

Asthma Diagnosis & Management Algorithm

FOR PRIMARY CARE

(algorithm abbreviations are listed in the appendix below)

PATIENT PRESENTS WITH ASTHMA SYMPTOMS
(cough, dyspnea, chest tightness, wheezing, sputum production, nocturnal symptoms/awakenings)

OBJECTIVELY CONFIRM DIAGNOSIS

(CTS asthma guidelines cts-sct.ca/guideline-library)

Preschoolers to Children 1-5 years of age (Spirometry not possible) (2)*

Diagnosis of asthma considered in children one to five years with frequent (≥ 8 days/month) asthma-like symptoms or recurrent (≥ 2) exacerbations showing all of the following:

- Airflow Obstruction**
 - Wheezing documented by a trained HCP using stethoscope (preferred)
 - Parents report 'wheezing' (alternative)
- Reversibility of airflow obstruction**
 - Documented response to SABA (+/- oral steroids) by a trained physician or HCP during acute exacerbation (preferred)
 - Parental report of symptomatic response to a 3 month therapeutic trial of medium dose ICS with SABA as needed (alternative)
- No clinical suspicion of alternate diagnosis**

Children ≥ 6 years to 11 years

- Preferred: Spirometry showing reversible airway obstruction**
 - FEV₁/FVC ratio < LLN (approx. < 0.80 - 0.90) based on age, sex, height and ethnicity
 - And $\geq 12\%$ change in FEV₁ post bronchodilator or after course of controller therapy
- Alternative: Improvement in PEF****
 - $\geq 20\%$ post bronchodilator or after course of controller therapy (diurnal variation not recommended)
- Alternative: Positive Challenge Test (if spirometry inconclusive)**
 - Methacholine challenge testing or Exercise challenge

Adults (≥ 12 yrs)

- Preferred: Spirometry showing reversible airway obstruction**
 - FEV₁/FVC ratio < LLN (approx. < 0.75 - 0.80) based on age, sex, height and ethnicity
 - And $\geq 12\%$ and min ≥ 200 mL change in FEV₁ post bronchodilator or after course of controller therapy
- Alternative: Improvement in PEF****
 - 60L/min (min $\geq 20\%$) (post bronchodilator or after course of controller therapy)
 - OR diurnal variation > 8% (based on 2 times/day reading), > 20% (based on multiple daily readings)
- Alternative: Positive Challenge Test (if spirometry inconclusive)**
 - Methacholine challenge testing or Exercise challenge

ASTHMA NOT CONFIRMED

Consider

- Was testing done when patient was not exposed to any triggers or asymptomatic?** (If yes, consider repeat testing when patient exposed/symptomatic or consider methacholine and/or exercise challenge test) or allergy testing
- Differential diagnosis:** examples include COPD, CF, IPF, VCD, GERD, CHF, primary ciliary dyskinesia, infectious/allergic rhinosinusitis, upper airway narrowing, bronchiectasis, pertussis, foreign-body inhalation, aspiration, pneumonia, atelectasis, tuberculosis, eosinophilic esophagitis, immune dysfunction, swallowing problem, pulmonary edema (2)

ASTHMA CONFIRMED

Patient Assessment

- History and risk of exacerbations
- Family history of asthma/allergies
- Smoking history (and exposure to smoke)
- Respiratory medication history (check for β -blocker, NSAID/ASA use, medic alert bracelet, epinephrine auto-injector) and client's drug plan
- History of triggers (skin testing may be indicated)
- Irritant triggers (especially colds in children)
- Relevant co-morbidities (i.e., sinusitis, rhinitis, GERD, obesity)
- Work-related triggers
- Special considerations (i.e., adherence, cultural issues, financial issues, lack of support)

ASTHMA MANAGEMENT

Pharmacological (Baseline Maintenance Therapy)

Based on the latest CTS guidelines - A focused update on the management of very mild and mild asthma
Adjust therapy to achieve and maintain control and prevent future risk:

- All should be on a reliever on demand:** SABA or bud/form***
- Still Uncontrolled (refer to "Review Control" table):** Change to daily ICS + SABA prn or PRN bud/form***
- Still Uncontrolled:**
 - Children (1-5 years and 6-11 years):** increase low dose ICS to medium dose ICS
 - Adults and children ≥ 12 years:** add LABA if on ICS (ideally in the same inhaler device)
- Still Uncontrolled:**
 - Children (1-5 years):** referral to asthma specialist
 - Children (6-11 years):** add LABA or LTRA
 - Adults and children ≥ 12 years:** Add LTRA and/or tiotropium
- Still Uncontrolled:**
 - Consider severe asthma diagnosis and refer to specialist

Pharmacological (Asthma Exacerbation)

CTS recommended controller step-up therapy (2,3,12) when patient has acute loss of control on their baseline maintenance therapy (yellow zone of [Asthma Action Plan](#)).

Children (1-5 years and 6-11 years) Step-up

- If the patient has no baseline maintenance medication:** consider starting regular controller therapy.
- If baseline maintenance medication is ICS:** add prednisone 1mg/kg x 3-5 days.

