup>	PharmaCare Coverage <sup>B</sup>	Adverse Effects	Therapeutic Considerations
	< 6 years	6 - 11 years	12 - 17 years	≥ 18 years				
<b>Inhaled Corticosteroids/Long-acting Beta-2 Agonists (ICS/LABA)</b>								
<b>Budesonide/ formoterol</b> <i>Symbicort</i> <sup>®</sup> <i>Turbuhaler</i> <sup>®</sup> (DPI) 100/6, 200/6mcg/inh 120 doses  200/6mcg/inh 60 doses 	<i>Not approved by Health Canada</i>	<i>Not approved by Health Canada</i>	100/6mcg or 200/6mcg once daily or bid  <b>Maintenance and Reliever Therapy (MART)</b>  200/6mcg as needed; may repeat if no relief  Max 8 inhalations per day  <i>Approved age by Health Canada ≥ 12y</i>	100/6mcg or 200/6mcg once daily or bid  <b>Maintenance and Reliever Therapy (MART)</b>  200/6mcg as needed; may repeat if no relief  Max 8 inhalations per day	100/6mcg: \$73  200/6mcg: \$95  (\$20 - \$95)	Limited Coverage	Headache, upper respiratory tract infection, pharyngitis, nasal congestion, dysphonia, oral thrush (can be reduced by rinsing mouth or using spacer device with an MDI)	For individuals ≥12 years of age not controlled on PRN SABA who have poor adherence to daily ICS despite substantial asthma education and support, consider PRN bud/form.  Based on asthma severity, bud/ form may be used as a reliever only or as part of a controller PLUS reliever regimen. Use as a reliever therapy was studied with the 200/6mcg dose; however, patients may be using their 100/6mcg as a daily controller plus reliever.  High dose treatment should be tapered rather than stopped abruptly.  Use cautiously in patients with cardiovascular disorders (e.g., coronary artery disease, arrhythmias, hypertension).

Generic Name Trade name Dose per inhalation Doses per device	Usual Dosage				Cost per device <sup>A</sup>	PharmaCare Coverage <sup>B</sup>	Adverse Effects	Therapeutic Considerations
	< 6 years	6 - 11 years	12 - 17 years	≥ 18 years				
<b>Inhaled Corticosteroids/Long-acting Beta-2 Agonists (ICS/LABA)</b>								
<b>Fluticasone furoate/vilanterol</b> <i>Breo Ellipta</i> 100/25, 200/25mcg/inh 30 doses 	<i>Not approved by Health Canada</i>	<i>Not approved by Health Canada</i>	<i>Not approved by Health Canada</i>	100/25 – 200/25mcg once daily (max 1 inh/day) Approved age by Health Canada ≥ 18y	100/25mcg: \$100 200/25mcg: \$156 (\$100-155)	Limited Coverage	Headache, upper respiratory tract infection, pharyngitis, nasal congestion, dysphonia, oral thrush (can be reduced by rinsing mouth or using spacer device with an MDI)	Initial dose based on previous asthma therapy, current control, and risk of exacerbation. If adequate response is not seen after 2 weeks of initial dose, increase dosage; once adequate control achieved, doses should be titrated to lowest effective dose.
<b>Fluticasone propionate/salmeterol</b> <i>Advair® (pMDI)</i> 125/25, 250/25mcg/puff 120 doses  <i>Advair® Diskus® (DPI), G</i> 100/50, 250/50, 500/50 mcg/inh 60 doses 	<i>Not approved by Health Canada DPI not recommended for children &lt; 6y</i>	<i>Not approved by Health Canada</i> 100/50mcg bid	2 puffs (250/50mcg – 500/50mcg) bid Approved age by Health Canada ≥ 12y 100/50mcg - 500/50mcg bid (max 1000/100mcg/day)	2 puffs (250/50mcg – 500/50mcg) bid 100/50mcg - 500/50mcg bid (max 1000/100mcg/day)	For 120 dose MDI: 125/25mcg: \$118 250/25mcg: \$168 (\$60 - \$170) For 60 dose DPI: 100/50mcg: \$46 250/50mcg: \$55 500/50mcg: \$78 (\$45 - \$80)	Limited Coverage		High dose treatment should be tapered rather than stopped abruptly. Use cautiously in patients with cardiovascular disorders (e.g., coronary artery disease, arrhythmias, hypertension).

