QUALITY STANDARDS

Diabetes in Pregnancy

Care for People of Reproductive Age

Measurement Guide

April 2021

Ontario Health

Contents

1 How to Use the Measurement Guide

This document is meant to serve as a measurement guide to support the adoption of the Diabetes in Pregnancy quality standard. Care for people with Diabetes in Pregnancy is a critical issue, and there are significant gaps and variations in the quality of care that people transitioning between hospital and home receive in Ontario. Recognizing this, 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 Diabetes in Pregnancy 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 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 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.

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 Diabetes in Pregnancy 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 1 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 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 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's quality standard *Diabetes in Pregnancy*. 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:

- Rate of all nonelective hospital visits for diabetes-specific reasons before delivery among people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) who deliver in hospital
    - Reported by:
        - Emergency department visits
        - Hospitalizations
- Percentage of people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) who deliver in hospital who have an antepartum or intrapartum outcome
    - Reported by:
        - Pre-eclampsia
        - Operative vaginal delivery
        - Caesarean section
        - Third- or fourth-degree lacerations
- Percentage of people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) who deliver in hospital whose infant has an adverse neonatal outcome
    - Reported by:
        - Neonatal hypoglycemia
        - Macrosomia
        - Shoulder dystocia
        - Stillbirth
        - Preterm birth
        - Hyperbilirubinemia
        - Respiratory distress
        - Neonatal mortality
- Percentage of people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) who deliver in hospital whose infant is admitted to a neonatal intensive care unit for 24 hours or more
- Percentage of people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) who receive interprofessional care specific to their needs to manage their diabetes in pregnancy
- Percentage of people of reproductive age living with diabetes who are planning to get pregnant who receive preconception care from an interprofessional care team
- Percentage of people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) who receive care for their diabetes who feel involved in decisions about their care

- Percentage of people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) who report feeling confident in knowing how to take care of and manage their diabetes during pregnancy

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 (there are well defined and validated data sources) *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 living with type 1 or type 2 diabetes who are planning to become or who are pregnant and for people diagnosed with gestational diabetes. It does not address the primary prevention of gestational diabetes in the general population, although it does provide guidance on lifestyle factors that may contribute to the development of type 2 diabetes in those who previously had gestational diabetes and are therefore at increased risk.

This quality standard applies to all settings.

This quality standard does not include care for people with type 1 and type 2 diabetes outside of preconception care and pregnancy. For quality standards that address care for people with type 1 or type 2 diabetes, please refer to the quality standards *Type 1 Diabetes* and *Prediabetes and Type 2 Diabetes*.

This quality standard includes six quality statements. They address areas identified by Ontario Health's Diabetes in Pregnancy Quality Standard Advisory Committee and several health and social service organizations working with Indigenous populations as having high potential for improving the quality of care in Ontario for people with diabetes in pregnancy.

5.2 Cohort Identification

For measurement at the provincial level, people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) can be identified using the following methods:

- People with pre-existing diabetes (Type 1 Diabetes or Type 2 Diabetes) can be identified using the Ontario Diabetes Database (ODD), which is held at the Institute for Clinical Evaluative Sciences (ICES). This population-based cohort is constructed using a validated algorithm based on hospitalizations, physician visits, and drug benefit claims to identify individuals with diabetes in Ontario (Hux JE et al. Diabetes Care, 2002). The ODD uses the following administrative databases:
    - Discharge Abstract Database (DAD)
    - Ontario Health Insurance Plan (OHIP) Claims Database

    - Ontario Drug Benefit (ODB) Database
    - Registered Persons Database (RPDB)

  Individuals are considered to have diabetes if they had at least: one hospital admission for diabetes (ICD-10-CA [International Statistical Classification of Diseases and Related Health Problems, 10th Revision] codes: E10, E11, E13, or E14), two physician service claims for diabetes (OHIP diagnostic code 250), or one diabetes drug claim in the past year. The ODD cohort has a high sensitivity (90%) and specificity (97.7%) for identifying individuals with non-gestational diabetes. Refer to the Appendix for more information about the ODD.
- People with gestational diabetes can be identified using an algorithm using administrative data used by Booth G et al. CMAJ, 2017:
    - Delivery hospitalization record with one of the following ICD-10-CA codes: E10, E11, E13, E14 or O24,
      OR
    - 2 or more physician fee-for service billing claims (OHIP) with a diagnosis of diabetes (ICD-9: 250) in the last 120 days of pregnancy. Claims must be separated by at least a day.

  This algorithm was found to have a sensitivity of 94% and specificity of 98%.

The Ontario Mother-Baby linked dataset (MOMBABY) Database, held at ICES, includes all inpatient admission records from the DAD for mothers and their newborns (capturing 97-98% of all births in Ontario). Individuals who are identified to have pre-existing diabetes or gestational diabetes, and who have a delivery in hospital in a given year can be identified through linkage to the MOMBABY Database. Refer to the Appendix for more information about the MOMBABY Database.

