



Asthma in Adults – Recognition, Diagnosis and Management

Effective Date: October 28, 2015

Scope

This guideline provides recommendations for the recognition, diagnosis and management of asthma in adults aged ≥ 19 years presenting in a primary care setting. For recommendations regarding asthma in patients aged 1–18 years see [BCGuidelines.ca – Asthma in Children – Diagnosis and Management](#).

Key Recommendations

- 30% of asthma patients are misdiagnosed; send all patients for spirometry, where available, to confirm the diagnosis of asthma.
- Document the history of respiratory symptoms and objective evidence of airflow obstruction (i.e., spirometry) **in all** patients suspected of or with an asthma diagnosis, even in cases where the diagnosis seems certain.
- Do not prescribe asthma medications in cases of low clinical urgency and where patient has no documented objective evidence to support an asthma diagnosis.
- As many as 90%¹ of asthma patients use their inhalers incorrectly; regularly review a patient's inhaler technique, especially when there is a poor or non-response to treatment.
- To improve inhaler technique, especially in those with poor coordination, prescribe all patients a spacer when taking their metered dose inhalers (MDI).
- To optimize self-management, consider sending all patients to an asthma education center, where available.
- Complete a written asthma action plan with all patients and reassess this plan with the patient on a regular basis, especially after an exacerbation.

Definition

Asthma is a chronic inflammatory disease of the airways that is characterized by bronchial hyper-responsiveness and variable airflow obstruction. Asthma is a diverse disease that results in recurrent episodes, varying over time and in intensity, of one or more respiratory symptoms, such as wheezing, breathlessness, chest tightness or coughing.

EPIDEMIOLOGY

The incidence of asthma in B.C. for patients between 5 and 54 years of age has remained constant since 2000/01, with an age standardized incidence rate for 2012/13 of 0.62%.² This amounts to almost 16,000 new cases of asthma in B.C.² The prevalence of asthma in B.C. has increased steadily since 2000/01 with an age standardized prevalence rate for 2012/13 of 10.53%, or an estimated 323,500 prevalent cases.²

The hospital, Medical Services Plan and PharmaCare costs per asthma patient in 2012/13 was \$539, \$617 and \$271/patient respectively.² In 2012/13, the total health care costs for patients with an asthma diagnosis in B.C. was over \$460 million.²

Although deaths and hospital admissions due to asthma have decreased over the past ten years over 50% of patients have asthma that is not well controlled.³ Asthma that is uncontrolled not only leads to increased health care costs it also results in productivity and work losses.^{3,4}

DIAGNOSIS

Due to the high prevalence of asthma, assess all patients for asthma who present with common asthma respiratory symptoms (see Figure 1). Take a history and perform a physical examination to determine if the pattern of respiratory symptoms supports the diagnosis of asthma (see Table 1. Adult clinical features to assess the probability of asthma).

A diagnosis of asthma is based on documenting a pattern of common asthma respiratory symptoms and objective evidence of variable airflow obstruction (see *Investigations or Tests*).

In patients with existing asthma diagnoses ensure there is documented evidence of variable airflow obstruction in their health care record.

Figure 1. Common asthma respiratory symptoms

- Wheeze
- Cough
- Shortness of breath (dyspnea)
- Chest tightness

► Signs and Symptoms

Clinical features of asthma often are similar or overlap with other respiratory conditions, so ensure other possible diagnoses are ruled out before diagnosing a patient with asthma (see *Differential Diagnosis*).

In patients with existing asthma diagnoses and who respond poorly to treatment, assuming adherence, inhaler technique and co-morbidities are being treated, reconsider the diagnosis of asthma.

Table 1. Adult clinical features to assess the probability of asthma^{5,6}

Clinical Features that...	
Increase the Probability of Asthma	Lower the Probability of Asthma
<ul style="list-style-type: none">• More than one of the common asthma respiratory symptoms (see <i>Figure 1</i>), particularly if symptoms are:<ul style="list-style-type: none">◦ worse at night or in the early morning◦ in response to exercise, allergens, irritants (including work-related), viral infections and cold air◦ varying over time and in intensity◦ worse after taking aspirin or beta blockers• History of atopic disorder• Family history of atopic disorder and/or asthma• Wheeze heard on auscultation• Otherwise unexplained low forced expiratory volume in 1 second (FEV₁) or peak expiratory flow (PEF)• Childhood asthma diagnosis	<ul style="list-style-type: none">• Prominent dizziness, light-headedness, peripheral tingling• Chronic productive cough in the absence of wheeze or breathlessness• Repeatedly normal physical examination of chest when symptomatic• Voice disturbance• Symptoms with colds only• Significant smoking history (i.e., > 20 pack-years)• Cardiac disease• Normal PEF or spirometry when symptomatic• No response to a trial of asthma therapy• Clinical features pointing to alternative diagnosis

NOTE: 30% of patients with a physician diagnosis of asthma are misdiagnosed.⁷⁻¹⁰ Thus, even in cases where the clinical diagnosis seems certain, it is still recommended that objective evidence of variable airflow obstruction be obtained.

► Investigation or Tests

1. Spirometry

Spirometry (pre and post bronchodilator) is the preferred test for providing objective evidence of variable airflow obstruction.

