COMMUNITY AND CLINICAL DATA INITIATIVE

Diabetes Control Measure Definition

December 2024

Prepared for:
Administration for Community Living

MITRE | Center for Transforming Health

Operator of the CMS Alliance to Modernize Healthcare (The Health FFRDC)

A Federally Funded Research and Development Center

This and other CODI resources are available at https://mitre.github.io/codi/.

Notice

The views, opinions and/or findings contained in this report are those of The MITRE Corporation and should not be construed as an official government position, policy, or decision, unless designated by other documentation.

This technical data report was produced for the U.S. Government under Contract Number 75FCMC18D0047 and is subject to Federal Acquisition Regulation Clause 52.227-14, Rights in Data-General.

No other use other than that granted to the U.S. Government, or to those acting on behalf of the U.S. Government under that Clause is authorized without the express written permission of The MITRE Corporation.

For further information, please contact The MITRE Corporation, Contracts Management Office, 7515 Colshire Drive, McLean, VA 22102-7539, (703) 983-6000.

Authors

The MITRE Corporation, McLean, VA

Acknowledgments

This measure was collaboratively developed by MITRE and the Chesapeake Regional Information System for our Patients (CRISP). We would like to thank the CRISP team for their time and contributions to the development of this diabetes control measure.

Table of Contents

1 Introduction 1
1.1 Purpose 1
1.2 Background Research 1
1.3 Assumptions 1
2 Measure Overview 2
2.1 Key Definitions 3
2.2 Source Data 3
2.3 Data Quality 3
3 Metric 1: Diabetes Control Surveillance 4
3.1 Metric Description 4
3.2 Selecting a Measurement Period 4
3.3 Selecting a Population of Interest 4
3.4 Calculating Age 4
3.5 Defining the Denominator 5
3.6 Calculating the Numerator 5
3.7 Specifying the Calculation Logic 6
4 Metric 2: Pre/Post Change in Individual A1C 7
4.1 Metric Description 7
4.2 Selecting a Measurement Period 7
4.3 Selecting a Population of Interest 9
4.4 Calculating Age 9
4.5 Selecting Pre/Post A1Cs 9
4.6 Defining the Denominator 10
4.7 Calculating the Numerator 11
4.8 Specifying Calculation Logic 12
5 Metric 3: Pre/Post Change in Diabetes Control Status 13
5.1 Metric Description 13
5.2 Selecting a Measurement Period 13
5.3 Selecting a Population of Interest 13
5.4 Calculating Age 13
5.5 Selecting Pre/Post A1Cs 13
5.6 Defining the Denominator 14
5.7 Calculating the Numerator 14
5.8 Specifying Calculation Logic 15
6 Limitations 17

Appendix A **Background Research Findings** **A-1**
Appendix B **ACL CODI Data Model Attributes Required to Compute Diabetes Control** **B-1**
Appendix C **Diabetes Control Surveillance Metric Calculation Logic Flow Chart** **C-1**
Appendix D **Pre/Post Change in Individual A1C Metric Calculation Logic Flow Chart** **D-1**
Appendix E **Pre/Post Change in Diabetes Control Status Metric Calculation Logic Flow Chart** **E-1**
Appendix F **Acronyms and Abbreviations** **F-1**

List of Figures

Figure 1. Example 6-Month Look Back and 12-Month Observation Periods Based on Intervention Start Dates 8
Figure 2. Pre-Intervention A1C Selection Example 10
Figure 3. Post-Intervention A1C Selection Example 10

List of Tables

Table A-1. Glycemic Control Studies and Measurement Methods of Interest A-1
Table B-1. DEMOGRAPHICS Table Data Elements for Measure Calculations B-1
Table B-2. ENCOUNTER Table Data Elements for Measure Calculations B-2
Table B-3. CONDITION Table Data Elements for Measure Calculations B-3
Table B-4. DIAGNOSIS Table Data Elements for Measure Calculations B-4
Table B-5. PROGRAM_ENROLLMENT Table Data Elements for Measure Calculations B-5
Table B-6. ASSET_ENROLLMENT Table Data Elements for Measure Calculations B-6
Table B-7. ASSET_DELIVERY Table Data Elements for Measure Calculations B-7
Table B-8. LAB_RESULT Table Data Elements for Measure Calculations B-8
Table B-9. ORGANIZATION Table Data Elements for Measure Calculations B-9
Table B-10. PROGRAM Table Data Elements for Measure Calculations B-9

1 Introduction

1.1 Purpose

This document describes a method for measuring diabetes control among a population of individuals diagnosed with diabetes. This document is intended for health information exchanges (HIEs) or organizations holding data from clinical settings who are interested in measuring diabetes control.

