

Asthma

Care in the Community for People
Under 16 Years of Age



About This Quality Standard

The following quality standard addresses the **diagnosis and management of asthma in people under 16 years of age**, with a focus on primary care and community-based settings. A separate quality standard addresses [*Asthma: Care in the Community for People 16 Years of Age and Older*](#).

What Is a Quality Standard?

Quality standards outline what high-quality care looks like for conditions or processes where there are large variations in how care is delivered, or where there are gaps between the care provided in Ontario and the care patients should receive. They:

- Help patients, families, and caregivers know what to ask for in their care
- Help health care professionals know what care they should be offering, based on evidence and expert consensus
- Help health care organizations measure, assess, and improve their performance in caring for patients

Quality standards are developed by the Quality business unit at Ontario Health, in collaboration with health care professionals, patients, and caregivers across Ontario.

For more information, contact qualitystandards@hqontario.ca.

Values That Are the Foundation of This Quality Standard

This quality standard was created, and should be implemented, according to the [Patient Declaration of Values for Ontario](#). This declaration “is a vision that articulates a path toward patient partnership across the health care system in Ontario. It describes a set of foundational principles that are considered from the perspective of Ontario patients, and serves as a guidance document for those involved in our health care system.”

These values are:

- Respect and dignity
- Empathy and compassion
- Accountability
- Transparency
- Equity and engagement

Health care professionals should acknowledge and work towards addressing the historical and present-day impacts of colonization in the context of the lives of Indigenous Peoples throughout Canada. This work involves being sensitive to the impacts of intergenerational and present-day traumas and the physical, mental, emotional, and social harms experienced by Indigenous people, families, and communities. This quality standard uses existing clinical practice guideline sources developed by groups that may not include culturally relevant care or acknowledge traditional Indigenous beliefs, practices, and models of care.

Quality Statements to Improve Care

These quality statements describe what high-quality care looks like for children and adolescents with asthma.

Quality Statement 1: Diagnosis

Children 6 years of age and older and adolescents clinically suspected of having asthma complete spirometry to demonstrate reversible airflow obstruction and, if negative, other lung function testing to confirm the diagnosis of asthma, as soon as possible. Children 1 to 5 years of age are diagnosed with asthma after documentation of signs or symptoms of airflow obstruction, reversibility of symptoms with asthma medications, and no clinical suspicion of an alternative diagnosis.

Quality Statement 2: Asthma Control

Children and adolescents with asthma have a structured assessment at least annually to determine their level of asthma control and reasons for poor control.

Quality Statement 3: Asthma Medication

Children and adolescents with asthma receive appropriate medication and devices based on their age and current level of asthma control, including early initiation of regular inhaled anti-inflammatory therapy.

Quality Statement 4: Self-Management Education and Asthma Action Plan

Children and adolescents with asthma and their caregivers receive self-management education and a written personalized asthma action plan that is reviewed regularly with a health care professional.

Quality Statement 5: Referral to Specialized Pediatric Asthma Care

Children and adolescents with asthma with appropriate indications are referred to specialized pediatric asthma care.

Quality Statement 6: Follow-Up After Discharge

Children and adolescents who have had an emergency department visit or been hospitalized for an asthma exacerbation have a follow-up assessment within 2 to 7 days after discharge.

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Scope of This Quality Standard

This quality standard addresses the diagnosis and management of asthma in children and adolescents under 16 years of age, with a focus on primary care and community-based settings. It addresses referral to specialized pediatric asthma care for children and adolescents who have indications characterizing severe asthma, but it does not address the management of severe asthma in specialized care, acute asthma exacerbations, or care provided during emergency department visits or hospitalizations.

The [Clinical Handbook for Paediatric Asthma](#) by the Provincial Council for Maternal and Child Health and Ontario's Ministry of Health addresses the emergency department and inpatient episodes of care.¹

A separate quality standard addresses [Asthma: Care in the Community for People 16 Years of Age and Older](#).

Why This Quality Standard Is Needed

Asthma is a chronic inflammatory disorder of the airways in the lungs. In people with asthma, the airways become inflamed and obstructed, usually because they are hyperresponsive to internal or external factors commonly called triggers (e.g., allergens, irritants).^{2,3} People with asthma typically experience difficulty breathing, shortness of breath, chest tightness, wheezing (a whistling sound produced in the airways during breathing), sputum (mucus) production, and/or cough. These symptoms can be episodic or persistent. As with many chronic conditions, the cause of asthma is not known with certainty, but it is thought to develop from interactions between genetic and environmental factors such as a family history of asthma and exposure to smoke, air pollution, or occupational vapours or particles.^{4,5}

Asthma is one of the most common chronic diseases of childhood in Canada, with about 15% of children and adolescents (up to 19 years of age) living with the disease in 2013/14.⁶ In Ontario, it is estimated that one in four people under 19 years of age were living with asthma in 2015,⁷ and half of all new asthma cases occur in people under the age of 15.⁸ In recent years, the incidence of asthma in Ontario (the number of people newly diagnosed each year) has been decreasing across all age groups; it dropped from nearly 10 new cases per 1,000 people in 1996/97 to 2.45 per 1,000 in 2016/17. At the same time, because people are generally living longer, the prevalence of asthma in Ontario (the total number of people living with the disease) continued to increase for all ages; it rose from around 90 per 1,000 people in 1996/97 to 155 per 1,000 in 2016/17.⁹ Both incidence and prevalence vary substantially across the province. In 2016/17, both were highest in the Central West region and lowest in the Waterloo Wellington region.⁹

Although asthma has no cure, most people can control their asthma by using appropriate controller medications, such as inhaled corticosteroids, and reducing their exposure to triggers. The primary goal of asthma care is to help people achieve and maintain asthma control, which reduces the risk of having an exacerbation (a flare-up or asthma attack) and improves their overall health and quality of life.³ Current guidelines stress that, with appropriate management in primary care, most people with asthma should be able to live symptom free. Exacerbations requiring oral corticosteroids, an emergency department visit, or hospitalization should usually be considered a failure of asthma management. Every asthma death should be considered preventable.¹⁰⁻¹²

However, it is estimated that 50% of people with asthma in Canada have uncontrolled disease, resulting in unnecessary reductions in quality of life and avoidable illness and deaths.^{13,14} In Ontario, about 85 people die from asthma each year (1,272 deaths from 2000 to 2015¹⁵). The age- and sex-adjusted all-cause mortality rate for people living with asthma remains higher than for the population overall (in 2008, there were 852 deaths per 100,000 people with asthma versus 640 per 100,000 in the general population^{16,17}).

Uncontrolled asthma also contributes to high health care use and costs. Overall use of health services for people with asthma has been shown to be much higher for people with uncontrolled asthma¹⁸ and particularly high in the year prior to asthma-related deaths.^{2,19} In Canada, asthma is the most common cause of hospital admission for children, and—based on measures of school absences, emergency department visits, and hospitalizations—one of the leading causes of morbidity from chronic disease among children and adolescents.^{2,20} Age is a significant factor: in Ontario, rates of asthma-related hospitalization, emergency department visits, and Ontario Health Insurance Plan (OHIP) claims are much higher among very young children (under 5 years of age) and young children (5 to 9 years of age) compared to older children and adolescents.²¹ Among people 19 years of age and under in Ontario in 2016/17, there were 14,015 asthma-specific emergency department visits and 4,215 asthma-specific hospitalizations.²¹

Asthma is also associated with substantial indirect costs to society, such as absenteeism from school and work.⁵ People affected by asthma often have a lower quality of life compared to the general population, including lower productivity at work among caregivers of children with asthma.⁶ The economic burden of asthma in Ontario (direct health care costs plus indirect social costs) was estimated at \$1.8 billion in 2011.⁸

These data highlight opportunities for improving the management of asthma. For example, the higher rates of hospitalization among the youngest children (under 5 years of age) are related to difficulties diagnosing and treating asthma in this age group.^{6,22} But these hospitalizations are considered largely preventable through improvements in the diagnosis and management of asthma in primary and

community-based care settings. This standard focuses on helping clinicians diagnose asthma appropriately, recognize and address uncontrolled asthma, escalate and taper medication optimally, empower children and adolescents with asthma and their caregivers to self-manage using an asthma action plan, and support safe, effective transitions in care. Improving the quality of asthma care can help children and adolescents better control their disease, preventing acute exacerbations, emergency department visits, hospital admissions, and deaths.

How to Use This Quality Standard

Quality standards inform patients, clinicians, and organizations about what high-quality care looks like for health conditions or processes deemed a priority for quality improvement in Ontario. They are based on the best evidence.

Guidance on how to use quality standards and their associated resources is included below.

For Patients

This quality standard consists of quality statements. These describe what high-quality care looks like for children and adolescents with asthma.

Within each quality statement, we've included information on what these statements mean for you, as a patient.

In addition, you may want to download the accompanying [patient guide](#) on asthma in children and teenagers, to help you and your family have informed conversations with your health care providers. Inside, you will find questions you may want to ask as you work together to make a plan for your care.

For Clinicians and Organizations

The quality statements within this quality standard describe what high-quality care looks like for children and adolescents with asthma.

They are based on the best evidence and designed to help you know what to do to reduce gaps and variations in care.

Many clinicians and organizations are already providing high-quality evidence-based care. However, there may be elements of your care that can be improved. This quality standard can serve as a resource to help you prioritize and measure improvement efforts.

Tools and resources to support you in your quality improvement efforts accompany each quality standard. These resources include indicators and their definitions (Appendix 1) to help you assess the quality of care you are delivering and identify gaps in care and areas for improvement. While it is not mandatory to use or collect data when using a quality standard to improve care, measurement is key to quality improvement.

There are also a number of resources online to help you, including:

- Our [patient guide](#) on asthma in children and teenagers, which you can share with patients and families to help them have conversations with you and their other health care providers. Please make the patient guide available where you provide care
- Our [measurement resources](#), which include our data tables to help you identify gaps in care and inform your resource planning and improvement efforts; our measurement guide of technical specifications for the indicators in this standard; and our “case for improvement” slide deck to help you to share why this standard was created and the data behind it
- Our [Getting Started Guide](#), which includes links to templates and tools to help you put quality standards into practice. This guide shows you how to plan for, implement, and sustain changes in your practice
- [Quorum](#), an online community dedicated to improving the quality of care across Ontario. This is a place where health care providers can share information, inform, and support each other, and it includes tools and resources to help you implement the quality statements within each standard
- [Quality Improvement Plans](#), which can help your organization outline how it will improve the quality of care provided to your patients, residents, or clients in the coming year

How the Health Care System Can Support Implementation

As you work to implement this quality standard, there may be times when you find it challenging to provide the care outlined due to system-level barriers or gaps. These challenges have been identified and documented as part of the development of the standard, which included extensive consultation with health care professionals and lived experience advisors and careful review of available evidence and existing programs. Many of the levers for system change fall within the purview of Ontario Health, and as such we will continue to work to address these barriers to support the

implementation of quality standards. We will also engage and support other provincial partners, including the Ministry of Health or other relevant ministries, on policy-level initiatives to help bridge system-level gaps.

