

Taddle Creek

Family Health Team

MEDICAL DIRECTIVE

Title:	<u>Asthma Action Plan</u>	Number:	<u>TCFHT-MD12</u>
Activation Date:	<u>10-06-2014</u>	Review Date:	<u>4-01-2019</u>
Next Review Date:	<u>01-01-2020</u>		

Sponsoring/Contact Person(s)
(name, position, contact particulars):

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Order and/or Delegated Procedure:

Appendix Attached: No Yes
Title: Appendix C – Asthma Action Plan

Using this directive, the implementer is authorized to:

- Provide patient/caregiver with a written Asthma Action Plan (AAP; see Appendix C), which will be reviewed at each visit (at least yearly), to reinforce self-management and skills required to use an action plan.
- Educate the patient/caregiver to monitor for symptoms that indicate controlled, uncontrolled and dangerously uncontrolled asthma.
- Direct patient/caregiver to make changes to treatment plan for the purpose of gaining control of uncontrolled asthma (changes to frequency and/or dose of current medications only, not new prescriptions).
- Renew prescriptions for green zone medications.
- Educate the patient/caregiver about situations when medical assistance is required.
- Provide prescription for spacers for insurance coverage purposes (See appendix H).

Recipient Patients:

Appendix Attached: No Yes
Title: Appendix A – Authorizer Approval Form

Recipients must:

- Be an active patient of a TCFHT primary care provider who has approved this directive by signing the Authorizer Approval Form
- Have a diagnosis of asthma
- Be over the age of 6 years
- Meet the conditions identified in this directive

Authorized Implementers:**Appendix Attached:** ___ No X Yes

Title: Appendix B – Implementer Approval Form

Appendix C – Asthma Action Plan

Appendix D – Reference Inhaled Corticosteroid Dosing

Appendix F – Asthma Action Plan Yellow Zone

Formulation Table

Implementers must be TCFHT employed Regulated Health Care Providers or Physician Assistants (under the supervision of a physician).

Implementers must complete the following preparation and sign the Implementer Approval Form:

- Attend AsthmaTrec, created by the Lung Association of Saskatchewan:
<http://www.resptrec.org> (exception: Pharmacists are considered to have received equivalent training in medications during their education)
 - If implementer has not completed AsthmaTrec, but is able to utilize this directive, they should complete **one** of the following:
- Primary Care Asthma Program (PCAP) provider educator program on the proper use of an asthma action plan, offered through McMaster University online, accessible from <http://machealth.ca/programs/asthma-action-plan/default.aspx>
- One-on-one training from a Certified Respiratory Educator (CRE), or;
- The asthma component of Comprehensive Respiratory Educator Program through Pear Health e-learning, accessible from <https://www.healthlearning.ca/lms/my/catalogue/index.php?id=27&subid=75&productid=396&producttype=training&action=view>
- Review the PCAP document: “Asthma Diagnosis and Management Algorithm for Primary Care”, accessible from <http://lungontario.ca/wp-content/uploads/2017/12/36-2015-Asthma-Diagnosis-and-Management-Algorithm-OTS-ORCS-FINAL-2.pdf>
- Review the PCAP document: “Asthma Care Map for Primary Care”, accessible from <http://lungontario.ca/wp-content/uploads/2017/12/35-OLA-Asthma-Care-Map-for-Primary-Care-copyrighted-2.pdf>
- Review the Ontario Lung Association Document: “Asthma Action Plan Yellow Zone Formulation Table”, available on PSS Handouts and Appendix F and accessible from http://lungontario.ca/wp-content/uploads/2018/03/ICS-Dose-Adjustment-in-Yellow-Zone-Dec-20-2017_logo-updated-link-1.pdf
- Review the following articles from UptoDate, accessible from <http://www.UptoDate.com>:
- Overview of asthma management
- Treatment of acute exacerbations of asthma in adults

Suggested additional reading:

- Review the Canadian Respiratory Guidelines accessible from <https://cts-sct.ca/wp-content/uploads/2018/01/ASTHMA-GUIDELINE-APRIL-2012.pdf>

Indications:

Appendix Attached: No Yes

Title:

Appendix D – Reference Inhaled Corticosteroid Dosing
Appendix F – Asthma Action Plan Yellow Zone Formulation Table

The authorized implementers may apply this directive pursuant to a Physician or Nurse Practitioner’s order.

Considerations:

- Adjustment of inhaled controller therapy for individuals 16 years of age and older based on Yellow Zone Formulation Table.
- Note: For adjustment of inhaled controller therapy for individuals ages 6-15: Consultation with the Primary Care Provider (PCP) is recommended due to limited evidence for inhaler adjustment in the yellow zone.

Contraindications:

- Difficulty understanding, reading, or following written directions, either because of a medical condition, language barrier, age, or at the implementer’s discretion.

Consent:

Appendix Attached: No Yes

Title:

Consent is implied upon referral for asthma care visit, asthma education, spirometry or completion of an Asthma Action Plan. However, the authorized implementer will explain the purpose and procedures involved in the Asthma Action Plan to further obtain verbal consent from the patient or POA.

Guidelines for Implementing the Order/Procedure:

Appendix Attached: No Yes

Title:

Appendix C – Asthma Action Plan (adult and pediatric)
Appendix D – Reference Inhaled Corticosteroid Dosing
Appendix F – Asthma Action Plan Yellow Zone Formulation Table

- Refer to Appendices
- Implementer must educate the patient/caregiver on how to recognize an acute exacerbation of asthma and how an Asthma Action Plan (AAP) can assist with asthma management. Patient/caregiver education also includes how to recognize loss of control and what to do if the symptoms worsen.
- Asthma action plans can be tailored for both pediatric and adult patients (see Appendix C).
- Yellow zone medication changes will be based upon the Ontario Lung Association document “Asthma Action Plan Yellow Zone Formulation Table” for individuals ≥ 16 years of age.

