Quality Standards

Asthma

Care in the Community
for People Under 16 Years of Age

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Health Quality Ontario

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Ontario

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.

This quality standard does not address the management of acute asthma exacerbations or care provided during emergency department visits and hospitalizations, but it does address transitions from hospital care to care in the community.

A separate quality standard addresses primary and community-based care for adults with asthma.

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 Health Quality Ontario, 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 undergo 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 and/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 regularly have a structured assessment to determine their level of asthma control and reasons for poor control.

Quality Statement 3: Pharmacological Management
Children and adolescents with asthma receive appropriate pharmacotherapy and devices based on their age and current level of asthma control, including early initiation of inhaled anti-inflammatory therapy.

Quality Statement 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.

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 does not address the management of acute asthma exacerbations or care provided during emergency department visits or hospitalizations. A separate quality standard addresses primary and community-based care for adults with asthma.

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).[1,2] 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.[3,4]

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.[5] In Ontario, one in four people 0 to 19 years of age were living with asthma in 2015,[6] and half of all new asthma cases occur in people under the age of 15.[7] In recent years, the incidence of asthma in Ontario across all age groups (the number of people newly diagnosed each year) has been decreasing; 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 for all ages (the total number of people living with the disease) continued to increase; it rose from around 90 per 1,000 people in 1996/97 to 155 per 1,000 in 2016/17.[8] 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.[8]

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.[9-11]

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.[12,13] In Ontario, about 85 people die from asthma each year (1,272 deaths from 2000 to 2015[14]). 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 per 100,000 people with asthma vs. 640 per 100,000 in the general population[15,16]).

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 asthma[17] and particularly high in the year prior to asthma-related deaths.[1,18] Asthma is the most common cause of hospital admission in Canadian children, and one of the leading causes of morbidity from chronic disease among children and adolescents based on measures of school absences, emergency department visits, and hospitalizations.[1,19] 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.[20] 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.[20]

Asthma is also associated with substantial indirect costs to society, such as absenteeism from school and work.[4] 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.[5] The economic burden of asthma in Ontario (direct health care costs plus indirect social costs) was estimated at $1.8 billion in 2011.[7]

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.[5,21] 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 are 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 this 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. One of these resources is an inventory of indicator definitions (Appendix 2) to help you assess the quality of care you are delivering, and to identify gaps in care and areas for improvement. These indicators can be used to assess processes, structures, and outcomes. 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 can 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 guide for asthma in children and adolescents, with technical details on what you can do to measure the quality of the care you provide locally, and on how we will measure the success of the quality standard provincially
- 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

While you implement this quality standard, there may be times you find it challenging to provide the care outlined due to system-level barriers. Appendix 1 provides our recommendations to provincial partners to help remove these barriers so you can provide high-quality care. 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 Success

The Asthma Quality Standard Advisory Committee identified a small number of overarching goals for this quality standard, which can be measured using the indicators below.

How Success Can Be Measured Provincially

These are the indicators that will be used to monitor the progress being made provincially:

- Percentage of children and adolescents (6 to 16 years of age) with 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

How Success Can Be Measured Locally

To measure the quality of care children and adolescents are receiving for their asthma, we recommend clinicians and organizations use the following locally measurable indicators, which cannot be measured provincially at this time:

- 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 and/or symptoms with pharmacotherapy
- Percentage of children and adolescents with asthma who had a structured assessment in the previous 6 months to determine their asthma symptom control and the reasons for poor control
- Percentage of children and adolescents with asthma who are prescribed 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 12 months

For more information about these indicators, see Appendix 2 and our measurement guide.

Quality Statements to Improve Care: The Details

Quality Statement 1: Diagnosis

Children 6 years of age and older and adolescents clinically suspected of having asthma undergo 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 and/or symptoms of airflow obstruction, reversibility of symptoms with asthma medications, and no clinical suspicion of an alternative diagnosis.