In the meantime, there are many actions you can take on your own, so please read the standard and act where you can.

How to Measure Overall Success

The Asthma Quality Standards Advisory Committee identified some overarching goals for this quality standard. These goals were mapped to indicators that can be used to monitor the progress being made to improve care for children and adolescents with asthma in Ontario. Some indicators are provincially measurable, while some can be measured using only locally sourced data.

Collecting and using data associated with this quality standard is optional. However, data will help you assess the quality of care you are delivering and the effectiveness of your quality improvement efforts.

We realize this standard includes a lengthy list of indicators. We've given you this list so you don't have to create your own quality improvement indicators. We recommend you identify areas to focus on in the quality standard and then use one or more of the associated indicators to guide and evaluate your quality improvement efforts.

See Appendix 1 for additional details on how to measure these indicators and our [measurement guide](#) for more information and support

Indicators That Can Be Measured Using Provincial Data

- Percentage of children and adolescents 6 to 16 years of age with incident asthma whose diagnosis is confirmed with lung function testing
- Percentage of children and adolescents 6 to 16 years of age with asthma who had a lung function test in the previous 12 months
- Percentage of children and adolescents with asthma who visited the emergency department for an asthma-specific reason in the previous 12 months
- Percentage of children and adolescents with asthma who were hospitalized for an asthma-specific reason in the previous 12 months

Indicators That Can Be Measured Using Only Local Data

- Percentage of young children 1 to 5 years of age clinically suspected of having asthma whose diagnosis of asthma is confirmed by documented reversibility of signs or symptoms with medication
- Percentage of children and adolescents with asthma who had a structured assessment in the previous 6 months
- Percentage of children and adolescents with asthma with one or more appropriate indications who are prescribed regular (daily) inhaled anti-inflammatory therapy
- Average number of asthma symptom-free days in the previous 4 weeks among children and adolescents with asthma
- Average number of days missed from school or work due to asthma in the previous 4 weeks

Quality Statements to Improve Care: The Details

1

Diagnosis

Children 6 years of age and older and adolescents clinically suspected of having asthma complete spirometry to demonstrate reversible airflow obstruction and, if negative, other lung function testing to confirm the diagnosis of asthma, as soon as possible. Children 1 to 5 years of age are diagnosed with asthma after documentation of signs or symptoms of airflow obstruction, reversibility of symptoms with asthma medications, and no clinical suspicion of an alternative diagnosis.

Sources: British Thoracic Society and Scottish Intercollegiate Guidelines Network, 2019⁹ | Canadian Thoracic Society, 2010,¹⁰ 2015²³ | Global Initiative for Asthma, 2019² | National Institute for Health and Care Excellence, 2017²⁴ | Registered Nurses' Association of Ontario, 2004⁴

Definitions

Clinically suspected of having asthma: Asthma is clinically suspected in the presence of signs or symptoms of variable airflow obstruction and in the absence of an alternative diagnosis (see definitions below). The presence of other atopic conditions (e.g., eczema, food allergy, allergic rhinitis) in the child or family members should also be assessed when asthma is suspected.

Spirometry: This is the preferred lung function test to diagnose asthma by assessing for airflow obstruction and its reversibility.¹⁰ The test measures airflow as the ratio of forced expiratory volume in 1 second (FEV₁), which is the volume of air exhaled during the first second of the forced vital capacity (FVC) measurement, and FVC, which is the volume of air forcibly exhaled from the point of maximal inspiration. Results are presented as a percentage of the predicted value or as an absolute value to be compared with the lower limit of normal (LLN) of the FEV₁/FVC ratio. Reference values to interpret the test are generally based on age, sex, and height and can include race.

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Diagnosis

Spirometry should be performed before and after the administration of an inhaled bronchodilator. A pre-bronchodilator FEV₁/FVC result less than the LLN (approximately < 0.8–0.9) demonstrates airflow obstruction. A post-bronchodilator increase in FEV₁ of at least 12% indicates that airflow obstruction is reversible and supports the diagnosis of asthma. A negative spirometry test does not rule out asthma, especially when asthma is controlled, because of the low sensitivity of the test. In such cases, additional lung function testing is required to confirm the diagnosis of asthma. In situations where people cannot perform spirometry, a referral to specialized asthma care may be considered (see quality statement 5).

Other lung function testing: In Ontario, the following tests are recommended to confirm a diagnosis of asthma¹⁰:

- **Challenge tests** are an alternative method to diagnose asthma when spirometry is negative. They assess for airway hypersensitivity and hyperresponsiveness. Challenge tests are also known as bronchial provocation tests, such as the methacholine challenge test. Methacholine challenge tests should not be performed within several weeks of an active infection. Bronchodilators should be withheld prior to testing in accordance with their duration of action. If safe to do so, inhaled corticosteroid (ICS) treatment should be withheld for 4 to 8 weeks prior to testing to remove the anti-inflammatory effect on the airways²⁵
- **Peak expiratory flow (PEF) measurement** assesses the presence of airflow variation over the span of 2 weeks. A variation in PEF of greater than 20% supports a diagnosis of asthma in children and adolescents older than 12 years of age

The measurement of airway inflammation, such as by measuring fractional exhaled nitric oxide levels (FeNO), is not yet widely available in Ontario, but there is emerging evidence for its utility in diagnosing asthma.²⁴

As soon as possible: Spirometry, followed by other lung function testing if spirometry is negative or not possible, should be performed to confirm the diagnosis of asthma as soon as possible and within at most 3 months of a person seeking care for their respiratory symptoms. A trial of medication may be considered if testing cannot be reliably or expediently performed, but confirmatory testing should be completed, regardless of the outcome of the therapeutic trial.¹⁰ Every attempt should be made to ensure the asthma diagnosis can be confirmed with lung

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Diagnosis

function testing, especially if any changes in the person's condition suggest they may be able to undergo testing. This includes the re-evaluation of an adolescent diagnosed with asthma in childhood without objective measures.

Signs or symptoms of airflow obstruction: These include shortness of breath, chest tightness, wheezing, or cough. The presence of respiratory signs and symptoms should be assessed through a structured clinical history and physical examination, then documented in the medical record.

Respiratory symptoms characteristic of asthma often^{2,26}:

- Include more than one symptom (i.e., shortness of breath, chest tightness, wheezing, cough)
- Vary in intensity or over time (e.g., worse at night and/or in the early morning)
- Occur frequently (≥ 2 days/week or ≥ 8 days/month)
- Are caused by allergens (e.g., dust mites, pet dander, cockroaches, pollen, mould), irritants (e.g., infections, smoke, fumes, chemicals, exercise, extreme air temperatures, thunderstorms), or other triggers (e.g., rhinitis, sinusitis, gastroesophageal reflux, food and drug reactions, laughter, hormonal changes during adolescence)

Reversibility of symptoms with asthma medications: A diagnosis of asthma in children and adolescents is best supported by the evidence of reversibility of airflow obstruction using pre- and post-bronchodilator spirometry in those who can perform the test. Children 1 to 5 years of age often cannot undergo spirometry, and in this age group, reversibility of symptoms can be directly observed and documented by a physician or other trained health care professional. A clinical diagnosis of asthma can be confirmed based on an improvement with asthma medications and no clinical suspicion of an alternative diagnosis (see definition below). Reversibility of symptoms can be observed in children with recurrent (≥ 2) episodes of worsening symptoms with asthma-like signs, based on the following:

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Diagnosis

- **Wheezing on presentation:** A direct observation of improvement with inhaled bronchodilator (with or without oral corticosteroids) is the preferred method to confirm the diagnosis
- **No wheezing on presentation, with frequent symptoms or any moderate or severe worsening:** Consider a 3-month trial of treatment with a medium daily dose of an ICS with, as needed, a short-acting β 2-agonist (SABA). Clear, consistent improvement in the frequency and severity of symptoms and/or exacerbations is the alternative method to confirm the diagnosis
- **No wheezing on presentation, with infrequent symptoms and mild exacerbations:** Monitor and reassess when the person is symptomatic. Alternatively, a trial of treatment with as-needed SABA is suggested, and a convincing parental report of a rapid and repeatedly observed response to SABA can be used as a weaker diagnostic method

Alternative diagnosis: Includes, but is not limited to, the following:

- Airway abnormalities (e.g., tracheomalacia, bronchomalacia)
- Congenital cardiac conditions (e.g., congenital heart disease)
- Conditions characterized by breathing difficulties (e.g., shortness of breath, hyperventilation, anxiety, shortness of breath on exertion due to poor cardiopulmonary fitness)
- Congenital lung conditions (e.g., cystic fibrosis, primary ciliary dyskinesia)
- Digestive disorders (e.g., gastroesophageal reflux, eosinophilic gastrointestinal disease)
- Infections (e.g., bacterial pneumonia, pertussis, tuberculosis, immune dysfunction)
- Obstructive lung disease (e.g., bronchiectasis)
- Upper respiratory tract infections (e.g., recurrent colds and coughs, rhinovirus)
- Vocal cord dysfunction (e.g., paroxysmal vocal cord function)

An alternative diagnosis and referral to a specialist (see quality statement 5) should be considered in children and adolescents if they have symptoms suggestive of asthma but normal spirometry or inability to perform lung function testing.

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Diagnosis

Rationale

In Ontario, spirometry and other lung function testing to diagnose asthma is increasing but not yet routine. According to available administrative health data, about half of people receive lung function testing to confirm their diagnosis within 3½ years of starting asthma care.²⁷ Most children 6 years of age and older are able to undergo spirometry (the preferred lung function test to diagnose asthma). Every attempt should be made to confirm the diagnosis of asthma with lung function testing, especially if any changes in the child's condition suggest they may be able to undergo testing.

