

Quality Standards

Heart Failure

Care in the Community for Adults

Measurement Guide

This measurement guide and its associated quality standard were developed in 2019 by Health Quality Ontario and CorHealth Ontario, now both part of Ontario Health. We updated these documents in 2022 to reflect new guidance from the Canadian Cardiovascular Society and the European Society of Cardiology on the medication management for people with heart failure who have a reduced ejection fraction.



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1 How to Use the Measurement Guide

This document is meant to serve as a measurement guide to support the adoption of the Heart Failure: Care in the Community for Adults quality standard. Care for people with heart failure is a critical issue, and there are significant gaps and variations in the quality of care that people with heart failure receive in Ontario. Recognizing this, Health Quality Ontario, in partnership with CorHealth Ontario, 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 Heart Failure: Care in the Community for Adults 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

Health Quality Ontario 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 principle 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

Health Quality Ontario 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 definitions section. 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 chronic obstructive pulmonary disease who are offered clozapine after first- and second-line antipsychotics have been ineffective. 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.

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, the intention of these measures is to monitor the unintended consequences.

3 Local Measurement

As part of the Heart Failure: Care in the Community for Adults 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:

1. Review the list of identified indicators (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
2. Determine the availability of data related to the indicators you have chosen
3. Identify a way to collect local data related to your chosen indicators
4. 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-day hospital readmission =

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

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, Health Quality Ontario does not develop benchmarks for quality standards 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, Health Quality Ontario 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 and Long-Term Care*](#)

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 and Long-Term Care 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 the Heart Failure: Care in the Community for Adults quality standard. Early in the development of each quality standard, a few performance indicators are chosen by the Quality Standards Advisory Committee 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 which were selected as the overall measures of success for this standard:

Process indicators:

- Percentage of people age 40 and older with newly diagnosed heart failure who receive an echocardiogram between 18 months prior to 30 days after heart failure diagnosis, 2015/16 to 2017/18
- Percentage of people age 40 and older with newly diagnosed heart failure who receive an electrocardiogram (ECG) and a chest X-ray within 3 months prior to 30 days after heart failure diagnosis and within 6 months prior to 30 days after heart failure diagnosis, 2015/16 to 2017/18
- Percentage of people age 65 and older with newly diagnosed heart failure who are dispensed quadruple therapy at 90 days and 180 days after heart failure diagnosis, 2015/16 to 2017/18
- Percentage of people age 40 and older who were hospitalized or treated in the emergency department (ED) for heart failure who are seen by a primary care physician, cardiologist, or internal medicine physician within 7 days of leaving the hospital, 2015/16 to 2017/18

Outcome indicators:

- Percentage of people age 40 and older with newly diagnosed heart failure who die within 30 days and 1 year of heart failure diagnosis from any cause of death, 2014/15 to 2016/17
- Rate of non-elective hospitalizations and emergency department (ED) visits for heart failure-specific reason(s), cardiovascular disease (CVD)-specific reason(s), and for any reason(s) per 1,000 person days for people age 40 and older with heart failure, 2015/16 to 2017/18
- Percentage of people age 40 and over who were hospitalized or treated in the emergency department (ED) for heart failure who are readmitted for any non-elective hospital or emergency department (ED) visit within 30 days of discharge, for heart failure-specific reason(s), cardiovascular disease (CVD)-specific reason(s), and for any reason(s), 2015/16 to 2017/18

Note on indicators: To ensure provincial measurability, measurement for these indicators relies on an administrative data algorithm that is used to identify people with heart failure that is limited to people age 40 and older (see section 5.2 Cohort Identification below); or to people aged 65 and older for medication-related indicators. However, the quality standard is intended to be applied for anyone with heart failure, and so care should not be restricted to people age 40 and over.

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 18 years of age or older who have heart failure, including the assessment and diagnosis of people with suspected heart failure. It does not address heart failure owing to congenital cardiac conditions. It also does not address the primary prevention of heart failure, although it does provide guidance on risks and lifestyle factors that may affect the progression of heart failure. This quality standard applies to community settings, including primary care, specialist care, home care, hospital outpatient clinics, and long-term care. It does not address care provided in hospital emergency departments

5.2 Cohort Identification

People with heart failure can be identified in administrative databases using the following codes:

- ICD-10-CA (International Statistical Classification of Diseases and Related Health Problems, 10th Revision) codes: I500, I501, I509
- ICD-9 code: 428 diagnosis codes for hospital

Researchers at the Institute for Clinical Evaluative Sciences (ICES) have developed a heart failure cohort for people age 40 and older using any of the above diagnosis codes for one hospital record, or for one physician billing followed by a second record from either source within one year. The cohort used the following administrative databases:

- Discharge Abstract Database
- National Ambulatory Care Reporting System
- Ontario Health Insurance Plan Claims Database
- Same Day Surgeries
- Ontario Mental Health Reporting System

Patients were included if:

- 1) They were hospitalized or had a same-day procedure with congestive heart failure, left ventricular failure or unspecified heart failure (ICD-9 428 or ICD-10 1500,1501, 1509) anywhere on their record
- 2) They had an outpatient OHIP visit for heart failure management (fee code Q050)
- 3) They visited the emergency department with congestive heart failure, left ventricular failure or unspecified heart failure (ICD-9 428 or ICD-10 1500,1501,1509) as the main diagnosis and any other visit type within 1 year or,
- 4) They had an outpatient OHIP visit for congestive heart failure (dxcode 428) and any other visit type within 1 year.

The date of cohort entry was the first visit if more than one was required to establish cohort inclusion. The year of cohort entry is considered the incident year while in subsequent years, a person would be counted in the HF prevalence estimates.

The heart failure cohort holds data for prevalent cases starting in April 1991 and incident cases starting in April 1994. More information on this cohort can be found here:

Schultz SE, Rothwell DM, Chen Z, Tu K. Identifying cases of congestive heart failure from administrative data: a validation study using primary care patient records. *Chronic Diseases and Injuries in Canada*. 2013;33(3):160-66.