Adults (≥ 12 years) Step-up

- If the patient has no baseline maintenance medication:** consider starting regular controller therapy.
- If baseline maintenance medication is ICS: 1st choice:** Trial ≥ 4 -fold \uparrow in ICS (dosing should not exceed manufacturer's recommended maximum daily dose) for 7-14 days. **2nd choice:** Add prednisone 30-50mg for for at least 5 days.
- If baseline maintenance medication is ICS/LABA (bud/form): 1st choice:** \uparrow to max 4 puffs BID for 7-14 days (Max 8 puffs/day). **2nd choice:** Add prednisone 30-50mg for at least 5 days.
- If baseline maintenance medication is ICS/LABA (FP/SALM or MOM/FORM): 1st choice:** Trial ≥ 4 -fold \uparrow in ICS for 7-14 days. **2nd choice:** Add prednisone 30-50mg for at least 5 days.

Note: Post-exacerbation, diligent follow-up should be done to consider stepping down add-on therapy.

Non-Pharmacological (Education)

- Refer to Certified Asthma/Respiratory Educator, if available
 - Discuss asthma pathophysiology, triggers, comorbidities, inhaler technique, reliever vs. controller, medication safety and side effects, adherence, asthma control
 - Smoking cessation counselling when appropriate
 - Create and review written [Asthma Action Plan](#) (instruction for when there is loss of control)
- Note:** If, after reviewing control, it is determined that the patient is uncontrolled on their baseline maintenance therapy, they are in the yellow zone and the CTS recommended controller step-up therapy should be started
- Prevention of exacerbations:** environmental control (i.e. work, home and school environment), tobacco smoke exposure, environmental triggers, irritant triggers, vaccinations, immunotherapy

Review Control

(Reassess at each visit)[†]

Control indicates all of the following criteria are met:

| | |
|--|--|
| Daytime symptoms (dyspnea, cough, wheeze, chest tightness): ≤ 2 days/week | Need for a reliever: ≤ 2 doses/week (pre-exercise doses should be included in weekly limit) |
| Night time symptoms: < 1 night/week and mild | FEV ₁ or PEF: $\geq 90\%$ of personal best |
| Physical activity: normal | Diurnal variability in PEF: < 10%-15% over a 2 week period (readings morning and night) |
| Asthma exacerbations within the last 12 months: mild, infrequent | Formula = $\frac{\text{Highest PEF} - \text{Lowest PEF}}{\text{Highest PEF}} \times 100$ |
| No absence from school/work due to asthma | Sputum eosinophils [‡] : < 2-3% |

Resources: Asthma Action Plan hcp.lunghealth.ca/clinical-tools

[†] Consider as an additional measure of asthma control in individuals ≥ 18 years with moderate to severe asthma who are assessed in specialized centres.

[‡] Preschoolers with ≥ 8 days/month of asthma symptoms or ≥ 2 severe exacerbations should be considered poorly controlled and should have ICS therapy initiated.

CONSIDER REFERRAL TO A SPECIALIST

- Not certain of diagnosis
- Sputum eosinophil monitoring
- Difficulty in determining baseline medication regimen
- Severe asthma requiring alternate therapy
- Recent ER/hospital admission or recurring exacerbations [≥ 2 for preschoolers (2)]

FOLLOW-UP

- Regularly reassess control (every 3-4 months for preschoolers²), inhaler technique, adherence, triggers, comorbidities, spirometry or PEF****
- Review medication regime and consider modifying maintenance therapy (consider stepping down add-on therapy or decrease ICS dose if asthma is well-controlled between visits)
- Review/Revise written [Asthma Action Plan](#)

APPENDIX:

ACRONYMS:
BUD: Budesonide
COPD: Chronic Obstructive Pulmonary Disease
CF: Cystic Fibrosis
CHF: Congestive Heart Failure
ER: Emergency room
FORM: Formoterol
GERD: Gastroesophageal Reflux Disorder
HCP: Health care professional
ICS: Inhaled Corticosteroid
IPF: Idiopathic Pulmonary Fibrosis
LABA: Long-Acting Beta2-Agonist

LTRA: Leukotriene-Receptor Antagonist
MOM: Mometasone
PEF: Peak Expiratory Flow
SABA: Short Acting Beta2-Agonist
SALM: Salmeterol
VCD: Vocal Cord Dysfunction

DEFINITIONS:
FEV₁: volume of air expired in the first second of the FVC (used to assess flow resistive properties of airway)
FVC: Maximum volume of air that can be expired forcefully and completely after complete inspiration
FEV₁/FVC: used for the assessment of airflow obstruction
LLN (Lower Limit of Normal): the value below the 5th percentile for the normal population (8)

[†] In individuals ≥ 15 years of age with a history of severe acute loss of asthma control in the preceding year.

* CTS guidelines for Preschoolers (2): Please refer to latest CTS guidelines for detailed diagnosis algorithm for preschoolers

**Spirometry is the preferred method of documenting airflow limitation (12)

***ICS/LABA, in a formulation approved for use as a reliever for 12 years of age and older (bud/form), may be considered as a reliever in individuals with mod. asthma and poor control despite fixed-dose maintenance ICS/LABA combination or for exacerbation prone individuals with uncontrolled asthma despite high maintenance dose of ICS or ICS/LABA

**** Spirometry is the preferred objective measure to help objectively assess asthma control (9).

This document has been modified with permission by the Lung Health Foundation from the original version developed by Dr Itamar Tamari, Primary Care Asthma Program (PCAP). The content of this algorithm is based on current available evidence and has been reviewed by medical experts. It is provided for information purposes only. It is not intended to be a substitute for sound clinical judgement.