Often, asthma is diagnosed based on symptoms and history, without spirometry or other lung function testing.^{14,16} There is a risk of misdiagnosis when reversible airflow obstruction is not confirmed with lung function testing.^{14,16} Asthma is commonly misdiagnosed in adolescents presenting with exercise-related symptoms caused by other diseases associated with breathing difficulties or cough.²⁶ Children and adolescents whose asthma diagnosis is not supported by lung function testing are less likely to receive appropriate medication, and they can be at higher risk of an asthma exacerbation if their asthma is not treated correctly.³

In children 1 to 5 years of age with recurrent asthma-like symptoms or exacerbations, even if triggered by viral infections, the diagnosis of asthma should be considered.²³ Among these children, diagnosing asthma can be difficult because they are often unable to perform lung function testing and because episodic respiratory symptoms (i.e., wheezing and cough) related to other respiratory diseases are common in this age group.^{6,26} The diagnosis of asthma in children in this age group should be based on documentation of observed signs and/or symptoms of airway obstruction and a consistent clinical response to asthma medications suggesting a reversibility of airflow obstruction, in the absence of clinical suspicion of an alternative diagnosis.^{3,23}

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Diagnosis

What This Quality Statement Means

For Caregivers of Children and Adolescents Suspected of Having Asthma

If your child is 6 years of age or older and is short of breath, has a tight feeling in their chest, or is wheezing or coughing, your child's health care professional should make sure they have lung function testing before diagnosing your child with asthma. Since you might have to wait a while for these tests, your child may need to start taking medication right away to help them breathe. Once your child's test results are available, their family doctor or nurse practitioner will review the results with you.

If your child is younger than 6 years old, they may not be able to do the lung function tests. To find out if they have asthma, your child's health care professional will:

- Check their breathing and symptoms
- Prescribe asthma medication to see if it helps
- Check to see if something other than asthma is causing their symptoms

For Clinicians

Administer or order spirometry for children and adolescents 6 year of age and older who are clinically suspected of having asthma to confirm a diagnosis of asthma. Given the low sensitivity of spirometry for the diagnosis of asthma, consider the need for additional lung function testing such as methacholine challenge testing if spirometry is inconclusive. Testing should occur as soon as possible and ideally be completed within at most 3 months of a person seeking care for their respiratory symptoms. Once results are available, review the results with patients and their caregivers.

QUALITY INDICATORS: HOW TO MEASURE IMPROVEMENT FOR THIS STATEMENT

- Percentage of children and adolescents 6 to 16 years of age clinically suspected of having asthma who complete lung function testing within 3 months of seeking care for their respiratory symptoms
- Percentage of children 1 to 5 years of age clinically suspected of having asthma whose diagnosis of asthma is confirmed after the documentation of signs or symptoms of airflow obstruction and reversibility of those signs or symptoms with asthma medication
- Local availability of lung function testing

Measurement details for these indicators, as well as indicators to measure overarching goals for the entire quality standard, are presented in Appendix 1.

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Diagnosis

Longer wait times should not deter clinicians from ordering and seeking appropriate lung function testing before confirming a diagnosis of asthma. Document signs and symptoms of variable airflow obstruction obtained from clinical history, physical examinations, and objective measures as the basis for diagnosing asthma.^{19,24}

Typically, children under the age of 6 years are unable to perform lung function testing accurately.⁴ To confirm a diagnosis of asthma in children 1 to 5 years of age who are unable to undergo spirometry—and for whom you have no clinical suspicion of another diagnosis—observe and document their signs and/or symptoms of airflow obstruction (i.e., shortness of breath, chest tightness, wheezing, and/or cough) and improvements with asthma medications during two or more episodes of worsening symptoms with asthma-like signs.

For Health Services Planners

Ensure lung function testing is locally available and accessible for children and adolescents 6 to 16 years of age. Ensure health care professionals in primary care and community-based settings are aware of the local availability of lung function testing²⁴ and can order appropriate lung function testing for children and adolescents clinically suspected of having asthma, including spirometry and challenge tests, without first referring to specialized asthma care. Ensure spirometry is performed within a quality assurance program by trained health care professionals.^{5,19} Ensure primary care physicians and nurse practitioners have the knowledge and skills to clinically diagnose asthma in children 1 to 5 years of age.

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Asthma Control

Children and adolescents with asthma have a structured assessment at least annually to determine their level of asthma control and reasons for poor control.

Sources: British Thoracic Society and Scottish Intercollegiate Guidelines Network, 2019⁹ | Canadian Thoracic Society, 2010,¹⁰ 2015,²³ 2017¹² | Global Initiative for Asthma, 2019² | National Institute for Health and Care Excellence, 2017²⁴ | Registered Nurses' Association of Ontario, 2004⁴

Definitions

Structured assessment to determine level of asthma control: Asthma control parameters for children and adolescents include measures of symptoms and lung function.

Symptom control

Symptom control over the previous 4 weeks should be assessed at least annually using validated symptom control questionnaires and tools (e.g., the Asthma Quiz for Kidz,²⁸ the Asthma Control Test [ACT],² the Asthma Control Questionnaire [ACQ]²⁹) to evaluate the following criteria²³:

- Daytime symptoms (target < 4 days/week for children 6 years of age and older; < 2 days/week for children under 6)
- Nighttime symptoms (target < 1 night/week)
- Frequency of need for rescue or reliever medication (target < 4 doses/week for children 6 years of age and older; < 2 days/week for children under 6)
- Physical activity (target normal)
- Absence from work or school due to asthma (target none)

Frequency and severity of exacerbations (target infrequent and mild) should be assessed since the last health care encounter in which they were assessed.³⁰

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Asthma Control

Lung function

For children 6 years of age and older, lung function should be assessed with spirometry and other lung function testing as needed (1) at the start of treatment; (2) after 3 to 6 months of treatment to identify and document response to treatment and the person's personal best forced expiratory volume in 1 second (FEV₁); and (3) annually for the ongoing assessment of asthma control and risk of exacerbation.² It is very common to observe normal lung function in children between exacerbations. Those who have good symptom control with persistent abnormal lung function should be referred to specialized pediatric asthma care.³¹ The following measures of lung function should be assessed:

- FEV₁ (target \geq 90% of personal best)
- If spirometry is unavailable, peak expiratory flow (PEF) diurnal variation can be used for children and adolescents 12 years of age and older (target $<$ 10%–15%)¹⁰

At least annually: Symptom control and any reasons for poor control should be assessed at least annually using a structured assessment, and in some cases more frequently: (1) at every asthma-related health care encounter; (2) after a severe exacerbation of symptoms; (3) when there is a change in treatment; (4) when a pattern of short-acting β 2-agonist (SABA) overuse is detected within a year (defined as \geq 3 SABA inhalers used in \leq 1 year)^{32,33}; (5) prior to or within a season when the patient's asthma would be most symptomatic (i.e., when they are likely to face increased exposure to viral infections and allergens); and (6) when there are complex health needs. In some cases, a phone or virtual health care encounter may be sufficient to assess asthma symptom control. Lung function should be assessed at least annually as described above.

Reasons for poor control: Health care professionals should explore the following reasons for poor control, as these factors can increase the risk of more severe asthma exacerbations and contribute to poor quality of life:

- Inadequate controller medication adherence (e.g., inhaled corticosteroid [ICS] underuse due to side effects, attitudes and goals for asthma treatment, affordability)
- Incorrect inhaler technique

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Asthma Control

- Exposure to allergic triggers and irritants (e.g., colds, cigarette smoke, electronic cigarette vapours, inhaled cannabis, perfumes/scents, chemicals)
- Symptomatic comorbidities (e.g., rhinitis, chronic rhinosinusitis, gastroesophageal reflux, obesity, obstructive sleep apnea, depression, anxiety)^{2,12}
- Impact of social determinants of health and the challenges with accessing supports to address these impacts (e.g., education, employment, ethnicity and culture, family and social support, housing, geographic location, income, transportation, and access to care)

Rationale

Asthma control should be assessed at least annually in primary care.^{10,19,23} Assessing control is an important gap in care for people with asthma. A longitudinal audit of primary care practice in Ontario in 2012 and 2013 found that only 15% of patients (16 years of age or older) had had an assessment to determine their level of asthma control at least once during the study period.³⁴ Health care professionals assessed asthma symptom control with at least one question from guideline recommendations in only 6% of visits (261 of 4,122 visits). Among these visits, they asked 1.6 of a recommended five questions, on average. They asked about daytime symptoms in 61% of visits with any asthma control assessment; frequency of need for reliever medication (45%); nighttime symptoms (27%); physical activity limitations (23%); and school or work absenteeism (4%). All five questions were asked in only 1.5% (n = 4) of these visits.³⁴

In addition, there is a widening gap between current practice and the recommended annual assessment of lung function (see definition in this statement). The percentage of people with asthma (6 years of age and older) who received asthma-related care and had lung function testing within that same year decreased by more than half in Ontario, from 14% in 1996/97 to 7% in 2016/17.²⁷

Besides high rates of emergency department care and hospitalization, uncontrolled asthma in childhood is also associated with decreased cardiovascular fitness, missed school days, and lower health-related quality of life.⁶ However, many reasons for poor control are modifiable, as uncontrolled asthma is most commonly associated with nonadherence to medication, incorrect inhaler technique, lack of an objective diagnosis (see quality statement 1), and poor management of comorbidities.¹² These and other reasons for poor control can be identified and addressed to help children and adolescents achieve and maintain asthma control. Children and adolescents identified as potentially

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Asthma Control

having uncontrolled asthma should also have their symptom severity accurately assessed, followed by the appropriate referral (e.g., to urgent care, a follow-up appointment, or specialized asthma care, including allergy testing [see quality statement 5]).^{4,23}

What This Quality Statement Means

For Caregivers of Children and Adolescents With Asthma

A health care professional should see your child at least annually to check on their asthma. If your child has a severe flare-up or a change in their medication, their health care professional may need to see them more often. At these appointments, they should explain how your child can expect to feel when their asthma is controlled, and they should ask you and your child about:

- Their asthma symptoms and what makes them worse
- Their use of medications
- Anything else that might be affecting how they feel

You can help by keeping track of these details between appointments.

For Clinicians

Inform patients they can expect to live symptom free when asthma is controlled. Assess asthma symptom control according to recommended criteria regularly, and at least annually. The structured assessment should determine the person's level of asthma symptom control and any reasons for poor control so they can be addressed before modifying medication (see quality statement 3). Whenever possible, ensure spirometry and other lung function testing as needed are done as described above.

