QUALITY STANDARDS

Asthma

Care in the Community for People Under 16 Years of Age

Measurement Guide

August 2020

Ontario Health
Quality

Contents

1 How to Use the Measurement Guide 3
2 Quality Indicators in Quality Standards 4
2.1 Measurement Principles 4
2.2 Process Indicators 4
2.3 Structural Indicators 5
2.4 Outcome Indicators 5
2.5 Balancing Measures 6
3 Local Measurement 7
3.1 Local Data Collection 7
3.2 Measurement Principles for Local Data Collection 7
3.3 Benchmarks and Targets 9
4 Provincial Measurement 10
4.1 Accessing Provincially Measurable Data 10
5 How Success Can Be Measured for This Quality Standard 11
5.1 Quality Standard Scope 11
5.2 Cohort Identification 12
5.3 How Success Can Be Measured Provincially 12
5.4 How Success Can Be Measured Locally 24
6 Resources and Questions 33
6.1 Resources 33
6.2 Questions? 33
7 Appendix: Data Sources Referenced in This Quality Standard 34

1 How to Use the Measurement Guide

This document is meant to serve as a measurement guide to support the adoption of the Asthma quality standard. Care for people with asthma is a critical issue, and there are significant gaps and variations in the quality of care that people in the community receive. Recognizing this, the Quality business unit at Ontario Health released this quality standard to identify opportunities that have a high potential for quality improvement.

This guide is intended for use by those looking to adopt the Asthma quality standard, including health care professionals working in regional or local roles.

This guide has dedicated sections for each of the two types of measurement within the quality standard:

- **Local measurement:** what you can do to assess the quality of care that you provide locally
- **Provincial measurement:** how we can measure the success of the quality standard on a provincial level using existing provincial data sources

Important Resources for Quality Standard Adoption

Ontario Health (Quality) has created resources to assist with the adoption of quality standards:

- A *Getting Started Guide* that outlines a process for using quality standards as a resource to deliver high-quality care. It includes links to templates, tools, and stories and advice from health care professionals, patients, and caregivers. You can use this guide to learn about evidence-based approaches to implementing changes to practice
- A *Quality Improvement Guide* to give health care teams and organizations in Ontario easy access to well-established quality improvement tools. The guide provides examples of how to adapt and apply these tools to our Ontario health care environments
- An online community called Quorum that is dedicated to working together to improve the quality of health care across Ontario. Quorum can support your quality improvement efforts

2 Quality Indicators in Quality Standards

Quality standards inform providers and patients about what high-quality health care looks like for aspects of care that have been deemed a priority for quality improvement in the province. They are intended to guide quality improvement, monitoring, and evaluation.

Measurability is a key element in developing and describing the quality statements; each statement is accompanied by one or more indicators. This section describes the measurement principles behind the quality indicators, the process for developing these indicators, and the technical definitions of the indicators.

An effective quality statement must be measurable. Measurement is necessary to demonstrate if a quality statement has been properly implemented, and if it is improving care for patients. This is a key part of the Plan-Do-Study-Act improvement cycle. If measurement shows there has been no improvement, you need to consider a change or try something different.

2.1 Measurement Principles

Ontario Health (Quality) uses the process, structure, and outcome indicator framework developed by Donabedian in 1966 to develop indicators for quality standards. The three indicator types play essential and interrelated roles in measuring the quality of health care and the impact of introducing and using quality standards.

The indicators provided are merely suggestions. It is not expected that every provider, team, or organization will be able to measure all of them (or even want to measure all of them), but they can identify which indicators best capture areas of improvement for their care and what can be measured given existing local data sources.

2.2 Process Indicators

Process indicators assess the activities involved in providing care. They measure the percentage of individuals, episodes, or encounters for which an activity (process) is performed. In most cases, the numerator should specify a timeframe in which the action is to be performed, established through evidence or expert consensus. When a quality statement applies to a subset of individuals rather than the total population, the denominator should reflect the population of the appropriate subgroup, rather than the entire Ontario population. If exclusions are required or stratifications are suggested, they are reflected in the indicator specifications.

Process indicators are central to assessing whether or not the quality statement has been achieved; nearly all quality statements are associated with one or more process indicators. In most cases, the numerator and denominator for process indicators can be derived from the language of the quality statement itself; additional parameters (such as a timeframe) can also appear in the background and definitions sections. In some cases, a proxy indicator is provided that indirectly measures the process. Proxy indicators are used only when the actual indicator cannot be measured with currently available data.

While most quality statements focus on a single concept and are linked with a single process indicator, some statements include two or more closely related concepts. In these cases, multiple process

indicators can be considered to capture all aspects of the quality statement. For example, a quality statement might suggest the need for a comprehensive assessment with several components, and each of those components might have a process indicator.
Examples of process indicators include the percentage of patients with hip fracture who receive surgery within 48 hours, or the percentage of patients with schizophrenia who are offered clozapine. Please refer to the published quality standards for more examples.