Definitions

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., bronchiectasis, bacterial pneumonia, eosinophilic gastrointestinal disease, 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.

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 3 months of a person seeking care for their respiratory symptoms. A trial of pharmacotherapy 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.[9] Every attempt should be made to ensure the asthma diagnosis can be confirmed with lung 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.

Clinically suspected of having asthma: Asthma is clinically suspected in the presence of signs and/or symptoms of variable airflow obstruction and in the absence of an alternative diagnosis (see definitions above).

Other lung function tests: In Ontario, the following are recommended to confirm a diagnosis of asthma[9]:

- **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 and can be direct, such as the methacholine challenge test. Methacholine challenge tests should not be performed within several weeks of an active infection, and, if safe to do so, inhaled corticosteroid (ICS) treatment should be withheld prior to testing for 4 to 8 weeks if the intent is to remove the effect on airway sensitivity and responsiveness. Similarly, bronchodilators should be withheld in accordance with their duration of action
- **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.[26]

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:

- 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 β2-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

Signs and/or symptoms of airflow obstruction: Include shortness of breath, chest tightness, wheezing, and/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[1,24]:

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

Spirometry: The preferred lung function test to diagnose asthma by assessing for airflow obstruction and its reversibility.[9] The test measures airflow as the ratio of forced expiratory volume in 1 second (FEV_1), 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 FEV_1/FVC ratio. Reference values to interpret the test are generally based on age, sex, and height and can include race.

Spirometry should be performed before and after the administration of an inhaled bronchodilator. A pre-bronchodilator FEV_1/FVC result less than the LLN (approximately < 0.8–0.9) demonstrates airflow obstruction. A post-bronchodilator increase in FEV_1 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. In such cases or in situations where people cannot perform spirometry, other lung function testing is required to confirm the diagnosis of asthma, and a referral to specialized asthma care may be considered (see quality statement 5).

Sources

British Thoracic Society and Scottish Intercollegiate Guidelines Network, 2016[18]
Canadian Thoracic Society, 2010,[9] 2015[25]
Global Initiative for Asthma, 2018[1]
National Institute for Health and Care Excellence, 2017[26]
Registered Nurses' Association of Ontario, 2004[3]

Rationale

In Ontario, spirometry and other lung function testing to diagnose asthma is increasing but not yet routine. Only 56% of people with asthma had lung function testing to confirm their diagnosis in 2016/17.[23] 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.[13,15] There is a risk of misdiagnosis when reversible airflow obstruction is not

demonstrated with lung function testing.[13,15] Asthma is commonly misdiagnosed in adolescents presenting with exercise-related symptoms caused by other diseases associated with breathing difficulties or cough.[24] Children and adolescents whose asthma diagnosis is not supported by lung function testing are less likely to receive appropriate pharmacotherapy, and they can be at higher risk of an asthma exacerbation if their asthma is not treated correctly.[2]

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.[25] 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.[5,24] 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.[2,25]

What This Quality Statement Means

For Caregivers of Children and Adolescents With 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.

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. Testing should occur as soon as possible and ideally be completed within 3 months of a person seeking care for their respiratory symptoms. 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.[18,26]

Typically, children under the age of 6 years are unable to perform lung function testing accurately.[3] 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 that lung function testing is locally available and accessible for children and adolescents 6 to 16 years of age. Ensure that health care professionals in primary care and community-

based settings are aware of the local availability of lung function testing[26] 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.[4,18] Ensure that health care professionals in primary care have the knowledge and skills to clinically diagnose asthma in children 1 to 5 years of age.

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 undergo 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 and/or symptoms of airflow obstruction and reversibility of those signs and/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 2.