This work is part of an Administration for Community Living (ACL) sponsored project, the Community and Clinical Data Initiative (CODI) Maryland pilot.[1] This measure was collaboratively developed by MITRE and the Chesapeake Regional Information System for our Patients (CRISP), the HIE in Maryland, to support the ability of MAC, Inc. and Meals on Wheels of Central Maryland to communicate the potential impact of their nutrition and diabetes self-management interventions on diabetes control.

1.2 Background Research

MITRE reviewed published diabetes measurement literature to identify candidate measurement approaches or components for consideration. Appendix A summarizes findings from relevant diabetes control literature, which provided measurement thresholds, intervals, and analytic approaches that informed measure development.

The literature review identified a hemoglobin A1C (A1C) target that defines controlled diabetes as less than 7% and poor control at greater than 9%. Additionally, clinical guidelines state that older adults may be less focused on glycemic control and should have less strict glycemic goals (A1C <8%).

1.3 Assumptions

The diabetes control measure assumes that the CODI definition of diabetes prevalence is used to identify individuals with diabetes since diabetes control is assessed among individuals with diabetes.[2] Thus, this diabetes control measure inherits the following assumptions of the CODI diabetes prevalence measure:

- Since the measure focuses on identifying people with diabetes in a population and provides a foundation for the assessment of diabetes control, the measure will not differentiate diabetes by type (e.g., Type 1 versus Type 2). The measure will also not identify:
    - individuals with prediabetes
    - individuals with undiagnosed diabetes mellitus.
    - incident cases of diabetes. An incident case refers to a new occurrence of a disease or health condition within a specified period of time. Incident cases are a subset of prevalent cases.

[1] This and other CODI resources are available at https://mitre.github.io/codi/.

[2] Available at https://mitre.github.io/codi/

- The measure assumes no primary data collection is required since computation of the measure only requires health data generated from routine delivery of healthcare services.
- The measure assumes that a longitudinal dataset is not required since it is cross-sectional. As a result, the measure will not measure progression of diabetes in an individual over time.
- The measure assumes that HIEs have access to basic demographic attributes, encounter information, and diagnostic codes in the form of International Classification of Disease revision 10 (ICD-10) codes received from a HIE participant (i.e., a healthcare provider organization that shares data with a HIE.)
- The measure assumes that HIEs implementing this measure may have to translate aspects of the measure definition based on their systems and data availability since each HIE receives different types and formats of health data through various mechanisms.
    - For instance, HIEs may have to interpret the concept of a clinical service or an encounter and what evidence is present in the clinical data they receive. Although a Continuity of Care Document (CCD) suggests that an encounter occurred, it is not itself evidence of an encounter; however, a HIE may accept a CCD as evidence that a clinical service was received.
- The measure assumes that some individuals in a population of interest may lack sufficient clinical data to be included in the measure calculation. Lacking clinical data may indicate that a person did not receive any healthcare during the measurement period or that clinical data has not been shared with the HIE in a usable way. Thus, HIEs will need to determine criteria to select individuals with sufficient clinical data for the measure calculation.
- The measure assumes that patient matching and deduplication will be conducted either as an ongoing effort, or prior to the calculation of this measure by the HIE.

In addition to the assumptions inherited from diabetes prevalence, the following assumptions apply:

- The measure assumes that specific glycemic targets may vary among individuals with diabetes due to age, co-morbidities, and other factors.[3]
- The measure assumes that HIEs will determine an approach for selecting A1Cs to determine control.

2 Measure Overview

The diabetes control measure is composed of three metrics to accommodate different analytic goals, reporting needs, and data availability. A user may choose to measure diabetes control by implementing all or a subset of the following three metrics:

- Diabetes Control Surveillance Metric (see Section 3)
- Change in Individual A1C Pre/Post Metric (see Section 4)

[3] https://diabetesjournals.org/care/article/47/Supplement_1/S111/153951/6-Glycemic-Goals-and-Hypoglycemia-Standards-of

- Change in Diabetes Control Status Pre/Post Metric (see Section 5)

During the ACL sponsored CODI Maryland pilot implementation (ending August 2025), all three metrics will be implemented by CRISP to measure diabetes control and will be used by MAC, Inc. and Meals on Wheels of Central Maryland to communicate the potential impact of their respective interventions.