2.3 Structural Indicators

Structural indicators assess the structures and resources that influence and enable delivery of care. These can include equipment; systems of care; availability of resources; and teams, programs, policies, protocols, licences, or certifications. Structural indicators assess whether factors that are in place are known to help in achieving the quality statement.

Some quality statements have structural indicators associated with them. Structural indicators are binary or categorical and do not require the definition of a numerator and denominator. However, in some cases it could be useful to specify a denominator defining an organizational unit, such as a hospital, a primary care practice, or a local region. In many cases data to measure structural indicators are not readily available using existing administrative data, so local data collection might be required. This local data collection might require regional or provincial level data collection systems to be developed.

Structural indicators should be defined for a quality statement or for the quality standard as a whole when there is strong evidence that a particular resource, capacity, or characteristic is important for enabling the effective delivery of a process of care. It should be theoretically feasible for these structural elements to be implemented across Ontario, even if adoption is aspirational in some cases. In rare instances, a quality statement might have two or more associated structural indicators, if the quality standard advisory committee decides that multiple factors are crucial to the delivery of the quality statement. Structural indicators should align with the Recommendations for Adoption, which outline gaps in resources in the province.

Examples of structural indicators include the availability of a stroke unit, the existence of discharge planning protocols, or access to a specialized behavioural support team. Please refer to the published quality standards for more examples.

2.4 Outcome Indicators

Outcome indicators assess the end results of the care provided. They are crucial and are arguably the most meaningful measures to collect, but many health outcomes—such as mortality or unplanned hospital readmissions—are often the product of a variety of related factors and cannot be reliably attributed to a single process of care. For this reason, although relatively few quality statements are directly linked to an outcome indicator, a set of overall measures—including key outcome indicators—is defined for the quality standard as a whole, reflecting the combined effect of all of the quality statements in the standard. Similar to process indicators, outcome indicators should be specified using a defined denominator and a numerator that, in most cases, should include a clear timeframe.

Examples of outcome indicators include mortality rates, improvement (or decline) in function, and patients' experience of care. Please refer to the published quality standards for more examples.

2.5 Balancing Measures

Balancing measures indicate if there are important unintended adverse consequences in other parts of the system. Examples include staff satisfaction and workload. Although they are not the focus of the standard and generally not included in the standard, the intention of these types of measures is to monitor the unintended consequences.

3 Local Measurement

As part of the Asthma quality standard, *specific* indicators were identified for each of the statements to support measurement for quality improvement.

As an early step in your project, we suggest that your team complete an *initial assessment* of the relevant indicators in the standard and come up with a draft measurement plan.

Here are some concrete next steps:

- Review the list of identified indicators (See Appendix 2 in the quality standard), and determine which ones you will use as part of your adoption planning, given your knowledge of current gaps in care
- Determine the availability of data related to the indicators you have chosen
- Identify a way to collect local data related to your chosen indicators. This may be through clinical chart extraction or administration of local surveys for example.
- Develop a draft measurement plan

The earlier you complete the above steps, the more successful your quality improvement project is likely to be.

3.1 Local Data Collection

Local data collection refers to data collection at the health provider or team level for indicators that cannot be assessed using provincial administrative or survey databases (such as databases held by the Institute for Clinical Evaluative Sciences or the Canadian Institute for Health Information). Examples of local data include data from electronic medical records, clinical patient records, regional data collection systems, and locally administered patient surveys. Indicators that require local data collection can signal an opportunity for local measurement, data advocacy, or data quality improvement.

Local data collection has many strengths: it is timely, can be tailored to quality improvement initiatives, and is modifiable on the basis of currently available data. However, caution is required when comparing indicators using local data collection between providers and over time to ensure consistency in definitions, consistency in calculation, and validity across patient groups.

3.2 Measurement Principles for Local Data Collection

Three types of data can be used to construct measures in quality improvement: continuous, classification, and count data. For all three types of data, it is important to consider clinical relevance when analyzing results (i.e. not every change is a clinically relevant change).

3.2.1 Continuous Data

Continuous data can take any numerical value in a range of possible values. These values can refer to a dimension, a physical attribute, or a calculated number. Examples include patient weight, number of calendar days, and temperature.

3.2.2 Classification Data

Classification (or categorical) data are recorded in two or more categories or classes. Examples include sex, race or ethnicity, and number of patients with depression versus number of patients without depression. In some cases, you might choose to convert continuous data into categories. For example, you could classify patient weight as underweight, normal weight, overweight, or obese.

Classification data are often presented as percentages. To calculate a percentage from classification data, you need a numerator and a denominator (a percentage is calculated by dividing the numerator by the denominator and multiplying by 100). The numerator includes the number of observations meeting the criteria (e.g., number of patients with depression), and the denominator includes the total number of observations measured (e.g., total number of patients in clinic). Note that the observations in the numerator must also be included in the denominator (source population).

Examples of measures that use classification data include percentage of patients with a family physician and percentage of patients who receive therapy.

3.2.3 Count Data

Count data often focus on attributes that are unusual or undesirable. Examples include number of falls in a long-term care home and number of medication errors.