Quality Statement 2: Asthma Control

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

Definitions

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., side effects, attitudes and goals for asthma treatment, affordability)
- Incorrect inhaler technique
- Exposure to irritant and allergic trigger exposures (e.g., colds, smoke, air pollution, allergens, perfumes/scents, chemicals)
- Poor management of comorbidities (e.g., rhinitis, chronic rhinosinusitis, gastroesophageal reflux, obesity, obstructive sleep apnea, depression, anxiety)[1,11]
- Impact of social determinants of health (e.g., education, employment, ethnicity and culture, family and social support, housing, geographic location, income, transportation and access to care)

Regularly: Symptom control and any reasons for poor control should be assessed using a structured assessment (1) at every asthma-related health care encounter; (2) after a severe exacerbation of symptoms; (3) when there is a change in treatment; and (4) at least every 6 months. In some cases, a phone or virtual health care encounter may be sufficient to assess asthma symptom control. Lung function testing should be assessed as described below. Children and adolescents with complex health needs may benefit from more frequent assessments.

Structured assessment to determine level of asthma control: Asthma control parameters for children and adolescents include measures of symptoms and lung function.
Symptom control over the previous 4 weeks should be assessed regularly, and at least every 6 months, using symptom control validated questionnaires and tools (e.g., the Asthma Quiz for Kidz,[28] the Asthma Control Test [ACT],[1] the Asthma Control Questionnaire [ACQ][29]) to evaluate the following criteria[25]:

- Daytime symptoms (target < 2 days/week)
- Nighttime symptoms (target < 1 night/week)
- Frequency of need for reliever medication (target < 2 doses/week)
- Physical activity (target normal)
- Absence from work or school due to asthma (target none)
- Frequency and severity of exacerbations (target infrequent and mild)

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 FEV_1 (forced expiratory volume in 1 second); and (3) annually for the ongoing assessment of asthma

control and risk of exacerbation.[1] It is very common to observe normal lung function in children between exacerbations. The following measures of lung function should be assessed:

- FEV_1 (target ≥ 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%)[9]

Sources

British Thoracic Society and Scottish Intercollegiate Guidelines Network, 2016[18]
Canadian Thoracic Society, 2010,[9] 2015,[25] 2017[11]
Global Initiative for Asthma, 2018[1]
National Institute for Health and Care Excellence, 2017[26]
Registered Nurses' Association of Ontario, 2004[3]

Rationale

Asthma control should be assessed regularly and at least every 6 months in primary care.[9,18,25] 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. 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).[27] 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.[27]

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.[23]

The lack of ongoing assessment of asthma control is concerning because an estimated 50% of people 18 years of age and older with the disease have uncontrolled asthma.[12,13] The audit of primary care practice in Ontario found that most people whose asthma control was assessed had uncontrolled asthma (135 of 136 adult patients).[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.[5] 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.[11] 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 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]).[3,25]

What This Quality Statement Means

For Caregivers of Children and Adolescents With Asthma
A health care professional should see your child at least every 6 months 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 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
Assess asthma symptom control according to recommended criteria regularly and at least every 6 months. The structured assessment should determine the person's level of asthma symptom control and any reasons for poor control so that they can be addressed before modifying pharmacotherapy (see quality statement 3). Whenever possible, ensure spirometry and other lung function testing as needed are done (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 FEV_1; and (3) annually for the ongoing assessment of asthma control and risk of exacerbation.

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.[24]

For Health Services Planners
Ensure that training, systems, processes, and resources are in place in primary care and community-based settings for health care professionals to regularly assess asthma symptom control and reasons for poor control according to recommended criteria. Ensure the local availability and accessibility of lung function testing to monitor asthma control.

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 to determine their asthma symptom control and, if applicable, the reasons for poor control
- Percentage of children and adolescents 6 to 16 years of age with asthma who received 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 2.