Local data collection, such as through clinical data, may also be used to identify patients with heart failure to establish a local cohort

5.3 How Success Can Be Measured Provincially

The following indicators are currently provincially measurable in Ontario's health care system:

Process indicators:

- Percentage of people age 40 and older with newly diagnosed heart failure who receive an echocardiogram between 18 months prior to 30 days after heart failure diagnosis, 2015/16 to 2017/18
- Percentage of people age 40 and older with newly diagnosed heart failure who receive an electrocardiogram (ECG) and a chest X-ray within 3 months prior to 30 days after heart failure diagnosis and within 6 months prior to 30 days after heart failure diagnosis, 2015/16 to 2017/18
- Percentage of people age 65 and older with newly diagnosed heart failure who are dispensed quadruple therapy at 90 days and 180 days after heart failure diagnosis, 2015/16 to 2017/18
- Percentage of people age 40 and older who were hospitalized or treated in the emergency department (ED) for heart failure who are seen by a primary care physician, cardiologist, or internal medicine physician within 7 days of leaving the hospital, 2015/16 to 2017/18

Outcome indicators:

- Percentage of people age 40 and older with newly diagnosed heart failure who die within 30 days and 1 year of heart failure diagnosis from any cause of death, 2014/15 to 2016/17
- Rate of non-elective hospitalizations and emergency department (ED) visits for heart failure-specific reason(s), cardiovascular disease (CVD)-specific reason(s), and for any reason(s) per 1,000 person days for people age 40 and older with heart failure, 2015/16 to 2017/18
- Percentage of people age 40 and over who were hospitalized or treated in the emergency department (ED) for heart failure who are readmitted for any non-elective hospital or emergency department (ED) visit within 30 days of discharge, for heart failure-specific reason(s), cardiovascular disease (CVD)-specific reason(s), and for any reason(s), 2015/16 to 2017/18

Methodological details for the provincially measurable indicators are described in the tables below. There were no provincial measures of success selected for this quality standard that were only measurable through local data collection, however it is possible through local clinical data to measure many of the indicators listed above.

Table 1: Percentage of people age 40 and older with newly diagnosed heart failure who receive an echocardiogram between 18 months prior to 30 days after heart failure diagnosis, 2015/16 to 2017/18

GENERAL DESCRIPTION	Indicator description	This indicator measures the percentage of people age 40 and older with newly diagnosed heart failure who receive an echocardiogram between 18 months prior to 30 days after heart failure diagnosis. Directionality: A higher percentage is better.
	Measurability	Measurable at the provincial level
	Dimension of quality	Effective, Timely
	Quality statement alignment	Quality Statement 1: Diagnosing Heart Failure People suspected to have heart failure undergo an initial evaluation that includes, at minimum, a medical history, a physical examination, initial laboratory investigations, an electrocardiogram, and a chest x-ray. If appropriate, natriuretic peptide levels are tested to help formulate a diagnosis. If heart failure is confirmed or suspected after these tests, an echocardiogram is then performed.
DEFINITION & SOURCE INFORMATION	Calculation: General	<p>Denominator Number of incident cases of heart failure among Ontario residents aged 40 and older in the ICES heart failure cohort (see section 5.2 Cohort Identification for cohort details), in each fiscal year, 2015/16, 2016/17, and 2017/18.</p> <p>Exclusions</p> <ol style="list-style-type: none"> 1. Patients without a valid health insurance number 2. Patients without an Ontario residence 3. Sex not recorded as male or female 4. Invalid date of birth 5. Congenital cardiac conditions within 5 years prior to diagnosis (including date of index) 6. Deaths that occur within 30 days after date of index diagnosis of heart failure <p><i>Congenital Cardiac Conditions</i></p> <ul style="list-style-type: none"> • ICD-10-CA codes: Q20, Q21, Q22, Q23, Q24, Q25, Q26, Q27, Q28 • OHIP codes: 745, 746, 747 <p>Numerator Number of people in the denominator who receive an echocardiogram between 18 months prior to 30 days after heart failure diagnosis.</p> <p>Inclusions <i>Echocardiography:</i></p> <ul style="list-style-type: none"> • DAD/NACRS CCI incode: 3IP30 • OHIP fee codes: G560-G562, G566-G568, G570-G572, G574-G581

		<p>Method Numerator divided by the denominator times 100 <i>Note: Rates are reported as crude and age- and sex-standardized.</i></p> <p>Data sources Heart Failure Cohort (Schultz SE, et al.), Ontario Health Insurance Plan Claims Database (OHIP), National Ambulatory Care Reporting System (NACRS), Discharge Abstract Database (DAD), Registered Persons Database (RPDB)</p>
ADDITIONAL INFORMATION	Limitations	<p>The ICES heart failure cohort underestimates the number of people with heart failure because it only captures people with heart failure aged 40 and older. Given that heart failure is strongly age-related, heart failure is extremely rare among those aged less than 40 years of age.</p> <p>The ICES heart failure cohort has been validated and has been found to successfully identify approximately 85% of patients with heart failure. Hence, the ICES cohort may underestimate the number of people with heart failure. The ICES heart failure cohort partially relies on OHIP billings. A physician can only list one diagnosis code per billing, and so if a heart failure patient's main reason for visiting a physician is not for heart failure, it may not be recorded. However, heart failure patients may visit their physician regularly for disease management, which may offset this limitation.</p> <p>For this indicator, we have used the cohort entry date to approximate the heart failure diagnosis date. The first health care contact with a diagnosis of heart failure is used as the cohort entry date and may occur before the diagnosis is confirmed. As such, this may not be accurate for every case of heart failure.</p>

Abbreviations: ICD-10: 10th revision of the International Statistical Classification of Diseases and Related Health Problems; OHIP: Ontario Health Insurance Plan, CCI: Canadian Classification of Health Interventions.