Count data are often presented as a rate, such as the number of events per 100 patient-days or per 1,000 doses. The numerator of a rate counts the number of events/nonconformities, and the denominator counts the number of opportunities for an event. It is possible for the event to occur more than once per opportunity (e.g., a long-term care resident could fall more than once).

$$Rate\ of\ 30\text{-}day\ hospital\ readmission =$$

$$\frac{Number\ of\ hospital\ readmissions\ within\ 30\ days\ of\ discharge\ [\mathbf{numerator}]}{Number\ of\ discharges\ from\ hospital\ [\mathbf{denominator}]}$$

3.2.4 Benefits of Continuous Data

It is common practice in health care to measure toward a target instead of reporting continuous measures in their original form. An example would be measuring the number of patients who saw their primary care physician within 7 days of hospital discharge instead of measuring the number of days between hospital discharge and an appointment with a primary care physician. Targets should be evidence-based or based on a high degree of consensus across clinicians.

When a choice exists, continuous data sometimes are more useful than count or classification data for learning about the impact of changes tested. Measures based on continuous data are more responsive and can capture smaller changes than measures based on count data; therefore, it is easier and faster to see improvement with measures based on continuous data. This is especially true when the average value for the continuous measure is far from the target. Continuous data are also more sensitive to change. For example, while you might not increase the number of people who are seen within 7 days, you might reduce how long people wait.

3.3 Benchmarks and Targets

Benchmarks are markers of excellence to which organizations can aspire. Benchmarks should be evidence-based or based on a high degree of consensus across clinicians. At this time, Ontario Health (Quality) does not develop benchmarks for the indicators. Users of these standards have variable practices, resources, and patient populations, so one benchmark might not be practical for the entire province.

Targets are goals for care that are often developed in the context of the local care environment. Providers, teams, and organizations are encouraged to develop their own targets appropriate to their patient populations, their current performance and their quality improvement work. Organizations that include a quality standard indicator in their quality improvement plans are asked to use a target that reflects improvement. Timeframe targets, like the number of people seen within 7 days, are typically provided with process indicators intended to guide quality improvement.

In many cases, achieving 100% on an indicator is not possible. For example, someone might not receive care in a wait time benchmark due to patient unavailability. This is why it is important to track these indicators over time, to compare results against those of colleagues, to track progress, and to aim for the successful implementation of the standard.

For guidance on setting benchmarks and targets at a local level, refer to:

- Approaches to Setting Targets for Quality Improvement Plans
- Long-Term Care Benchmarking Resource Guide

4 Provincial Measurement

In its quality standards, Ontario Health (Quality) strives to incorporate measurement that is standardized, reliable, and comparable across providers to assess the impact of the standards provincially. Where possible, indicators should be measurable using province-wide data sources. However, in many instances data are unavailable for indicator measurement. In these cases, the source is described as local data collection.

For more information on the data sources referenced in this standard, please see the **appendix.**

4.1 Accessing Provincially Measurable Data

Provincial platforms are available to users to create custom analyses to help you calculate results for identified measures of success. Examples of these platforms include IntelliHealth and eReports. Please refer to the links below to determine if you have access to the platforms listed.

4.1.1 IntelliHealth—Ministry of Health

IntelliHealth is a knowledge repository that contains clinical and administrative data collected from various sectors of the Ontario healthcare system. IntelliHealth enables users to create queries and run reports through easy web-based access to high quality, well organized, integrated data.

4.1.2 eReports—Canadian Institute for Health Information

Quick Reports offer at-a-glance comparisons for the organizations you choose. The tool also provides some ways to manipulate the pre-formatted look and feel of the reports. Flexible or Organization Reports offer you many choices to compare your organization's data with those of other organizations. With these customizable reports, you can view data by different attributes and for multiple organizations.

4.1.3 Applied Health Research Questions (AHRQ) — Institute for Clinical Evaluative Sciences

ICES receives funds from the Ministry of Health to provide research evidence to organizations from across the Ontario health care system (Knowledge Users). This knowledge is used to inform planning, policy and program development. Knowledge Users can submit an Applied Health Research Question (AHRQ) to ICES. As a health services research institute that holds Ontario's administrative data, ICES is well positioned to respond to AHRQs that directly involve the use of ICES data holdings.

5 How Success Can Be Measured for This Quality Standard

This measurement guide accompanies Ontario Health (Quality)'s Asthma quality standard. Early in the development of each quality standard, a few performance indicators are chosen to measure the success of the entire standard. These indicators guide the development of the quality standard so that every statement within the standard aids in achieving the standard's overall goals.

This measurement guide includes information on the definitions and technical details of the indicators listed below:

- 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
- 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

This guide includes data sources for indicators that can be consistently measured across providers, across the sectors of health care, and across the province.

Indicators are categorized as:

- Provincially measurable (the indicator is well defined and validated) *or*
- Locally measurable (the indicator is not well defined, and data sources do not currently exist to measure it consistently across providers and at the system level)

For more information on statement-specific indicators, please refer to the quality standard.