NOTE: Negative spirometry results do not necessarily exclude the diagnosis of asthma.

If results are negative and clinical suspicion remains high, repeat spirometry on another occasion. Spirometry is more reliable when the patient is symptomatic.

The following result is typically considered objective evidence of variable airflow obstruction:

- A 12 % or greater improvement in FEV₁ and > 200 ml from baseline 15 minutes after use of an inhaled short-acting beta₂ agonist (SABA).⁹

2. Peak flow monitoring

Peak flow monitoring (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 PFM can be unreliable for the following reasons:

- Reference values for peak flow readings are not as well standardized as spirometry,
- Readings are not always well documented by the patient,
- Readings are more variable than spirometry, and
- Device may malfunction.

NOTE: Ensure the same meter is used for PFM as readings can vary substantially by device.

The following result is typically considered objective evidence of variable airflow obstruction:

- A > 20% change after administration of a bronchodilator; a 20% change in values over time.¹¹

3. Methacholine challenge

When spirometry and PFM results are negative and clinical suspicion remains, a methacholine challenge can be used to assess airway hyper-responsiveness. A positive result is diagnostic of asthma; however, false negatives may occur when the patient:

- has seasonal asthma, and/or
- is well controlled on pharmacological treatment, and/or
- is currently asymptomatic.

4. Trial of pharmaceutical therapy

It is **not recommended** to use a trial of pharmaceutical therapy as evidence to support the asthma diagnosis.

In cases of low clinical urgency and timely access to spirometry consider delaying the initiation of pharmaceutical therapy until objective evidence of variable airflow obstruction can be obtained.

NOTE: once pharmaceutical therapy begins it is harder to obtain objective evidence to support the asthma diagnosis.

5. Chest x-ray

Chest x-rays are not routinely required but may be useful for excluding other diagnoses.

6. Allergy testing

For patients whose symptoms are not well controlled, it may be helpful to identify allergens the patient is sensitive to. Inhalant allergen exposures have been shown to lead to asthma attacks in some patients. Food allergens are not a common producer of asthma symptoms.⁵ (See *Appendix A: Lifestyle and Environmental Modifications*).

► Differential Diagnosis

In cases of diagnostic uncertainty and/or there is no response to treatment consider the differential diagnosis. The following are the most common* alternative diagnoses to consider:

1. Chronic Obstructive Pulmonary Disease (COPD)

If clinical features of patient suggest COPD (e.g., patient is a current or past smoker), see BCGuidelines.ca – *Chronic Obstructive Pulmonary Disease (COPD)* and/or refer to specialist.

2. Asthma-COPD Overlap Syndrome (ACOS)

In patients that are older and who are smokers it may be hard to distinguish if the patient has asthma or COPD, and in some cases the patient may have ACOS. ACOS is characterized by airflow limitation and is identified by the symptoms it shares with both asthma and COPD. For more information see Global Initiative for Asthma's Global Strategy for Asthma Management and Prevention Chapter 5: Diagnosis of asthma, COPD, and asthma-COPD overlap syndrome (ACOS), website: www.ginasthma.org.

3. Work-related Asthma

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).¹² Work-related asthma accounts for approximately 5-20%¹³ of new adult onset asthma cases and at least 15%¹⁴ of all adult asthma cases; thus, resulting in a significant socioeconomic loss to society. Ask all patients about potential occupational exposures at the workplace.⁵ For more information see *Appendix A* Table 1. Examples of occupational exposures that can contribute to asthma.

Refer all patients with suspected work-related asthma to a specialist.

MANAGEMENT

► Treatment

- Asthma is predominantly treated using pharmaceutical therapy recommended through a stepwise approach (see *Pharmacological Management – Stepwise Approach*). The stepwise approach bases a patient's treatment on their current corresponding level of asthma control (see *Assessment of Asthma Control* below).
- Identify asthma triggers and recommend relevant lifestyle and environmental modifications to support the treatment plan (see *Appendix A*).
- Complete a personalized written asthma action plan with the patient so they know how to self-manage worsening asthma symptoms and when to seek medical help (see *Self-Management* and *Asthma Action Plan*).

► Assessment of Asthma Control

Assess asthma control at the time of diagnosis, when creating/modifying a treatment plan and when monitoring treatment outcomes. Consider both symptom control and risk of a future asthma attack.

* To consider less common alternative diagnoses refer to the Global Initiative for Asthma's *Global Strategy for Asthma Management and Prevention*, available at: www.ginasthma.org or refer patient to a specialist.

1. Asthma Symptom Control^{15, 16}

In the past 4 weeks, has the patient had:	Yes [1 point]	No [0 points]
Daytime asthma symptoms more than twice/week?		
Any night waking due to asthma?		
Reliever needed for symptoms* more than twice/week?		
Any activity limitation due to asthma?		
FEV ₁ or peak flow < 80% of personal best?		
TOTAL POINTS		

* Excludes reliever taken before exercise if patient is well and has no other asthma symptoms.