Table 2: Percentage of people age 40 and older with newly diagnosed heart failure who receive an electrocardiogram (ECG) and a chest X-ray within 3 months prior to 30 days after heart failure diagnosis and within 6 months prior to 30 days after heart failure diagnosis, 2015/16 to 2017/18

GENERAL DESCRIPTION	Indicator description	This indicator measures the percentage of people age 40 and older with newly diagnosed heart failure who receive an ECG and a chest x-ray within 3 months prior to 30 days after heart failure diagnosis and within 6 months prior to 30 days after heart failure diagnosis Directionality: A higher percentage is better.
	Measurability	Measurable at the provincial level
	Dimension of quality	Effective, Timely
	Quality statement alignment	Quality Statement 1: Diagnosing Heart Failure People suspected to have heart failure undergo an initial evaluation that includes, at minimum, a medical history, a physical examination, initial laboratory investigations, an electrocardiogram, and a chest x-ray. If appropriate, natriuretic peptide levels are tested to help formulate a diagnosis. If heart failure is confirmed or suspected after these tests, an echocardiogram is then performed.
DEFINITION & SOURCE INFORMATION	Calculation: General	<p>Denominator</p> <p>Number of incident cases of heart failure among Ontario residents aged 40 and older in the ICES heart failure cohort (see section 5.2 Cohort Identification for cohort details), in each fiscal year, 2015/16, 2016/17, and 2017/18.</p> <p>Exclusions</p> <ol style="list-style-type: none"> 1. Patients without a valid health insurance number 2. Patients without an Ontario residence 3. Sex not recorded as male or female 4. Invalid date of birth 5. Congenital cardiac conditions within 5 years prior to diagnosis (including date of index) 6. Deaths that occur within 30 days after date of index diagnosis of heart failure <p><i>Congenital Cardiac Conditions</i></p> <ul style="list-style-type: none"> • ICD-10-CA codes: Q20, Q21, Q22, Q23, Q24, Q25, Q26, Q27, Q28 • OHIP codes: 745, 746, 747 <p>Numerator</p> <ul style="list-style-type: none"> • Number of people in the denominator who receive the following diagnostic testing tests with 3 months prior to 30 days after heart failure diagnosis, and within 6 months prior to 30 days after heart failure diagnosis: • An electrocardiogram

		<ul style="list-style-type: none"> • A chest x-ray • Both an electrocardiogram and a chest x-ray <p>Inclusions</p> <p><i>Electrocardiography:</i></p> <ul style="list-style-type: none"> • DAD/NACRS CCI incode: 2HZ24JAKE • OHIP fee code: G310, G313 <p><i>Chest x-ray:</i></p> <ul style="list-style-type: none"> • DAD/NACRS CCI incode: 3GY10 • OHIP fee code: X090, X091, X092, X195 <p>Method</p> <p>Numerator divided by the denominator times 100</p> <p><i>Note: Rates are reported as crude and age- and sex-standardized.</i></p> <p>Data sources</p> <p>Heart Failure Cohort (Schultz SE, et al.), Ontario Health Insurance Plan Claims Database (OHIP), National Ambulatory Care Reporting System (NACRS), Discharge Abstract Database (DAD), Registered Persons Database (RPDB)</p>
ADDITIONAL INFORMATION	Limitations	<p>The time frames for follow up chosen for this indicator are exploratory. Examination of different follow-up periods may yield a more complete picture of electrocardiography and x-ray imaging for heart failure.</p> <p>The ICES heart failure cohort underestimates the number of people with heart failure because it only captures people with heart failure aged 40 and older. Given that heart failure is strongly age-related, heart failure is extremely rare among those aged less than 40 years of age.</p> <p>The ICES heart failure cohort has been validated and has been found to successfully identify approximately 85% of patients with heart failure. Hence, the ICES cohort may underestimate the number of people with heart failure. The ICES heart failure cohort partially relies on OHIP billings. A physician can only list one diagnosis code per billing, and so if a heart failure patient's main reason for visiting a physician is not for heart failure, it may not be recorded. However, heart failure patients may visit their physician regularly for disease management, which may offset this limitation.</p> <p>For this indicator, we have used the cohort entry date to approximate the heart failure diagnosis date. The first health care contact with a diagnosis of heart failure is used as the cohort entry date and may occur before the diagnosis is confirmed. As such, this may not be accurate for every case of heart failure.</p>

Abbreviations: ICD-10: 10th revision of the International Statistical Classification of Diseases and Related Health Problems; OHIP: Ontario Health Insurance Plan, CCI: Canadian Classification of Health Interventions.

Table 3: Percentage of people age 65 and older with newly diagnosed heart failure who are dispensed triple therapy at 90 days and 180 days after heart failure diagnosis, 2015/16 to 2017/18

**This table refers to triple therapy. It will be updated in the future with new technical specifications based on the updated quality statement for quadruple therapy.*

GENERAL DESCRIPTION	Indicator description	This indicator measures the percentage of people age 65 and older with newly diagnosed heart failure who are dispensed triple therapy medication that cover the dates 90 days after heart failure diagnosis and 180 days after heart failure diagnosis. Directionality: A higher percentage is better.
	Measurability	Measurable at the provincial level
	Dimension of quality	Effective
	Quality statement alignment	Quality Statement 5: Triple Therapy for People With Heart Failure Who Have a Reduced Ejection Fraction People with heart failure who have a reduced ejection fraction (HFrEF) and New York Heart Association (NYHA) class II to IV symptoms are offered pharmacological management with “triple therapy.” They may require additional medications and are prescribed these as needed.
DEFINITION & SOURCE INFORMATION	Calculation: General	<p>Denominator</p> <p>Number of incident cases of heart failure among Ontario residents age 65 and older in the ICES heart failure cohort (see section 5.2 Cohort Identification for cohort details), in each fiscal year, 2015/16, 2016/17, and 2017/18.</p> <p>Exclusions</p> <ol style="list-style-type: none"> 1. Patients <65 or >105 years at index date 2. Patients without a valid health insurance number 3. Patients without an Ontario residence 4. Sex not recorded as male or female 5. Invalid date of birth 6. Congenital cardiac conditions within 5 years prior to diagnosis (including date of index) 7. Deaths that occur within 6 months after date of index diagnosis of heart failure <p><i>Congenital Cardiac Conditions</i></p> <ul style="list-style-type: none"> • ICD-10-CA codes: Q20, Q21, Q22, Q23, Q24, Q25, Q26, Q27, Q28 • OHIP codes: 745, 746, 747 <p>Numerator</p> <p>Number of people in the denominator who are dispensed the following medications at 90 days and 180 days after heart failure diagnosis:</p> <ul style="list-style-type: none"> • Triple therapy (one or more ACEi, ARB, or ARNI; one or more BB; one or more MRA) • One or more BB