5.1 Quality Standard Scope

This quality standard addresses care for people under 16 years of age, with a focus on primary care and community-based settings.

This quality standard includes 6 quality statements. They address areas identified by Ontario Health (Quality)'s Asthma Quality Standard Advisory Committee as having high potential for improving the quality of care in Ontario for people with asthma.

5.2 Cohort Identification

For measurement at the provincial level, people with asthma can be identified using a validated algorithm using administrative data developed by Gershon et al. Details on the algorithm can be found in the tables below. For local measurement, people with asthma may be identified using local data sources (such as electronic medical records or clinical patient records).

5.3 How Success Can Be Measured Provincially

The Asthma Quality Standard Advisory Committee identified a small number of overarching goals **for this quality standard.** These have been mapped to indicators that may be used to assess quality of care provincially. The following indicators are currently measurable in Ontario's health care system:

- 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

Methodologic details are described in the tables below.

Table 1: Percentage of children and adolescents 6 to 16 years of age with incident asthma whose diagnosis is confirmed with lung function testing

GENERAL DESCRIPTION	Indicator description	Name: Percentage of children and adolescents 6 to 16 years of age with incident asthma whose diagnosis is confirmed with lung function testing Directionality: A higher percentage is better
	Measurability	**Measurable at the provincial level**
	Dimensions of quality	Effective
	Quality statement alignment	**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.
DEFINITION & SOURCE INFORMATION	Calculation: General	**Denominator** Total number of children and adolescents 6 to 16 years of age with newly diagnosed with asthma in the year of interest *Inclusions:* - Age 6 to 16 *Exclusions:* - Invalid OHIP number - Missing sex - Missing LHIN - Missing rurality Note: The index date for the asthma cohort is defined as the first asthma diagnosis after April 1, 1991. Individuals who were aged 0 to 99 years, were residents of Ontario at the index date and contained no missing gender information in the Registered People Database (RPDB) database were included in the cohort. To construct the cohort, all OHIP claims that occurred after the index date were extracted, including medical and non-medical physician

		billings, as well as laboratory and non-laboratory billings. The ICD-9 fee code 493 was used to identify the subset of asthma OHIP claims made from July 1, 1991 onward. Since it is possible for multiple OHIP billings to occur for each patient, only one claim per physician, per service day, per patient was used to represent a health care visit. All inpatient acute care hospital admissions and same day surgeries occurring after the index date were extracted from the CIHI database. ICD-9 code 493 and ICD-10 code J45 were used to identify the subset of asthma hospitalizations. The diagnosis date was taken as the earlier of either the first asthma hospitalization or the first of two OHIP claims that comprised the asthma algorithm. **Numerator** Total number of individuals in the denominator with a lung function test in one year prior to or two and half years after the incidence date Ontario Health Insurance Plan (OHIP) physician claim must include one of the following interventions: - J301: Volume versus Time Study - J324: - repeat J301 after bronchodilator - J304: Volume versus Flow Study - J327: - repeat J304 after bronchodilator - J333: Non-specific bronchial provocative test (histamine, methacholine, thermal challenge) **Method** Numerator divided by the denominator times 100 **Data sources:** Registered Persons Database (RPDB), Ontario Health Insurance Plan (OHIP), Discharge Abstract Database (DAD)
ADDITIONAL INFORMATION	Limitations	Lung function testing offered in Community Health Centers (CHCs) or offered by providers that do not bill OHIP would not be captured in the numerator. The asthma cohort may underestimate the number of individuals newly diagnosed with asthma. Quality of the data are dependent on coding accuracy at the point of care

	Comments	Individuals with asthma are identified using a previously validated health administrative data case definition for asthma: ≥ 2 outpatient claims in 2 consecutive years or ≥ 1 hospitalizations(s) for asthma with a sensitivity of 84 per cent and a specificity of 76 per cent when compared to a clinical reference standard.[1,2] [1]To T, Cicutto L, Dell S, Dick PT, MacLusky I. Case verification of children with asthma in Ontario. Pediatric Allergy and Immunology 2006; 17:69-76. [2]Gershon AS, Wang C, Guan J, Vasilevska-Ristovska J, Cicutto L, To T. Identifying patients with physician diagnosed asthma in health administrative databases. Can Respir J. 2009 Nov-Dec;16(6):183-8.