2.1 Key Definitions

The following terms are used in the metric descriptions as defined below.

- **Intervention**: A structured set of activities designed to address specific needs or goals. Interventions include programs, such as diabetes self-management classes, and services, such as home-delivered meals.
- **Participant**: An individual who receives an intervention, including participating in a program or receiving a service intended to address specific health-related needs. In the context of the Diabetes Control Measure, all participants should be living with diabetes at the time of the intervention.
- **Evidence of Receiving a Clinical Service**: A clinical service is generally assumed to be provided at an encounter (i.e., hospitalization or ambulatory visit). However, HIEs must infer what occurred during an encounter since a complete record of a healthcare encounter is not usually shared. A HIE may define evidence of receiving a clinical service in different ways; for example, evidence of an encounter (such as an HL7 Version 2[4] Admission, Discharge, and Transfer message or a CCD[5])) with at least one diagnostic code.

  For multi-day encounters that start before or extend beyond the measurement period, a HIE must consider whether to assess the receipt of clinical services at either the beginning or at the end of the encounter. The end date of the encounter may be preferred as diagnosis data may be more available at discharge.
- **Indication of Diabetes Unrelated to Pregnancy**: Defined as individuals with one or more instances of the ICD-10 diagnostic codes indicating diabetes (E10, E11, and E13) and not a code indicating diabetes due to pregnancy (O24).[6]

2.2 Source Data

The minimum clinical and intervention data necessary to compute diabetes control are described in Appendix B in the context of the CODI data model.[2]

2.3 Data Quality

The quality of the clinical data used to calculate diabetes control should be assessed regularly to improve the accuracy and reliability of the results. Users are encouraged to assess data quality based on completeness, accuracy and stability, among others. Users should set their

[4] HL7 Version 2 Specification: https://www.hl7.org/implement/standards/product_brief.cfm?product_id=185

[5] HL7 Clinical Document Architecture: https://www.hl7.org/implement/standards/product_brief.cfm?product_id=7

[6] Individuals who had an ICD-10 code indicating malnutrition-related diabetes mellitus (Lontchi-Yimagou et al., 2022) (E12), diabetes due underlying conditions (E08), or drug-induced diabetes (E09) are not included.

own measurement benchmarks and targets for these metrics as appropriate for their data sources.

3 Metric 1: Diabetes Control Surveillance

3.1 Metric Description

The surveillance metric is designed to monitor the overall risk of diabetes-related complications within a population of interest by evaluating A1C levels to identify the proportion of individuals with diabetes who are in a defined control state, such as well controlled, moderately controlled, or not controlled. This metric can be used to describe the diabetes control status of a defined population at a specified time (e.g., calendar year 2024) or can be used to monitor changes in control over time within a population by applying this metric over two time periods. It is a cross-sectional (e.g., point in time) measure driven by a user-selected time period(s).

3.2 Selecting a Measurement Period

Users must define a measurement period to calculate diabetes control; the measurement period is the time period during which diabetes control will be calculated and assessed and also the time period used to select clinical data.

In defining a measurement period, users may consider their analytic goals, the data available to participating HIEs, and the information needs of HIE data-sharing partners like community-based organizations. Users may decide to align the measurement period to similar work (e.g., the reporting period for care quality measures) for comparability and validation.

A 12-month measurement period is recommended. Longer measurement periods may be beneficial in some circumstances and extending the measurement period can increase the size of the population included in the denominator. Users are cautioned that applying an abbreviated measurement period that is less than a year could introduce bias.

Important in the selection of a measurement period is the recognition that individuals seek and consume healthcare in non-standard and non-random patterns, meaning that people seek and receive healthcare at different frequencies, and some are totally disengaged from the healthcare system. That means that no measurement period can be designed to capture everyone and users should carefully consider healthcare utilization patterns when creating a measurement period.

3.3 Selecting a Population of Interest

Users must define the population of interest—the group for whom diabetes control will be calculated. The population of interest may be defined based on the demographic, clinical, and/or other characteristics required for reporting. For instance, a defined population may be all participants that received services from a community-based organization. Selecting the population of interest is the first step in calculating diabetes prevalence (see calculation logic below).

3.4 Calculating Age

Users must calculate individual age as part of this metric. Individuals must have only one age calculated based on a single date in the measurement period to determine if they meet the

denominator's exclusion criteria. There are several ways that age can be calculated, but a consistent approach should be used for all individuals.