0 points = well controlled asthma symptoms

1–2 points = partly controlled asthma symptoms

≥ 3 points = uncontrolled asthma symptoms

2. Risk of a Future Asthma Attack^{8, 15, 17-19}

Does the patient have any of the following risk factors:

- ≥ 1 severe attack (e.g., requires hospitalization, oral steroid use) in last 12 months
- Uncontrolled asthma symptoms
- Co-morbidities: obesity, rhinosinusitis, confirmed food allergy
- Ever intubated or in intensive care unit for asthma
- Excessive SABA use (> 1 x 200-dose canister/month)
- Exposure to tobacco smoke
- Inadequate inhaled corticosteroid (ICS): not prescribed ICS; poor adherence; incorrect inhaler technique
- Low FEV₁, especially if <60% predicted
- Major psychological or socioeconomic problems (e.g., depression in older adults)
- Sputum or blood eosinophilia
- Pregnancy

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, weight loss programs, etc.).

► Pharmacological Management – Stepwise Approach

Refer to Table 2. Initiating inhalers – stepwise approach to treatment.

Initial Treatment:

- Choose step based on assessment of asthma control (symptom control and risk of future asthma attacks) and patient's preference (e.g., cost, willingness to use the prescribed device, and ability to adhere to treatment plan).
- Aim to have the patient at the lowest step needed for asthma control.

Step up:

- Consider if symptoms not routinely controlled **or** if patient continues to have recurrent asthma attacks at current step.
- Before stepping up, confirm the diagnosis, review patient's self-management education and lifestyle/environmental modifications and ensure medication adherence and correct inhaler technique.

Step down:

- Consider stepping down if symptoms are controlled for ≥ 3 months and risk of asthma attack is low.

Table 2. Initiating inhalers – stepwise approach to treatment

PREFERRED CONTROLLER	STEP 1	STEP 2	STEP 3	STEP 4	STEP 5
	May not need controller	Low-dose ICS	Med-dose ICS	Med-dose ICS/LABA	Refer patients with persistent symptoms, exacerbations despite adherence, good inhaler technique and step 4 treatments
			Low-dose ICS/long-acting beta-2 agonist (LABA)	Low-dose Symbicort (MART)*	
Alternate options	Low-dose inhaled corticosteroids (ICS)		Low-dose Symbicort Maintenance and Reliever Therapy (MART)*	High-dose ICS (more side-effects, limited benefit, dose-response curve flattens. Trial for 3–6months)	
RELIEVER	As needed short-acting beta-2 agonists (SABA)		As needed SABA or Symbicort (MART)*		

***Symbicort Maintenance And Reliever Therapy (MART)** is the use of Symbicort as both regular maintenance treatment (usually BID) and as a reliever when asthma symptoms are present (1 inhalation, repeat as needed every 5 minutes to a max of 6 inhalations). Daily maximum is 8 inhalations. Do not use if patient symptoms are controlled on low/med-dose ICS. See [product monograph](#) for more information on treatment considerations.

► **Self-Management**

Successful self-management education for patients includes the following:

1. Discussing with the patient:

- the condition (e.g., asthma is a chronic condition, how asthma attacks occur),
- the goals of treatment (e.g., what well controlled asthma look like, patient’s concept of quality of life), and
- the treatment options (e.g., patient’s willingness to modify lifestyle/environment based on trigger identification and to use pharmacological therapy). There is minimal evidence supporting the greater efficacy of dry powder inhalers over metered dose inhalers and spacers in adult patients.²⁰ Choose inhaler based on the patient’s preference (e.g., cost, willingness to use the prescribed device, and ability to adhere to treatment plan). See *Appendix A* and *Appendix C: Asthma Medication Table* for more information.

2. Developing a written asthma action plan with the patient (see *Asthma Action Plan*).

3. Referring patient to an asthma education program, where available. See *Physician and Patient Resources*.

4. Reviewing the following with the patient at regular office visits[†] (see *Associated Document – Asthma Patient Care Flow Sheet for Adults*):

- medication adherence (e.g., is patient taking their medication as prescribed?) see Figure 2,
- inhaler technique (e.g., have patient demonstrate how they take their inhalers),
- level of symptom control and ability to follow lifestyle modifications,
- how to monitor symptoms and in patients with poor perception of their symptoms how to monitor peak flow,²¹ and
- Asthma action plan (modify if necessary).

Figure 2. Key messages to improve inhaled corticosteroid use

- Are safe and do not create dependency
- Meant for regular use rather than intermittent
- Smoking and exposure to second hand smoke reduces efficacy.

► **Treating acute loss of asthma control⁵**

1. Assess the severity of the asthma attack:

- *Severe – life-threatening:* While arranging urgent transfer to an acute care facility treat the patient with short-acting beta₂-agonists (SABA), controlled oxygen and oral corticosteroids (OCS).
- *Mild-moderate:* treat in the primary care setting (see *Goals of treatment* and *Treatment steps* below).

† Visits also include follow-up visits after a patient has had an asthma attack.

2. Goals of treatment:

- Rapidly relieve airflow obstruction,
- Identify and address the cause of the asthma attack, and
- Reduce risk of relapse by reviewing and adjusting maintenance treatment plan.