Quality Statement 3: Pharmacological Management

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

Definitions

Appropriate pharmacotherapy and devices: All children and adolescents with a confirmed diagnosis of asthma should be offered pharmacotherapy 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).[3] Inhaler technique should be assessed (e.g., using the inhaler device assessment tool [IDAT])[31] to identify changing needs as children and adolescents grow and develop.[3] Those with one or more criteria of uncontrolled asthma should have their pharmacotherapy escalated to help them gain control only after addressing other reasons for poor control including, but not limited to, symptoms due to co-morbid conditions, trigger exposures, inadequate adherence to controller medication when prescribed to be taken regularly, and incorrect inhaler technique (see quality statement 2). If response remains inadequate after escalation to daily medium dose inhaled corticosteroids (ICS) for children 1 to 11 years of age, or daily medium dose ICS/LABA or ICS/LTRA for adolescents 12 years of age and older, referral to specialized pediatric asthma care should be considered.[25] Pharmacotherapy should be offered and 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 more than hours to a few days) should be offered an as-needed reliever medication in the form of a short-acting β2-agonist (SABA).[25]

- **Step 2:** Children with persistent symptoms (> 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 daily inhaled anti-inflammatory medication in the form of a low-dose ICS with as-needed SABA reliever medication.[25]

- **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 twice a month and have no risk factors for exacerbations may use an as-needed inhaled short-acting reliever medication in the form of a short-acting β2-agonist (SABA).[11]

- **Step 2:** Children who experience symptoms more than twice per week or have symptoms that cause waking one or more nights per week while taking as-needed SABA medication should be offered a daily inhaled anti-inflammatory medication in the form of a low-dose ICS with as-needed SABA reliever medication.[11] Daily use of an oral anti-inflammatory medication in the form of a leukotriene receptor antagonist (LTRA) with as-needed SABA reliever medication is a less effective second-line step 2 alternative.[32]

- **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.[11] 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 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 twice a month and have no risk factors for exacerbations may use as-needed inhaled short-acting reliever medication in the form of a short-acting β2-agonist (SABA).[11] As-needed use of a combined inhaled anti-inflammatory and long-acting reliever medication in the form of low-dose budesonide-formoterol (i.e., ICS/ LABA) may be an alternative step 1 therapy.[30,33-35]

- **Step 2:** Adolescents who experience symptoms more than twice per week or have symptoms that cause waking one or more nights per week while taking as-needed SABA medication should be offered a daily inhaled anti-inflammatory medication in the form of a low-dose ICS with as-needed SABA reliever medication.[11,18,26,36] Recent evidence suggests that the as-needed use of a combined inhaled anti-inflammatory and long-acting reliever medication in the form of low-dose budesonide-formoterol may be an alternative step 2 therapy.[30,33-35] 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 alternative.[11]

- **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). Those who have uncontrolled asthma while using as-needed low-dose budesonide-formoterol should similarly be switched to daily use of this medication. Second-line step 3 alternatives include continuing to take daily low-dose ICS and adding a daily LTRA; or daily medium-dose ICS.[11]

- **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. Second-line step 4 alternatives 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 tiotropium.[11]

- **Step 5:** Adolescents who have uncontrolled asthma while using daily step 4 medications should be offered daily high-dose ICS/LABA and should be referred to specialized pediatric asthma care (see quality statement 5).[11]

Once the child or adolescent with asthma has achieved control with at least 3 months of controller medication, pharmacotherapy should be reduced to the lowest effective dose required to maintain asthma control, prevent future exacerbations, and minimize side effects. 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.[25]

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, regardless of the outcome of the therapeutic trial (see quality statement 1).[10]

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

Sources

British Thoracic Society and Scottish Intercollegiate Guidelines Network, 2016[18]
Canadian Thoracic Society, 2012,[10] 2015,[25] 2017[11]
Global Initiative for Asthma, 2019[30]
National Institute for Health and Care Excellence, 2017[26]

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.[9] Because uncontrolled asthma is most commonly associated with undertreatment, a lack of adherence to medication, and/or incorrect inhaler technique, care delivery that follows guideline recommendations for pharmacological escalation can help to improve asthma control.