The recommended approach is to calculate an individual's age on the first day of the measurement period as follows:

$$Age = [Start\ Date\ of\ Measurement\ Period] - [Date\ of\ Birth]$$

3.5 Defining the Denominator

Individuals in the denominator are those during the measurement period who:

- are in the defined population of interest,
- are 18 years or older,[7]
- have evidence of receiving at least one clinical service during measurement period, and
- have an indication of diabetes unrelated to pregnancy.

3.5.1 Denominator Exclusions

The denominator excludes any individual:

- without at least one A1C result that is >4% and <15% during the measurement period. Values outside of this range are considered biologically implausible, or
- without at least one A1C observation that was recorded on or after the earliest date associated with an ICD-10 diagnostic code indicating diabetes unrelated to pregnancy during the measurement period.[8]

While not required, users may elect to further refine their denominator by implementing one or more additional criteria, like excluding individuals who died during the measurement period.

3.6 Calculating the Numerator

Individuals in the denominator are aggregated into the following three control categories[9] based on their latest (most recent) A1C result in the measurement period:

- **Well Controlled**: Individuals with an A1C result of less than 7% (A1C<7%).
- **Moderately Controlled:** Individuals with an A1C result between 7% and less than 9% (7%≤A1C<9%).
- **Not Controlled**: Individuals with an A1C result of 9% or higher (A1C≥9%).

The population in each control category should be calculated as a proportion of the denominator (e.g., percent well controlled).

---

[7] Individuals under the age of 18 are excluded from the denominator to limit the influence of type 1 diabetes mellitus.

[8] Individuals may have one or more diabetes diagnostic codes during the defined measurement period; an A1C measured prior to documentation of a diabetes diagnosis cannot be used to assess control.

[9] Control category thresholds informed by glycemic goals standard of care and consideration that some individuals may have less stringent goals. See https://diabetesjournals.org/care/article/47/Supplement_1/S111/153951/6-Glycemic-Goals-and-Hypoglycemia-Standards-of

3.7 Specifying the Calculation Logic

The diabetes control surveillance metric calculation logic is described below; see Appendix C for the calculation logic diagram. This logic should be applied after the population of interest and measurement period have been defined and patient matching and linkage has been completed.

1. Is the individual 18 years or older? (Y/N)
    - If no, exclude.
    - If yes, proceed to next step.

2. Did the individual have evidence of at least one clinical service in the measurement period? (Y/N)
    - If no, exclude.
    - If yes, proceed to next step.

3. Did the individual have one or more ICD-10 diagnostic codes indicating diabetes (E10, E11, and E13) in the measurement period? (Y/N)
    - If no, exclude.
    - If yes, proceed to next step.

4. Did the individual have an ICD-10 code indicating diabetes mellitus during or due to pregnancy (O24) during the measurement period? (Y/N)
    - If yes, exclude.
    - If no, proceed to next step.

5. Did the individual have one or more A1C labs constrained to codes in the HbA1C Laboratory Test value set (OID 2.16.840.1.113883.3.464.1003.198.12.1013[10]) in the measurement period? (Y/N)
    - If no, exclude.
    - If yes, proceed to next step.

6. Did the individual have one or more A1C results >4% and <15% constrained to codes in HbA1C Laboratory Test value set[10] in the measurement period?
    - If no, exclude.
    - If yes, include the individual in the denominator.

7. What was the individual's last A1C result in the measurement period?
    - If the A1C result was <7%, this individual's diabetes control status is classified as "Well Controlled." Calculate as proportion of denominator.
    - If the A1C result was ≥7% and <9%, this individual's diabetes control status is classified as "Moderately Controlled." Calculate as proportion of denominator.
    - If the A1C result was ≥9%, this individual's diabetes control status is classified as "Not Controlled." Calculate as proportion of denominator.

[10] Value Set Website: https://vsac.nlm.nih.gov/valueset/2.16.840.1.113883.3.464.1003.198.12.1013/expansion/Latest

4 Metric 2: Pre/Post Change in Individual A1C

4.1 Metric Description

This pre/post metric compares two A1C results among adults diagnosed with diabetes—selecting one A1C result from before a selected intervention starts (pre) and one A1C result following the intervention start date (post) to determine if participants experienced a medically relevant change in A1C.