3. Treatment steps:

- Administer SABA with a spacer 2–6 puffs every 20 min for first hour then decrease frequency based on patient response.
- A good response to SABA is PEF > 80% of personal best, 50–79% is an incomplete response (administer OCS), and <50% PEF is a need for urgent medical care. See *Asthma Action Plan*.
- Monitor patient closely and continue treatment until peak flow readings improve > 60–80% of patient's best.
- Give OCS to patients who are not responding to SABA, deteriorating or who have increased their inhaler doses before presenting. (OCS adult dose 1mg/kg/day, max 50mg/day for 5–7 days).
- If patient improves: review *Asthma Action Plan* (make modifications as necessary), review how to monitor symptoms, review inhaler technique and adherence, what to do if symptoms worsen and schedule follow-up appointment (1 week later) if patient stabilizes.
- Increase controller medications for the next 2–4 weeks[‡] and prescribe controllers for patients who are not taking them already.
- If patient gets worse and is admitted to hospital: depending on the clinical context, schedule follow-up appointment for 2–7 days after the asthma attack. See *Self-Management*.
- **If there is no response to treatment or patient continues to deteriorate arrange urgent transfer to acute care facility.**

► Management of poor or incomplete response to long-term treatment

If there is a poor or non-response to proposed treatment plan, consider the following:

1. Poor adherence with medications due to:
 - cost of prescribed medications is a significant barrier. Ensure patient can afford the medication prescribed. Discuss patient's drug plan to ensure appropriate coverage. See *Appendix C – Asthma Medication Table*
 - inhaler burden – try to prescribe less inhalers if possible (e.g., combination devices versus several individual inhalers that do the same thing)
2. Incorrect inhaler technique – prescribe spacer and review its use.²⁰
3. Review and readdress risk factors and co-morbidities (e.g., smoking, triggers, rhinosinusitis, obesity and gastro-esophageal reflux disease).
4. Confirm and review diagnosis and refer to specialist for further investigation.

[‡] For more information on dose recommendations see page 61 of Global Initiative for Asthma's *Global Strategy for Asthma Management and Prevention (2014)*. www.ginasthma.org

► References

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► Physician and Patient Resources

Allergy and Asthma Information Association: Mission is to create safer environments and improve quality of life for Canadians affected by allergy, asthma, and anaphylaxis by empowering individuals and providing education, leadership, and a national voice.

Website: <http://aaia.ca/en/>

Asthma Education Centre Resources: Provides contact information for provincial certified asthma education centres, listed by Health Authority.

Website: <http://lungcentre.vch.ca/resources/asthmaeducator.aspx>

The Asthma Society of Canada: Provides a variety of free educational materials and resources with the latest asthma news and information.

Website: www.asthma.ca/adults/

Phone: Toll free 1-866-787-4050

BC Lung Association: A non-profit and volunteer-based health charity, the BC Lung Association offers in-depth information on asthma programs and educational resources.

Website: www.bc.lung.ca/

Phone: Greater Vancouver 604-731-5864 or Toll free in B.C. 1-800-665-5864

The Canadian Lung Association: Publishes the Lung Association Asthma Handbook; a comprehensive guide that is written in a clear, easy-to-understand style for people with asthma.

Website: www.lung.ca

Phone: Toll Free 1-888-566-5864

HealthLink BC: provides easy access to non-emergency health information and services. Translation services are available in over 130 languages on request.

Website: www.HealthLinkBC.ca

Phone: In B.C. 8-1-1.

Phone: TTY (deaf and hearing-impaired) 7-1-1

Instructions on inhaler technique: Provides detailed instructions on how to use various types of asthma inhalers.

Website: <http://lungcentre.vch.ca/medicine/inhalerinstructions.aspx>

QuitNow: An internet-based quit smoking service, available FREE-of-charge to all British Columbia residents. Translation services are available in over 130 languages on request.

Website: www.quitnow.ca

Phone: Toll Free in B.C. 1-877-455-2233

RACE – Rapid Access to Consultative Expertise program: A telephone advice line from a selection of specialty services for family physicians and nurse practitioners.

- For Vancouver Coastal Health Region/Providence Health Care/Interior Health/Fraser Health – www.raceconnect.ca or by telephone 604-696-2131 (Vancouver area) or 1-877-696-2131 (toll free); Monday to Friday, 8 am to 5 pm
- For Northern Health – www.northernpartnersincare.ca/northernrace/ or by telephone 1-877-605-7223

▶ **Diagnostic code:** 493 (Asthma)

▶ **Appendices**

- Appendix A: Lifestyle and Environmental Modifications
- Appendix B: Initiating Inhalers – A Stepwise Approach to Treatment
- Appendix C: Asthma Medication Table

▶ **Associated Documents**

The following documents accompany this guideline:

- Asthma Action Plan for Adults
- Asthma Patient Care Flow Sheet for Adults

This guideline is based on scientific evidence current as of the Effective Date.

This guideline was developed by 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

Contact Information:

Guidelines and Protocols Advisory Committee
PO Box 9642 STN PROV GOVT
Victoria BC V8W 9P1

Email: hlth.guidelines@gov.bc.ca

Website: www.BCGuidelines.ca

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: Lifestyle and Environmental Modifications

Consider the following triggers and mitigation strategies when developing a patient's treatment plan:

Allergens

- Year-long: consider common home allergens (e.g., pets, mold, dust mites), refer to allergist for testing and management – remove allergen(s) if possible.
- Seasonal: consider seasonal outdoor allergens (e.g., grass, trees, weeds), refer to allergist for testing and management – minimize exposure to allergen/ allergy shots.