QUALITY INDICATORS: HOW TO MEASURE IMPROVEMENT FOR THIS STATEMENT

- Percentage of children and adolescents with asthma who had a structured assessment in the previous 6 months
- Percentage of children and adolescents 6 to 16 years of age with asthma who completed a lung function test in the previous 12 months

Measurement details for these indicators, as well as indicators to measure overarching goals for the entire quality standard, are presented in Appendix 1.

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Asthma Control

Asthma can occur for the first time in adolescence (commonly around the start of menstruation), or worsen or improve, amidst the rapid physical, emotional, cognitive, and social changes in this period. As a result, close monitoring is necessary so that medication can be adjusted to maintain asthma control at the lowest effective doses.²⁶

For Health Services Planners

Ensure people with asthma are informed that they can expect to live symptom free when their asthma is controlled. Ensure training, systems, processes, and resources are in place in primary care and community-based settings for health care professionals to—at least annually and according to recommended criteria—assess asthma symptom control and reasons for poor control. Ensure the local availability and accessibility of lung function testing to monitor asthma control.

Asthma Medication

Children and adolescents with asthma receive appropriate medication and devices based on their age and current level of asthma control, including early initiation of regular inhaled anti-inflammatory therapy.

Sources: British Thoracic Society and Scottish Intercollegiate Guidelines Network, 2019¹⁹ | Canadian Thoracic Society, 2012,¹¹ 2015,²³ 2017¹² | Global Initiative for Asthma, 2019² | National Institute for Health and Care Excellence, 2017²⁴

Definitions

Appropriate medication and devices: All children and adolescents with a confirmed diagnosis of asthma should be offered medication based on their age and current level of asthma control and the most appropriate inhaler devices and spacer device to meet their needs and developmental level. (A spacer device is a long tube with a valve that can be attached to metered dose inhalers to make it easier to inhale the medication.) Children should be switched to a spacer with a mouth piece as soon as they are developmentally able (e.g., at 4 years of age or older).⁴ Inhaler technique should be assessed (e.g., using the inhaler device assessment tool (IDAT))³⁵ to identify changing needs as children and adolescents grow and develop.⁴

Children and adolescents with one or more criteria of uncontrolled asthma should have their medication escalated to help them gain control only after addressing other reasons for poor control (e.g., by counselling on elimination of tobacco and cannabis smoke exposure, smoking prevention or cessation, and allergen avoidance or immunotherapy [if indicated]). Reasons for poor control include, but are not limited to, symptoms of comorbid conditions, trigger exposures (e.g., colds, allergens, cigarette smoke, electronic cigarette vapours), incorrect inhaler technique, overreliance on rescue or reliever medication with inadequate or intermittent use of controller medication.

Intermittent use of low- or medium-dose inhaled steroids only during virally triggered exacerbations in children and adolescents is not recommended owing to a lack of evidence of this strategy as the best method to maintain asthma control.²³ If asthma remains uncontrolled after escalation to regular (daily) medium-dose inhaled corticosteroids (ICS) for children 1 to 11 years of age, or regular medium-dose ICS/long-acting β_2 -agonist (LABA) or ICS/leukotriene receptor antagonist (LTRA) for

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Asthma Medication

adolescents 12 years of age and older, consultation with or referral to specialized pediatric asthma care should be considered.²³

Once the child or adolescent with asthma has achieved control with at least 3 months of controller medication, medication should be reduced to the lowest effective dose required to maintain asthma control, prevent future exacerbations, and minimize side effects.

Medication should be offered, escalated, and de-escalated as follows:

Children 1 to 5 years of age

Step 1: Children with mild, infrequent symptoms (< 8 days/month) and no or mild exacerbations (i.e., no rescue oral corticosteroids, no emergency department visit or hospitalization, no exacerbations lasting hours to a few days) should be offered an as-needed reliever medication in the form of a short-acting β 2-agonist (SABA)²³

- **Step 2:** Children with persistent symptoms (\geq 8 days/month) or moderate to severe exacerbations (i.e., worsening symptoms while on SABA alone and requiring oral corticosteroids, an emergency department visit or hospitalization) should be offered regular (daily) inhaled anti-inflammatory medication in the form of a low-dose ICS with as-needed SABA reliever medication²³
- **Step 3:** If response is inadequate with daily low-dose ICS, children should be offered a medium-dose ICS with as-needed SABA reliever medication. A referral to specialized pediatric asthma care should be considered if response remains inadequate

Children 6 to 11 years age

Step 1: Children who experience symptoms less than two times per week and have no risk factors for exacerbations may use an as-needed inhaled short-acting reliever medication in the form of a short-acting β 2-agonist (SABA)¹²

- **Step 2:** Children who experience daytime symptoms two or more times per week or meet other criteria for uncontrolled asthma should be offered regular (daily) inhaled anti-inflammatory medication in the form of a low-dose ICS with as-needed SABA reliever medication.¹² Daily use of an oral anti-inflammatory medication in the form of a LTRA with as-needed SABA reliever medication is a less effective second-line step 2 therapy³⁶

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Asthma Medication

- **Step 3:** Children with uncontrolled asthma who are already using daily inhaled anti-inflammatory treatment in the form of a low-dose ICS should be offered a daily medium-dose ICS with as-needed SABA reliever medication.¹² A referral to specialized pediatric asthma care should be considered if response remains inadequate
- **Step 4:** If response is inadequate with daily medium-dose ICS, children should be offered one of two options in (or in consultation with) a specialized pediatric asthma care setting: (1) switch to daily combined inhaled anti-inflammatory and long-acting reliever medications in the form of a medium-dose ICS/LABA; or (2) keep taking a medium-dose ICS and add a daily oral anti-inflammatory medication in the form of a LTRA

Adolescents 12 years of age and older

Step 1: Adolescents who experience symptoms less than two times a week and have no risk factors for exacerbations may use as-needed inhaled short-acting reliever medication in the form of a short-acting β_2 -agonist (SABA).¹² As-needed use of a combined inhaled anti-inflammatory and fast/long-acting reliever medication in the form of low-dose ICS-formoterol may be an alternative step 1 therapy³⁷⁻⁴⁰

- **Step 2:** Adolescents who experience symptoms two or more times per week or meet other criteria for uncontrolled asthma should be offered regular (daily) inhaled anti-inflammatory medication in the form of a low-dose ICS with as-needed SABA reliever medication.^{12,19,24,41} As-needed use of a combined inhaled anti-inflammatory and fast/long-acting reliever medication in the form of low-dose ICS-formoterol may be an alternative step 2 therapy.³⁷⁻⁴⁰ Daily use of an oral anti-inflammatory medication in the form of an LTRA with as-needed SABA reliever medication is a second-line step 2 therapy¹²
- **Step 3:** Adolescents who have uncontrolled asthma while using a daily inhaled anti-inflammatory medication in the form of a low-dose ICS should be offered daily combined inhaled anti-inflammatory and long-acting reliever medication at a low dose (i.e., an ICS/LABA) with as-needed SABA reliever medication. Those who have uncontrolled asthma while using as-needed low-dose ICS-formoterol should similarly be switched to daily use of this medication (with as-needed low-dose ICS-formoterol also used as a reliever medication). Second-line step 3 therapies include continuing to take daily low-dose ICS and adding a daily LTRA, or escalating to a medium-dose ICS¹²

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Asthma Medication

- **Step 4:** Adolescents who have uncontrolled asthma while using a daily combined inhaled anti-inflammatory and long-acting reliever medication in the form of low-dose ICS/LABA should be offered daily medium-dose ICS/LABA (with as-needed SABA or medium-dose ICS-formoterol used as a reliever medication). Second-line step 4 therapies include continuing to take daily low-dose ICS/LABA and adding a daily LTRA or continuing to take a daily low-dose ICS/LABA and adding daily tiotropium¹²
- **Step 5:** Adolescents who have uncontrolled asthma while using daily step 4 medications should be offered daily high-dose ICS/LABA (with as-needed SABA or high-dose ICS-formoterol used as a reliever medication) and should be referred to specialized pediatric asthma care (see quality statement 5)¹²

Medication de-escalation can be attempted once the child or adolescent with asthma has achieved control for at least 3 to 6 months.

Children and adolescents, including younger children, with clinically suspected asthma that has not yet been confirmed with lung function testing may be prescribed a trial of therapy if testing cannot be reliably or expediently performed, but confirmatory testing should still be completed as soon as possible, regardless of the outcome of the therapeutic trial (see quality statement 1).¹¹

Asthma control: Parameters include measures of symptoms and lung function, as described in quality statement 2.

Rationale

Asthma management aims to control the disease and, by doing so, prevent or minimize the risk of short- and long-term complications and death.¹⁰ Because uncontrolled asthma is most commonly associated with overreliance on rescue or reliever medication and inadequate use of controller medication, care delivery that follows guideline recommendations for medication escalation can help to improve asthma control.

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Asthma Medication

However, appropriate medication as a component of asthma management often depends on other key components of high-quality asthma care, such as regular assessment of asthma control and reasons for poor control (see quality statement 2) and the use of asthma action plans along with asthma education (see quality statement 4).² Therefore, discussions about appropriate medication and devices—between the person with asthma, their caregiver(s), and their health care professional—should promote patient empowerment, shared decision-making, and self-management. This can include discussions of the patient's and their caregivers' preferences, such as goals, beliefs, and concerns about asthma and medications; their preferences for strategies to achieve control and to reduce the risk of asthma exacerbations (while considering individual characteristics or phenotype); and practical issues, such as inhaler technique, controller medication adherence, and the affordability of medications.² Factors that change in importance as children get older may influence the type of medication and inhaler device prescribed; these factors include convenience, affordability, ease of device use, portability, stigma of having asthma, peer influence, and personal or cultural preference for a specific device. Adolescents are at particularly high risk for uncontrolled asthma if they have difficulty accepting the need to take controller medications.⁴

The need for increased knowledge among prescribers about optimal escalation and tapering of asthma medication continues to be an important part of appropriate prescribing. Despite recommendations for the early initiation of inhaled anti-inflammatory therapy and for escalating or tapering the inhaled anti-inflammatory medication based on patients' asthma control level, a longitudinal primary care practice audit in Ontario found large gaps in asthma medication for adults with asthma.³⁴ Similar gaps are likely in the care of children and adolescents with asthma.