Table 2: Percentage of children and adolescents 6 to 16 years of age with asthma who had a lung function test in the previous 12 months

GENERAL DESCRIPTION	Indicator description	Name: Percentage of children and adolescents 6 to 16 years of age with asthma who had a lung function test in the previous 12 months Directionality: A higher percentage is better
	Measurability	**Measurable at the provincial level**
	Dimensions of quality	Effective
	Quality statement alignment	**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.
DEFINITION & SOURCE INFORMATION	Calculation: General	**Denominator** Total number of children and adolescents 6 to 16 years of age with asthma who had at least one asthma claim (active asthma) in the year of interest *Inclusions:* - Age 6 to 16 *Exclusions:* - Invalid OHIP number - Missing sex - Missing LHIN - Missing rurality - Asthma prevalence without year OHIP coverage Note: The index date for the asthma cohort is defined as the first asthma diagnosis after April 1, 1991. Individuals who were aged 0 to 99 years, were residents of Ontario at the index date and contained no missing gender information in the Registered People Database (RPDB) database were included in the cohort. To construct the cohort, all OHIP claims that occurred after the index date were extracted, including medical and non-medical physician

		billings, as well as laboratory and non-laboratory billings. The ICD-9 fee code 493 was used to identify the subset of asthma OHIP claims made from July 1, 1991 onward. Since it is possible for multiple OHIP billings to occur for each patient, only one claim per physician, per service day, per patient was used to represent a health care visit. All inpatient acute care hospital admissions and same day surgeries occurring after the index date were extracted from the CIHI database. ICD-9 code 493 and ICD-10 code J45 were used to identify the subset of asthma hospitalizations. The diagnosis date was taken as the earlier of either the first asthma hospitalization or the first of two OHIP claims that comprised the asthma algorithm. Active asthma: Individuals with asthma who had at least one Ontario Health Insurance Program (OHIP) claim, emergency department (ED) visit or hospitalization for asthma in a fiscal year. These individuals are a subset of the asthma prevalence cohort. **Numerator** Total number of individuals in the denominator with a lung function test in the year prior to the date of first asthma health service use in the year Ontario Health Insurance Plan (OHIP) physician claim must include one of the following interventions: - J301: Volume versus Time Study - J324: - repeat J301 after bronchodilator - J304: Volume versus Flow Study - J327: - repeat J304 after bronchodilator - J333: Non-specific bronchial provocative test (histamine, methacholine, thermal challenge) **Method** Numerator ÷ denominator x 100 **Data sources:** Registered Persons Database (RPDB), Ontario Health Insurance Plan (OHIP), Discharge Abstract Database (DAD), National Ambulatory Care Reporting System (NACRS)

ADDITIONAL INFORMATION	Limitations	Lung function testing offered in Community Health Centers (CHCs) or offered by providers that do not bill OHIP would not be captured in the numerator. The asthma cohort may underestimate the number of individuals newly diagnosed with asthma. Quality of the data are dependent on coding accuracy at the point of care
	Comments	Individuals with asthma are identified using a previously validated health administrative data case definition for asthma: ≥ 2 outpatient claims in 2 consecutive years or ≥ 1 hospitalizations(s) for asthma with a sensitivity of 84 per cent and a specificity of 76 per cent when compared to a clinical reference standard.[1,2] [1]To T, Cicutto L, Dell S, Dick PT, MacLusky I. Case verification of children with asthma in Ontario. Pediatric Allergy and Immunology 2006; 17:69-76. [2]Gershon AS, Wang C, Guan J, Vasilevska-Ristovska J, Cicutto L, To T. Identifying patients with physician diagnosed asthma in health administrative databases. Can Respir J. 2009 Nov-Dec;16(6):183-8.

Table 3: Percentage of children and adolescents with asthma who visited the emergency department for an asthma-specific reason in the previous 12 months

GENERAL DESCRIPTION	Indicator description	Name: Percentage of children and adolescents with asthma who visited the emergency department for an asthma-specific reason Directionality: A lower percentage is better
	Measurability	**Measurable at the provincial level**
	Dimension of quality	Effective
	Quality statement alignment	All quality standard statements align
DEFINITION & SOURCE INFORMATION	Calculation: General	**Denominator** Total number of children and adolescents under 16 years of age with asthma in the year of interest *Inclusions:* - Under 16 years of age *Exclusions:* - Invalid OHIP number - Missing sex - Missing LHIN - Missing rurality - Asthma prevalence without year OHIP coverage Note: The index date for the asthma cohort is defined as the first asthma diagnosis after April 1, 1991. Individuals who were aged 0 to 99 years, were residents of Ontario at the index date and contained no missing gender information in the Registered People Database (RPDB) database were included in the cohort. To construct the cohort, all OHIP claims that occurred after the index date were extracted, including medical and non-medical physician billings, as well as laboratory and non-laboratory billings. The ICD-9 fee code 493 was used to identify the subset of asthma OHIP claims made from July 1, 1991 onward. Since it is possible for multiple OHIP billings to occur for each patient, only one claim per physician, per service day, per patient was used to represent a health care visit. All inpatient acute care hospital admissions and same day surgeries occurring after the index date were extracted from the CIHI database.