Food/Sulfites

- Symptoms after eating shrimp and/or drinking beer or wine – consider sulfite allergies – allergen avoidance

Work

- Consider occupational allergens (see Table 1. Examples of occupational exposures that can contribute to asthma) – consider workplace adjustments/change.

Exercise

- Encourage exercise and SABA PRN pre exercise to reduce exercise induced symptoms.

Medication

- Symptoms after taking medication – consider common medications (e.g., beta-blockers including ophthalmic preparations, ASA, NSAIDs, and ACE-Inhibitors) – stop medication and prescribe an alternative.

Tobacco smoke

- Identify first, second and third hand smoke sources – remove from living areas if possible.
- If patient smokes discuss their willingness to quit (discuss at every visit until patient is willing to try quitting smoking) – provide resources to patients who want to quit smoking, see *Physician and Patient Resources*.

Irritants

- Consider other irritants, such as wood-burning stove/fireplace, fragrances, cleaners, painting, air pollution – remove/avoid allergens.

Vaccinations

- Recommend annual influenza and pneumococcal vaccinations for all patients with asthma.

Table 1. Examples of occupational exposures that can contribute to asthma

Jobs at risk	Possible causative agent
Car paint spraying	Isocyanates
Laboratory work	Small animals
Joinery	Hard woods
Electronics, soldering	Colophony
Bakery, farming	Grain, flour improver
Healthcare workers	Glutaraldehyde
Heavy manual work	Exercise
Farming	Mouldy hay

Source: Table adapted from Chambers R, Moore S, Parker G, et al. Occupational Health Matters in General Practice. 2001. Radcliffe Medical Press Ltd. Abingdon, Oxon: UK. 24-25. (Chapter: The relationship between work and health).



Appendix B: Initiating Inhalers – A Stepwise Approach to Treatment

Refer to Table 1. Initiating inhalers – stepwise approach to treatment.

Initial Treatment:

- Choose step based on assessment of asthma control (symptom control and risk of future asthma attacks) and patient's preference (e.g., cost, willingness to use the prescribed device, and ability to adhere to treatment plan).
- Aim to have the patient at the lowest step needed for asthma control.

Step up:

- Consider if symptoms not routinely controlled or if patient continues to have recurrent asthma attacks at current step.
- Before stepping up, confirm the diagnosis, review patient's self-management education and lifestyle/environmental modifications and ensure medication adherence and correct inhaler technique.

Step down:

- Consider stepping down if symptoms are controlled for ≥ 3 months and risk of asthma attack is low.

Table 1. Initiating inhalers – stepwise approach to treatment

PREFERRED CONTROLLER	STEP 1	STEP 2	STEP 3	STEP 4	STEP 5
	May not need controller	Low-dose ICS	Med-dose ICS	Med-dose ICS/LABA	Refer patients with persistent symptoms, exacerbations despite adherence, good inhaler technique and step 4 treatments
Alternate options	Low-dose inhaled corticosteroids (ICS)		Low-dose ICS/long-acting beta-2 agonist (LABA)	Low-dose Symbicort (MART)*	
			Low-dose Symbicort Maintenance and Reliever Therapy (MART)*	High-dose ICS (more side-effects, limited benefit, dose-response curve flattens. Trial for 3-6 months)	
RELIEVER	As needed short-acting beta-2 agonists (SABA)		As needed SABA or Symbicort (MART)*		

* **Symbicort Maintenance And Reliever Therapy (MART)** is the use of Symbicort as both regular maintenance treatment (usually BID) and as a reliever when asthma symptoms are present (1 inhalation, repeat as needed every 5 minutes to a max of 6 inhalations). Daily maximum is 8 inhalations. Do not use if patient symptoms are controlled on low/med-dose ICS. See [product monograph](#) for more information on treatment considerations.

Further considerations for choosing steps:

Step 1. SABA as needed (PRN) alone: If forced expiratory volume in 1 second (FEV₁) is normal, symptoms are controlled and no risk factors for future asthma attacks (see *Assessment of Asthma Control*).

NOTE: chronic airway inflammation can be found in these patients and the safety of SABA-alone asthma treatment is not well known.¹

Step 2. Regular low-dose ICS (plus SABA PRN) is recommended in patients with:

- Asthma symptoms more than twice a month
- Waking due to asthma more than once a month
- Asthma symptoms plus any risk factor(s) for exacerbations (see *Assessment of Asthma Control*)
- Seasonal allergic asthma – initiate when symptoms begin and discontinue 4 weeks after last seasonal exposure.²

Treatment with a regular daily low-dose ICS is highly effective in reducing asthma symptoms, the risk of asthma-related exacerbations, hospitalization and death. Leukotriene receptor antagonist (LTRA) is a less effective alternate; ICS/LABA is a more expensive alternate.

Step 3. Med-dose ICS (plus SABA PRN) or low-dose ICS/LABA (plus SABA PRN) or low-dose Symbicort MART. Add-on with LABA may reduce exacerbations requiring oral steroids by 1% (ARR)³ compared with med/high-dose ICS (NNT=73-100).³ Consider cost and inhaler burden compliance concerns. Step 3 is recommended in patients with troublesome asthma symptoms on most days, greater than one awakening from asthma symptoms per week, and especially if risk factors for exacerbations exist.