What This Quality Statement Means

For Caregivers of Children and Adolescents With Asthma

Most people with asthma can live symptom free by regularly using their controller puffer and by avoiding triggers as much as possible. Your child's health care professional should work with you and your child to decide what asthma medication and devices would work best for your child. They should:

- Explain when your child should use their puffers and show you and your child how to use them
- Ask you or your child to show them how to use their puffers to make sure you and your child are confident using them

There are many different types of asthma medication. If your child continues to have asthma symptoms while on their current medications, talk with their doctor, nurse practitioner, or other health care professional about trying a different dose or a different asthma medication. When you fill prescriptions, the pharmacist will teach you and your child how to use the medication and answer any questions you have. It is important for your child to take their controller medication every day if their doctor or nurse practitioner has prescribed it this way.

Your child should always carry their rescue inhaler with them. Talk to their teachers, other educators, and school or day care staff about your child's asthma and the medication they need.

QUALITY INDICATORS: HOW TO MEASURE IMPROVEMENT FOR THIS STATEMENT

- Percentage of children and adolescents with asthma with one or more appropriate indications who are prescribed regular (daily) inhaled anti-inflammatory therapy
- Percentage of children and adolescents with uncontrolled asthma who have had all their reasons for poor control addressed
- Percentage of children and adolescents with uncontrolled asthma who have their medication escalated after other reasons for poor control have been addressed

Measurement details for these indicators, as well as indicators to measure overarching goals for the entire quality standard, are presented in Appendix 1.

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Asthma Medication

For Clinicians

Prescribe medications based on the person's level of asthma control, and prescribe a spacer if any medications are delivered via metered dose inhaler. Escalate medication according to the steps described in this statement's definitions, only after addressing other reasons for poor control (see quality statement 2).¹² Initiate a low-dose ICS as a regular controller medication for children and adolescents 1 to 16 years of age with a confirmed diagnosis of asthma who experience asthma symptoms two or more times per week or meet other criteria for uncontrolled asthma.¹² For children 12 years of age and older, ICS-formoterol, to be taken as needed, may be prescribed as an alternative for the same indications.

When prescribing or dispensing asthma medication, provide clear instructions about when and how to properly use the medication and its delivery system. Teach proper inhaler technique and use of a spacer device whenever a metered dose inhaler is prescribed, and ask people to demonstrate how they use their inhaler to ensure proper technique. (This patient education technique is called "teach back.")

For Health Services Planners

Ensure training, systems, processes, and resources are in place in primary care and community-based settings for health care professionals to prescribe appropriate medication and devices based on the level of asthma control. Ensure caregivers of children and adolescents with asthma can access and afford the most appropriate medication and devices for their child.

4

Self-Management Education and Asthma Action Plan

Children and adolescents with asthma and their caregivers receive asthma self-management education and a written personalized asthma action plan that is reviewed regularly with a health care professional.

Sources: British Thoracic Society and Scottish Intercollegiate Guidelines Network, 2019¹⁹ | Canadian Thoracic Society, 2010,¹⁰ 2015²³ | Global Initiative for Asthma, 2019² | National Institute for Health and Care Excellence, 2017²⁴ | Registered Nurses' Association of Ontario, 2004⁴

Definitions

Self-management education: This is tailored to the person's learning needs and provided by a trained health care professional. It should include information and support related to the following issues⁵:

- Medication adherence (e.g., side effects, attitudes and goals for asthma treatment, affordability)
- Medication delivery device and inhaler technique
- Identification and avoidance or reduction of exposure to allergic and irritant triggers (e.g., pet dander, mould, colds, smoke, air pollution, extreme air temperatures, chemicals, perfumes/scents)
- Smoking prevention and cessation for the person with asthma and other people in their household (e.g., vaping, tobacco, cannabis)
- Impact of comorbidities on asthma symptoms and importance of management of comorbidities (e.g., rhinitis, chronic rhinosinusitis, gastroesophageal reflux, obesity, obstructive sleep apnea, depression, anxiety)^{2,12}

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Self-Management Education and Asthma Action Plan

- Education for older children and adolescents to take independent responsibility for managing as much of their asthma care as they are able to, and support for caregivers to gradually hand over responsibility for management to their child
- Use of peak flow meters when indicated for children 12 years of age and older

To ensure people are empowered to self-manage their asthma, health care professionals who provide self-management education and supports should consider the social determinants of health and the person's circumstances (e.g., education, employment, ethnicity and culture, family and social support, housing, geographic location, income, transportation, and access to care).

Asthma action plan: A written personalized asthma action plan (sometimes referred to as an AAP) is provided alongside self-management education. It typically uses three "zones" (similar to traffic light colours: green, yellow, and red) to describe the level of asthma control. It is a collaboratively written set of instructions that is explained and provided to the person with asthma and/or their caregiver(s) to assist them with the following:

- How to assess asthma control (self-monitoring)
- How to maintain good control and prevent asthma exacerbations by regularly using controller medication
- How to identify signs, symptoms, and/or peak flow rate indicating uncontrolled asthma
- What to do during periods of uncontrolled asthma, such as adding medications or increasing the dose of medication; how much medication to take and for how long; and when and how to seek help (e.g., when to call their health care professional or go to the hospital)

Reviewed regularly: The written personalized asthma action plan should be reviewed at every asthma-related health care encounter, after a severe exacerbation of symptoms, when there is a change in the person's level of asthma control or a change in treatment, or at least annually.

Health care professional: Many types of health care professionals may be involved in providing and reviewing asthma action plans and providing self-management education. Asthma action

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Self-Management Education and Asthma Action Plan

plans can be provided by primary care providers, such as family doctors or nurse practitioners, or by respirologists, pediatricians, allergists, and other physicians. In addition, nurses, respiratory therapists, pharmacists, and other health care professionals who are certified respiratory educators (CREs) or certified asthma educators (CAEs) can review asthma action plans and provide self-management education.

Rationale

Providing self-management education on inhaler technique, along with written personalized asthma action plans that reinforce understanding of medication and are regularly reviewed by a health care professional, can significantly improve people's asthma management and their health outcomes.^{11,13,42} In practice currently, self-management education remains poorly implemented, and patients rarely receive written asthma action plans.^{13,43} For example, in a 2004 survey, only 22% of Canadian physicians reported consistently providing written asthma action plans, while just 11% of patients reported receiving one.¹³ In a primary care chart review in Alberta, only 2% of patients had an asthma action plan.⁴⁴

Older children and adolescents with asthma should be prepared, educated, and empowered by their health care professionals to take responsibility for managing as much of their asthma care as they are able to, and caregivers should be supported to gradually hand over responsibility to their child.

What This Quality Statement Means

For Caregivers of Children and Adolescents With Asthma

Your child's health care professional should help you and your child learn how to manage their asthma. They should work with you and your child to create an asthma action plan. This plan describes:

- Your child's medications and how to take them
- Things your child can do each day to stay healthy

4

Self-Management Education and Asthma Action Plan

- What to do if your child's symptoms flare up

You can share a copy of your child's asthma action plan with any of their other health care professionals and their school or day care.

For Clinicians

When prescribing medication, provide asthma self-management education to children and adolescents with asthma and their caregivers, and work with them to create a written personalized asthma action plan that considers literacy, usability, and language. Ensure they receive information about and referrals to local service providers who can help them learn how to avoid or reduce exposure to triggers and improve their ability to self-manage (e.g., referral to asthma education, team-based care, or social services).

When dispensing medication for children and adolescents with asthma, ensure it aligns with their asthma action plan and review the plan with them and/or their caregivers.

For Health Services Planners

Ensure training, systems, processes, and resources are in place in primary care and community-based settings for health care professionals to provide and review self-management education and asthma action plans with children and adolescents with asthma and their caregivers. Ensure children and adolescents with asthma and their caregivers have access to health care professionals trained in providing asthma self-management education and asthma action plans, including, but not limited to, respiratory therapists and other health care professionals who are CREs or CAEs.

QUALITY INDICATORS: HOW TO MEASURE IMPROVEMENT FOR THIS STATEMENT

- Percentage of children and adolescents with asthma who have ever received asthma self-management education from a trained health care professional
- Percentage of children and adolescents with asthma who have received a written personalized asthma action plan
- Percentage of children and adolescents with asthma who have a written personalized asthma action plan and who have had their asthma action plan reviewed in the previous 12 months

Measurement details for these indicators, as well as indicators to measure overarching goals for the entire quality standard, are presented in Appendix 1.

5

Referral to Specialized Pediatric Asthma Care

Children and adolescents with asthma with appropriate indications are referred to specialized pediatric asthma care.

Sources: British Thoracic Society and Scottish Intercollegiate Guidelines Network, 2019¹⁹ | Canadian Thoracic Society, 2010,¹⁰ 2015²³

Definitions

Appropriate indications: A referral to specialized pediatric asthma care for children and adolescents may be considered for any of the following reasons:

- The person's inability to complete lung function testing
- Diagnostic uncertainty (e.g., having obstructive spirometry but negative bronchodilator reversibility, symptoms suggestive of asthma but negative spirometry and negative peak flow variability)
- Persistent abnormal lung function testing results despite good symptom control
- Suspected comorbidity or alternative diagnosis that requires specialist care
- Lack of response to an escalation of controller medication (e.g., frequent symptoms [≥ 8 days/month] despite a daily medium-dose of inhaled corticosteroid [ICS; 200–250 mcg for children 1 to 5 years of age, 201–400 mcg for children 6 to 11 years of age, or 251–500 mcg for children and adolescents 12 years of age and over] with correct inhaler technique and appropriate medication adherence)^{2,12,23}
- Repeated (> 1) exacerbations requiring oral corticosteroids, care in the emergency department, or hospitalization
- Suspicion or recognition of severe asthma (i.e., symptoms requiring treatment with high-dose ICS [> 400 mcg/day for children 6 to 11 years of age or > 500 mcg/day for children 12 years of age and over] and the use of a second controller for the previous year or the need for daily maintenance oral corticosteroid)

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Referral to Specialized Pediatric Asthma Care

- Life-threatening event such as an admission to the intensive care unit
- Suspected side effects of treatment (e.g., adrenal suppression, continuous reduction in growth velocity after 1 to 2 years of ICS treatment)²
- Poor understanding of asthma self-management (by the person with asthma or their caregiver)
- Need for allergy testing to assess the possible role of environmental allergens
- Other considerations such as parental anxiety, the need for reassurance, or the need for additional education

Specialized asthma care: Depending on the clinical indication, one or more of the following professionals may provide specialized pediatric asthma care:

- A pediatric respirologist
- An allergist
- A pediatrician with expertise in asthma
- A health care professional with expertise in pediatric asthma and/or working within a specialized pediatric asthma clinic, such as a family physician, a nurse practitioner, a nurse, a respiratory therapist, or another health care professional who is a certified respiratory educator (CRE) or certified asthma educator (CAE)

Rationale

Most children and adolescents with asthma can effectively manage their asthma with medication, self-management education, and support from primary care. However, in some clinical situations, a referral to specialized pediatric asthma care may be needed for expert advice regarding diagnosis and/or management.^{2,12} A study examining factors associated with having seen an asthma specialist among children and adolescents (0 to 17 years of age) visiting the emergency department for their asthma found that self-management was poorer among those who had not seen a specialist.⁴⁵ Particularly, these patients' parents reported that their children underused

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Referral to Specialized Pediatric Asthma Care

asthma controller medications (24% vs. 64% among those who had seen a specialist) and asthma action plans (20% vs. 62%).⁴⁵

In Ontario, children and adolescents, including younger children, may need to be referred to specialized care within a regional pediatric asthma centre or a primary care asthma program site to confirm a diagnosis of asthma and/or for further self-management education.^{23,46}

To promote patient-centred care, the referral process should involve an integrated approach in which there is collaboration, communication, and shared decision-making among health care professionals, the person with asthma, and their caregivers.