		<ul style="list-style-type: none"> • One or more MRA • One or more ACEi, ARB, or ARNI • One or more ACEi • One or more ARB • One or more ARNI <p><i>Notes:</i></p> <ul style="list-style-type: none"> • <i>Follow-up period:</i> We assigned single points in time at 90 days and 180 days after diagnosis and looked for medications that overlapped those specific days (while incorporating a grace period for medication use). • <i>Grace period:</i> A grace period of 1.5x the days supplied was applied to all medication claims when determining overlapping use on day 90 and day 180 • Medication group #1 = ACEi or ARB or ARNI. Medication group #2 = BB. Medication group #3 = MRA. • ARNI medications are newly approved drugs in Ontario in 2017. They are not available in 2015/16, and are represented in low numbers in 2016/17 and 2017/18. <p>Method Numerator divided by the denominator times 100 <i>Note: Rates are reported as crude and age- and sex-standardized.</i></p> <p>Data sources Heart Failure Cohort (Schultz SE, et al.), Ontario Drug Benefit Claims (ODB), Registered Persons Database (RPDB)</p>
ADDITIONAL INFORMATION	Limitations	<p>The time frames for follow up chosen for this indicator are exploratory. Examination of different follow-up periods may yield a more complete picture of medication prescribing for heart failure.</p> <p>To determine whether heart failure patients were receiving medications, we looked at a point in time (either 90 days or 180 days after diagnosis) to see if a prescription included these dates. This provides a snapshot of medication use, but cannot confirm that people were consistently on therapy</p> <p>Triple therapy medication is recommended for people with reduced ejection fraction and NYHA class II-IV symptoms. A major limitation for this indicator is that we are unable to differentiate between reduced ejection fraction and preserved ejection fraction, or the different NYHA classes of heart failure using administrative data. However, about 50% of people with heart failure have heart failure with reduced ejection fraction and should receive triple therapy medication. In addition to reporting triple therapy medication, we have also reported each of the 3 groups of medications, and each medication separately, which may be useful for investigations of medication use for all patients with heart failure.</p> <p>Using administrative data, it is possible to access provincial drug data only for people with heart failure who are 65 years of age and older, who are eligible for Ontario Dug Benefit. Ideally, this indicator should be measured for all people with heart failure. It should be noted, however, that heart failure is rare for people under 65 years of age.</p>

		<p>This indicator does not exclude people with contraindications to any of the above medications, as contraindications are not easily captured in administrative data. Therefore, the data may be under-reporting medication rates for people who should appropriately be receiving these medications.</p> <p>The ICES heart failure cohort has been validated and has been found to successfully identify approximately 85% of patients with heart failure. Hence, the ICES cohort may underestimate the number of people with heart failure. The ICES heart failure cohort partially relies on OHIP billings. A physician can only list one diagnosis code per billing, and so if a heart failure patient's main reason for visiting a physician is not for heart failure, it may not be recorded. However, heart failure patients may visit their physician regularly for disease management, which may offset this limitation.</p> <p>For this indicator, we have used the cohort entry date to approximate the heart failure diagnosis date. The first health care contact with a diagnosis of heart failure is used as the cohort entry date and may occur before the diagnosis is confirmed. As such, this may not be accurate for every case of heart failure.</p>
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Abbreviations: ACEi: angiotensin-converting enzyme inhibitor, ARB: angiotensin II receptor blocker, ARNI: angiotensin receptor neprilysin inhibitor. BB: beta blocker, MRA: mineralocorticoid receptor antagonist, ICD-10-CA, International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Canada, OHIP: Ontario Health Insurance Plan Claims Database

Table 4: Percentage of people age 40 and older who were hospitalized or treated in the emergency department (ED) for heart failure who are seen by a primary care physician, cardiologist, or internal medicine physician within 7 days of leaving the hospital, 2015/16 to 2017/18

GENERAL DESCRIPTION	Indicator description	<p>This indicator measures the percentage of people age 40 and older who were hospitalized or treated in the ED for heart failure who are seen by a primary care physician, cardiologist, or internal medicine physician within 7 days of leaving the hospital.</p> <p>Directionality: A higher percentage is better.</p>
	Measurability	Measurable at the provincial level
	Dimension of quality	Effective, Timely
	Quality statement alignment	<p>Quality Statement 2: Individualized, Person-Centred, Comprehensive Care Plan People with heart failure and their caregivers collaborate with their care providers to develop an individualized, person-centred, comprehensive care plan. The care plan is reviewed at least every 6 months, and sooner if there is a significant change. It is made readily available to all members of the person’s care team, including the person and their caregiver(s).</p> <p>Quality Statement 9: Transition from Hospital to Community People hospitalized or treated in the emergency department for heart failure receive a follow-up appointment to reassess volume status and medication reconciliation with a member of their community health care team within 7 days of leaving the hospital.</p>
DEFINITION & SOURCE INFORMATION	Calculation: General	<p>Denominator Total number of discharges from an acute care facility for:</p> <ul style="list-style-type: none"> • Both hospitalizations and emergency department (ED) visits • Hospitalizations only • Emergency department (ED) visits only <p>with a main diagnosis of heart failure, among Ontario residents age 40 and older in each fiscal year, 2015/16, 2016/17, and 2017/18.</p> <p>Inclusions</p> <ul style="list-style-type: none"> • Diagnosis codes: ICD-10-CA codes I500, I501, I509 • Discharge disposition • For hospital admissions, DAD: dischdisp = ‘02’ (transferred to a long term or continuing care facility), dischdisp = ‘04’ (discharged to home or home setting with support services) or dischdisp = ‘05’ (discharged to home with no support service from an external agency required) • ED visits where a person is seen by a physician in the ED and then goes home. These patients are not admitted for inpatient care (NACRS: visdisp2005= ‘01’ (discharged home) or ‘15’ (discharged to place of residence, institution)) <p>Exclusions</p> <ul style="list-style-type: none"> • Non-Ontario residents