Step 4. Med-dose ICS/LABA or low/med-dose Symbicort MART. The considerations to move to step 4 are similar to moving from step 2 to step 3. Consider low-dose Symbicort MART only when low/med dose ICS is ineffective and there are adherence concerns (e.g., inhaler burden). High-dose ICS has more side-effects and little added benefit as the dose-response curve to ICS is flat after initiation of low dose ICS.

Step 5. Obtain specialist guidance.

Considerations for stepping down:⁵

Step 5 → Step 4. Obtain specialist guidance.

Step 4 → Step 3.

- If on med/high-dose ICS/LABA → Reduce ICS component by 50%; do not D/C LABA; continue SABA PRN.
- If on med-dose Symbicort MART → Reduce to low-dose Symbicort MART.⁴
- If on high-dose ICS → Reduce ICS dose by 50%; continue SABA PRN.⁵

Step 3 → Step 2.

- If on low-dose ICS/LABA → Reduce to once daily; D/C LABA likely to lead to deterioration; continue SABA PRN.
- If on low-dose Symbicort MART → Reduce maintenance component to once a day and continue low-dose reliever PRN.⁴
- If on med-dose ICS → Reduce ICS dose by 50%; continue SABA PRN.

Step 2 → Step 1.

- If on low-dose ICS → Once daily dosing (budesonide, ciclesonide, mometasone, fluticasone).
- Consider stopping treatment if no symptoms for 6-12 months and no risk factors – monitor closely as asthma attack risk increases when ICS is stopped.

References:

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- 3 Ducharme FM, Ni Chroinin M, Greenstone I, Lasserson TJ. Addition of long-acting beta₂-agonists to inhaled steroids versus higher dose inhaled steroids in adults and children with persistent asthma. The Cochrane database of systematic reviews. 2010;(4):CD005533. doi:10.1002/14651858.CD005533.pub2.
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- 6 Rogers L & Reibman J. Stepping Down Asthma Treatment: How and When. *Curr Opin Pulm Med*. 2012. January; 18(1): 70-5.

⁵ There are very few studies on optimal timing of treatment options for stepping down asthma treatment. Any step down should be considered a therapeutic trial and the patient should be monitored closely and instructed with an action plan on what to do if asthma symptoms worsen. The considerations listed for stepping down treatment are based on what little evidence is available but more research is needed.^{4,6}



Appendix C: Asthma Medication Table

Generic Name Trade name (formulation), pack-size. Dose per inhalation.	Adult Dosage Information ¹⁻⁹	Cost per device (cost per dose)	PharmaCare Coverage [†]	Therapeutic Considerations ¹⁻¹⁰
Short-Acting Beta-2 Agonists Inhaled (SABAs)				
Salbutamol Airomir™, Ventolin®, Generics (MDI), 200 doses. 100 mcg/dose.	1–2 puffs tid-qid prn	\$6.50 (\$0.03)	MDI: Regular Coverage	Nervousness, tremor, tachycardia, palpitations. High regular use (i.e., >10 puffs/day) may itself increase asthma risk. Increasing regular use indicates poor asthma control. Nebules: Not recommended for asthma given MDI + spacer device is equally efficacious. High doses can cause hypokalemia.
Ventolin® Diskus® (DPI), 60 doses. 200 mcg/dose.	200 mcg tid-qid prn	\$13 (\$0.22)	Diskus: No Coverage	
Terbutaline Bricanyl Turbuhaler® (DPI), 100 doses. 500 mcg/dose.	500 mcg prn (q4–6h)	\$8 (\$0.80)	Regular Coverage	
Inhaled Corticosteroid (ICS)		Medium dose costs \$20-45 per month		
beclomethasone dipropionate Qvar™ HFA (pMDI), 200 doses. 50 mcg, 100 mcg/dose.	Low 50–100 mcg bid Med 100–200 mcg bid High >200 mcg bid	50 mcg: \$34 (\$0.17) 100 mcg: \$67 (\$0.34)	Regular Coverage	Symptom improvement is usually evident within 1–2 weeks after start of therapy, pulmonary function improves over months. Once asthma is well controlled for 3 months, consider stepping down to lowest effective dose. In seasonal allergic asthma, cease ICS 4 weeks after end of exposure. Dysphonia, oral thrush (low with ciclesonide and can be reduced by rinsing mouth or using spacer device), sore mouth, sore throat.
Budesonide Pulmicort Turbuhaler® (DPI), 200 doses. 100, 200, 400 mcg/dose.	Low 100–200 mcg bid Med 200–400 mcg bid (can dose 400 mcg once daily) High >400 µg bid	100 mcg: \$34 (\$0.17) 200 mcg: \$69 (\$0.34) 400 mcg: \$100 (\$0.50)	Regular Coverage	
Ciclesonide Alvesco® (pMDI), 120 doses. 100 mcg, 200 mcg/dose.	Low 100–200 mcg once daily Med 200–400 mcg daily (usual starting dose) High >400 µg daily	100 mcg: \$49 (\$0.41) 200 mcg: \$81 (\$0.68)	Regular Coverage	
fluticasone propionate Flovent® HFA (pMDI), 120 doses. 50, 125, 250 mcg/dose. Flovent Diskus (DPI), 60 doses. 50, 100, 250, 500 mcg/dose.	Low 50–125 mcg bid Med 125–250 mcg bid High >250 mcg bid	For 120 dose MDI: 50 mcg: \$26 (\$0.22) 125 mcg: \$45 (\$0.37) 250 mcg: \$89 (\$0.74) 50 mcg: \$16.35 (\$0.27) For 60 dose Diskus: 100 mcg: \$26 (\$0.43) 250 mcg: \$45 (\$0.74) 500 mcg: \$76 (\$1.49)	Regular Coverage	
Mometasone Asmanex Twisterhaler (DPI), 60 doses. 200, 400 mcg/dose.	Low 200 mcg daily in evening Med 200 mcg bid or 400 mcg daily in the evening High 400 mcg bid	200 mcg \$35 (\$0.58) 400 mcg \$69 (\$1.15)	Regular Coverage	