A recent chart audit of a convenience sample of primary care clinics in Ontario highlighted that wait times (the duration between a patient's referral and their specialist visit) vary across clinical specialties (median of 79 days for nonurgent referrals and 49 days for urgent referrals).⁴⁷ Electronic tools for specialist consultation such as eConsult or virtual visits can be used to improve wait times for specialized pediatric asthma care.

QUALITY INDICATORS: HOW TO MEASURE IMPROVEMENT FOR THIS STATEMENT

- Percentage of children and adolescents with one or more appropriate indications who are referred to specialized pediatric asthma care
- Percentage of children and adolescents with asthma who have two or more asthma-specific emergency department visits or one or more hospitalizations and who then have a consultation with a relevant specialist physician within 3 months of the index event

Measurement details for these indicators, as well as indicators to measure overarching goals for the entire quality standard, are presented in Appendix 1.

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Referral to Specialized Pediatric Asthma Care

What This Quality Statement Means

For Caregivers of Children and Adolescents With Asthma

If your child takes their medication and avoids triggers as much as possible but continues to have asthma symptoms, or if their family doctor or nurse practitioner has other concerns, they should consult with or refer your child to someone who specializes in asthma care for children.

For Clinicians

Ensure children and adolescents with asthma are referred to specialized pediatric asthma care if there are appropriate indications (see definition in this statement). After seeing the patient, the specialized pediatric asthma care provider should communicate the recommended plan for treatment and follow-up (if needed) to the primary care provider. In some cases, a consultation between the primary care provider and specialized pediatric asthma care provider may be required or sufficient; that is, the patient may not need to visit the specialized provider.

All clinicians involved should ensure the entire referral process involves collaboration, communication, and shared decision-making among health care professionals, the person with asthma, and their caregivers.

For Health Services Planners

Ensure systems, processes, and resources are in place so all children and adolescents with asthma have timely access to specialized pediatric asthma care when needed upon referral from their primary care provider, including the use of eReferral, eConsult, and virtual visits. Ensure health care professionals in primary care and community-based care are aware of the asthma services and referral processes in their communities.⁵

6

Follow-Up After Discharge

Children and adolescents who have had an emergency department visit or been hospitalized for an asthma exacerbation have a follow-up assessment within 2 to 7 days after discharge.

Sources: British Thoracic Society and Scottish Intercollegiate Guidelines Network, 2019¹⁹ | Global Initiative for Asthma, 2019²

Definitions

Asthma exacerbation: This can occur in people with a pre-existing diagnosis of asthma (even when mild or well controlled) or, occasionally, as the first presentation of asthma. It is an episode characterized by a progressive worsening in symptoms of shortness of breath, cough, wheezing, or chest tightness, and a progressive decrease in lung function. Asthma exacerbations represent a big enough change from the person's usual status to require a change in treatment (e.g., the use of oral corticosteroids), an emergency department visit, or hospitalization. Exacerbations often occur in response to irritant or allergic trigger exposures (e.g., viral, bacterial, or fungal infection in the upper or lower respiratory tract, air pollution, smoke, pollen) and/or inadequate controller medication adherence. However, a subset of people present with exacerbations without trigger exposures.

Follow-up assessment: Children and adolescents should be assessed in primary care or an asthma clinic within 2 to 7 days of an emergency department visit or hospital discharge and reassessed regularly over subsequent weeks until they achieve asthma control and reach or surpass their personal best lung function (see quality statement 2). The initial follow-up may be completed by primary care providers, such as family doctors or nurse practitioners, or by respirologists, allergists, and other physicians or other members of the care team, such as nurses, respiratory therapists, and pharmacists who are certified respiratory educators (CREs) or certified asthma educators (CAEs). In some cases, a phone or virtual follow-up may be sufficient.²

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Follow-Up After Discharge

The follow-up assessment should be individualized and related to the details of the emergency department visit or hospitalization. Components of the follow-up assessment include, but are not limited to, a review of the following:

- The person's or their caregivers' understanding of the cause of their asthma exacerbation
- Asthma control and reasons for poor control (see quality statement 2)
- Changes in medication as needed by prescribing physicians or nurse practitioners, including discontinuation of oral corticosteroids (see quality statement 3)
- Asthma action plan (see quality statement 4)
- Self-management education, including medication adherence, inhaler technique, and avoidance or reduction of trigger exposures (see quality statement 4)

Rationale

Asthma exacerbations can be life-threatening emergencies and may require care in an emergency department or a hospitalization.² The subsequent transition from hospital to home can complicate a person's care, as transitions are vulnerable points in the provision of health care.⁴⁸ Transitions pose a risk of information being lost or miscommunicated between health care settings, which can increase the person's vulnerability to adverse events.⁴⁹

For children with asthma, the need for an acute care visit should be considered a failure of asthma management, and their transition back to primary care should provide an opportunity to address gaps in care and/or self-management.¹⁰ Gaps in the quality of hospital-based care may also increase vulnerability to adverse events. For example, the Ontario Asthma Regional Variation Study documented important care gaps in Ontario emergency departments, including the underutilization of systemic steroids on discharge (in about 32% of pediatric patients) and failure to refer pediatric patients to specialized asthma services (about 1.8%) or other asthma service (about 2.8%).⁵⁰

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Follow-Up After Discharge

Prompt follow-up in primary care or referral to an asthma clinic can mitigate these risks. In some patients with respiratory or chronic illnesses other than asthma, early follow-up has been linked to improved patient outcomes with reduced rates of readmission, emergency department use, and death.⁵¹

For more information on discharge planning and follow-up in primary care after discharge, please see the quality standard [Transitions Between Hospital and Home](#).

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Follow-Up After Discharge

What This Quality Statement Means

For Caregivers of Children and Adolescents With Asthma

If your child has gone to the emergency department or been admitted to hospital because of an asthma flare-up, their family doctor or nurse practitioner should follow up with them within 2 to 7 days of leaving the hospital. They will check to see how your child is doing and make any needed changes to their medications and asthma action plan.

In some cases, the initial follow-up may be done by a respirologist, allergist, or another physician, or by other members of the care team, such as nurses, respiratory therapists, and pharmacists who are certified respiratory educators (CREs) or certified asthma educators (CAEs).

At this visit, you can also ask questions to make sure you understand:

- What caused the flare-up
- What care your child received
- What you and your child can do to prevent asthma flare-ups

For Clinicians

Before a child or adolescent who has had an asthma exacerbation is discharged from an emergency department, the care team should tell their caregiver to arrange a follow-up primary care appointment. If the person was hospitalized, the hospital care team should arrange for a follow-up assessment in primary care. In either setting, the discharging care team should send the person's discharge information directly to the primary care provider. Primary care

QUALITY INDICATOR: HOW TO MEASURE IMPROVEMENT FOR THIS STATEMENT

- Percentage of children and adolescents who have a follow-up assessment in primary care or in an asthma clinic within 7 days following an emergency department visit or hospitalization for an asthma exacerbation

Measurement details for this indicator, as well as indicators to measure overarching goals for the entire quality standard, are presented in Appendix 1.

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Follow-Up After Discharge

follow-up is important to ensure the person's treatment continues, their asthma symptoms are well controlled, and their lung function reaches their known personal best.

Following discharge, consider referral to an asthma education program or specialized pediatric asthma care.²

For Health Services Planners

Ensure systems, processes, and resources are in place so all children and adolescents have timely access to follow-up in primary care after an asthma-specific emergency department visit or hospitalization. This includes ensuring all children and adolescents with asthma have a primary care provider, arrangements for a follow-up assessment in primary care are made, and seamless communication is possible between hospital and primary care settings.

Appendices

Appendix 1. Measurement to Support Improvement

The Asthma Quality Standards Advisory Committee identified some overarching goals for this quality standard. These goals were mapped to indicators that can be used to monitor the progress being made to improve care for children and adolescents with asthma in Ontario. Some indicators are provincially measurable, while some can be measured using only locally sourced data.

Collecting and using data associated with this quality standard is optional. However, data will help you assess the quality of care you are delivering and the effectiveness of your quality improvement efforts.

We realize this standard includes a lengthy list of indicators. We've given you this list so you don't have to create your own quality improvement indicators. We recommend you identify areas to focus on in the quality standard and then use one or more of the associated indicators to guide and evaluate your quality improvement efforts.

To assess equitable delivery of care, you can stratify locally measured indicators by patient socioeconomic and demographic characteristics, such as age, education, gender, income, language, and sex.

Our [measurement guide](#) for asthma provides more information and concrete steps on how to incorporate measurement into your planning and quality improvement work.

