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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.

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 FEV_1, 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 Low-dose ICS/long- acting beta-2 agonist (LABA)	Med-dose ICS/LABA Low-dose Symbicort (MART)*	Refer patients with persistent symptoms, exacerbations despite adherence, good inhaler technique and step 4 treatments
Alternate options	Low-dose inhaled cortico-steroids (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 control[5]

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 beta$_2$-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

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

<table>
<tr><th rowspan="2">PREFERRED CONTROLLER</th><th>STEP 1</th><th>STEP 2</th><th>STEP 3</th><th>STEP 4</th><th>STEP 5</th></tr>
<tr><td>May not need controller</td><td rowspan="2">Low-dose ICS</td><td>Med-dose ICS

Low-dose ICS/long- acting beta-2 agonist (LABA)</td><td>Med-dose ICS/LABA

Low-dose Symbicort (MART)*</td><td rowspan="2">Refer patients with persistent symptoms, exacerbations despite adherence, good inhaler technique and step 4 treatments</td></tr>
<tr><td>Alternate options</td><td>Low-dose inhaled cortico-steroids (ICS)</td><td>Low-dose Symbicort Maintenance and Reliever Therapy (MART)*</td><td>High-dose ICS (more side –effects, limited benefit, dose-response curve flattens. Trial for 3-6months)</td></tr>
<tr><td>RELIEVER</td><td colspan="2">As needed short-acting beta-2 agonists (SABA)</td><td colspan="3">As needed SABA or Symbicort (MART)*</td></tr>
</table>

* **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 (FEV_1) 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 does 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:[§]

Step 5 ➔ Step 4. Obtain specialist guidance.

Step 4 ➔ Step 3.

- If on med/high-dose ICS/LABA ➔ IReduce 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:

1 Global Initiative for Asthma (GINA). Global Strategy for Asthma Management and Prevention. 2014:1-132. Available from: www.ginasthma.org. Accessed November 14, 2014. Page 30.

2 Global Initiative for Asthma (GINA). Global Strategy for Asthma Management and Prevention. 2014:1-132. Available from: www.ginasthma.org. Accessed November 14, 2014. Page 33.

3 Ducharme FM, Ni Chroinin M, Greenstone I, Lasserson TJ. Addition of long-acting beta$_2$-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.

4 Global Initiative for Asthma (GINA). Global Strategy for Asthma Management and Prevention. 2014: 1-132. Available from: www.ginasthma.org. Accessed November 14, 2014.

5 British Thoracic Society (BTS) & Scottish Intercollegiate Guidelines Network (SIGN). British guideline on the management of asthma: A national clinical guideline. 2014 (revised). Accessed online December 3, 2014 at: www.brit-thoracic.org.uk. (192 pages).

6 Rogers L & Reibman J. Stepping Down Asthma Treatment: How and When. Curr Opin Pulm Med. 2012. January; 18(1): 70-5.

§ 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]

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 l (400, 60 0mg 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 glucocorticosteroids[4]

Drug	Low Dose	Medium Daily Dose	High Daily Dose	Max Dose Approved by Health Canada
Beclomethasone diproprionate 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 PrQVAR™ 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 PrAlvesco® Product Monograph. Takeda Canada. Date of Preparation: June 25, 2012
5 PrFLOVENT® HFA Product Monograph. GlaxoSmithKline Inc. Date of Revision: July 29, 2014.
6 PrASMANEX® Twisthaler® Product Monograph. Merck Canada. Date of Revision: August 20, 2013.
7 SYMBICORT® TURBUHALER® Product Monograph. AstraZeneca Canada. Date of Revision June 21, 2012.
8 ADVAIR® DISKUS® Product Monograph. GlaxoSmithKline Inc. Date of Revision: July 29, 2014.
9 ZENHALE® Product Monograph. Merck Canada. Date of Revision: October 21, 2014
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
11 PrBREO® ELLIPTA® Product Monograph. GlaxoSmithKline Inc. Date of Revision: August 26, 2015.