		ICD-9 code 493 and ICD-10 code J45 were used to identify the subset of asthma hospitalizations. The diagnosis date was taken as the earlier of either the first asthma hospitalization or the first of two OHIP claims that comprised the asthma algorithm. **Numerator** Total number individuals in the denominator who had at least one unplanned emergency department visit for asthma in the year of interest *Inclusions* - Unplanned ED Visits: VISITTYPE [1,2,4] or SCHEDEDVISIT = N - Main problem: J45 *Exclusions* - Invalid date of birth, admission date/time, discharge date/time Note: Unscheduled/unplanned ED visits are identified by: NACRS variables VISITTYPE = [1,2,4] OR SCHEDEDVISIT = N Where, VISITTYPE, Values 1= Unplanned Emergency Dep visit for a new clinical condition 2 = Unplanned return visit to Emergency Dep for the same clinical condition 3 = Planned return visit to follow-up to the Emergency Dep visit for the same clinical condition 4 = Patients referred for Emergency Department service provider assessment 5 = Patient referred and seen by a non-Emergency Dept service provider SCHEDEDVISIT Values: N = Not scheduled, Y = Scheduled **Method** Numerator ÷ Denominator × 100 **Data sources:** Registered Persons Database (RPDB), Ontario Health Insurance Plan (OHIP), Discharge Abstract Database (DAD), National Ambulatory Care Reporting System (NACRS)
ADDITIONAL INFORMATION	Limitations	Quality of the data are dependent on coding accuracy at the point of care. The asthma cohort may underestimate the number of individuals diagnosed with asthma.

	Comments	Individuals with asthma are identified using a previously validated health administrative data case definition for asthma: ≥ 2 outpatient claims in 2 consecutive years or ≥ 1 hospitalizations(s) for asthma with a sensitivity of 84 per cent and a specificity of 76 per cent when compared to a clinical reference standard.[1,2] [1]To T, Cicutto L, Dell S, Dick PT, MacLusky I. Case verification of children with asthma in Ontario. Pediatric Allergy and Immunology 2006; 17:69-76. [2]Gershon AS, Wang C, Guan J, Vasilevska-Ristovska J, Cicutto L, To T. Identifying patients with physician diagnosed asthma in health administrative databases. Can Respir J. 2009 Nov-Dec;16(6):183-8.

Table 4: Percentage of children and adolescents with asthma who were hospitalized for an asthma-specific reason in the previous 12 months

GENERAL DESCRIPTION	Indicator description	Name: Percentage of children and adolescents with asthma who were hospitalized for an asthma-specific reason in the previous 12 months Directionality: A lower percentage is better
	Measurability	**Measurable at the provincial level**
	Dimension of quality	Effective
	Quality statement alignment	All quality standard statements align
DEFINITION & SOURCE INFORMATION	Calculation: General	**Denominator** Total number of children and adolescents under 16 years of age diagnosed with asthma *Inclusions:* - Under 16 years of age *Exclusions:* - Invalid OHIP number - Missing sex - Missing LHIN - Missing rurality - Asthma prevalence without year OHIP coverage Note: The index date for the asthma cohort is defined as the first asthma diagnosis after April 1, 1991. Individuals who were aged 0 to 99 years, were residents of Ontario at the index date and contained no missing gender information in the Registered People Database (RPDB) database were included in the cohort. To construct the cohort, all OHIP claims that occurred after the index date were extracted, including medical and non-medical physician billings, as well as laboratory and non-laboratory billings. The ICD-9 fee code 493 was used to identify the subset of asthma OHIP claims made from July 1, 1991 onward. Since it is possible for multiple OHIP billings to occur for each patient, only one claim per physician, per service day, per patient was used to represent a health care visit. All inpatient acute care hospital admissions and same day surgeries occurring after the index date were extracted from the CIHI database.

		ICD-9 code 493 and ICD-10 code J45 were used to identify the subset of asthma hospitalizations. The diagnosis date was taken as the earlier of either the first asthma hospitalization or the first of two OHIP claims that comprised the asthma algorithm. **Numerator** Total number individuals in the denominator who were hospitalized for asthma in the year of interest *Inclusions* - Nonelective hospitalizations for asthma (Most responsible diagnosis: J45) - Nonelective hospitalizations for asthma (Any diagnosis: J45) *Exclusions* - Missing date of birth, admission date/time, discharge date/time **Method** Numerator ÷ Denominator × 100 **Data sources:** Registered Persons Database (RPDB), Ontario Health Insurance Plan (OHIP), Discharge Abstract Database (DAD)
ADDITIONAL INFORMATION	Limitations	Quality of the data are dependent on coding accuracy at the point of care The asthma cohort may underestimate the number of individuals diagnosed with asthma.
	Comments	Individuals with asthma are identified using a previously validated health administrative data case definition for asthma: ≥ 2 outpatient claims in 2 consecutive years or ≥ 1 hospitalizations(s) for asthma with a sensitivity of 84 per cent and a specificity of 76 per cent when compared to a clinical reference standard.[1,2] [1]To T, Cicutto L, Dell S, Dick PT, MacLusky I. Case verification of children with asthma in Ontario. Pediatric Allergy and Immunology 2006; 17:69-76. [2]Gershon AS, Wang C, Guan J, Vasilevska-Ristovska J, Cicutto L, To T. Identifying patients with physician diagnosed asthma in health administrative databases. Can Respir J. 2009 Nov-Dec;16(6):183-8.