Generic Name Trade name (formulation), pack-size. Dose per inhalation.	Adult Dosage Information ¹⁻⁹	Cost per device (cost per dose)	PharmaCare Coverage [†]	Therapeutic Considerations ¹⁻¹⁰
Inhaled Corticosteroid / Long-acting Beta-2 Agonist Combination (ICS/LABA)		Medium dose costs \$45-55 per month		
budesonide/ formoterol Symbicort® Turbuhaler® (DPI), 120 doses. (100/6, 200/6 mcg)/dose.	Low 100/6 mcg 1–2 doses bid Med 200/6 mcg 1–2 doses bid (4 inhalations of 200/6 mcg daily is High maintenance dose)	100/6 mcg: \$69 (\$0.57) 200/6 mcg: \$90 (\$0.75)	Limited Coverage Special Authority Criteria: <i>Diagnosis of asthma PLUS inadequate response on optimal dose of inhaled corticosteroid.</i> See: www.health.gov.bc.ca/ pharmacare/sa/saindex. html#list	Only prescribe for patients not adequately controlled on a low dose ICS treatment. High dose treatment should not be stopped abruptly, but tapered.
fluticasone/ salmeterol Advair® Diskus® (DPI), 60 doses. (100/50, 250/50, or 500/50 mcg)/dose.	Prescribe as 1 inhalation bid of: Low 100/50 (not for >18y) Med 250/50 High >250/50	100/50 mcg: \$88 (\$1.47) 250/50 mcg: \$105 (\$1.75) 500/50 mcg: \$149 (\$2.49)		
fluticasone/ salmeterol Advair® (pMDI), 120 doses. (125/25, 250/25 mcg)/ dose.	Prescribe as 2 inhalations bid of: Med 125/25 mcg, High 250/25 mcg	125/25 mcg: \$105 (\$0.88) 250/25 mcg: \$149 (\$1.25)		
Mometasone/ formoterol Zenhale (MDI), 120 doses. (50/5, 100/5, 200/5 mcg)/ dose.	Prescribe as 2 inhalations bid of: Low 50/5 µg Med 100/5 µg High 200/5 µg	50/5 mcg: \$66 (\$0.88) 100/5 mcg: \$86 (\$0.55) 200/5 mcg: \$105 (\$0.72)		
Fluticasone furoate/ vilanterol ¹¹ Breo® Ellipta® (powder for oral inhalation), 30 doses. (100/25, 200/25 mcg)/dose.	1 dose once daily	\$130 (\$4.30)	Pending	Nasopharyngitis, upper respiratory tract infection.
Beta₂-adrenergic agonists, long acting (LABAs)				
formoterol fumarate Foradil® (DPI), 60 doses. 12 mcg/dose.	1 cap bid (max 48 mcg/day)	12 mcg: \$55 (\$0.91)	Limited Coverage Special Authority Criteria:	Combination LABA/ corticosteroid product preferred. Recommended only if confident patient will use prescribed inhaled corticosteroid as well. More expensive than combo-inhalers. Nervousness, tremor, tachycardia, palpitations.
formoterol fumarate dehydrate Oxeze® Turbuhaler® (DPI) 60 doses. 6, 12 mcg/dose.	6–12 µg q12h; max 48 µg/day	6 mcg: \$36 (\$0.61) 12 mcg: \$48 (\$ 0.81)	<i>Diagnosis of asthma PLUS inadequate response on optimal dose of inhaled corticosteroid.</i>	
Salmeterol Serevent® Diskus®, Serevent® Diskhaler® (DPI), 60 doses. 50 mcg/dose.	Diskhaler 50 µg/blister: 1 blister bid Diskus 50 µg/inhalation: 1 inhalation bid	50 mcg: \$61 (\$1)	See: www.health.gov.bc.ca/ pharmacare/sa/saindex. html#list	