For local measurement, people with diabetes in pregnancy (pre-existing Type 1 or Type 2 diabetes, or gestational diabetes) who have a delivery in a given year 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 Diabetes in Pregnancy 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:

- Rate of all nonelective hospital visits for diabetes-specific reasons before delivery among people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) who deliver in hospital
    - Reported by:
        - Emergency department visits
        - Hospitalizations
- Percentage of people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) who deliver in hospital who have an antepartum or intrapartum outcome
    - Reported by:
        - Pre-eclampsia
        - Operative vaginal delivery

        - Caesarean section
        - Third- or fourth-degree lacerations
- Percentage of people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) who deliver in hospital whose infant has an adverse neonatal outcome
    - Reported by:
        - Neonatal hypoglycemia
        - Macrosomia
        - Shoulder dystocia
        - Stillbirth
        - Preterm birth
        - Hyperbilirubinemia
        - Respiratory distress
        - Neonatal mortality
- Percentage of people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) who deliver in hospital whose infant is admitted to a neonatal intensive care unit for 24 hours or more

Methodologic details are described in the tables below.

Table 1: Rate of all nonelective hospital visits for diabetes-specific reasons before delivery among people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) who deliver in hospital

GENERAL DESCRIPTION	Indicator description	Name: Rate of all nonelective hospital visits for diabetes-specific reasons before delivery among people with diabetes in pregnancy (pre-existing or gestational diabetes) who deliver in hospital
		• Reported by:
		  ○ Emergency department visits
		  ○ Hospitalizations
		
		Diabetes-specific reasons include: diabetes with poor control, diabetes without complication, diabetes with hypoglycemia, diabetes with ketoacidosis, diabetes with hyperosmolarity, and a main diagnosis of diabetes with hyperglycemia or hypoglycemia
		
		Directionality: A lower rate is generally better. While not all unplanned emergency department visits or hospitalizations are avoidable, appropriate care in the community can be effective in reducing the need for a hospital visit.

	Measurability	**Measurable at the provincial level**
	Dimensions of quality	Effective, Patient-Centred, Timely
	Quality statement alignment	**Quality Statement 2: Coordinated Interprofessional Care** People with diabetes receive coordinated interprofessional care specific to their needs during preconception and throughout pregnancy. People with gestational diabetes receive interprofessional care at the time of diagnosis and throughout the remainder of their pregnancy. **Quality Statement 3: Self-Management Education and Support** People with diabetes and their families are offered tailored self-management education and support at the beginning of pregnancy, or at the time of gestational diabetes diagnosis, and throughout their pregnancy as needed. **Quality Statement 4: Lifestyle Management During Pregnancy** People with diabetes in pregnancy receive tailored information and support about gestational weight gain, diet, and physical activity to optimize blood glucose levels and maternal and fetal outcomes at the beginning of pregnancy, or at the time of gestational diabetes diagnosis, and throughout pregnancy.
DEFINITION & SOURCE INFORMATIO	Calculation: General	**Denominator** Total number of people who delivered in hospital in each fiscal year, 2016/17, 2017/18, 2018/19, and had:

		• Pre-existing diabetes (prevalent cases in the ODD for a given fiscal year)
		• Gestational diabetes (using the gestational diabetes algorithm)
		
		MOMBABY database is linked to the above two sub-populations to identify people with deliveries in hospital in each fiscal year.
		
		Notes:
		Refer to 5.2 Cohort Identification section for more information.
		Rates for the pre-existing diabetes and gestational diabetes sub-populations are reported separately.
		
		Exclusions
		• Invalid maternal IKN (m_ikn)
		• Sex is male or missing
		• Age: <13 or >50 at delivery or missing
		• Non-Ontario resident
		• Deliveries that are not singletons (MOMBABY, m_multibirth = F)
		
		Numerator
		Number of people in the denominator who had one or more nonelective hospital visit for a diabetes-specific reason before delivery
		• Reported by:
		  ○ Emergency department visits
		  ○ Hospitalizations
		
		Diabetes-specific reasons include: diabetes with poor control, diabetes without complication, diabetes with hypoglycemia, diabetes with ketoacidosis, diabetes with hyperosmolarity, and a main diagnosis of diabetes with hyperglycemia or hypoglycemia
		
		Note: Rates for emergency department visits and hospitalizations are reported separately for the two sub-populations.
		
		Inclusions
		• At least one hospital visit for a diabetes-specific reason as the main diagnosis must occur (for emergency department visits, ICD-10-CA in NACRS; for hospitalizations, ICD-10-CA in DAD):
		  ○ diabetes with poor control: E10.64, E11.64, E13.64, or E14.64
		  ○ diabetes without complication: E10.9, E11.9, E13.9, or E14.9
		  ○ diabetes with hypoglycemia: E10.63, E11.63, E13.63, or E14.63
		  ○ diabetes with ketoacidosis: E10.10, E11.10, E13.10, or E14.10
		  ○ diabetes with hyperosmolarity: E11.00, E11.01, E13.00, E13.01, E14.00, E14.01
		  ○ main diagnosis of diabetes with any diagnosis of hyperglycemia: E10, E11, E13 or E14 and R739