Documentation and Communication:

Appendix Attached: No Yes

Title:

Appendix C – Asthma Action Plan
Appendix D – Reference Inhaled Corticosteroid Dosing
Appendix F – Asthma Action Plan Yellow Zone Formulation Table

- At each asthma care visit, the implementer will review the AAP with the patient and document the visit using “Resp. Prog. - Control Assessment (Asthma)” Custom Form.
- Any and all changes to the AAP must be documented in the chart through use of “LUNG-Asthma Action Plan” Custom Form, which can be printed and provided as hard copy to

patient/caregiver.

- “Asthma Action Plan Yellow Zone Formulation Table” for individuals ≥ 16 years of age is available in EMR Handouts for clinical reference.
- Any and all medication changes shall be noted in the patient profile in EMR CPP.
- Implementers can use education materials found in Respiratory Program Folder in the Network.

Review and Quality Monitoring Guidelines:

Appendix Attached: No Yes
Title:

- Routine renewal will occur annually on the anniversary of the activation date. Renewal will involve a collaboration between the authorizing primary care providers and the authorized implementers.
- At any such time that issues related to the use of this directive are identified, TCFHT must act upon the concerns and immediately undertake a review of the directive by the authorizing primary care providers and the authorized implementers.
- This medical directive can be placed on hold if routine review processes are not completed, or if indicated for an ad hoc review. During the hold, implementers cannot perform the procedures under authority of the directive and must obtain direct, patient-specific orders for the procedure until it is renewed.
- If new information becomes available between routine renewals, such as the publishing of new clinical practice guidelines, and particularly, if this new information has implications for unexpected outcomes, the directive will be reviewed by the authorizing physician/nurse practitioner and a minimum of one implementer.

References:

Lougheed, M. D., Lemiere, C., Ducharme, F. M., Licskai, C., Dell, S. D. Rowe, B. H., et al. (2012).

Canadian Thoracic Society 2012 guideline update: Diagnosis and management of asthma in preschoolers, children and adults: Executive summary. Canadian Respiratory Journal, 19 (6), e81-e88.

Canadian Respiratory Guidelines: Recommendations for the Diagnosis and Management of Asthma – Preschoolers, children and adults 2012 update. Available online through the CTS: <https://cts-sct.ca/wp-content/uploads/2018/01/ASTHMA-GUIDELINE-APRIL-2012.pdf>

Global Strategy for Asthma Management and Prevention, Global Initiative for Asthma (GINA) 2012. Accessed November 26, 2018 from <https://ginasthma.org/2018-gina-report-global-strategy-for-asthma-management-and-prevention/>

The Lung Association Pediatric Asthma Action Plan (2018). Accessed November 26, 2018 from <http://olapep.ca/wp-content/uploads/2018/06/PAAP-with-cover-June-15-2018-Final.pdf>

The Lung Association Adult Asthma Action Plan (2018). Accessed November 26, 2018 from <http://lung.healthdiary.ca/Guest/Product.aspx?IDS=iqhzDlyjtUBtRdVtMjiBw%3d%3d>

The Lung Association (2018). “Asthma Action Plan Yellow Zone Formulation Table”, accessed November 26, 2018 from http://lungontario.ca/wp-content/uploads/2018/03/ICS-Dose-Adjustment-in-Yellow-Zone-Dec-20-2017_logo-updated-link-1.pdf

Appendix C:

Adult Asthma Action Plan (age ≥ 16 years)

Name: _____

Date: _____

Review with your healthcare provider at every visit.

Adult Asthma Action Plan (16 years and older)

Emergency contact name: _____	Phone: _____
Physician name: _____	Phone: _____

Personal Best Peak Flow _____ L/min

**The goal of asthma treatment is to live a healthy, active life.
Remember that it is very important to remain on your maintenance medication, even if you are having no symptoms of asthma.**

Go: Maintain Therapy	Caution: Step Up Therapy	Stop: Get Help Now																																			
<p>Description You have all of the following:</p> <p>Use your reliever no more than 3 times per week</p> <p>Cough, wheezing, shortness of breath or chest tightening no more than 3 days per week</p> <p>Can do normal physical activities and sports without difficulty</p> <p>Night asthma symptoms less than 1 night per week</p> <p>No missed regular activities or school or work</p> <p>Peak Flow: >80% personal best, or > _____</p> <p>Other:</p> <div style="border: 1px solid black; height: 30px; width: 100%;"></div>	<p>Description You have any of the following:</p> <p>Use your reliever more than 3 times per week</p> <p>Have daytime cough, wheezing, shortness of breath or chest tightening more than 3 days per week</p> <p>Physical activity is limited</p> <p>Asthma symptoms at night or in early AM 1 or more nights per week</p> <p>Peak Flow: 60-80% personal best, or _____ to _____</p> <p>Other:</p> <div style="border: 1px solid black; height: 30px; width: 100%;"></div>	<p>Description You have any of the following:</p> <p>Reliever lasts 2-3 hours or less</p> <p>Continuous asthma symptoms</p> <p>Continuous cough</p> <p>Wheezing all the time</p> <p>Severe shortness of breath</p> <p>Sudden and severe attack of asthma</p> <p>Peak Flow: <60% personal best, or < _____</p> <p>Other:</p> <div style="border: 1px solid black; height: 30px; width: 100%;"></div>																																			
<p>Instructions:</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 20%;">Medication</th> <th style="width: 10%;">Puffer colour</th> <th style="width: 10%;">Dose</th> <th style="width: 10%;">Puffs</th> <th style="width: 10%;">Times per day</th> </tr> </thead> <tbody> <tr style="background-color: #D3D3D3;"> <td colspan="5">Controller</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr style="background-color: #D3D3D3;"> <td colspan="5">Reliever</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> <p>Other:</p> <div style="border: 1px solid black; height: 30px; width: 100%;"></div>	Medication	Puffer colour	Dose	Puffs	Times per day	Controller																				Reliever										<p>Instructions:</p> <p><input type="checkbox"/> Increase _____ controller (_____) to: _____ puffs _____ times per day for _____ days</p> <p><input type="checkbox"/> Add _____ controller (_____) : _____ puffs _____ times per day for _____ days</p> <p><input type="checkbox"/> Take _____ reliever (_____) 1 to 2 puffs every 4 to 6 hours as needed</p> <p><input type="checkbox"/> If no improvement in your symptoms and/or peak flows in 2-3 days or your reliever only lasts for 2-3 hours, go to red zone</p> <p>Other:</p> <div style="border: 1px solid black; height: 30px; width: 100%;"></div>	<p>Instructions:</p> <p>Take _____ reliever (_____) _____ puffs every 10-30 minutes as needed</p> <p>Asthma symptoms can get worse quickly. When in doubt, seek medical help.</p> <p>Asthma can be a life-threatening illness. Do not wait!</p> <p>If you cannot contact your doctor: call 911 for an ambulance, or go directly to the Emergency Department!</p> <p>Bring this asthma action plan with you to the emergency room or hospital</p> <p>Stay calm</p> <p>Other:</p> <div style="border: 1px solid black; height: 30px; width: 100%;"></div>
Medication	Puffer colour	Dose	Puffs	Times per day																																	
Controller																																					
Reliever																																					