		<ul style="list-style-type: none"> • Invalid sex • Patients <40 or >105 years at discharge date • Congenital cardiac conditions within 5 years prior to diagnosis <p><i>Congenital Cardiac Conditions</i></p> <ul style="list-style-type: none"> • ICD-10-CA codes: Q20, Q21, Q22, Q23, Q24, Q25, Q26, Q27, Q28 • OHIP codes: 745, 746, 747 <p><i>Note: The admissions are unique by episode (one patient can have more than one admission during a fiscal year).</i></p> <p>Numerator</p> <p>The number of people in the denominator who had at least one physician visit to:</p> <ul style="list-style-type: none"> • Any physician (a primary care physician, cardiologist, or internal medicine physician) • A primary care physician • A cardiologist • An internal medicine physician <p>within 7 days after discharge</p> <p><i>Physician specialties</i></p> <ul style="list-style-type: none"> • Primary care physician (IPDB Mainspec = 'GP/FP' or 'F.P./EMERGENCY MEDICINE') • Cardiologist (IPDB Mainspec 'CARDIOLOGY' or 'CARDIO AND THORACIC SURGERY') • Internal medicine (IPDB Mainspec 'INTERNAL MEDICINE') <p>Inclusions</p> <ul style="list-style-type: none"> • Physician visits taking place in office, home, or long-term care (OHIP location = 'O' or 'H' or 'L') • Follow up to 7 days into the new fiscal year, if initial hospital or ED visit was at the very end of the fiscal year <p><i>Note: Scheduled visits to physicians in hospitals are included by including physician visits occurring between days 0 or 1 to 7 after hospitalization or ED visits (i.e. includes date of discharge). In DAD start follow up from discharge date. In NACRS, use the LEFTEDDATE variable as a form of discharge. If a patient's discharge time was before 8 am, count the OHIP visit on the day 0, otherwise don't count the OHIP visit on the same day since you can't distinguish if OHIP visit happened before or after the discharge (OHIP has date only).</i></p> <p>Exclusions</p> <ul style="list-style-type: none"> • Negated OHIP claims, duplicate claims and lab claims • Records with missing or invalid data on service date, health number
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		<p>Method Numerator divided by the denominator times 100 <i>Note: Rates are reported as crude and age- and sex-standardized.</i></p> <p>Data sources Ontario Health Insurance Plan Claims Database (OHIP), National Ambulatory Care Reporting System (NACRS), Discharge Abstract Database (DAD), Registered Persons Database (RPDB), Physician Database (IPDB)</p>
ADDITIONAL INFORMATION	Limitations	<p>This indicator includes all follow-up visits, regardless of whether these were related to the hospitalization or ED visit or whether they were for heart failure. As such, we may be overestimating the rate of physician 7 day follow up that is specific to the hospital admission or ED visit.</p> <p>The Heart Failure: Care in the Community for Adults quality standard recommends non-physician providers can provide follow up care. Follow up by non-physician providers (i.e. nurse practitioners in family health teams) or providers that do not provide billing or shadow billing are not captured by administrative data. Therefore, this indicator underestimates follow up rates after hospitalizations and ED visits.</p>

Abbreviations: ICD-10-CA: International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Canada, OHIP: Ontario Health Insurance Plan Claims Database, NACRS: National Ambulatory Care Reporting System, DAD: Discharge Abstract Database, RPDB: Registered Persons Database, IPDB: ICES Physician Database

Table 5: Percentage of people age 40 and older with newly diagnosed heart failure who die within 30 days and 1 year of heart failure diagnosis from any cause of death, 2014/15 to 2016/17

GENERAL DESCRIPTION	Indicator description	This indicator measures the percentage of people age 40 and older with newly diagnosed heart failure who die within 30 days and 1 year of heart failure diagnosis from any cause of death Directionality: A lower percentage is better.
	Measurability	Measurable at the provincial level
	Dimension of quality	Effective
	Quality statement alignment	<p>Quality Statement 3: Empowering and Supporting People With Heart Failure to Develop Self-Management Skills People with heart failure and their caregiver(s) collaborate with their care providers to create a tailored self-management program with the goal of enhancing their skills and confidence so that they can be actively involved in their own care.</p> <p>Quality Statement 5: Quadruple Therapy for People With Heart Failure Who Have a Reduced Ejection Fraction People with heart failure who have a reduced ejection fraction (HFrEF) and New York Heart Association (NYHA) class II to IV symptoms are offered pharmacological management with “quadruple therapy.” They may require additional medications and are prescribed these as needed.</p> <p>Quality Statement 6: Worsening Symptoms of Heart Failure People with heart failure who report gradual, progressive, worsening symptoms are assessed by a care provider and have their medications adjusted (if needed) within 48 hours.</p> <p>Quality Statement 7: Management of Non-cardiac Comorbidities People with heart failure are treated for non-cardiac comorbidities that are likely to affect their heart failure management.</p> <p>Quality Statement 8: Specialized Multidisciplinary Care People with newly diagnosed heart failure, those who have recently been hospitalized or treated in the emergency department for heart failure, and those with advanced heart failure (NYHA III–IV) are offered a referral to specialized multidisciplinary care for heart failure.</p> <p>Quality Statement 9: Transition From Hospital to Community People hospitalized or treated in the emergency department for heart failure receive a follow-up appointment to reassess volume status and medication reconciliation with a member of their community health care team within 7 days of leaving the hospital.</p>

DEFINITION & SOURCE INFORMATION	<p>Calculation: General</p>	<p>Denominator Number of incident cases of heart failure among Ontario residents age 40 and older in the ICES heart failure cohort (see section 5.2 Cohort Identification for cohort details), in each fiscal year, 2014/15, 2015/16, and 2016/17.</p> <p>Exclusions</p> <ul style="list-style-type: none"> • Patients without a valid health insurance number • Patients without an Ontario residence • Sex not recorded as male or female • Invalid date of birth • Congenital cardiac conditions within 5 years prior to diagnosis (including date of index) <p><i>Congenital Cardiac Conditions</i></p> <ul style="list-style-type: none"> • ICD-10-CA codes: Q20, Q21, Q22, Q23, Q24, Q25, Q26, Q27, Q28 • OHIP codes: 745, 746, 747 <p>Numerator Number of people in the denominator who die from any cause of death within 30 days of diagnosis of heart failure and within 1 year of diagnosis of heart failure.</p> <p>Method Numerator divided by the denominator times 100 <i>Note: Rates are reported as crude and risk-adjusted by age, sex, and Charlson Comorbidity Index. Comorbidity calculated using the weighted Charlson Comorbidity Index score based off of a year of hospitalization and physician services data prior to CHF diagnosis and modeled as a continuous covariate.</i></p> <p>Data sources Heart Failure Cohort (Schultz SE, et al.), Registered Persons Database (RPDB)</p>
ADDITIONAL INFORMATION	<p>Limitations</p>	<p>The ICES heart failure cohort underestimates the number of people with heart failure because it only captures people with heart failure aged 40 and older. Given that heart failure is strongly age-related, heart failure is extremely rare among those aged less than 40 years of age.</p> <p>The ICES heart failure cohort has been validated and has been found to successfully identify approximately 85% of patients with heart failure. Hence, the ICES cohort may underestimate the number of people with heart failure. The ICES heart failure cohort partially relies on OHIP billings. A physician can only list one diagnosis code per billing, and so if a heart failure patient's main reason for visiting a physician is not for heart failure, it may not be recorded. However, heart failure patients may visit their physician regularly for disease management, which may offset this limitation.</p>