		○ main diagnosis of diabetes with any diagnosis of hypoglycemia: E10, E11, E13 or E14 and E161 or E162 • The hospital visit (emergency department visit or hospitalization) must occur prior to the delivery date and during the pregnancy. The hospital admission for the delivery is not included in the numerator. *Exclusions* • For emergency department visits only: ○ Planned or scheduled ED visits ○ ED visits that resulted in a hospitalization. Only ED visits with visit disposition of discharge to the community ('discharged home' or 'discharge to place of residence') are included. • For hospitalizations only: ○ Elective hospital admissions **Method** Numerator divided by the denominator times 100 *Note: Rates are reported as age-standardized.* **Data sources:** Discharge Abstract Database (DAD), National Ambulatory Care Reporting System (NACRS), Ontario Diabetes Database (ODD), Ontario Health Insurance Plan (OHIP) Claims Database, Ontario Mother-Baby linked dataset (MOMBABY), Registered Persons Database (RPDB)
ADDITIONAL INFORMATION	Limitations	Individuals who deliver outside of a hospital (e.g., home births) are not captured in the cohort. However, the MOMBABY database captures 97-98%[1] of all births in Ontario, and people with pre-existing diabetes and people requiring insulin are more likely to deliver in hospital.
	Comments	The analysis was limited to singletons only, since multiple births have their own set of risks and complications that might not be related to diabetes in pregnancy. Multiple births account for approximately 3% of all valid records in the MOMBABY database from fiscal year 2016/17 to 2018/19. The literature for the diabetes in pregnancy population typically reports ED visit or hospitalization data for any reason. As this indicator captures ED visits or hospitalizations for a set of diabetes-specific reasons, the data may not be comparable.

Abbreviations: DAD, Discharge Abstract Database; ED, emergency department; ICD-10-CA, *International Statistical Classification of Diseases and Related Health Problems*, 10th Revision, Canada; MOMBABY, Ontario Mother-Baby linked dataset; NACRS, National Ambulatory Care Reporting System; ODD, Ontario Diabetes Database.

Source: [1]Statistics Canada. Table 13-10-0429-01 Live births and fetal deaths (stillbirths), by place of birth (hospital or non-hospital).

Table 2: Percentage of people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) who deliver in hospital who have an antepartum or intrapartum outcome

GENERAL DESCRIPTION	Indicator description	Name: Percentage of people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) who deliver in hospital who have an antepartum or intrapartum outcome
		• Reported by:
		  ○ Pre-eclampsia
		  ○ Operative vaginal delivery
		  ○ Caesarean section
		  ○ Third-or fourth-degree lacerations
		
		Directionality: A lower rate is generally better. However, directionality for Caesarean section rates is unclear as it may be the appropriate care in some cases.

	Measurability	**Measurable at the provincial level**
	Dimension of quality	Safe, Effective, Patient-Centred, Timely
	Quality statement alignment	**Quality Statement 2: Coordinated Interprofessional Care** People with diabetes receive coordinated interprofessional care specific to their needs during preconception and throughout pregnancy. People with gestational diabetes receive interprofessional care at the time of diagnosis and throughout the remainder of their pregnancy. **Quality Statement 3: Self-Management Education and Support** People with diabetes and their families are offered tailored self-management education and support at the beginning of pregnancy, or at the time of gestational diabetes diagnosis, and throughout their pregnancy as needed. **Quality Statement 4: Lifestyle Management During Pregnancy** People with diabetes in pregnancy receive tailored information and support about gestational weight gain, diet, and physical activity to optimize blood glucose levels and maternal and fetal outcomes at the beginning of pregnancy, or at the time of gestational diabetes diagnosis, and throughout pregnancy. **Quality Statement 5: Fetal Monitoring and Timing of Delivery** People with diabetes in pregnancy receive increased fetal monitoring based on glucose control, maternal complications, comorbid conditions, and/or fetal well-being. Induction of labour is considered before 40 weeks' gestation if maternal or fetal indications exist.

DEFINITION & SOURCE INFORMATION	Calculation: General	**Denominator**
		Total number of people who delivered in hospital in each fiscal year, 2016/17, 2017/18, 2018/19, and had:
		• Pre-existing diabetes (prevalent cases in the ODD for a given fiscal year)
		• Gestational diabetes (using the gestational diabetes algorithm)
		
		MOMBABY database is linked to the above two sub-populations to identify people with deliveries in hospital in each fiscal year.
		
		Notes:
		Refer to 5.2 Cohort Identification section for more information.
		Rates for the pre-existing diabetes and gestational diabetes sub-populations are reported separately.
		
		Exclusions
		• Invalid maternal IKN (m_ikn)
		• Sex is male or missing
		• Age: <13 or >50 at delivery or missing
		• Non-Ontario resident
		• Deliveries that are not singletons (MOMBABY, m_multibirth = F)
		
		Numerator
		Number of people in the denominator who have an antepartum or intrapartum outcome
		• Reported by:
		  ○ Pre-eclampsia
		  ○ Operative vaginal delivery
		  ○ Caesarean section
		  ○ Third-or fourth-degree lacerations
		
		Note: Rate for each outcome is reported individually, and rates are reported separately for the two sub-populations.
		