Adapted from Gupta S, et al. Respiration 2012;84(5):406-15. © 2018 Dr. S. Gupta (materials intended for non-commercial use only)

Allergies may be triggering your asthma - avoid the things that you are allergic to and have allergy skin testing if you are unsure.

Controller: has a lasting effect, treats inflammation, prevents asthma attacks, may take time to act
Reliever: rapidly relieves symptoms of cough, wheeze, lasts 4 hours

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Pediatric Asthma Action Plan

Pediatric Asthma Action Plan (1-15 years)




Name: _____

Date: _____

Review your action plan with your healthcare provider at every visit.

Healthcare provider/phone: _____

Always remain on your green zone medication, even if you are having no symptoms of asthma.

Go: Maintain Therapy	Caution: Step Up Therapy	Stop: Get Help Now																									
<p>Description You/your child has all of the following:</p> <p>Use of reliever puffer no more than 3 times a week*</p> <p>Daytime symptoms (cough, wheeze or breathing problems) no more than 3 times a week*</p> <p>Ability to do physical activity (playing, running) or sports without difficulty</p> <p>No nighttime asthma symptoms</p> <p>Not missing regular activities or school</p> <p>No symptoms of a cold</p> <p>*1 time a week if 1 to 5 years old</p>  <p>Other: _____</p>	<p>Description You/your child has any of the following:</p> <p>Use of reliever puffer more than 3 times a week*</p> <p>Daytime symptoms (cough, wheeze or breathing problems) more than 3 times a week*</p> <p>Difficulty with physical activity (playing, running) or sports</p> <p>Asthma symptoms 1 or more nights a week</p> <p>Missing regular activities or school</p> <p>Symptoms of a cold</p> <p>*1 time a week if 1 to 5 years old</p>  <p>Other: _____</p>	<p>Description You/your child has any of the following:</p> <p>Reliever puffer lasts less than 3 hours</p> <p>"Pulling in" of skin in the neck/between or below ribs</p> <p>Feeling very short of breath</p> <p>Difficulty talking</p> <p>Continuous wheeze or cough</p>  <p>Other: _____</p>																									
<p>Instructions:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Medication</th> <th>Puffer colour</th> <th>Dose</th> <th>Puffs</th> <th>Times a day</th> </tr> </thead> <tbody> <tr> <td colspan="5">Controller</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td colspan="5">Reliever</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td>every 4 hours as needed</td> </tr> </tbody> </table> <p><input type="checkbox"/> Use reliever before exercise</p> <p>Other: _____</p>	Medication	Puffer colour	Dose	Puffs	Times a day	Controller										Reliever									every 4 hours as needed	<p>Instructions:</p> <p><input type="checkbox"/> Take _____ (colour) reliever _____ puffs every 4 hours as needed, and:</p> <p><input type="checkbox"/> Continue to take your green zone medication</p> <p><input type="checkbox"/> If reliever puffer is needed consistently every 4 hours, or if there is no improvement in your symptoms in 2-3 days, contact your healthcare provider</p> <p>Other: _____</p>	<p>Instructions:</p> <p>Take _____ (colour) reliever 4-6 puffs every 15-20 minutes and</p> <p>Call 911 or go directly to the emergency department</p> <p>Asthma symptoms can get worse quickly</p> <p>Asthma can be a life-threatening illness - do not wait!</p> <p>Bring this asthma action plan with you to the emergency department</p> <p>Stay calm</p> <p>Other: _____</p>
Medication	Puffer colour	Dose	Puffs	Times a day																							
Controller																											
Reliever																											
				every 4 hours as needed																							


Use spacer device (holding chamber) with all metered dose inhalers.
Lung Health Information Line 1-888-344-5864 (LUNG) or lungontario.ca


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the lung association


Pediatric Asthma Action Plan (1-15 years) - The goal of asthma treatment is to live a healthy, active life

This Asthma Action Plan outlines steps for you/your child to self-manage asthma when you/your child start(s) having more symptoms. Your healthcare provider might also change you/your child's usual asthma treatment according to the level of asthma control over time. Review all symptoms and this plan regularly with the healthcare provider.

Asthma Triggers


 **Colds** are the most common trigger - wash hands often


 **Smoking** or being in a house or a car where someone smokes


 **Fumes, chemicals and strong scents**


Check the Air Quality Health Index before you leave home (www.airqualityontario.com)

Allergies may be triggering you/your child's asthma. Follow the instructions below if you/your child are allergic to any of these (have allergy skin testing if you are unsure):

 **Pets with fur or feathers** - If you have pets, wash them regularly and keep them out of bedrooms

 **Pollen and Grass** - Try to stay inside on high pollen days and avoid freshly cut grass

 **Dust and dust mites** - Wash bedsheets in hot water and vacuum with a HEPA filter or central vacuum regularly; consider mattress and pillow covers

 **Mould** - Keep bathroom and basement dry, clean visible mould, avoid decomposing leaves in the fall

Simple ways to take care of you/your child's asthma:

- ✓ Avoid triggers
- ✓ Know your medication and how and when to take it
Take controller medications regularly
- ✓ Follow your action plan
- ✓ After any emergency room visit, schedule a follow-up appointment with your healthcare provider in the next 2 weeks
- ✓ Always have your reliever medication with you
- ✓ Use appropriate spacer (holding chamber) with metered dose inhaler



For Healthcare Providers

At every visit, re-assess adherence to therapy, inhaler technique, asthma control criteria and environmental control.