Generic Name Trade name Dose per inhalation Doses per device	Usual Dosage				Cost per device <sup>A</sup>	PharmaCare Coverage <sup>B</sup>	Adverse Effects	Therapeutic Considerations
	< 6 years	6 - 11 years	12 - 17 years	≥ 18 years				
<b>Inhaled Corticosteroids/Long-acting Beta-2 Agonists (ICS/LABA)</b>								
<b>Mometasone furoate/indacaterol</b> <i>Atecura®</i> <i>Breezhaler® (DPI)</i> 80/150 mcg, 160/150 mcg, 320/150 mcg/ inh 30 doses 	<i>Not approved by Health Canada</i>	<i>Not approved by Health Canada</i>	80-150mcg – 320 - 150mcg (1 inh) daily  (max 320 - 150mcg/day)  <i>Approved age by Health Canada ≥ 12y</i>	80-150mcg – 320 - 150mcg (1 inh) daily  (max 320 - 150mcg/day)	80/150mcg: \$35  160/150mcg: \$43  320/150mcg: \$60  (\$35 - \$60)	Limited Coverage	See above	See above
<b>Mometasone/formoterol</b> <i>Zenhale® (pMDI)</i> 100/5, 200/5mcg/ puff 60, 120 doses 	<i>Not approved by Health Canada</i>	<i>Not approved by Health Canada</i>	200/10mcg - 400/10mcg (2 puffs) bid  Max 800/20mcg/day	200/10mcg - 400/10mcg (2 puffs) bid  Max 800/20mcg/day	100/5mcg: \$104  200/5mcg: \$128  (\$105- \$130)	Limited Coverage		
<b>Long-Acting Muscarinic Antagonist (LAMA)</b>								
<b>Tiotropium</b> <i>Spiriva® Respimat</i> 2.5mcg/inh 60 doses 	<i>Not approved by Health Canada</i>	<i>Not approved by Health Canada</i>	<i>Not approved by Health Canada</i>	2 inh (5mcg) daily  <i>Approved age by Health Canada ≥ 18y</i>	\$59	Regular benefit	Dry mouth (rinse mouth after inhalation to decrease), headache, pharyngitis, sinusitis, dyspepsia	Should not be used for the relief of acute symptoms.  Usually for severe asthma and initiated by asthma specialists.

Generic Name Trade name Dose per inhalation Doses per device	Usual Dosage				Cost per device <sup>A</sup>	PharmaCare Coverage <sup>B</sup>	Adverse Effects	Therapeutic Considerations
	< 6 years	6 - 11 years	12 - 17 years	≥ 18 years				
<b>Inhaled Corticosteroids/ Long-Acting Muscarinic Antagonists/ Long Acting Beta2 Agonists (ICS/LAMA/LABA)</b>								
<b>Fluticasone furoate/ umeclidinium/ vilanterol</b> <i>Trelegy Ellipta (DPI)</i> 100/62.5/25, 200/62.5/25 mcg/inh 30 doses 	<i>Not approved by Health Canada</i>	<i>Not approved by Health Canada</i>	<i>Not approved by Health Canada</i>	100/62.5/ 25mcg - 200/62.5/25mcg (1 inh) daily  <i>Approved age by Health Canada ≥ 18y</i>	100/62.5/25: \$149  200/62.5/ 25mcg: \$163 (\$150 - \$165)	Non benefit	Similar adverse effects as ICS/LABAs and LAMAs (see above).	For patients experiencing exacerbations despite low dose ICS-LABA, ICS dose should be increased, or treatment switched to maintenance and reliever therapy with bud/form, before considering adding a LAMA.  Usually for severe asthma and initiated by asthma specialists.
<b>Mometasone furoate/ glycopyrronium/ indacaterol</b> <i>Energair®</i> <i>Breezhaler®(DPI)</i> 160/50/150 mcg/inh 30 doses 	<i>Not approved by Health Canada</i>	<i>Not approved by Health Canada</i>	<i>Not approved by Health Canada</i>	160/50/150mcg (1 inh) daily  <i>Approved age by Health Canada ≥ 18y</i>	\$110	Limited Coverage		