		Inclusions
		• In the mother's delivery record in DAD:
		  ○ Pre-eclampsia (ICD-10-CA, any diagnosis):
		  - Gestational [pregnancy-induced] hypertension with significant proteinuria: O14
		  ○ Operative vaginal delivery (CCI):
		  - Forceps traction and rotation delivery: 5.MD.53
		  - Vacuum traction delivery: 5.MD.54
		  - Combination of vacuum and forceps delivery: 5.MD.55

		- Breech delivery (subset, involving use of forceps): 5.MD.56.NN, 5.MD.56.PC, 5.MD.56.NR, 5.MD.56.PF, 5.MD.56.NW, 5.MD.56.PJ ○ Caesarean section (ICD-10-CA, any diagnosis): - Singleton, born in hospital, delivered by caesarean: Z38.01 ○ Caesarean section (CCI): - Cesarean section delivery: 5.MD.60 ○ Third-or fourth-degree lacerations (ICD-10-CA, any diagnosis): - Third degree perineal laceration during delivery: O70.2 - Fourth degree perineal laceration during delivery: O70.3 **Method** Numerator divided by the denominator times 100 *Note: Rates are reported as age-standardized.* **Data sources:** Discharge Abstract Database (DAD), Ontario Diabetes Database (ODD), Ontario Health Insurance Plan (OHIP) Claims Database, Ontario Mother-Baby linked dataset (MOMBABY), Registered Persons Database (RPDB)
ADDITIONAL INFORMATION	Limitations	Individuals who deliver outside of a hospital (e.g., home births) are not captured in the cohort. However, the MOMBABY database captures 97-98%[1] of all births in Ontario, and people with pre-existing diabetes and people requiring insulin are more likely to deliver in hospital. Operative vaginal delivery and Third- or fourth degree lacerations: The denominator for these sub-indicators includes all deliveries (i.e., both vaginal deliveries and Caesarean sections). As such, when compared to results in the literature that only include vaginal deliveries in the denominator, the results from the Quality Standard would have lower rates.
	Comments	The analysis was limited to singletons only, since multiple births have their own set of risks and complications that might not be related to diabetes in pregnancy. Multiple births account for approximately 3% of all valid records in the MOMBABY database from fiscal year 2016/17 to 2018/19.

Abbreviations: CCI, Canadian Classification of Health Interventions; DAD, Discharge Abstract Database; ICD-10-CA, *International Statistical Classification of Diseases and Related Health Problems*, 10th Revision, Canada; MOMBABY, Ontario Mother-Baby linked dataset; ODD, Ontario Diabetes Database.

Source: [1]Statistics Canada. Table 13-10-0429-01 Live births and fetal deaths (stillbirths), by place of birth (hospital or non-hospital).

Table 3: Percentage of people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) who deliver in hospital whose infant has an adverse neonatal outcome

GENERAL DESCRIPTION	Indicator description	Name: Percentage of people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) who deliver in hospital whose infant has an adverse neonatal outcome
		• Reported by:
		  ○ Neonatal hypoglycemia
		  ○ Macrosomia
		  ○ Shoulder dystocia
		  ○ Stillbirth
		  ○ Preterm birth
		  ○ Hyperbilirubinemia
		  ○ Respiratory distress
		  ○ Neonatal mortality
		
		Directionality: A lower rate is better.

	Measurability	**Measurable at the provincial level**
	Dimension of quality	Safe, Effective, Patient-Centred, Timely
	Quality statement alignment	**Quality Statement 2: Coordinated Interprofessional Care** People with diabetes receive coordinated interprofessional care specific to their needs during preconception and throughout pregnancy. People with gestational diabetes receive interprofessional care at the time of diagnosis and throughout the remainder of their pregnancy. **Quality Statement 3: Self-Management Education and Support** People with diabetes and their families are offered tailored self-management education and support at the beginning of pregnancy, or at the time of gestational diabetes diagnosis, and throughout their pregnancy as needed. **Quality Statement 4: Lifestyle Management During Pregnancy** People with diabetes in pregnancy receive tailored information and support about gestational weight gain, diet, and physical activity to optimize blood glucose levels and maternal and fetal outcomes at the beginning of pregnancy, or at the time of gestational diabetes diagnosis, and throughout pregnancy. **Quality Statement 5: Fetal Monitoring and Timing of Delivery** People with diabetes in pregnancy receive increased fetal monitoring based on glucose control, maternal complications, comorbid conditions, and/or fetal well-being. Induction of labour is considered before 40 weeks' gestation if maternal or fetal indications exist.

DEFINITION & SOURCE INFORMATION	Calculation: General	**Denominator**
		Total number of people who delivered in hospital in each fiscal year, 2016/17, 2017/18, 2018/19, and had:
		• Pre-existing diabetes (prevalent cases in the ODD for a given fiscal year)
		• Gestational diabetes (using the gestational diabetes algorithm)
		
		MOMBABY database is linked to the above two sub-populations to identify people with deliveries in hospital in each fiscal year.
		
		Notes:
		Refer to 5.2 Cohort Identification section for more information.
		Rates for the pre-existing diabetes and gestational diabetes sub-populations are reported separately.
		