For children 1-5 years, refer to the figure provided and the 2015 Diagnosis and Management of Asthma in Preschoolers position statement** to determine treatment and medication doses required to maintain ongoing asthma control. For children 6 years and over, refer to the CTS 2012 Asthma guideline update¹.

An exacerbation requiring rescue systemic corticosteroids or hospitalization is an indication of suboptimal control and should prompt reassessment.

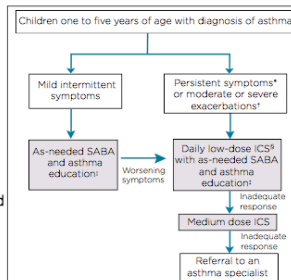


Figure 2 Treatment algorithm for preschoolers with asthma. *Symptoms occurring ≥2 days/month; ≥2 days/month with use of inhaled short-acting β₂-agonists (SABA), ≥1 night awakening due to symptoms/month, any exercise limitation/month or any absence from usual activities to asthma symptoms. †Etiologies requiring rescue oral corticosteroids or hospital admission. ‡Asthma education including environmental control and a written self-management plan. §Inhaled corticosteroid (ICS) are more effective than leukotriene receptor antagonists (LTRA).

This asthma action plan was adapted from Gupta S., et al. Respiration 2012; 84(5):406-15. Pictograms in the asthma action plan were adapted from Tulloch J., et al. Can Respir J. 2012 Jan-Feb;19(1):26-31. Instructions were designed to align with: **Ducharme FM, Dell SD, Radhakrishnan D, et al. Diagnosis and management of asthma in preschoolers: A Canadian Thoracic Society and Canadian Paediatric Society position paper. Can Respir J 2015; 22(3):135-143 and †Lougheed MD, Lemiere C, Ducharme F, et al. Canadian Thoracic Society 2012 guideline update: Diagnosis and management of asthma in preschoolers, children and adults. Can Respir J 2012; Vol 19(2), 127-64. For information on how this action plan was developed, or to download a copy of this action plan and/or for associated resources, please visit olapep.ca/resources

Appendix D:

Reference Inhaled Corticosteroid Dosing

Comparative inhaled corticosteroids (ICS) dosing categories in children and adults

Corticosteroid	Trade name	Daily ICS dose, mcg					
		Pediatric (6 to 11 years of age)			Adult (12 years of age and over)		
		Low	Medium	High	Low	Medium	High
Beclomethasone dipropionate HFA	QVAR [†]	≤200	201–400 ^a	>400 ^a	≤250	251–500	>500
Budesonide*	Pulmicort Turbuhaler [‡]	≤400	401–800	>800	≤400	401–800	>800
Ciclesonide*	Alvesco [§]	≤200	201–400 ^a	>400 ^a	≤200	201–400	>400
Fluticasone	Flovent MDI and spacer; Flovent Diskus [¶]	≤200	201–400	>400 ^a	≤250	251–500	>500
Mometasone	Asmanex Twisthaler ^{**}				200	≥400–800	>800 ^b

Dosing categories are approximate, based on a combination of approximate dose equivalency as well as safety and efficacy data rather than available product formulations. *Licensed for once daily dosing in Canada (a: Daily doses of beclomethasone dipropionate HFA >200 mcg/day, ciclesonide >200 mcg/day and fluticasone >400 mcg/day are not approved for use in children in Canada [highlighted]); †Graceway Pharmaceuticals, Canada; ‡AstraZeneca Inc, Canada; §Nycomed Canada Inc; ¶GlaxoSmithKline Inc, Canada; **Merck & Co Inc, USA (b: Daily doses of mometasone >800 mg/day are not approved for use in adults in Canada [highlighted]).

Reference: Loughheed MD, et al. Canadian Thoracic Society 2012 guideline update: Diagnosis and management of asthma in preschoolers, children and adults. Can Respir J. 2012;19(2):127-164.

Appendix E:

Recommended Controller Step-Up Therapy in Yellow Zone (ages 6-15 yrs)⁵

Note: Therapy below requires PCP prescription

Maintenance Therapy*	Recommended controller step-up therapy for the Action Plan "Yellow Zone"	
	1 st choice	2 nd choice***
No maintenance	No good evidence	Consider starting regular low-dose controller therapy
Low-dose ICS	No good evidence	<ul style="list-style-type: none"> • Medium-dose ICS (GRADE 1A) OR • Prednisone/prednisolone 1mg/kg x 3-5 days • Consider referral to Pediatric Respiriologist
Medium-dose ICS	No good evidence	<ul style="list-style-type: none"> • Add LABA <i>or</i> LTRA (GRADE 2B) • Consider referral to Pediatric Respiriologist (CONSENSUS)
ICS/LABA**	No good evidence	<ul style="list-style-type: none"> • Prednisone/prednisolone 1mg/kg x3-5 days • Consider add leukotriene receptor antagonist (LTRA) Montelukast • Consider referral to Pediatric Respiriologist
<p>* Refer to Appendix D for low-, medium-, high-ICS dosing ** ICS/LABA combination does not apply to pre-schoolers <6 years of age; there is no clear evidence of the benefit of ICS and LABA combination therapy in the pediatric population⁵ *** If patient uncontrolled on regular-low-dose ICS, authorized implementer will consult with PCP and/or consider referral to Pediatric Respiriology</p>		

As per CTS 2012 Guidelines Update⁵:

- For children 6 to 11 years of age, the evidence is not clear with respect to the next best option when low-dose ICS does not result in asthma control. Consider referral to Pediatric Respiriologist.