However, appropriate pharmacotherapy 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 and asthma education (see quality statement 4).[1] Therefore, discussions about appropriate pharmacotherapy 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 caregiver(s)' 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.[1] 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, and personal or peer preference for a specific device. Adolescents are particularly at high risk for uncontrolled asthma due to a "quick fix" mentality, which may lead them to not take controller medications.[3]

Lack of knowledge among prescribers about optimal escalation and tapering of asthma medication continues to be an important barrier to appropriate pharmacotherapy. 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 pharmacological management for adults with asthma.[27] 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 develop a treatment plan that works for your child. They should:

- Explain how and when your child should use their medications
- 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 medication. If your child's asthma symptoms continue on their current medications, talk with their health care professional about trying a different dose or a different asthma medication.

For Clinicians
Prescribe medications based on the person's level of asthma control. Escalate pharmacotherapy, according to definition above, only after addressing other reasons for poor control (see quality statement 2).[11] 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 more than twice per week or have symptoms that cause waking one or more nights per week.[11] For children 12 years of age and older, budesonide-formoterol, to be taken as needed, may be prescribed as an alternative for the same indications. 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, if needed, 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 that training, systems, processes, and resources are in place in primary care and community-based setting for health care professionals to prescribe appropriate pharmacotherapy and devices based on the asthma control level of children and adolescents with asthma. Ensure caregivers of children and adolescents with asthma can access and afford the most appropriate pharmacotherapy and devices for their child.

Quality Indicators: How to Measure Improvement for This Statement

- Percentage of children and adolescents with asthma who are prescribed inhaled anti-inflammatory therapy
- Percentage of children and adolescents with uncontrolled asthma who have their pharmacotherapy 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 2.

Quality Statement 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.

Definitions

Asthma action plan: A written personalized asthma action plan (sometimes referred to as an AAP) 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 are 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 by regularly using controller medication
- How to identify signs, symptoms, and/or peak flow meter rate indicating uncontrolled asthma
- What to do during periods of uncontrolled asthma, such as medications to add or increase, 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)

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 plans can be provided by primary care providers, such as family doctors or nurse practitioners, or by respirologists, pediatricians, allergists, and other physicians. In additions, 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.

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 every 6 months.

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 issues[4]:

- 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 irritants and allergic triggers (e.g., colds, smoke, air pollution, allergens, perfumes/scents, chemicals)
- Smoking prevention and cessation of 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)[1,11]
- 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

To ensure people are empowered to self-manage their asthma, health care professionals who provide self-management education 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).

Sources

British Thoracic Society and Scottish Intercollegiate Guidelines Network, 2016[18]
Canadian Thoracic Society, 2010,[9] 2015[25]
Global Initiative for Asthma, 2018[1]
National Institute for Health and Care Excellence, 2017[26]
Registered Nurses' Association of Ontario, 2004[3]

Rationale

Children and adolescents with a confirmed diagnosis of asthma and their caregivers should receive asthma self-management education that emphasizes adherence to pharmacotherapy, instruction on appropriate inhaler and spacer technique, and avoidance of irritants such as cigarette smoke and airborne allergens. They should also receive a written personalized self-management plan, referred to as an asthma action plan.[25] 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.

Providing self-management education on inhaler technique, along with asthma action plans that reinforce understanding of pharmacotherapy and are regularly reviewed by a health care professional, can significantly improve people's asthma management and their health outcomes.[10,12,37] In practice currently, self-management education remains poorly implemented, and the provision of written asthma action plans has been low.[12,38] 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. In a chart review conducted in primary care in Alberta, only 2% of patients had an asthma action plan.[12,39]

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

For Clinicians
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. 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 team-based health and social services).

For Health Services Planners
Ensure that training, systems, processes, and resources are in place in primary care and community-based setting 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 that 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 received asthma self-management education from a trained health care professional at least once
- 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 6 months

Measurement details for these indicators, as well as indicators to measure overarching goals for the entire quality standard, are presented in Appendix 2.