		Exclusions
		• Invalid maternal IKN (m_ikn)
		• Sex is male or missing
		• Age: <13 or >50 at delivery or missing
		• Non-Ontario resident
		• Deliveries that are not singletons (MOMBABY, m_multibirth = F)
		
		Numerator
		Number of people in the denominator whose infant has an adverse neonatal outcome
		• Reported by:
		  ○ Neonatal hypoglycemia
		  ○ Macrosomia
		  ○ Shoulder dystocia
		  ○ Stillbirth
		  ○ Preterm birth
		  ○ Hyperbilirubinemia
		  ○ Respiratory distress
		  ○ Neonatal mortality
		
		Note: Rate for each outcome is reported individually, and rates are reported separately for the two sub-populations.
		
		Inclusions
		• In the mother's delivery record:
		  ○ Preterm birth (in MOMBABY):
		  - Mom's gestational weeks at delivery is less than 37 completed weeks: m_gestwks_del < 37
		  ○ Shoulder dystocia (in DAD, ICD-10-CA, any diagnosis):
		  - Obstructed labour due to shoulder dystocia: O66.0

		• In the baby's birth record:
		  ○ Neonatal hypoglycemia (in DAD, ICD-10-CA, any diagnosis):
		  - Syndrome of infant of mother with gestational diabetes: P70.0
		  - Syndrome of infant of a diabetic mother: P70.1
		  - Other neonatal hypoglycaemia: P70.4
		  ○ Macrosomia (in MOMBABY):
		  - Baby's weight in grams at birth: b_weight ≥ 4000g
		  ○ Stillbirth (in MOMBABY):
		  - Mom had a stillbirth based on dxcodes: m_stillbirth = T
		  ○ Hyperbilirubinemia (in DAD, ICD-10-CA, any diagnosis):
		  - Kernicterus: P57
		  - Neonatal jaundice due to other excessive haemolysis: P58
		  - Neonatal jaundice from other and unspecified causes: P59
		  OR
		  - If none of the above diagnoses were in the baby's birth record, but there was a readmission for the baby within 14 days after birth with any of the above three diagnosis codes, the baby should be included in the numerator for hyperbilirubinemia.
		  ○ Respiratory distress (in DAD, ICD-10-CA, any diagnosis):
		  - Respiratory distress of newborn: P22
		  ○ Neonatal mortality (in RPDB):
		  - Death within 27 days of birth (if b_ikn is not missing)
		  OR
		  - If b_ikn is missing but b_key is complete, and m_stillbirth = 'F', use b_key to link to DAD record and flag those where the discharge disposition was death (dischdisp = '07' or '72') and the discharge date (ddate) was within 27 days of the baby's birthdate in MOMBABY (b_bdate).
		
		Method
		Numerator divided by the denominator times 100
		Note: Rates are reported as age-standardized.
		
		Data sources: Discharge Abstract Database (DAD), Ontario Diabetes Database (ODD), Ontario Health Insurance Plan (OHIP) Claims Database, Ontario Mother-Baby linked dataset (MOMBABY), Registered Persons Database (RPDB)

ADDITIONAL INFORMATION	Limitations	Individuals who deliver outside of a hospital (e.g., home births) are not captured in the cohort. However, the MOMBABY database captures 97-98%[1] of all births in Ontario, and people with pre-existing diabetes and people requiring insulin are more likely to deliver in hospital. For some sub-indicators, certain exclusions were not applied to the denominator for measurement purposes. They are as follows: • Stillbirths* or records with an invalid IKN for the newborn for the following sub-indicators: ○ preterm birth, shoulder dystocia, neonatal hypoglycemia, macrosomia, hyperbilirubinemia, respiratory distress, neonatal mortality. • Records for the mother with missing gestational age for the preterm birth sub-indicator. • Newborns with missing birthweight for the macrosomia sub-indicator. *Stillbirth rate is approximately 1% for pre-existing diabetes and < 0.5% for gestational diabetes[2].
	Comments	The analysis was limited to singletons only, since multiple births have their own set of risks and complications that might not be related to diabetes in pregnancy. Multiple births account for approximately 3% of all valid records in the MOMBABY database from fiscal year 2016/17 to 2018/19. Some outcomes are unlikely for multiples (e.g., macrosomia), whereas other outcomes may be more likely for multiples (e.g., preterm birth). Some results from the Quality Standard for the neonatal outcomes indicator may differ from results reported in other studies due to methodological differences, such as inclusion and exclusion criteria.

Abbreviations: DAD, Discharge Abstract Database; ICD-10-CA, *International Statistical Classification of Diseases and Related Health Problems*, 10th Revision, Canada; MOMBABY, Ontario Mother-Baby linked dataset; ODD, Ontario Diabetes Database; RPDB, Registered Persons Database.

Sources: [1]Statistics Canada. Table 13-10-0429-01 Live births and fetal deaths (stillbirths), by place of birth (hospital or non-hospital).

[2]Green ME, Jones CR, Walker JD, Shah BR, Jacklin K, Slater M, Frymire E, eds. *First Nations and Diabetes in Ontario.* Toronto, ON: ICES; 2019.