Oral corticosteroid dosage forms and strengths available

Corticosteroid	Dosage form	Strengths	Dosage regimen for exacerbations
Prednisone	Oral tablets	1, 5, 50mg	Prednisone 30-50mg po daily x 5-7 days
Prednisolone (Pediapred)	Oral liquid solution	1mg/mL	1-2 mg/kg/day (max 50mg) po x 3-5 days

Note: Tapering is not needed if oral corticosteroid prescribed <2 weeks

Appendix F:

Asthma Action Plan Yellow Zone Formulation Table (age \geq 16 years old)



Adjustment of Inhaled Controller Therapy of Asthma in the Yellow Zone, Based on the Inhaler Product Used in the Green Zone Age 16 Years and Older

The Canadian Thoracic Society and other international asthma guideline bodies recommend a temporary, 4-5 fold increase in the inhaled corticosteroid (ICS) dose in selected patients in response to acutely worsening asthma symptoms, as part of a self-management asthma action plan (AAP).¹ The green-yellow-red zone framework in the AAP describes stable asthma, acutely worsening asthma, and a severe asthma exacerbation, respectively.

However, as confirmed in a recent review,² there are several practical challenges in broadly applying these recommendations. For certain dosing situations, guidelines provide no clear approach. In other situations, such as patients on a moderate to high baseline inhaled corticosteroid (ICS) dose (either as ICS monotherapy or in combination with a long-acting beta agonist (LABA)), a 4-5 fold dose increase in the yellow zone would exceed the manufacturer's recommended maximum daily dose. In such situations, clinicians might either choose to temporarily exceed manufacturer-recommended doses, or to directly recommend oral corticosteroids. This decision must be individualized, and will require consideration of clinician comfort level, patient preferences, medication cost (inhaled corticosteroid medications are more costly than oral corticosteroids), and medication availability (patients can easily increase use of their existing ICS, but may not have rapid access to oral corticosteroids). In these cases, both options are presented, and are considered equivalent, with no intended preferential hierarchy. Also, where there is evidence of a ceiling ICS dose that is equivalent to a course of oral prednisone, we have listed dose increases that achieve the ceiling dose but may be less than a 4-fold increase from the patient's green zone baseline dose (e.g. see tables for fluticasone, budesonide, ciclesonide). Where there is no evidence to confirm an ICS ceiling dose equivalent to prednisone (e.g. mometasone) we have not included a recommendation in the table, but have included a recommendation in the footnotes to the table. Support for a possible ceiling dose (ie, producing a prednisone-like effect) for mometasone is inferred based on pharmacokinetic similarity of mometasone to fluticasone propionate.

Furthermore, dose increases in the yellow zone can be achieved in a variety of ways, including changes to the number and/or frequency of inhalations, through *addition* of a new inhaler, or through temporary *replacement* of the baseline medication with a more potent (ie, higher strength) inhaler. To address these various implementation challenges, we have adopted evidence-based approaches recommended by authors Kouri, et al.² These approaches seek to maximize patient satisfaction and adherence while minimizing patient errors. For example, recommended dose adjustments are based on use of the patient's existing inhaler where possible. A strategy of stepping up to an inhaler strength that is higher than the current green zone inhaler as a way of increasing the ICS dose may be logistically challenging for the patient and therefore is deemed a less desirable option (although such options can be considered and are listed in the table footnotes where applicable for completeness). However, we note that approaches to reaching each target ICS dose level in the AAP yellow zone may vary, and should be ideally individualized based on patient preferences.

We also note that there are certain special considerations, as follows:

1) In patients with a history of sudden and severe exacerbations, and/or presenting with peak expiratory flow (PEF) or forced expiratory volume in 1 second (FEV1) \leq 60% of personal best/predicted, the preferred first line therapy for the yellow zone of the action plan is prednisone 30-50 mg daily for 5-7 days.

2) In patients who fail to improve clinically within 2-3 days of increase in inhaled controller medication, and/or have a rapid clinical deterioration, and/or a PEF or FEV1 that falls to \leq 60% of their personal best value, rescue therapy with prednisone 30-50 mg daily for 5-7 days is recommended.

Tables below list dosing options that are convenient and do not exceed 4 puffs per dose time. Dose recommendations listed in red exceed the manufacturer's maximum recommended dose. The **footnotes for each table contain essential information** for interpreting table and applying the information in clinical practice.

Maintenance Controller Medication in the Green Zone	Total daily maintenance ICS dose in mcg	Recommended dose adjustment	Dose of ICS after adjustment	Total daily ICS dose after adjustment (mcg)	Degree of increase in ICS over baseline
Fluticasone propionate pMDI Flovent HFA®					
• 50 mcg/puff 1 puff bid	100	4 puffs bid	200 mcg bid	400	4-fold
• 50 mcg/puff 2 puff bid	200	4 puffs qid**	200 mcg qid	800	4-fold
• 125 mcg/puff 1 puff bid*	250	4 puffs bid	500 mcg bid	1000	4-fold
• 125 mcg/puff 2 puffs bid	500	4 puffs qid**	500 mcg qid	2000	4-fold
• 250 mcg/puff 1 puff bid*	500	4 puffs bid	1000 mcg bid	2000	4-fold
• 250 mcg/puff 2 puffs bid	1000	4 puffs bid	1000 mcg bid	2000	2-fold***

*Although the manufacturer recommends that the usual dose be obtained using 2 puffs from each available strength of Flovent HFA® pMDI, **one** puff dosing regimens may be in clinical use.

**A qid dosing regimen is required to achieve a 4-fold increase while avoiding an excessive number of puffs at each dose time.