5.4 How Success Can Be Measured Locally

You might want to assess the quality of care you provide to your patients with asthma. You might also want to monitor your own quality improvement efforts. It can be possible to do this using your own clinical records, or you might need to collect additional data. We recommend the following list of potential indicators, some of which cannot be measured provincially using currently available 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

Methodologic details are described in the tables below.

Table 5: 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

GENERAL DESCRIPTION	Indicator description	Name: 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 Directionality: Higher is better
	Indicator status	**Developmental**
	Dimensions of quality	Effective
	Quality statement alignment	**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.
DEFINITION & SOURCE INFORMATION	Calculation: General	**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 **Method** Numerator ÷ Denominator × 100
	Data source	Local data collection

ADDITIONAL INFORMATION	Limitations	N/A
	Comments	**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. **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 Note: refer to the *Asthma: Care in the Community for People Under 16 Years of Age* Quality Standard for more information.
	Potential proxy indicator	N/A

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

GENERAL DESCRIPTION	Indicator description	Name: Percentage of children and adolescents with asthma who had a structured assessment in the previous 6 months Directionality: Higher is better
	Indicator status	**Developmental**
	Dimensions of quality	Effective
	Quality statement alignment	**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.
DEFINITION & SOURCE INFORMATION	Calculation: General	**Denominator** Total number of children and adolescents under 16 years of age diagnosed with asthma **Numerator** Number of people in the denominator who had a structured assessment in the previous 6 months **Method** Numerator ÷ Denominator × 100
	Data source	Local data collection
ADDITIONAL INFORMATION	Limitations	N/A
	Comments	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, the Asthma Control Test [ACT], the Asthma Control Questionnaire [ACQ]) to evaluate the following criteria: - 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) Note: refer to the *Asthma: Care in the Community for People Under 16 Years of Age* Quality Standard for more information.
	Potential proxy indicator	N/A

Table 7: Percentage of children and adolescents with asthma with one or more appropriate indications who are prescribed regular (daily) inhaled anti-inflammatory therapy

GENERAL DESCRIPTION	Indicator description	Name: Percentage of children and adolescents with asthma with one or more appropriate indications who are prescribed regular (daily) inhaled anti-inflammatory therapy Directionality: Higher is better
	Indicator status	**Developmental**
	Dimensions of quality	Effective
	Quality statement alignment	**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.
DEFINITION & SOURCE INFORMATION	Calculation: General	**Denominator** Total number of children and adolescents under 16 years of age with asthma with one or more appropriate indications **Numerator** Number of people in the denominator who are prescribed regular (daily) inhaled anti-inflammatory therapy **Method** Numerator ÷ Denominator × 100
	Data source	Local data collection
ADDITIONAL INFORMATION	Limitations	N/A
	Comments	**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). Inhaler technique should be assessed (e.g., using the inhaler device assessment tool [IDAT]) to identify changing needs as children and adolescents grow and develop. 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. 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 β2-agonist (LABA) or ICS/leukotriene receptor antagonist (LTRA) for adolescents 12 years of age and older, consultation with or referral to specialized pediatric asthma care should be considered. 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. Note: refer to the *Asthma: Care in the Community for People Under 16 Years of Age* Quality Standard for more information
	Potential proxy indicator	N/A

Table 8: Average number of asthma symptom–free days in the previous 4 weeks among children and adolescents with asthma

GENERAL DESCRIPTION	Indicator description	Name: Average number of asthma symptom–free days in the previous 4 weeks among children and adolescents with asthma Directionality: Higher is better
	Indicator status	**Developmental**
	Dimensions of quality	Effective
	Quality statement alignment	**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 asthma self-management education and a written personalized asthma action plan that is reviewed regularly with a health care professional.
DEFINITION & SOURCE INFORMATION	Calculation: General	**Population** Total number of children and adolescents under 16 years of age with asthma **Calculation** Mean number of symptom–free days in the previous 4 weeks
	Data source	Local data collection
ADDITIONAL INFORMATION	Limitations	N/A
	Comments	This indicator aligns with a performance indicator measured by the Primary Care – Asthma Performance Indicators (PC-API) project. More information on this initiative can be found at https://lab.research.sickkids.ca/oasis/pc-api-demo/
	Potential proxy indicator	N/A

Table 9: Average number of days missed from school or work due to asthma in the previous 4 weeks

GENERAL DESCRIPTION	Indicator description	Name: Average number of days missed from school or work due to asthma in the previous 4 weeks Directionality: Lower is better
	Indicator status	**Developmental**
	Dimensions of quality	Effective
	Quality statement alignment	**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 asthma self-management education and a written personalized asthma action plan that is reviewed regularly with a health care professional.
DEFINITION & SOURCE INFORMATION	Calculation: General	**Population** Total number of children and adolescents under 16 years of age with asthma **Calculation** Mean number of days missed from school or work (parents included) due to asthma in the previous 4 weeks
	Data source	Local data collection
ADDITIONAL INFORMATION	Limitations	N/A
	Comments	This indicator aligns with a performance indicator measured by the Primary Care – Asthma Performance Indicators (PC-API) project. More information on this initiative can be found at https://lab.research.sickkids.ca/oasis/pc-api-demo/
	Potential proxy indicator	N/A