Table 4: Percentage of people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) who deliver in hospital whose infant is admitted to a neonatal intensive care unit for 24 hours or more

GENERAL DESCRIPTION	Indicator description	Name: Percentage of people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) who deliver in hospital whose infant is admitted to a neonatal intensive care unit for 24 hours or more Directionality: A lower rate is generally better, but a rate of 0% is not expected as observation or invention might be required in some cases.
	Measurability	**Measurable at the provincial level**
	Dimension of quality	Safe, Effective, Patient-Centred, Timely
	Quality statement alignment	**Quality Statement 2: Coordinated Interprofessional Care** People with diabetes receive coordinated interprofessional care specific to their needs during preconception and throughout pregnancy. People with gestational diabetes receive interprofessional care at the time of diagnosis and throughout the remainder of their pregnancy. **Quality Statement 3: Self-Management Education and Support** People with diabetes and their families are offered tailored self-management education and support at the beginning of pregnancy, or at the time of gestational diabetes diagnosis, and throughout their pregnancy as needed. **Quality Statement 4: Lifestyle Management During Pregnancy** People with diabetes in pregnancy receive tailored information and support about gestational weight gain, diet, and physical activity to optimize blood glucose levels and maternal and fetal outcomes at the beginning of pregnancy, or at the time of gestational diabetes diagnosis, and throughout pregnancy. **Quality Statement 5: Fetal Monitoring and Timing of Delivery** People with diabetes in pregnancy receive increased fetal monitoring based on glucose control, maternal complications, comorbid conditions, and/or fetal well-being. Induction of labour is considered before 40 weeks' gestation if maternal or fetal indications exist.
DEFINITION & SOURCE INFORMATION	Calculation: General	**Denominator** Total number of people who delivered in hospital in each fiscal year, 2016/17, 2017/18, 2018/19, and had: • Pre-existing diabetes (prevalent cases in the ODD for a given fiscal year) • Gestational diabetes (using the gestational diabetes algorithm)

		MOMBABY database is linked to the above two sub-populations to identify people with deliveries in hospital in each fiscal year. Notes: Refer to 5.2 Cohort Identification section for more information. Rates for the pre-existing diabetes and gestational diabetes sub-populations are reported separately. *Exclusions* • Invalid maternal IKN (m_ikn) • Sex is male or missing • Age: <13 or >50 at delivery or missing • Non-Ontario resident • Deliveries that are not singletons (MOMBABY, m_multibirth = F) **Numerator** Number of people in the denominator whose infant is admitted to a neonatal intensive care unit for 24 hours or more *Inclusions* • In the baby's birth record (in DAD): ○ Special care unit admission to NICU (any level) for any reason: - SCU1 to SCU6 = 50, 51, 52 or 53 ○ NICU length of stay/Special care unit hours: SCUHRS1 to SCUHRS6 ≥ 24 hours - The total length of stay in the NICU for a baby includes cases where there were multiple admissions to different NICUs/transfers, and the sum of the duration of stay in each. **Method** Numerator divided by the denominator times 100 *Note: Rates are reported as age-standardized.* **Data sources:** Discharge Abstract Database (DAD), Ontario Diabetes Database (ODD), Ontario Health Insurance Plan (OHIP) Claims Database, Ontario Mother-Baby linked dataset (MOMBABY), Registered Persons Database (RPDB)
ADDITIONAL INFORMATION	Limitations	Individuals who deliver outside of a hospital (e.g., home births) are not captured in the cohort. However, the MOMBABY database captures 97-98%[1] of all births in Ontario, and people with pre-existing diabetes and people requiring insulin are more likely to deliver in hospital. Denominator did not exclude stillbirths (stillbirth rate is approximately 1% for pre-existing diabetes and < 0.5% for gestational diabetes[2]).

	Comments	The analysis was limited to singletons only, since multiple births have their own set of risks and complications that might not be related to diabetes in pregnancy. Multiple births account for approximately 3% of all valid records in the MOMBABY database from fiscal year 2016/17 to 2018/19. In some cases, newborns may be admitted to the NICU for observation as a result of birth from a mother with diabetes. However, this observation period may be short. In order to exclude these cases, a minimum duration for admission of 24 hours was applied. The rates reported for the Quality Standard would not be comparable to studies that included admissions of short duration (e.g., a few hours only).

Abbreviations: DAD, Discharge Abstract Database; MOMBABY, Ontario Mother-Baby linked dataset; NICU, neonatal intensive care unit; ODD, Ontario Diabetes Database.

Sources: [1]Statistics Canada. Table 13-10-0429-01 Live births and fetal deaths (stillbirths), by place of birth (hospital or non-hospital).

[2]Green ME, Jones CR, Walker JD, Shah BR, Jacklin K, Slater M, Frymire E, eds. *First Nations and Diabetes in Ontario.* Toronto, ON: ICES; 2019.

5.4 How Success Can Be Measured Locally

You might want to assess the quality of care you provide to your patients with diabetes in pregnancy. 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 people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) who receive interprofessional care specific to their needs to manage their diabetes in pregnancy
- Percentage of people of reproductive age living with diabetes who are planning to get pregnant who receive preconception care from an interprofessional care team
- Percentage of people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) who receive care for their diabetes who feel involved in decisions about their care
- Percentage of people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) who report feeling confident in knowing how to take care of and manage their diabetes during pregnancy

Methodologic details are described in the tables below.