***Although this represents less than a 4-fold dose increase, there is evidence that a transient dose increase to a dose of 2000 mcg/day has a comparable effect to oral corticosteroids, regardless of the baseline ICS dose.²

Maintenance Controller Medication in the Green Zone	Total daily maintenance ICS dose in mcg	Recommended dose adjustment	Dose of ICS after adjustment	Total daily ICS dose after adjustment (mcg)	Degree of increase in ICS over baseline
Fluticasone propionate Flovent® Diskus					
• 100 mcg/inh 1 inh bid	200	4 inh bid	400 mcg bid	800	4-fold
• 250 mcg/inh 1 inh bid	500	4 inh bid	1000 mcg bid	2000	4-fold
• 500 mcg/inh 1 inh bid	1000	2 inh bid	1000 mcg bid	2000	2-fold*
• 500 mcg/inh 2 inh bid	2000	Prednisone 30-50 mg daily			

*Although this represents less than a 4-fold dose increase, there is evidence that a transient dose increase to a dose of 2000 mcg/day has a comparable effect to oral corticosteroids, regardless of the baseline ICS dose.²

Maintenance Controller Medication in the Green Zone	Total daily maintenance ICS dose in mcg	Recommended dose adjustment	Dose of ICS after adjustment	Total daily ICS dose after adjustment (mcg)	Degree of increase in ICS over baseline
Fluticasone furoate® Arnuity® Ellipta					
• 100 mcg/inhalation 1 inh daily	100	<i>Option 1: Increase to 4 puffs daily*</i> <i>Option 2: Prednisone 30-50 mg daily**</i>	400 mcg daily	400	4-fold
• 200 mcg/inhalation 1 inh daily	200	<i>Option 1: Increase to 4 puffs daily*</i> <i>Option 2: Prednisone 30-50 mg daily**</i>	800 mcg daily	800	4-fold

* 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. We also note that this product is relatively new on the market, and effects of higher doses are less certain than for other formulations.

** Ask patients to contact the health care provider to consider a prednisone prescription and/or provide a standing prescription for prednisone 30-50 mg daily for 5-7 days. Ensure that patients are appropriately counseled about the risks of short-term prednisone use.

Maintenance Controller Medication in the Green Zone	Daily maintenance ICS dose in mcg	Recommended dose adjustment	Dose of ICS after adjustment	Total daily ICS dose after adjustment (mcg)	Degree of increase in ICS over baseline
Budesonide Pulmicort® Turbuhaler®					
• 100 mcg/inhalation 1 inh bid	200	4 inhalations bid*	400 mcg bid	800	4-fold
• 200 mcg/inhalation 1 inh bid	400	4 inhalations bid*	800 mcg bid	1600	4-fold
• 400 mcg/inhalation 1 inh bid	800	3 inhalations bid	1200 mcg bid	2400	3-fold**
• 400 mcg/inhalation 2 inh bid	1600	3 inhalations bid	1200 mcg bid	2400	1.5-fold**

*Although maintaining the baseline dosing frequency is thought to reduce medication dosing errors, a qid regimen of budesonide (not shown in the table) may have superior efficacy to a bid regimen, and can be considered.

**Although this represents less than a 4-fold dose increase, there is evidence that a transient dose increase to a dose of 2400 mcg/day has a comparable effect to oral corticosteroids, regardless of the baseline ICS dose.²

Maintenance Controller Medication in the Green Zone	Daily maintenance ICS dose in mcg	Recommended dose adjustment	Dose of ICS after adjustment	Total daily ICS dose After adjustment (mcg)	Degree of increase in ICS over baseline
Beclomethasone pMDI Qvar®					
• 50 mcg/puff 1 puff bid	100	4 puffs bid (or 2 puffs qid)	200 mcg bid 100mcg qid	400 400	4-fold 4-fold
• 50 mcg/puff 2 puffs bid	200	4 puffs qid*	200 mcg qid	800	4-fold
• 100 mcg/puff 1 puff bid	200	4 puffs bid (or 2 puffs qid)	400 mcg bid 200mcg qid	800 800	4-fold 4-fold
• 100 mcg/puff 2 puffs bid	400	<i>Option 1: Increase to 4 puffs qid*;**</i> <i>Option 2: Prednisone 30-50 mg daily***</i>	400 mcg qid	1600	4-fold

*A qid dosing regimen is required to achieve a 4-fold increase while avoiding an excessive number of puffs at each dose time

** 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.

*** Ask patients to contact the health care provider to consider a prednisone prescription and/or provide a standing prescription for prednisone 30-50 mg daily for 5-7 days. Ensure that patients are appropriately counseled about the risks of short-term prednisone use.

Maintenance Controller Medication in the Green Zone	Daily maintenance ICS dose in mcg	Recommended dose adjustment	Dose of ICS after adjustment	Total daily ICS dose after adjustment (mcg)	Degree of increase in ICS over baseline	
Ciclesonide pMDI Alvesco®	• 100 mcg/puff 1 puff daily	100	4 puffs daily	400 mcg daily	400	4-fold
	• 100 mcg/puff 2 puffs daily	200	4 puffs bid	400 mcg bid	800	4-fold
	• 200 mcg/puff 1 puff daily	200	4 puffs daily*	800 mcg daily	800	4-fold
			(or 2 puffs bid)	400 mcg bid	800	4-fold
	• 200 mcg/puff 2 puffs daily	400	4 puffs bid**	800 mcg bid	1600	4-fold
	• 200 mcg/puff 2 puffs bid	800	4 puffs bid**	800 mcg bid	1600	2-fold***

* Although maintaining the baseline dosing frequency is thought to reduce medication dosing errors, the manufacturer recommends splitting the dose into a bid schedule whenever the total administered dose is > 400 mcg/day, and this can be considered.