How to Measure Overall Success

Indicators That Can Be Measured Using Provincial Data

Percentage of children and adolescents 6 to 16 years of age with incident asthma whose diagnosis is confirmed with lung function testing

- Denominator: total number of children and adolescents 6 to 16 years of age with incident asthma
- Numerator: number of people in the denominator whose diagnosis is confirmed with lung function testing
- Data sources: Discharge Abstract Database, National Ambulatory Care Reporting System, OHIP Claims Database

Percentage of children and adolescents 6 to 16 years of age with asthma who had a lung function test in the previous 12 months

- Denominator: total number of children and adolescents 6 to 16 years of age with asthma
- Numerator: number of people in the denominator who had a lung function test in the previous 12 months
- Data sources: Discharge Abstract Database, National Ambulatory Care Reporting System, OHIP Claims Database

Percentage of children and adolescents with asthma who visited the emergency department for an asthma-specific reason in the previous 12 months

- Denominator: total number of children and adolescents with asthma
- Numerator: number of people in the denominator who visited the emergency department for an asthma-specific reason in the previous 12 months
- Data sources: Discharge Abstract Database, National Ambulatory Care Reporting System, OHIP Claims Database

Percentage of children and adolescents with asthma who were hospitalized for an asthma-specific reason in the previous 12 months

- Denominator: total number of children and adolescents with asthma
- Numerator: number of people in the denominator who were hospitalized for an asthma-specific reason in the previous 12 months
- Data sources: Discharge Abstract Database, National Ambulatory Care Reporting System, OHIP Claims Database

Indicators That Can Be Measured Using Only Local Data

Percentage of young children 1 to 5 years of age clinically suspected of having asthma whose diagnosis of asthma is confirmed by documented reversibility of signs or symptoms with medication

- Denominator: total number of young children 1 to 5 years of age clinically suspected of having asthma
- Numerator: number of people in the denominator whose diagnosis of asthma is confirmed by documented reversibility of signs or symptoms with medication
- Data source: local data collection

Percentage of children and adolescents with asthma who had a structured assessment in the previous 6 months

- Denominator: total number of children and adolescents with asthma
- Numerator: number of people in the denominator who had a structured assessment in the previous 6 months
- Data source: local data collection

Percentage of children and adolescents with asthma with one or more appropriate indications who are prescribed regular (daily) inhaled anti-inflammatory therapy

- Denominator: total number of children and adolescents with asthma with one or more appropriate indications
- Numerator: number of people in the denominator who are prescribed regular (daily) inhaled anti-inflammatory therapy
- Data source: local data collection

Average number of asthma symptom-free days in the previous 4 weeks among children and adolescents with asthma

- Population: total number of children and adolescents with asthma
- Calculation: mean number of symptom-free days in the previous 4 weeks
- Data source: local data collection

Average number of days missed from school or work due to asthma in the previous 4 weeks

- Population: total number of children and adolescents with asthma
- Calculation: mean number of days missed from school or work due to asthma in the previous 4 weeks
- Data source: Local data collection

How to Measure Improvement for Specific Statements

Quality Statement 1: Diagnosis

Percentage of children and adolescents 6 to 16 years of age clinically suspected of having asthma who complete lung function testing within 3 months of seeking care for their respiratory symptoms

- Denominator: total number of children and adolescents 6 to 16 years of age clinically suspected of having asthma
- Numerator: number of people in the denominator who complete lung function testing within 3 months of seeking care for their respiratory symptoms
- Data source: local data collection

Percentage of children 1 to 5 years of age clinically suspected of having asthma whose diagnosis of asthma is confirmed after the documentation of signs or symptoms of airflow obstruction and reversibility of those signs or symptoms with asthma medication

- Denominator: total number of children 1 to 5 years of age clinically suspected of having asthma
- Numerator: number of children in the denominator whose diagnosis of asthma is confirmed after the documentation of signs or symptoms of airflow obstruction and reversibility of those signs or symptoms with asthma medication
- Data source: local data collection

Local availability of lung function testing

- Data source: local data collection

Quality Statement 2: Asthma Control

Percentage of children and adolescents with asthma who had a structured assessment in the previous 6 months

- Denominator: total number of children and adolescents with asthma
- Numerator: number of people in the denominator who had a structured assessment in the previous 6 months
- Data source: local data collection

Percentage of children and adolescents 6 to 16 years of age with asthma who completed a lung function test in the previous 12 months

- Denominator: total number of children and adolescents 6 to 16 years of age with asthma
- Numerator: number of people in the denominator who completed a lung function test in the previous 12 months
- Data sources: local data collection, Discharge Abstract Database, National Ambulatory Care Reporting System, OHIP Claims Database

Quality Statement 3: Asthma Medication

Percentage of children and adolescents with asthma with one or more appropriate indications who are prescribed regular (daily) inhaled anti-inflammatory therapy

- Denominator: total number of children and adolescents with asthma with one or more appropriate indications
- Numerator: number of people in the denominator who are prescribed regular (daily) inhaled anti-inflammatory therapy
- Data source: local data collection

Percentage of children and adolescents with uncontrolled asthma who have had all their reasons for poor control addressed

- Denominator: total number of children and adolescents with uncontrolled asthma
- Numerator: number of people in the denominator who have had all their reasons for poor control addressed
- Data source: local data collection

Percentage of children and adolescents with uncontrolled asthma who have their medication escalated after other reasons for poor control have been addressed

- Denominator: total number of children and adolescents with uncontrolled asthma who have had other reasons for poor control addressed
- Numerator: number of people in the denominator who have their medication escalated
- Data source: local data collection

Quality Statement 4: Self-Management Education and Asthma Action Plan

Percentage of children and adolescents with asthma who have ever received asthma self-management education from a trained health care professional

- Denominator: total number of children and adolescents with asthma
- Numerator: number of people in the denominator who have received asthma self-management education from a trained health care professional at least once
- Data source: local data collection

Percentage of children and adolescents with asthma who have received a written personalized asthma action plan

- Denominator: total number of children and adolescents with asthma
- Numerator: number of people in the denominator who have received a written personalized asthma action plan
- Data source: local data collection

Percentage of children and adolescents with asthma who have a written personalized asthma action plan and who have had their asthma action plan reviewed in the previous 12 months

- Denominator: total number of children and adolescents with asthma who have a written personalized asthma action plan
- Numerator: number of people in the denominator who have had their asthma action plan reviewed in the previous 12 months
- Data source: local data collection

Quality Statement 5: Referral to Specialized Pediatric Asthma Care

Percentage of children and adolescents with one or more appropriate indications who are referred to specialized pediatric asthma care

- Denominator: total number of children and adolescents with one or more appropriate indications
- Numerator: number of people in the denominator who are referred to specialized pediatric asthma care
- Data source: local data collection

Percentage of children and adolescents with asthma who have two or more asthma-specific emergency department visits or one or more hospitalizations and who then have a consultation with a relevant specialist physician within 3 months of the index event

- Denominator: total number of children and adolescents who have two or more asthma-specific emergency department visits or one or more hospitalizations
- Numerator: number of people in the denominator who have a consultation with a relevant specialist physician within 3 months of the index event
- Data sources: Discharge Abstract Database, National Ambulatory Care Reporting System, OHIP Claims Database

Quality Statement 6: Follow-Up After Discharge

Percentage of children and adolescents who have a follow-up assessment in primary care or in an asthma clinic within 7 days following an emergency department visit or hospitalization for an asthma exacerbation

- Denominator: total number of children and adolescents who visit the emergency department or are hospitalized for an asthma exacerbation
- Numerator: number of people in the denominator who have a follow-up assessment in primary care or in an asthma clinic within 7 days following their discharge from the emergency department or hospitalization
- Data sources: local data collection, Discharge Abstract Database, National Ambulatory Care Reporting System, OHIP Claims Database

Appendix 2. Glossary

Caregiver: An unpaid person who provides care and support to a child or adolescent with asthma. This may be a parent, legal guardian, family member, or anyone identified by the person with asthma.

Children and adolescents: People under 16 years of age.

Controller medication: An inhaler or puffer that prevents asthma symptoms by bringing down the swelling in the airways in the lungs.

Health care professionals: Regulated professionals, such as nurses, nurse practitioners, occupational therapists, pharmacists, physicians, physiotherapists, psychologists, respiratory therapists, and social workers.

Health care providers: Health care professionals and also people in unregulated professions, such as administrative staff, behavioural support workers, personal support workers, recreational staff, and spiritual care staff.

Rescue or reliever medication: An inhaler or puffer that relieves asthma symptoms quickly by opening the airways.

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References

1. Provincial Council for Maternal and Child Health, Ministry of Health and Long-Term Care. Clinical handbook for paediatric asthma [Internet]. Toronto (ON): Queen's Printer for Ontario; 2016 [cited 2019 Mar]. Available from: http://www.health.gov.on.ca/en/pro/programs/ecfa/docs/hb_paed_asthma.pdf
2. Global Initiative for Asthma. Global strategy for asthma management and prevention (2019 update) [Internet]. Fontana (WI): The Initiative 2019 [cited 2019 Nov]. Available from: <https://ginasthma.org/wp-content/uploads/2019/06/GINA-2019-main-report-June-2019-wms.pdf>
3. National Institute for Health and Care Excellence. Asthma. Quality standard [Internet]. London (UK): The Institute; 2013 (2018 update) [cited 2019 Mar]. Available from: <https://www.nice.org.uk/guidance/qs25/>
4. Registered Nurses' Association of Ontario. Promoting asthma control in children [Internet]. Toronto (ON): The Association; 2004 [cited 2019 Mar]. Available from: https://rnao.ca/sites/rnao-ca/files/Promoting_Asthma_Control_in_Children.pdf
5. Registered Nurses' Association of Ontario. Adult asthma care: promoting control of asthma [Internet]. Toronto (ON): The Association; 2017 [cited 2019 Mar]. Available from: https://rnao.ca/sites/rnao-ca/files/bpg/Adult_Asthma_FINAL_WEB.pdf
6. Canadian Institute for Health Information. Asthma hospitalizations among children and youth in Canada. Ottawa (ON): The Institute; 2018.
7. Ontario Asthma Surveillance Information System. OASIS: asthma infographic [Internet]. Toronto (ON): The Hospital for Sick Children (SickKids); c1999-2014 [updated 2016; cited 2019 Mar]. Available from: <http://lab.research.sickkids.ca/oasis/oasis-statistics/>
8. Smetanin P, Stiff D, Briante C, Ahmad S, Wong L, Ler A. Life and economic impact of lung disease in Ontario: 2011 to 2041 [Internet]. Toronto (ON): RiskAnalytica, on behalf of the Ontario Lung Association; 2011 [cited 2019 Apr]. Available from: <http://lungontario.ca/wp-content/uploads/2017/09/OLA-Final-Report-June-281.pdf>
9. Ontario Asthma Surveillance Information System, ICES. Asthma incidence and prevalence (data tables) [Internet]. Toronto (ON): The Hospital for Sick Children (SickKids); 2018 [cited 2019 Mar]. Available from: <http://lab.research.sickkids.ca/oasis/data-tables/>
10. Lougheed MD, Lemiere C, Dell SD, Ducharme FM, Fitzgerald JM, Leigh R, et al. Canadian Thoracic Society asthma management continuum – 2010 consensus summary for children six years of age and over, and adults. *Can Respir J*. 2010;17(1):15-24.
11. Lougheed MD, Lemiere C, Ducharme FM, Liciskai C, Dell SD, Rowe BH, et al. Canadian Thoracic Society 2012 guideline update: diagnosis and management of asthma in preschoolers, children and adults. *Can Respir J*. 2012;19(2):127-64.
12. FitzGerald JM, Lemiere C, Lougheed MD, Ducharme FM, Dell SD, Ramsey C, et al. Recognition and management of severe asthma: a Canadian Thoracic Society position statement. *Can J Respir Crit Care Sleep Med*. 2017;1(4):199-221.
13. FitzGerald JM, Boulet L-P, McIvor RA, Zimmerman S, Chapman KR. Asthma control in Canada remains suboptimal: The Reality of Asthma Control (TRAC) study. *Can Respir J*. 2006;13(5):253-9.
14. The Lung Association. Moving the dial on the diagnosis and treatment of asthma [Internet]. Toronto (ON): The Association; 2019 Jan [cited 2019 May 13]. Available from: https://www.lung.ca/sites/default/files/MovingtheDial_WhitePaper.pdf
15. To T, Zhu J, Williams DP, Feldman L, Simatovic J, Gershon A, et al. Frequency of health service use in the year prior to asthma death. *J Asthma*. 2016;53(5):505-9.
16. Aaron SD, Vandemheen KL, FitzGerald JM, Ainslie M, Gupta S, Lemiere C, et al. Reevaluation of diagnosis in adults with physician-diagnosed asthma. *JAMA*. 2017;317(3):269-79.
17. To T, Simatovic J, Zhu J, Feldman L, Dell SD, Lougheed MD, et al. Asthma deaths in a large provincial health system. A 10-year population-based study. *Ann Am Thorac Soc*. 2014;11(8):1210-7.