Table 5: Percentage of people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) who receive interprofessional care specific to their needs to manage their diabetes in pregnancy

GENERAL DESCRIPTION	Indicator description	Name: Percentage of people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) who receive interprofessional care specific to their needs to manage their diabetes in pregnancy Directionality: A higher rate is better.
	Indicator status	**Not measurable**
	Dimensions of quality	Effective, Patient-Centred, Efficient
	Quality statement alignment	**Quality Statement 2: Coordinated Interprofessional Care** People with diabetes receive coordinated interprofessional care specific to their needs during preconception and throughout pregnancy. People with gestational diabetes receive interprofessional care at the time of diagnosis and throughout the remainder of their pregnancy.
DEFINITION & SOURCE INFORMATION	Calculation: General	**Denominator** Total number of people with diabetes in pregnancy: • Pre-existing diabetes • Gestational diabetes Notes: Rates for the pre-existing diabetes and gestational diabetes sub-populations should be calculated separately. Consider defining a time period for measurement (e.g., people with diabetes in pregnancy in a given year). **Numerator** Number of people in the denominator who receive interprofessional care specific to their needs to manage their diabetes in pregnancy Refer to Quality Statement 2 for definitions and for additional indicators for people with pre-existing diabetes or gestational diabetes who receive interprofessional care at specific points in time. **Method** Numerator divided by the denominator times 100
	Data source	Local data collection

ADDITIONAL INFORMATION	Limitations	N/A
	Comments	N/A
	Potential proxy indicator	N/A

Abbreviation: N/A, not applicable.

Table 6: Percentage of people of reproductive age living with diabetes who are planning to get pregnant who receive preconception care from an interprofessional care team

GENERAL DESCRIPTION	Indicator description	Name: Percentage of people of reproductive age living with diabetes who are planning to get pregnant who receive preconception care from an interprofessional care team Directionality: A higher rate is better.
	Indicator status	**Not measurable**
	Dimension of quality	Safe, Effective, Patient-Centred, Timely
	Quality statement alignment	**Quality Statement 1: Preconception Care for People with Diabetes** All people of reproductive age who might become pregnant who are living with diabetes receive information about family planning. People with diabetes who are planning to become pregnant receive preconception care from an interprofessional care team, including counselling on optimizing diabetes management, screening for complications, and a review of medications.
DEFINITION & SOURCE INFORMATION	Calculation: General	**Denominator** Total number of people of reproductive age living with diabetes (Type 1 diabetes or Type 2 diabetes) who are planning to get pregnant Notes: Refer to Quality Statement 1 for definitions. Consider defining a time period for measurement (e.g., people living with diabetes in a given year). **Numerator** Number of people in the denominator who receive preconception care from an interprofessional care team Notes: refer to Quality Statement 1 for definitions. Consider defining the health care providers that form the interprofessional care team, where appropriate (e.g., primary care provider, endocrinologist, diabetes educator, etc.), and frequency of care (e.g., as frequently as clinically appropriate). **Method** Numerator divided by the denominator times 100
	Data source	Local data collection

ADDITIONAL INFORMATION	Limitations	N/A
	Comments	N/A
	Potential proxy indicator	N/A

Abbreviation: N/A, not applicable.

Table 7: Percentage of people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) who receive care for their diabetes who feel involved in decisions about their care

GENERAL DESCRIPTION	Indicator description	Name: Percentage of people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) who receive care for their diabetes who feel involved in decisions about their care Directionality: A higher rate is better.
	Indicator status	**Not measurable**
	Dimension of quality	Effective, Patient-Centred
	Quality statement alignment	**Quality Statement 2: Coordinated Interprofessional Care** People with diabetes receive coordinated interprofessional care specific to their needs during preconception and throughout pregnancy. People with gestational diabetes receive interprofessional care at the time of diagnosis and throughout the remainder of their pregnancy.
DEFINITION & SOURCE INFORMATION	Calculation: General	**Denominator** Total number of people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) who receive care for their diabetes Notes: Rates for the pre-existing diabetes and gestational diabetes sub-populations should be calculated separately. Consider defining a time period for measurement (e.g., people with diabetes in pregnancy in a given year). **Numerator** Number of people in the denominator who feel involved in decisions about their care Notes: This question is adapted from the Health Care Experience Survey[1]; consider using a validated diabetes patient experience survey that captures this concept to track this indicator. A similar indicator is also included in Quality Statement 2. **Method** Numerator divided by the denominator times 100
	Data source	Local data collection

ADDITIONAL INFORMATION	Limitations	N/A
	Comments	There are many validated tools for measuring patient experience in people with diabetes, however, many surveys have not been validated in the diabetes in pregnancy population. An example of a survey that may be used as a resource for this indicator is the Patient Assessment of Chronic Illness Care (PACIC) (Glasgow, 2005).
	Potential proxy indicator	N/A

Abbreviation: N/A, not applicable.

Source: [1]Government of Ontario. Health care experience survey (HCES) [Internet]. Toronto (ON): Queen's Printer for Ontario; 2012-20 [cited 2021 Mar 1]. Available from: https://data.ontario.ca/dataset/health-care-experience-survey-hces.