** This dose exceeds product monograph total daily dose limits intended for chronic daily use. However, a short term increase to this dose level was shown to be safe and effective in a clinical trial.²

***Although this represents less than a 4-fold dose increase, there is evidence that a transient dose increase to a dose of 1600 mcg/day has a comparable effect to oral corticosteroids, regardless of the baseline ICS dose.²

Maintenance Controller Medication in the Green Zone	Daily maintenance ICS dose in mcg	Recommended dose adjustment	Dose of ICS after adjustment	Total daily ICS dose after adjustment (mcg)	Degree of increase in ICS over baseline	
Mometasone Asmanex® Twisthaler®	• 100 mcg/inhalation 1 inh daily	100	4 inhalations daily	400 mcg daily	400	4-fold
	• 200 mcg/inhalation 1 inh daily	200	4 inhalations daily*	800 mcg daily	800	4-fold
			(or 2 inh bid)	400 mcg bid	800	4-fold
	• 200 mcg/inhalation 1 inh bid	400	Option 1: Increase to 4 inh bid**	800 mcg bid	1600	4-fold
			Option 2: Prednisone 30-50 mg daily****			
	• 400 mcg/inhalation 1 inh daily	400	Option 1: Increase to 4 inh daily**	1600 mcg daily	1600	4-fold
		(or 2 inhalations bid)	800 mcg bid	1600	4-fold	
		Option 2: Prednisone 30-50 mg daily****				
• 400 mcg/inhalation 1 inh bid***	800	Prednisone 30-50 mg daily****				

* Although maintaining the baseline dosing frequency is thought to reduce medication dosing errors, the manufacturer recommends splitting the dose into a bid schedule whenever the total administered dose is > 400 mcg/day, and this can be considered.

** 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.

*** Another possible approach would be to increase to 2 inhalations bid, and this can be considered (not shown in the table).

Although this recommendation is not evidence-based, because the pharmacokinetic profile of mometasone is similar to fluticasone propionate, doubling of mometasone to 1600 mcg (twice the recommended usual maximum dose) may provide efficacy similar to fluticasone propionate 2000 mcg/day, a dose which has shown an effect comparable to oral corticosteroids.²

**** Ask patients to contact the health care provider to consider a prednisone prescription and/or provide a standing prescription for prednisone 30-50mg daily for 5-7 days. Ensure that patients are appropriately counseled about the risks of short-term prednisone use.

Maintenance Controller Medication in the Green Zone	Daily maintenance ICS dose in mcg	Recommended dose adjustment	Dose of ICS after adjustment	Total daily ICS dose after adjustment (mcg)	Degree of increase in ICS over baseline
Advair® pMDI Fluticasone/salmeterol <ul style="list-style-type: none"> 125/25 mcg 1 puff bid* 125/25 mcg 2 puffs bid 250/25 mcg 1 puff bid* 250/25 mcg 2 puffs bid 	250	Add fluticasone 125 mcg/puff pMDI 3 puffs bid	Fluticasone/salmeterol 125 mcg bid + Fluticasone 375 mcg bid	1000	4-fold
	500	Add fluticasone 250 mcg/puff pMDI 3 puffs bid	Fluticasone/salmeterol 250 mcg bid + Fluticasone 750 mcg bid	2000	4-fold
	500	Add fluticasone 250 mcg/puff pMDI 3 puffs bid	Fluticasone/salmeterol 250 mcg bid + Fluticasone 750 mcg bid	2000	4-fold
	1000	Add fluticasone 250 mcg/puff pMDI 2 puffs bid	Fluticasone/salmeterol 500 mcg bid + Fluticasone 500 mcg bid	2000	2-fold**

*Although the manufacturer-recommended dose is 2 puffs from each available strength of Advair® pMDI in order to obtain 50 mcg of salmeterol at each dose time, **one** puff dosing regimens may be in clinical use

**Although this represents less than a 4-fold dose increase, there is evidence that a transient dose increase to a dose of 2000 mcg/day has a comparable effect to oral corticosteroids, regardless of the baseline ICS dose²

Maintenance Controller Medication in the Green Zone	Daily maintenance ICS dose in mcg	Recommended dose after adjustment	Dose of ICS after adjustment (mcg)	Total daily ICS dose after adjustment (mcg)	Degree of increase in ICS over baseline
Advair® Diskus® Fluticasone/salmeterol* <ul style="list-style-type: none"> 100/50 1 inhalation bid 250/50 1 inhalation bid 500/50 1 inhalation bid 	200	Add fluticasone 100 mcg/inhalation 3 inhalations bid	Fluticasone/salmeterol 100 mcg bid + Fluticasone 300 mcg bid	800	4-fold
	500	Add fluticasone 250 mcg/inhalation 3 inhalations bid	Fluticasone/salmeterol 250 mcg bid + Fluticasone 750 mcg bid	2000	4-fold
	1000	Add fluticasone 500 mcg/inhalation 1 inhalation bid	Fluticasone/salmeterol 500 mcg bid + Fluticasone 500 mcg bid	2000	2-fold**

*Note: Since each inhalation from the Advair® Diskus delivers salmeterol 50 mcg, the manufacturer's recommended dose is 1 inhalation from each available strength of Advair® Diskus in order to obtain 50 mcg of salmeterol at each dose time. Increasing the number of inhalations from Advair Diskus is not appropriate since this will exceed the daily dose limit for salmeterol.

**Although this represents less than a 4-fold dose increase, there is evidence that a transient dose increase to a dose of 2000 mcg/day has a comparable effect to oral corticosteroids, regardless of the baseline ICS dose²

Maintenance Controller Medication in the Green Zone	Daily maintenance ICS dose in mcg	Recommended dose after adjustment	Dose of ICS after adjustment	Total daily ICS dose after adjustment (mcg)	Degree of increase in ICS over baseline
Brevo® Ellipta® Fluticasone furoate/vilanterol* <ul style="list-style-type: none"> 100/25 1 inhalation daily 	100	<i>Option 1:</i> Increase to 4 puffs od** <i>Option 2:</i> Prednisone 30-50 mg daily***	400 mcg od	400	4-fold
	200	<i>Option 1:</i> Increase to 4 puffs od** <i>Option 2:</i> Prednisone 30-50 mg daily***	800 mcg od	800	4-fold

*Note: Each inhalation from either strength of Brevo® Ellipta® delivers vilanterol 25 mcg, which is the maximum recommended daily dose for routine usage.

** This dose exceeds product monograph total daily dose limits for fluticasone furoate and vilanterol 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. We also note that this product is relatively new on the market, and effects of higher doses are less certain than for other formulations.

*** Ask patients to contact the health care provider to consider a prednisone prescription and/or provide a standing prescription for prednisone 30-50 mg daily for 5-7 days. Ensure that patients are appropriately counseled about the risks of short-term prednisone use.