		For this indicator, we have used the cohort entry date to approximate the heart failure diagnosis date. The first health care contact with a diagnosis of heart failure is used as the cohort entry date and may occur before the diagnosis is confirmed. As such, this may not be accurate for every case of heart failure.
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Abbreviations: ICD-10-CA: International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Canada, OHIP: Ontario Health Insurance Plan Claims Database

Table 6: Rate of non-elective hospitalizations and emergency department (ED) visits for heart failure-specific reason(s), cardiovascular disease (CVD)-specific reason(s), and for any reason(s) per 1,000 person days for people age 40 and older with heart failure, 2015/16 to 2017/18

GENERAL DESCRIPTION		Indicator description	This indicator measures the rate of non-elective hospitalizations and ED visits for heart failure-specific reason(s), CVD-specific reason(s) and for any reason(s) per 1,000 person days for people age 40 and older with heart failure
		Measurability	Measurable at the provincial level
		Dimension of quality	Effective
		Quality statement alignment	<p>Quality Statement 3: Empowering and Supporting People With Heart Failure to Develop Self-Management Skills People with heart failure and their caregiver(s) collaborate with their care providers to create a tailored self-management program with the goal of enhancing their skills and confidence so that they can be actively involved in their own care.</p> <p>Quality Statement 5: Quadruple Therapy for People With Heart Failure Who Have a Reduced Ejection Fraction People with heart failure who have a reduced ejection fraction (HFrEF) and New York Heart Association (NYHA) class II to IV symptoms are offered pharmacological management with “quadruple therapy.” They may require additional medications and are prescribed these as needed.</p> <p>Quality Statement 6: Worsening Symptoms of Heart Failure People with heart failure who report gradual, progressive, worsening symptoms are assessed by a care provider and have their medications adjusted (if needed) within 48 hours.</p> <p>Quality Statement 7: Management of Non-cardiac Comorbidities People with heart failure are treated for non-cardiac comorbidities that are likely to affect their heart failure management.</p> <p>Quality Statement 8: Specialized Multidisciplinary Care People with newly diagnosed heart failure, those who have recently been hospitalized or treated in the emergency department for heart failure, and those with advanced heart failure (NYHA III–IV) are offered a referral to specialized multidisciplinary care for heart failure.</p>

			<p>Quality Statement 9: Transition From Hospital to Community People hospitalized or treated in the emergency department for heart failure receive a follow-up appointment to reassess volume status and medication reconciliation with a member of their community health care team within 7 days of leaving the hospital.</p> <p>Quality Statement 10: Palliative Care and Heart Failure People with heart failure and their families have their palliative care needs identified early and are offered support to address their needs.</p>
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DEFINITION & SOURCE INFORMATION		<p>Calculation: General</p>	<p>Denominator 1,000 person days among Ontario residents age 40 and older with prevalent cases of heart failure in the ICES heart failure cohort (see section 5.2 Cohort Identification for cohort details), in each of the relevant fiscal years.</p> <p>Inclusions</p> <ul style="list-style-type: none"> • Limit to people identified as having prevalent heart failure in the year prior to the interval year <p>Exclusions</p> <ul style="list-style-type: none"> • Patients without a valid health insurance number • Patients without an Ontario residence • Sex not recorded as male or female • Congenital cardiac conditions within 5 years prior to diagnosis (including date of index) <p><i>Congenital Cardiac Conditions</i></p> <ul style="list-style-type: none"> • ICD-10-CA codes: Q20, Q21, Q22, Q23, Q24, Q25, Q26, Q27, Q28 • OHIP codes: 745, 746, 747 <p>Numerator Total number of non-elective acute care visits (1. hospital admissions, 2. ED visits) among the denominator population in 2015/16, 2016/17, and 2017/18 for:</p> <ul style="list-style-type: none"> • Heart-failure specific reason(s), • CVD-specific reason(s) • Any reason(s) <p>Inclusions</p> <p><i>Heart failure-specific reason(s)</i></p> <ul style="list-style-type: none"> • For hospital admissions, main diagnosis of heart failure • For ED visits, main problem of heart failure • ICD-10-CA codes I500, I501, I509 <p><i>Cardiovascular disease (CVD)-specific reason(s)</i></p> <ul style="list-style-type: none"> • For hospital admissions, main diagnosis of cardiovascular disease • For ED visits, main problem of cardiovascular disease • ICD-10-CA codes I00-I99 (diseases of the circulatory system) <p><i>Any reason(s)</i></p> <ul style="list-style-type: none"> • For hospital admissions, hospital admissions for any reason(s) • For ED visits, ED visits for any reason(s)
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			<ul style="list-style-type: none"> • Hospital admissions where the patient is discharged home (DAD: dischdisp = '02' (transferred to a long term or continuing care facility), dischdisp = '04' (discharged to home or home setting with support services) or dischdisp = '05' (discharged to home with no support service from an external agency required)) • ED visits where a person is seen by a physician in the ED and then goes home. These patients are not admitted for inpatient care (NACRS: visdisp2005= '01' (discharged home) or '15' (discharged to place of residence, institution)) • For hospital admissions, invalid date of birth, admission date, discharge date, • For ED visits, invalid date of birth <p>Exclusions</p> <ul style="list-style-type: none"> • Elective visits • For hospital admissions, patient transfers to another acute care facility <p>Method</p> <p>Numerator divided by the denominator times 100</p> <p><i>Note: Rates are reported as crude and risk-adjusted by age, sex, and Charlson Comorbidity Index. Comorbidity calculated using the weighted Charlson Comorbidity Index score based off of a year of hospitalization and physician services data prior to CHF diagnosis and modeled as a continuous covariate.</i></p> <p>Data sources</p> <p>Heart Failure Cohort (Schultz SE, et al.), National Ambulatory Care Reporting System (NACRS), Discharge Abstract Database (DAD), Registered Persons Database (RPDB)</p>
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ADDITIONAL INFORMATION		<p>Limitations</p>	<p>Caution should be used in drawing conclusions on heart failure-specific reason(s) for hospital admissions and ED visit alone. Because heart failure is a multi-system disease, heart failure may be a contributing reason for cardiovascular disease-specific hospital admissions and ED visits as well. For this reason, we have also captured CVD specific and all-cause hospitalizations and ED visits to provide a more complete picture of hospital use among people with heart failure</p> <p>The ICES heart failure cohort underestimates the number of people with heart failure because it only captures people with heart failure aged 40 and older. Given that heart failure is strongly age-related, heart failure is extremely rare among those aged less than 40 years of age.</p> <p>The ICES heart failure cohort has been validated and has been found to successfully identify approximately 85% of patients with heart failure. Hence, the ICES cohort may underestimate the number of people with heart failure. The ICES heart failure cohort partially relies on OHIP billings. A physician can only list one diagnosis code per billing, and so if a heart failure patient's main reason for visiting a physician is not for heart failure, it may not be recorded. However, heart failure patients may visit their physician regularly for disease management, which may offset this limitation.</p> <p>For this indicator, we have used the cohort entry date to approximate the heart failure diagnosis date. The first health care contact with a diagnosis of heart failure is used as the cohort entry date and may occur before the diagnosis is confirmed. As such, this may not be accurate for every case of heart failure.</p>
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Abbreviations: ICD-10-CA: International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Canada, OHIP: Ontario Health Insurance Plan Claims Database, NACRS: National Ambulatory Care Reporting System, DAD: Discharge Abstract Database, CVD: cardiovascular disease