Table 8: Percentage of people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) who report feeling confident in knowing how to take care of and manage their diabetes during pregnancy

GENERAL DESCRIPTION	Indicator description	Name: Percentage of people with diabetes in pregnancy (pre-existing diabetes or gestational diabetes) who report feeling confident in knowing how to take care of and manage their diabetes during pregnancy Directionality: A higher rate is better.
	Indicator status	**Not measurable**
	Dimension of quality	Safe, Effective, Patient-Centred
	Quality statement alignment	**Quality Statement 3: Self-Management Education and Support** People with diabetes and their families are offered tailored self-management education and support at the beginning of pregnancy, or at the time of gestational diabetes diagnosis, and throughout their pregnancy as needed.
DEFINITION & SOURCE INFORMATION	Calculation: General	**Denominator** Total number of people with diabetes in pregnancy: • Pre-existing diabetes • Gestational diabetes Notes: Rates for the pre-existing diabetes and gestational diabetes sub-populations should be calculated separately. Consider defining a time period for measurement (e.g., people with diabetes in pregnancy in a given year). **Numerator** Number of people in the denominator who report feeling confident in knowing how to take care of and manage their diabetes during pregnancy Notes: This question is adapted from the Health Care Experience Survey[1]; consider using a validated diabetes patient experience survey that captures this concept to track this indicator.

		This indicator is also included in Quality Statement 3. **Method** Numerator divided by the denominator times 100
	Data source	Local data collection
ADDITIONAL INFORMATION	Limitations	N/A
	Comments	There are many validated tools for measuring patient experience in people with diabetes, however, many surveys have not been validated in the diabetes in pregnancy population. An example of a survey that may be used as a resource for this indicator is the Diabetes Empowerment Scale (DES) (Michigan Diabetes Research Centre, 2021).
	Potential proxy indicator	N/A

Abbreviation: N/A, not applicable.

Source: [1]Government of Ontario. Health care experience survey (HCES) [Internet]. Toronto (ON): Queen's Printer for Ontario; 2012-20 [cited 2021 Mar 1]. Available from: https://data.ontario.ca/dataset/health-care-experience-survey-hces.

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 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 used to produce the indicators are noted below.

Discharge Abstract Database (DAD) —Canadian Institute for Health Information
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)—Canadian Institute for Health Information
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)—Ministry of Health
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.

Ontario Diabetes Database (ODD)—Institute for Clinical Evaluative Sciences
The ODD is an Institute for Clinical Evaluative Sciences (ICES)-derived cohort that employs a validated algorithm to identify people with diabetes using data on hospitalizations, physician visits, and drug benefit claims. Hospital discharge abstracts data, collected by the Canadian Institute for Health

Information (CIHI) from April 1988 onwards, were used to identify Ontarians with a valid health card number who had been hospitalized with a new or pre-existing diagnosis of diabetes. Physician claim records held by the Ontario Health Insurance Plan (OHIP) from July 1991 onwards were also used to identify individuals with visits to a physician for diabetes. The Ontario Drug Benefit (ODB) claims database, which captures medications dispensed to Ontario residents eligible for the Ontario Drug Benefit Program (people aged 65 years and older, residents of long-term care facilities, recipients of professional home and community care services, people receiving social assistance, and beneficiaries of specialized drug programs) since April 1990, was used to identify dispensations for insulin and other oral anti-glycemics used to treat diabetes.

Individuals were considered to have diabetes if they had at least:

- One hospital admission for diabetes (with a diagnostic code of diabetes: ICD-9-CA: 250 in any diagnostic code space; ICD-10-CA: E10, E11, E13, or E14 in any diagnostic code space) in the past year, or
- Two physician service claims for diabetes (with a diagnostic code for diabetes: OHIP diagnostic code 250) in the past year, or
- One diabetes drug claim in the ODB in the past year.

For individuals 18 years old or younger, the algorithm also considers OHIP fee codes for diabetes management, insulin therapy support, and diabetic management assessment codes (Q040, K029, K030, K045, K046). This case-definition algorithm has a sensitivity of 90% and a specificity of 97.7% for identifying diabetes in the population.

People enter the ODD as incident cases when they are defined as having diabetes (i.e., the first of DAD admission date or OHIP service date or ODB drug claim over the one-year period as incident rate). The ODD does not differentiate between Type 1 and Type 2 diabetes.

As well, when there was a hospital record with a diagnosis of pregnancy care or delivery close to a diabetic record (i.e., diabetes record date between 120 days before and 180 days after a gestational admission date), the diabetic record was considered to be for gestational diabetes and was excluded.

Ontario Mother-Baby linked dataset (MOMBABY)—Institute for Clinical Evaluative Sciences

This dataset is derived within the Institute for Clinical Evaluative Sciences (ICES) to deterministically link the inpatient admission records of delivering mothers and their newborns using a unique maternal/newborn chart number. Ideally, each record corresponds to a mother-child pair; the proportion of mothers linked to at least one infant record is approximately 98%. However, in cases when a mother record was identified but the corresponding child-record was not found, or vice versa, a MOMBABY record is still created with all the available information. This dataset contains flags for whether a mother delivered a stillborn infant while in-hospital and for the maternal gestational weeks at delivery.

Registered Persons Data Base (RPDB)—Ministry of Health

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.

8 Acknowledgements

Measurement Advisory Group

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Looking for more information?

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

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