Quality Statement 5: Referral to Specialized Pediatric Asthma Care

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

Definitions

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

- Inability to perform objective tests, diagnostic uncertainty (e.g., having obstructive spirometry but negative bronchodilator reversibility, symptoms suggestive of asthma but negative spirometry and negative peak flow variability), or suspicion of comorbidity or an alternative diagnosis that requires specialist care
- Lack of response to an escalation of controller pharmacotherapy, such as frequent symptoms (≥ 8 days/month) despite medium-dose of inhaled corticosteroid (ICS) (200–250 mcg for children 1 to 5 years of age or 201–800 mcg for children and adolescents 6 years of age and over) with correct inhaler technique and appropriate medication adherence[1,11,25]
- 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] and the use of a second controller for the previous year, or the use of oral corticosteroids for half the previous year to prevent asthma from becoming uncontrolled or remaining uncontrolled despite this therapy)
- 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)[1]
- 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 pediatric 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)

Sources

British Thoracic Society and Scottish Intercollegiate Guidelines Network, 2016[18]
Canadian Thoracic Society, 2010,[9] 2015[25]

Rationale

Most children and adolescents with asthma can effectively manage their asthma with pharmacotherapy, 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.[1,11] 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.[40] Particularly, these patients' parents reported that their children underused asthma controller medications (24% vs. 64%) and asthma action plans (20% vs. 62%).[40]

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.[25,41] 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.

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
Refer children and adolescents with asthma 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 that all children and adolescents with asthma have timely access to specialized pediatric asthma care when needed upon referral from their primary care provider. Ensure health care professionals in primary care and community-based care are aware of the asthma services and referral processes in their communities.[4]

Quality Indicators: How to Measure Improvement for This Statement

- Percentage of children and adolescents with severe asthma and 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 who have a visit 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 2.

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.

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 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). In some cases, a phone or virtual follow-up may be sufficient.
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 pharmacotherapy as needed, 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)

Sources

Advisory committee consensus
British Thoracic Society and Scottish Intercollegiate Guidelines Network, 2016[18]
Global Initiative for Asthma, 2018[1]

Rationale

Asthma exacerbations can be life-threatening emergencies and may require care in an emergency department or a hospitalization.[1] The subsequent transition from hospital to home can complicate a person's care, as transitions are vulnerable points in the provision of health care.[42] Transitions pose a risk of information being lost or miscommunicated between health care settings, which can increase the person's vulnerability to adverse events.[43]

For children 6 years of age and older 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.[9] 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%).[44]

Prompt follow-up in primary care 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.[43]

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

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. 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, the emergency department care team should tell their caregiver to arrange a follow-up primary care appointment and send the person's discharge information directly to the primary care provider. If the person was hospitalized, the hospital care team should arrange for a follow-up assessment in primary care to ensure the person's treatment continues, their asthma symptoms are well controlled, and their lung function reaches their known personal best.

Complete a follow-up assessment in primary care for all children and adolescents who have had an asthma exacerbation within 2 to 7 days of an asthma-specific emergency department visit or hospitalization. In some cases, a phone or virtual follow-up may be sufficient.[1] The assessment should consist of (1) a medication review; (2) a review of strategies to improve asthma management, including medication adherence, inhaler technique, and asthma education; and (3) a written asthma action plan.[1,18] Following discharge, consider referral to an asthma education program or specialized pediatric asthma care.[1]

For Health Services Planners
Ensure systems, processes, and resources are in place so that 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 that all children and adolescents with asthma have a primary care provider, that arrangements for a follow-up assessment in primary care are

made, and that seamless communication is possible between hospital and primary care settings.

Quality Indicators: How to Measure Improvement for This Statement

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

Measurement details for these indicators, as well as indicators to measure overarching goals for the entire quality standard, are presented in Appendix 2.

Appendix 1: How the Health Care System Can Support Implementation

To come

Appendix 2: How to Measure Success

The Asthma Quality Standard Advisory Committee identified a small number of overarching goals for this quality standard, which can be measured using the indicators below.