Table 7: Percentage of people age 40 and older who were hospitalized or treated in the emergency department (ED) for heart failure who are readmitted for any non-elective hospital or ED visit within 30 days of discharge, for heart failure-specific reason(s), cardiovascular disease (CVD)-specific reason(s), and for any reason(s), 2015/16 to 2017/18

GENERAL DESCRIPTION	Indicator description	<p>This indicator measures the percentage of people age 40 and older who were hospitalized or treated in the ED for heart failure who are readmitted for any non-elective hospital or ED visit within 30 days of discharge for heart failure-specific reason(s), CVD-specific reason(s) and for any reason(s)</p> <p>Directionality: A lower percentage is better.</p>
	Measurability	Measurable at the provincial level
	Dimension of quality	Effective
	Quality statement alignment	<p>Quality Statement 3: Empowering and Supporting People With Heart Failure to Develop Self-Management Skills People with heart failure and their caregiver(s) collaborate with their care providers to create a tailored self-management program with the goal of enhancing their skills and confidence so that they can be actively involved in their own care.</p> <p>Quality Statement 5: Quadruple Therapy for People With Heart Failure Who Have a Reduced Ejection Fraction People with heart failure who have a reduced ejection fraction (HFrEF) and New York Heart Association (NYHA) class II to IV symptoms are offered pharmacological management with “quadruple therapy.” They may require additional medications and are prescribed these as needed.</p> <p>Quality Statement 6: Worsening Symptoms of Heart Failure People with heart failure who report gradual, progressive, worsening symptoms are assessed by a care provider and have their medications adjusted (if needed) within 48 hours.</p> <p>Quality Statement 7: Management of Non-cardiac Comorbidities People with heart failure are treated for non-cardiac comorbidities that are likely to affect their heart failure management.</p> <p>Quality Statement 8: Specialized Multidisciplinary Care People with newly diagnosed heart failure, those who have recently been hospitalized or treated in the emergency department for heart failure, and those with advanced heart failure (NYHA III–IV) are offered a referral to specialized multidisciplinary care for heart failure.</p>

		<p>Quality Statement 9: Transition From Hospital to Community People hospitalized or treated in the emergency department for heart failure receive a follow-up appointment to reassess volume status and medication reconciliation with a member of their community health care team within 7 days of leaving the hospital.</p> <p>Quality Statement 10: Palliative Care and Heart Failure People with heart failure and their families have their palliative care needs identified early and are offered support to address their needs.</p>
DEFINITION & SOURCE INFORMATION	Calculation: General	<p>Denominator Any acute care episode of care (1. Hospital admission, 2. ED visit), among Ontario residents age 40 and older, with a main diagnosis code of heart failure in the first acute care episode, in each fiscal year, 2015/16, 2016/17, and 2017/18</p> <p>Inclusions <i>Index visit</i></p> <ul style="list-style-type: none"> • For index hospital admissions, main diagnosis of heart failure • For index ED visits, main problem of heart failure • ICD-10-CA codes I500, I501, I509 • For patients with multiple acute care facility visits, all hospital admissions and ED visits with a main diagnosis (hospital admission) of heart failure or main problem (ED) of heart failure in a given year • Hospital admissions where the patient is discharged home (DAD: dischdisp = '02' (transferred to a long term or continuing care facility), dischdisp = '04' (discharged to home or home setting with support services) or dischdisp = '05' (discharged to home with no support service from an external agency required)) • ED visits where a person is seen by a physician in the ED and then goes home. These patients are not admitted for inpatient care (NACRS: visdisp2005= '01' (discharged home) or '15' (discharged to place of residence, institution)) <p>Exclusions</p> <ul style="list-style-type: none"> • Patients <40 or >105 years at index date • Patients without a valid health insurance number • Patients without an Ontario residence • Sex not recorded as male or female • For hospital admissions, invalid date of birth, admission date, discharge date • For emergency department (ED) visits, invalid date of birth • Congenital cardiac conditions within 5 years prior to diagnosis (including date of index) <p>Congenital Cardiac Conditions</p> <ul style="list-style-type: none"> • ICD-10-CA codes: Q20, Q21, Q22, Q23, Q24, Q25, Q26, Q27, Q28 • OHIP codes: 745, 746, 747