Generic Name Trade name (formulation), pack-size. Dose per inhalation.	Adult Dosage Information ¹⁻⁹	Cost per device (cost per dose)	PharmaCare Coverage [†]	Therapeutic Considerations ¹⁻¹⁰
Other (Leukotriene receptor agonists, IgE neutralizing antibody, xanthine derivatives)				
Montelukast Singulair, G (4,5 mg chew) (10 mg tab)	≥ 15 y: 10 mg QHS po 6–14y: 5 mg QHS	4 mg: \$36 (\$1.18) 5 mg: \$39 (\$1.31) 10 mg: \$58 (\$1.91) per 30 days (unit dose)	No Coverage	Headache, abdominal pain, flu-like symptoms.
Zafirlukast Accolate 20mg	20 mg bid 1-2h after meals	20 mg: \$50 (\$0.83) per 30 days (unit dose)	No Coverage	Headache, nausea, diarrhea.
Oxtriphylline 100 mg/5ml	Initial: 200 mg QID po Maintenance dose: 800–1200 mg/day po given in 3–4 divided doses	\$0.04/ml	Regular Coverage	Monitor serum levels. Multiple drug interactions (phenytoin, carbamazepine and rifampin reduce levels, macrolides, quinolones, smoking cessation increase theophylline levels.) Nausea, vomiting, abdominal cramps, headache, palpitations, CNS stimulation.
Theophylline Anhydrous 100, 200, 300 mg 12h ER I (400, 600mg 24hr ER)	Initial: 400–600 mg/day po, given in 1–3 divided doses depending on preparation used	\$0.14/100 mg LA \$0.15/200 mg LA \$0.19/300 mg LA \$0.36/400 mg ER \$0.44/600 mg ER		
Omalizumab Xolair 150 mg	Refer to specialist if in need of these therapies.			Injection site reactions (45%), viral infections (24%), upper respiratory tract infections (19%), headache (15%), sinusitis (16%), pharyngitis (10%). Anaphylaxis (0.2%), cardiovascular and cerebrovascular events.

Abbreviations: **bid:** twice daily; **DPI:** dry power inhaler; **ER:** extended-release; **G:** generic; **h:** hours; **ICS:** inhaled corticosteroids; **LA:** long acting; **LABA:** long acting beta agonist; **MDI:** metered dose inhaler; **mcg:** micrograms; **mg:** milligrams; **ml:** milliliters; **pMDI:** pressurized metered dose inhaler; **po:** oral; **prn:** as needed; **q4–6h:** every 4–6 hours; **q12h:** every 12 hours; **QHS:** nightly at bedtime; **qid:** 4 times a day; **SABA:** Short-Acting Beta-2 Agonists; **tid:** 3 times a day; **µg:** micrograms; **y:** years of age.

Note: Please review product monographs at <http://hc-sc.gc.ca/dhp-mps/prodpharma/databasdon/index-eng.php> and regularly review current Health Canada advisories, warnings and recalls at www.hc-sc.gc.ca/ahc-asc/media/advisories-avis/index_e.html.

Pricing is approximate as per PharmaNet 2015/05/01 and does not include dispensing fee or additional markups.

† PharmaCare Coverage Definitions

Regular Coverage: also known as regular benefit; does not require Special Authority. Regular benefits may be fully or partially covered.^Ω

Limited Coverage: requires Special Authority for coverage. Limited Coverage benefits approved by Special Authority may be fully or partially covered.^Ω

No Coverage: also known as non-benefit; does not fit the above categories.

^Ω 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.

Drugs which can trigger or exacerbate asthma:

- Beta-blockers (including amounts in ophthalmic solutions)
- Aspirin and NSAID drugs
- ACE Inhibitors (can cause cough)

Estimated Equipotent Daily doses of inhaled glucocorticosteroids⁴

Drug	Low Dose	Medium Daily Dose	High Daily Dose	Max Dose Approved by Health Canada
Beclomethasone dipropionate HFA (QVAR)	100–200	>200–400	>400	800
Budesonide (Pulmicort)	200–400	>400–800	>800	2400
Ciclesonide (Alvesco)	100–200	>200–400	>400	800
Fluticasone propionate (Flovent)	100–250	>250–500	>500	2000
Mometasone (Asthmanex)	200	>200–400	>400–800	800

References:

- 1 E-CPS. Therapeutic Choices. © Canadian Pharmacists Association, 2014. <https://www-e-therapeutics-ca.ezproxy.library.ubc.ca/tc.showPopupTable.action?chapterId=c0039n00081>
- 2 [®]QVAR™ Inhalation Aerosol. Product Monograph. Valeant Canada. Date of Revision: September 18, 2013
- 3 PULMICORT®TURBUHALER® Product Monograph. AstraZeneca Canada. Date of Revision: January 6, 2014
- 4 [®]Alvesco® Product Monograph. Takeda Canada. Date of Preparation: June 25, 2012
- 5 [®]FLOVENT® HFA Product Monograph. GlaxoSmithKline Inc. Date of Revision: July 29, 2014.
- 6 [®]ASMANEX® Twisthaler® Product Monograph. Merck Canada. Date of Revision: August 20, 2013.
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- 10 Pocket Guide for Asthma Management and Prevention (for adults and children older than 5 years). A Pocket Guide for Physicians and Nurses Revised 2014. Global Initiative for Asthma. Available at: www.ginasthma.org/local/uploads/files/GINA_Pocket_2014_Jun11.pdf
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