REFERENCES CONTINUED

18. Sadatsafavi M, Lynd L, Marra C, Carleton B, Tan WC, Sullivan S, et al. Direct health care costs associated with asthma in British Columbia. *Can Respir J*. 2010;17(2):74-80.
19. British Thoracic Society, Scottish Intercollegiate Guidelines Network. British guideline on the management of asthma. A national clinical guideline [Internet]. London (UK): Healthcare Improvement Scotland; 2019 Jul [cited 2019 Dec]. Available from: <https://www.brit-thoracic.org.uk/quality-improvement/guidelines/asthma/>
20. To T, Dell S, Dick PT, Cicutto L, Harris JK, MacLusky IB, et al. Case verification of children with asthma in Ontario. *Pediatr Allergy Immunol*. 2006;17(1):69-76.
21. Ontario Asthma Surveillance Information System, ICES. Health services use (data tables) [Internet]. Toronto (ON): The Hospital for Sick Children (Sick-Kids); 2018 [cited 2019 Mar]. Available from: <http://lab.research.sickkids.ca/oasis/data-tables/>
22. Institute for Clinical Evaluative Sciences. Only a third of children with asthma treated in an Ontario ED seek recommended follow-up care (news release) [Internet]. Toronto (ON): The Institute; 2012 [cited 2019 Mar]. Available from: <https://www.ices.on.ca/Newsroom/News-Releases/2012/Only-a-third-of-children-with-asthma>
23. Ducharme FM, Dell SD, Radhakrishnan D, Grad RM, Watson WTA, Yang CL, 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):135-43.
24. National Institute for Health and Care Excellence. Asthma: diagnosis, monitoring and chronic asthma management [Internet]. London (UK): The Institute; 2017 [cited 2019 Mar]. Available from: <https://www.nice.org.uk/guidance/ng80>
25. Coates AL, Wanger J, Cockcroft DW, Culver BH, Diamant Z, Gauvreau G, et al. ERS technical standard on bronchial challenge testing: general considerations and performance of methacholine challenge tests. *Eur Respir J*. 2017;49(5).
26. National Asthma Council Australia. Australian asthma handbook [Internet]. South Melbourne (AU): The Council; 2016 [cited 2019 Mar]. Available from: <https://www.astmahandbook.org.au/>
27. Ontario Asthma Surveillance Information System, ICES. Asthma indicators for all of Ontario [Internet]. Toronto (ON): The Hospital for Sick Children (SickKids); 2018 [cited 2019 Mar]. Available from: <http://lab.research.sickkids.ca/oasis/wp-content/uploads/sites/6/2018/08/ONTARIO.pdf>
28. Ducharme FM, Davis GM, Noya F, Rich H, Ernst P. The Asthma Quiz for Kidz: a validated tool to appreciate the level of asthma control in children. *Can Respir J*. 2004;11(8):541-6.
29. Juniper EF, Bousquet J, Abetz L, Bateman ED. Identifying 'well-controlled' and 'not well-controlled' asthma using the Asthma Control Questionnaire. *Respir Med*. 2006;100(4):616-21.
30. Lougheed MD, Minard J, Dworkin S, Juurlink MA, Temple WJ, To T, et al. Pan-Canadian Respiratory Standards Initiative for Electronic Health Records (PRESTINE): 2011 national forum proceedings. *Can Respir J*. 2012;19(2):117-26.
31. McGeachie MJ, Yates KP, Zhou X, Guo F, Sternberg AL, Van Natta ML, et al. Patterns of growth and decline in lung function in persistent childhood asthma. *N Engl J Med*. 2016;374(19):1842-52.
32. Stanford RH, Shah MB, D'Souza AO, Dhamane AD, Schatz M. Short-acting beta-agonist use and its ability to predict future asthma-related outcomes. *Ann Allergy Asthma Immunol*. 2012;109(6):403-7.
33. Hull SA, McKibben S, Homer K, Taylor SJ, Pike K, Griffiths C. Asthma prescribing, ethnicity and risk of hospital admission: an analysis of 35,864 linked primary and secondary care records in East London. *NPJ Prim Care Respir Med*. 2016;26:16049.
34. Price C, Agarwal G, Chan D, Goel S, Kaplan AG, Boulet LP, et al. Large care gaps in primary care management of asthma: a longitudinal practice audit. *BMJ Open*. 2019;9(1):e022506.

REFERENCES CONTINUED

35. Davies B, Danseco E, Cicutto L, Higuchi KS, McConnell H, Edwards N, et al. Nursing best practice guidelines evaluation user guide: inhaler device assessment tool for promoting asthma control in children. Ottawa (ON): University of Ottawa Nursing Best Practice Research Unit; 2006.
36. Szeffler SJ, Baker JW, Uryniak T, Goldman M, Silkoff PE. Comparative study of budesonide inhalation suspension and montelukast in young children with mild persistent asthma. *J Allergy Clin Immunol*. 2007;120(5):1043-50.
37. Global Initiative for Asthma. Pocket guide for asthma management and prevention (for adults and children older than 5 years) [Internet]. Fontana (WI): The Initiative; 2019 [cited 2019 Jun 4]. Available from: <https://ginasthma.org/wp-content/uploads/2019/04/GINA-2019-main-Pocket-Guide-wms.pdf>
38. Bateman ED, Reddel HK, O'Byrne PM, Barnes PJ, Zhong N, Keen C, et al. As-needed budesonide-formoterol versus maintenance budesonide in mild asthma. *N Engl J Med*. 2018;378(20):1877-87.
39. O'Byrne PM, FitzGerald JM, Bateman ED, Barnes PJ, Zhong N, Keen C, et al. Inhaled combined budesonide-formoterol as needed in mild asthma. *N Engl J Med*. 2018;378(20):1865-76.
40. Beasley R, Holliday M, Reddel HK, Braithwaite I, Ebmeier S, Hancox RJ, et al. Controlled trial of budesonide-formoterol as needed for mild asthma. *N Engl J Med*. 2019;380(21):2020-30.
41. Reddel HK, Busse WW, Pedersen S, Tan WC, Chen YZ, Jorup C, et al. Should recommendations about starting inhaled corticosteroid treatment for mild asthma be based on symptom frequency: a post-hoc efficacy analysis of the START study. *Lancet*. 2017;389(10065):157-66.
42. Burgess S, Sly P, Devadason S. Adherence with preventive medication in childhood asthma. *Pulm Med*. 2011;2011:973849
43. Pinnock H, Epiphaniou E, Pearce G, Parke H, Greenhalgh T, Sheikh A, et al. Implementing supported self-management for asthma: a systematic review and suggested hierarchy of evidence of implementation studies. *BMC Med*. 2015;13(1):127.
44. Tsuyuki RT, Sin DD, Sharpe HM, Cowie RL, Nilsson C, Man SF. Management of asthma among community-based primary care physicians. *J Asthma*. 2005;42(3):163-7.
45. Agnihotri NT, Pade KH, Vangala S, Thompson LR, Wang VJ, Okelo SO. Predictors of prior asthma specialist care among pediatric patients seen in the emergency department for asthma. *J Asthma*. 2018:1-7.
46. Ministry of Health and Long-Term Care, The Lung Association – Ontario. Primary Care Asthma Program (PCAP): program manual, version 2018 [Internet]. Toronto (ON): The Association; 2018 [cited 2019 Mar]. Available from: <http://lungontario.ca/wp-content/uploads/2018/03/2018-Non-AP.pdf>
47. Liddy C, Nawar N, Moroz I, McRae S, Russell C, Mihan A, et al. Understanding patient referral wait times for specialty care in Ontario: a retrospective chart audit. *Healthc Policy*. 2018;13(3):59-69.
48. Naylor M, Keating SA. Transitional care: moving patients from one care setting to another. *Am J Nurs*. 2008;108 Suppl 9:58-63.
49. Ontario Asthma Surveillance Information System, ICES. Asthma prevalence crude rates (per 100 Ontario population) [Internet]. Toronto (ON): The Hospital for Sick Children (SickKids); 2019 [cited 2019 Apr 29]. Available from: https://lab.research.sickkids.ca/oasis/wp-content/uploads/sites/6/2018/07/prevrt_upto2016.pdf
50. Lougheed MD, Garvey N, Chapman KR, Cicutto L, Dales R, Day AG, et al. The Ontario Asthma Regional Variation Study: emergency department visit rates and the relation to hospitalization rates. *Chest*. 2006;129(4):909-17.
51. Health Quality Ontario. Effect of early follow-up after hospital discharge on outcomes in patients with heart failure or chronic obstructive pulmonary disease: a systematic review. *Ont Health Technol Assess Ser* [Internet]. 2017;17(8):1-37. Available from: <http://www.hqontario.ca/Evidence-to-Improve-Care/Journal-Ontario-Health-Technology-Assessment-Series>.

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