		<p>Numerator</p> <p>The subsequent non-elective readmission to an acute care facility (1. hospital admission, 2. ED visit) within 30 days of discharge following an index hospital admission or ED visit, with a most responsible diagnosis of:</p> <ul style="list-style-type: none"> • Heart-failure specific reason(s), • CVD-specific reason(s) • Any reason(s) <p><i>Note: This indicator is a count of the number of patients who had either event (subsequent hospitalization or ED visit) in the period. Some patients will have been counted as having both events (both a subsequent hospital admission or ED visit).</i></p> <p>Inclusions</p> <p><i>Heart failure-specific reason(s)</i></p> <ul style="list-style-type: none"> • For subsequent hospital admissions, main diagnosis of heart failure • For subsequent ED visits, main problem of heart failure • ICD-10-CA codes I500, I501, I509 <p><i>Cardiovascular disease (CVD)-specific reason(s)</i></p> <ul style="list-style-type: none"> • For subsequent hospital admissions, main diagnosis of cardiovascular disease • For subsequent ED visits, main problem of cardiovascular disease • ICD-10-CA codes I00-I99 (diseases of the circulatory system) <p><i>Any reason(s)</i></p> <ul style="list-style-type: none"> • For subsequent hospital admissions, hospital admissions for any reason(s) • For subsequent ED visits, ED visits for any reason(s) <ul style="list-style-type: none"> • For patients with multiple acute care facility visits, all hospital admissions and ED visits with a main diagnosis (hospital admission) of heart failure or main problem (ED) of heart failure in a given year • Hospital admissions where the patient is discharged home (DAD: dischdisp = '02' (transferred to a long term or continuing care facility), dischdisp = '04' (discharged to home or home setting with support services) or dischdisp = '05' (discharged to home with no support service from an external agency required)) • ED visits where a person is seen by a physician in the ED and then goes home. These patients are not admitted for inpatient care (NACRS: visdisp2005= '01' (discharged home) or '15' (discharged to place of residence, institution)) <p>Exclusions</p> <ul style="list-style-type: none"> • Elective visits • For subsequent hospital admissions, patient transfers to another acute care facility <p>Method</p> <p>Numerator divided by the denominator times 100</p>
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ADDITIONAL INFORMATION	Limitations	<p>Caution should be used in drawing conclusions on heart failure-specific reason(s) for hospital admissions and ED visit alone. Because heart failure is a multi-system disease, heart failure may be a contributing reason for cardiovascular disease-specific hospital admissions and ED visits as well. For this reason, we have also captured CVD specific and all-cause hospitalizations and ED visits to provide a more complete picture of hospital use among people with heart failure.</p> <p>The ICES heart failure cohort underestimates the number of people with heart failure because it only captures people with heart failure aged 40 and older. Given that heart failure is strongly age-related, heart failure is extremely rare among those aged less than 40 years of age.</p> <p>The ICES heart failure cohort has been validated and has been found to successfully identify approximately 85% of patients with heart failure. Hence, the ICES cohort may underestimate the number of people with heart failure. The ICES heart failure cohort partially relies on OHIP billings. A physician can only list one diagnosis code per billing, and so if a heart failure patient’s main reason for visiting a physician is not for heart failure, it may not be recorded. However, heart failure patients may visit their physician regularly for disease management, which may offset this limitation.</p> <p>For this indicator, we have used the cohort entry date to approximate the heart failure diagnosis date. The first health care contact with a diagnosis of heart failure is used as the cohort entry date and may occur before the diagnosis is confirmed. As such, this may not be accurate for every case of heart failure.</p>

Abbreviations: ICD-10-CA: International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Canada, OHIP: Ontario Health Insurance Plan Claims Database, NACRS: National Ambulatory Care Reporting System, DAD: Discharge Abstract Database, CVD: cardiovascular disease

5.4 How Success Can Be Measured Locally

You might want to assess the quality of care you provide to your patients with heart failure. 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.

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@hqontario.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.

Health Quality Ontario 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 Health Quality Ontario used to produce the indicators are noted below.

Discharge Abstract Database (DAD)

The DAD is a database of information abstracted from hospital records that captures administrative, clinical and patient demographic information on all hospital inpatient separations, including discharges, deaths, signouts and transfers. CIHI receives Ontario data directly from participating facilities or from their respective regional health authorities or the MOHLTC. The DAD includes patient-level data for acute care facilities in Ontario. Data are collected, maintained and validated by CIHI. The main data elements of the DAD are patient identifiers (e.g. name, health care number), administrative information, clinical information (e.g. diagnoses and procedures) and patient demographics (e.g. age, sex, geographic location).

ICES Physician Database (IPDB) - Institute for Clinical Evaluative Sciences (ICES)

The ICES Physician Database (IPDB) comprises information from the Corporate Provider Database (CPDB), the Ontario Physician Human Resource Data Centre (OPHRDC) database and the OHIP database of physician billings. The CPDB contains information about physician demographics, specialty training and certification, and practice location. This information is validated against the OPHRDC database, which is updated through periodic telephone interviews with all physicians practicing in Ontario.

National Ambulatory Care Reporting System (NACRS)

The NACRS contains data for all hospital-based and community-based emergency and ambulatory care, including day surgeries, outpatient clinics and emergency departments. Data are collected, maintained and validated by CIHI. CIHI receives Ontario data directly from participating facilities or from their respective regional health authorities or the MOHLTC. Data are collected, maintained and validated by CIHI. Data elements of the NACRS include patient identifiers (e.g. name, health care number), patient demographics (e.g. age, sex, geographic location), clinical information (e.g. diagnoses and procedures), and administrative information.

Ontario Drug Benefit Claims Database (ODB)

The Ontario Drug Benefit claims database contains records of all prescriptions dispensed to patients covered by the program, which include people living in long-term care facilities in Ontario. Records include the Drug Identification Number, date the drug was dispensed, and the number of days each dispensed prescription is to be taken. The record also identifies which of the claims are made in long-term care. Data are collected through the Health Network System by the ministry.

Ontario Health Insurance Plan (OHIP) Claims Database

The OHIP claims database covers all reimbursement claims to the MOHLTC made by fee-for-service physicians, community-based laboratories and radiology facilities. The OHIP database at ICES contains encrypted patient and physician identifiers, codes for services provided, date of service, the associated diagnosis and fee paid. Services which are missing from the OHIP data include: some lab services; services received in provincial psychiatric hospitals; services

provided by health service organizations and other alternate providers; diagnostic procedures performed on an inpatient basis and lab services performed at hospitals (both inpatient and same day). Also excluded is remuneration to physicians through alternate funding plans (AFPs), which 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 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.

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

Tel: 416-323-6868

Toll Free: 1-877-280-8538

Fax: 416-323-9261

Email: qualitystandards@ontariohealth.ca

Website: www.hqontario.ca

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