How Success Can Be Measured Provincially

These are the indicators that will be used to monitor the progress being made provincially:

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

- Denominator: total number of children and adolescents (6 to 16 years of age) with asthma
- Numerator: number of people in the denominator whose diagnosis is confirmed with lung function testing
- Data source: to come

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 source: to come

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 source: to come

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 source: to come

How Success Can Be Measured Locally

To measure the quality of care children and adults are receiving for their asthma, we recommend clinicians and organizations use the following locally measurable indicators, which cannot be measured provincially at this time:

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 and/or symptoms with pharmacotherapy

- 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 and/or symptoms with pharmacotherapy
- Data source: to come

Percentage of children and adolescents with asthma who had a structured assessment in the previous 6 months to determine their asthma symptom control and the reasons for poor control

- 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 to determine their asthma symptom control and the reasons for poor control
- Data source: to come

Percentage of children and adolescents with asthma who are prescribed inhaled anti-inflammatory therapy

- Denominator: total number of children and adolescents with asthma
- Numerator: number of people in the denominator who are prescribed inhaled anti-inflammatory therapy
- Data source: to come

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

- Data source: to come

Average number of days missed from school or work due to asthma in the previous 12 months

- Data source: to come

To assess equitable delivery of care, clinicians and organizations can stratify the statement-specific indicators and the overall local indicators by patient socioeconomic and demographic characteristics, such as income, education, language, age, sex, and gender.

In addition to the overall measures of success, each quality statement within the standard is accompanied by one or more indicators. These statement-specific indicators, detailed below, are intended to guide the measurement of quality improvement efforts related to the implementation of the statement.

Quality Statement 1: Diagnosis

Percentage of children and adolescents 6 to 16 years of age clinically suspected of having asthma who undergo 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 children and adolescents in the denominator who undergo 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 and/or symptoms of airflow obstruction and reversibility of those signs and/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 and/or symptoms of airflow obstruction and reversibility of those signs and/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 to determine their asthma symptom control and, if applicable, the reasons for poor control

- Denominator: total number of children and adolescents with asthma
- Numerator: number of children and adolescents in the denominator who had a structured assessment in the previous 6 months to determine their asthma symptom control and, if applicable, the reasons for poor control
- Data source: local data collection

Percentage of children and adolescents 6 to 16 years of age with asthma who received 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 children and adolescents in the denominator who received 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: Pharmacological Management

Percentage of children and adolescents with asthma who are prescribed inhaled anti-inflammatory therapy

- Denominator: total number of children and adolescents with asthma
- Numerator: number of children and adolescents in the denominator who are prescribed inhaled anti-inflammatory therapy
- Data source: local data collection

Percentage of children and adolescents with uncontrolled asthma who have their pharmacotherapy 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 children and adolescents in the denominator who have their pharmacotherapy 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 received asthma self-management education from a trained health care professional at least once

- Denominator: total number of children and adolescents with asthma
- Numerator: number of children and adolescents 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 children and adolescents 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 6 months

- Denominator: total number of children and adolescents with asthma who have a written personalized asthma action plan
- Numerator: number of children and adolescents in the denominator who have had their asthma action plan reviewed in the previous 6 months
- Data source: local data collection

Quality Statement 5: Referral to Specialized Pediatric Asthma Care

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

- Denominator: total number of children and adolescents with severe asthma and one or more appropriate indications
- Numerator: number of children and adolescents 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 who have a visit 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 children and adolescents in the denominator who have a visit 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 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 children and adolescents in the denominator who have a follow-up assessment in primary care 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 (for providers captured in the OHIP Claims Database), OHIP Claims Database

Appendix 3: 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.

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.

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About Health Quality Ontario

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We focus on making health care more effective, efficient and affordable through a legislative mandate of:

- Reporting to the public, organizations, government and health care providers on how the health system is performing,
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- Translating this evidence into clinical standards; recommendations to health care professionals and funders; and tools that health care providers can easily put into practice to make improvements.

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