6 Resources and Questions

6.1 Resources

Several resources are available for more information:

- The **quality standard** provides information on the background, definitions of terminology, numerators and denominators for all statement-specific indicators
- The ***Getting Started Guide*** includes quality improvement tools and resources for health care professionals, including an action plan template
- The **Case for Improvement deck** provides data on why a particular quality standard has been created and the data behind it
- The **data tables** provide data that can be used to examine variations in indicator results across the province

6.2 Questions?

Please contact qualitystandards@ontariohealth.ca. We would be happy to provide advice on measuring quality standard indicators, or put you in touch with other providers who have implemented the standards and might have faced similar questions.

Ontario Health (Quality) offers an online community dedicated to improving the quality of health care across Ontario together called Quorum. Quorum can support your quality improvement work by allowing you to:

- Find and connect with others working to improve health care quality
- Identify opportunities to collaborate
- Stay informed with the latest quality improvement news
- Give and receive support from the community
- Share what works and what doesn't
- See details of completed quality improvement projects
- Learn about training opportunities
- Join a community of practice

7 Appendix: Data Sources Referenced in This Quality Standard

Within this quality standard, there are several data sources used for provincial measurement. The data source(s) for each indicator are listed within the individual indicator specifications. More details on the specific data sources that Ontario Health (Quality) used to produce the indicators are noted below.

Discharge Abstract Database (DAD)
The Discharge Abstract Database by the Canadian Institute for Health Information contains information abstracted from hospital records that capture administrative, clinical, and patient demographic data on all hospital in-patient separations, including discharges, deaths, sign-outs, and transfers. The institute receives Ontario data directly from participating facilities, from their respective regional health authorities, or from the Ministry of Health. The database includes patient-level data for acute care facilities in Ontario. Data are collected, maintained, and validated by the institute.

The main data elements of this database are patient identifiers (e.g., name, health card number), patient demographics (e.g., age, sex, geographic location), clinical information (e.g., diagnoses, procedures), and administrative information.

National Ambulatory Care Reporting System (NACRS)
The National Ambulatory Care Reporting System by the Canadian Institute for Health Information contains data for all hospital- and community-based emergency and ambulatory care, including day surgeries, outpatient clinics, and emergency departments. Data are collected, maintained, and validated by the institute. The institute receives Ontario data directly from participating facilities, from their respective regional health authorities, or from the Ministry of Health. Data are collected, maintained, and validated by the institute.

Data elements of this reporting system include patient identifiers (e.g., name, health card number), patient demographics (e.g., age, sex, geographic location), clinical information (e.g., diagnoses, procedures), and administrative information.

Ontario Health Insurance Plan (OHIP)
The Ontario Health Insurance Plan (OHIP) claims database covers all reimbursement claims to the ministry made by fee-for-service physicians, community-based laboratories, and radiology facilities. The OHIP database at the Institute for Clinical Evaluative Sciences contains encrypted patient and physician identifiers, codes for services provided, dates of service, associated diagnoses, and fees paid. Services missing from OHIP data include some laboratory services, services received in provincial psychiatric hospitals, services provided by health service organizations and other alternative providers, diagnostic procedures performed on an in-patient basis, and laboratory services performed at hospitals (both in-patient and same day). Also excluded is remuneration to physicians through alternative funding plans; this could distort analyses because of their concentration in certain specialties or geographic areas.

Registered Persons Data Base (RPDB)
The RPDB provides basic demographic information about anyone who has ever received an Ontario health card number. The RPDB is a historical listing of the unique health numbers issued to each person eligible for Ontario health services. This listing includes corresponding demographic information such as

date of birth, sex, address, date of death (where applicable) and changes in eligibility status. At the Institute for Clinical Evaluative Sciences (ICES), data from the RPDB are enhanced with available information through other administrative data sources; however, even the enhanced dataset overestimates the number of people living in Ontario for several reasons, including the source of death information and record linkage issues. Although improvements have been made in recent years, the RPDB still contains a substantial number of individuals who are deceased or no longer living in Ontario. As such, the RPDB will underestimate mortality. To ensure that rates and estimates are correct, a methodology has been developed to adjust the RPDB so that regional population counts by age and sex match estimates from Statistics Canada.

Looking for more information?

Visit **hqontario.ca** or contact us at **qualitystandards@ontariohealth.ca** if you have any questions or feedback about this guide.

Ontario Health (Quality)
130 Bloor Street West, 10th Floor
Toronto, Ontario
M5S 1N5

Tel: 416-323-6868
Toll Free: 1-866-623-6868
Fax: 416-323-9261
Email: qualitystandards@ontariohealth.ca
Website: hqontario.ca

ISBN 978-1-4868-4387-9 (PDF)