Generic Name Trade name Dose per inhalation Doses per device	Usual Dosage				Cost per device <sup>A</sup>	PharmaCare Coverage <sup>B</sup>	Adverse Effects	Therapeutic Considerations
	< 6 years	6 - 11 years	12 - 17 years	≥ 18 years				
<b>Leukotriene receptor antagonist (LTRA)</b>								
<b>Montelukast</b> <i>Singulair<sup>®</sup>, G</i> Chewable: 4mg, 5mg Granules: 4mg Tablet: 10mg	4mg po daily <i>Approved age by Health Canada ≥ 2y</i>	5mg po daily	5mg po daily (12 - 14y) 10mg po daily (≥15y)	10mg po daily	Chewable \$35 - \$40 Granules \$45 Tablet \$60	Non benefit	Neuropsychiatric AE: irritability, aggressiveness, anxiety, sleep disturbance including suicidal thoughts/actions (up to 16% of pediatric patients; typically occurred within 2 weeks of initiation)	In all age groups LTRA are 2nd line to daily ICS.

Abbreviations: **AE**: adverse effects; **bid**: twice daily; **DPI**: dry power inhaler; **bud/form**: budesonide/formoterol; **HFA**: Hydrofluoroalkane; **ICS**: inhaled corticosteroids; **inh**: inhalation; **LABA**: long acting beta-2 agonist; **LTRA**: leukotriene receptor antagonist; **MART**: maintenance and reliever therapy; **mcg**: micrograms; **MDI**: metered dose inhaler; **mg**: milligrams; **pMDI**: pressurized metered dose inhaler; **po**: oral; **prn**: as needed; **q4h**: every 4 hours; **SABA**: short acting beta agonist; **y**: years of age.

A Drugs costs are average retail cost of the generic, when available. Current as of Oct 2022 and does not include retail markups or pharmacy fees. Cost per month is approximate and rounded to nearest \$5.


B PharmaCare coverage as of Oct 2022 (subject to revision). Regular Benefit: Eligible for full reimbursement\*. Limited Coverage: Requires Special Authority to be eligible for reimbursement\*. Non-benefit: Not eligible for reimbursement. \*Reimbursement is subject to the rules of a patient's PharmaCare plan, including any deductibles. In all cases, coverage is subject to drug price limits set by PharmaCare. See: [www.health.gov.bc.ca/pharmacare/plans/index.html](http://www.health.gov.bc.ca/pharmacare/plans/index.html) and [www.health.gov.bc.ca/pharmacare/policy.html](http://www.health.gov.bc.ca/pharmacare/policy.html) for further information. \* [Special Authority drug list](#).


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3. Jobson MD. UpToDate [Internet]. Waltham, MA: UpToDate Inc.; c2019 [Accessed October 14, 2022]
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Note: Information on which products PharmaCare covers can be obtained using the B.C. PharmaCare Formulary Search (<https://pharmacareformularysearch.gov.bc.ca/>)

 = Higher environmental impact option (per inhaler carbon footprint of > 100 km by car)

 = Mid-range environmental impact option (per inhaler carbon footprint of 38.8 - 50 km by car)

 = Lowest environmental impact option (per inhaler carbon footprint of 5 - 27.1 km by car)

For more information on the environmental impact of specific medications, please see the *Inhaler Coverage and Environmental Impact Guide*