Maintenance Controller Medication in the Green Zone	Daily maintenance ICS dose in mcg	Recommended dose after adjustment	Dose of ICS after adjustment	Total daily ICS dose after adjustment (mcg)	Degree of increase in ICS over baseline
Zenhale® pMDI Mometasone/formoterol <ul style="list-style-type: none"> 100/5 2 puffs bid* 	400	<i>Option 1:</i> <u>Change to</u> Zenhale MDI 200/5 mcg 4 puffs bid** <i>Option 2:</i> Prednisone 30-50 mg daily****	200/5 mcg 4 puffs bid**	1600	4-fold
	800	Prednisone 30-50 mg daily****			

*Note: Since each puff from the Zenhale® pMDI delivers formoterol 5 mcg, the manufacturer's recommended dose is 2 puffs from each available strength of Zenhale® pMDI in order to obtain 10 mcg of formoterol at each dose time. Increasing the dose of 100/5 to 4 puffs bid complies with the manufacturer's maximum dose for formoterol of 40 mcg/day, but would only achieve a 2-fold increase in the ICS dose to 800 mcg. Since this strategy may be suboptimal, it may be considered, but is not listed in the table as an option.

** To achieve a 4-fold increase in mometasone to 1600 mcg/day, a higher strength inhaler is required (i.e. 200/5). 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.

*** Another possible approach would be to increase to 4 inhalations bid, and this can be considered (not shown in the table).

Although this recommendation is not evidence-based, because the pharmacokinetic profile of mometasone is similar to

fluticasone propionate, doubling of mometasone to 1600 mcg (twice the recommended usual maximum dose) may provide efficacy similar to fluticasone propionate 2000 mcg/day, a dose which has shown an effect comparable to oral corticosteroids.²

**** Ask patients to contact the health care provider to consider a prednisone prescription and/or provide a standing prescription for prednisone 30-50 mg daily for 5-7 days. Ensure that patients are appropriately counseled about the risks of short-term prednisone use.

Maintenance Controller Medication in the Green Zone	Daily maintenance ICS dose in mcg	Recommended dose after adjustment	Total daily ICS dose after adjustment (mcg)	Degree of increase in ICS over baseline
Symbicort® Turbuhaler® Budesonide/formoterol*		Symbicort® Adjustable Maintenance Dosing		
• 100/6 1 inhalation daily	100	Increase to 4 inhalations/day	400	4-fold
• 100/6 1 inhalation bid	200	Increase to 4 inhalations bid	800	4-fold
• 100/6 2 inhalations daily	200	Increase to 4 inhalations bid	800	4-fold
• 100/6 2 inhalations bid****	400	Add budesonide 200 mcg 3 inhalations bid	1600	4-fold
• 200/6 1 inhalation daily	200	Increase to 4 inhalations/day	800	4-fold
• 200/6 1 inhalation bid	400	Increase to 4 inhalations bid	1600	4-fold
• 200/6 2 inhalations daily	400	Increase to 4 inhalations bid	1600	4-fold
• 200/6 2 inhalations bid****	800	Add budesonide 400 mcg 2 inhalations bid	2400	3-fold**
Symbicort® Maintenance and Reliever Therapy (SMART)****		Symbicort® Maintenance and Reliever Therapy (SMART)	Maximum:	
• 100/6 1 inhalations bid	200	In addition to the maintenance dose, may take 1 additional dose 'as needed' in response to symptoms.	800/day	
• 100/6 2 inhalations bid	400	Not more than 6 inhalations on any single occasion. Not more than 8 inhalations per day in total (maintenance and reliever doses)	800/day	
• 100/6 2 inhalations daily	200		800/day	
• 200/6 1 inhalation bid	400		1600/day	
• 200/6 2 inhalations bid	800		1600/day	
• 200/6 2 inhalations daily	400		1600/day	

*Dose based on 1 inhalation from each available strength of Symbicort® Turbuhaler®.

**Although this represents less than a 4-fold dose increase, there is evidence that a transient dose increase to a dose of 2400 mcg/day has a comparable effect to oral corticosteroids, regardless of the baseline ICS dose.²

***Stepping up to 4 inhalations bid is a manufacturer-recommended option, but it falls short of the 4-fold increase in ICS or the 2400 mcg budesonide target dose.

****SMART dosing strategy has been shown to prevent acute exacerbations of asthma from becoming severe. There is no evidence-based recommendation for the use of supplemental budesonide with this dosing strategy. If satisfactory relief of asthma symptoms is not achieved with a maximum of 8 inhalations per day, seek medical attention.

References:

1. Loughheed MD, Lemièrre C, Ducharme FM, et al. Canadian Thoracic Society 2012 guideline update: Diagnosis and management of asthma in preschoolers, children and adults. *Can Resp J* 2012;19(2):127-164.
2. Kouri A, Boulet LP, Kaplan A, Gupta S. An evidence-based, point-of-care tool to guide completion of asthma action plans in practice. *European Respiratory Journal*. 2017; 49(5).

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Reviewers: Provider Education Program

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December 17th, 2017

Appendix H:

**Taddle Creek Family Health Team
Offices of Drs. del Junco & Jackson; Drs. Davis, Machamer & Sugiyama
726 Bloor St. W. Suite 207 & B102
Toronto, ON M6G 4A1
tel: 416-538-3939
fax: 416-538-2980**

Oct 13, 2017

Office Notes Simpson
726 Bloor St. W
Suite 207
ON
M6G 1K7
Phone: 416-538-3939

Dear Office Notes:

As per verbal order from Dr. Jackson, this patient requires a spacer for proper deposition of their inhaled medication. Authorized through TCFHT Medical Directive #12.

Yours truly,

Compassionate sources of Aerochambers as of Nov 29, 2018:

- 1) Ontario Lung Association will mail an aerochamber device free-of-charge on an individual case-by-case basis if Pt provides a mailing address – Pt can call tel: 1-888-344-5864
- 2) Trudell Medical may also provide aerochambers in small quantities for Respiratory Team clinician teaching purposes