Because modest variation in A1C results is expected, a medically relevant change for this metric is defined as an absolute difference ≥ 0.5% between the selected pre and post A1C results; the change may either be positive or negative. For example, selected pre and post A1C results of 8.5% and 8.7%, respectively, do not constitute a change for this metric.

4.2 Selecting a Measurement Period

Users must define a measurement period to calculate diabetes control among participants receiving an intervention; the measurement period is the time period during which diabetes control will be calculated and assessed and also the time period used to select clinical data.

In defining a measurement period, users may consider their analytic goals, the data available to participating HIEs, and the information needs of HIE data-sharing partners like community-based organizations (CBOs). Users may decide to align the measurement period to similar work (e.g., the reporting period for care quality measures) for comparability and validation.

For pre/post calculations, time has more components and complexity compared to the surveillance measure. There are three relevant dates and time periods to consider when calculating this metric: **a participant's intervention start date**, the pre-intervention observation period to assess diabetes control before the intervention start date (referred to as "**look-back period**"), and a post intervention observation period to assess change after the intervention start date (referred to as "**observation period**").

For group interventions like cooking classes, participants will have a common intervention start date. For asynchronous interventions such as home-delivered meals, participants may start the intervention on different days. This means that the measurement period may differ for each participant. This metric approaches time based on intervention start date rather than start ***and*** end dates because interventions, like home-delivered meals, vary in duration and some may be ongoing (i.e., no defined end date).

Users will define the measurement period for this metric by selecting the duration of the look-back period and observation period. All three of the following time components must be populated to define the measurement period for selected participants.

- **Intervention Start Date**: Users will select a date attribute that provides an intervention start date. The selected date attribute should most closely correspond to the date a participant first received an intervention (e.g., participated in a program or first received a service). There may be instances when enrollment information is missing but delivery information is available. When appropriate, users may draw the intervention start date from multiple date attributes so that if one date from a selected attribute (e.g., intervention start date) is missing, a backup date (e.g., enrollment date) can be used to approximate the start. Some interventions may have been operating for more years than clinical data are available; users should verify that the selected intervention start date time period aligns with clinical data availability. Users may improve precision by further

constraining the metric to intervention start dates from specific periods of time (like calendar year 2024).

- **Look-Back Period**: Users will select a duration of time (days, weeks, or months) to look backwards from a participant's intervention start date to determine baseline diabetes control (such as 12 months). Participants must have an ICD-10 diagnostic code for diabetes (E10, E11, and E13) during the look-back period to be assessed by the pre/post metrics.
- **Observation Period**: Users will select a duration of time to observe from a participant's intervention start date to determine diabetes control after an intervention has begun (such as 12 months). Because some interventions are time limited while others are ongoing, some participants may be receiving the intervention for some, most, or all of the observation period; some participants may still be receiving the intervention after the observation period ends.

Figure 1 illustrates how a participant's intervention start date, look-back period, and observation period are applied to define a participant's measurement period.

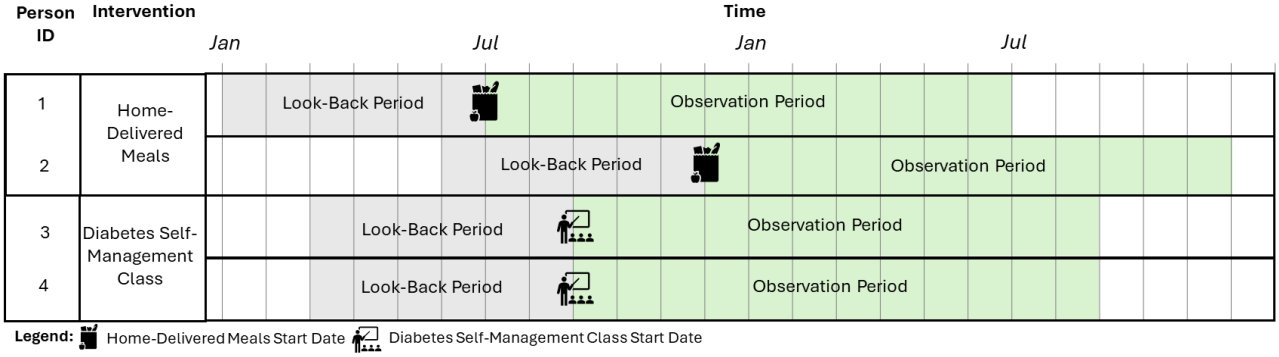


Figure 1. Example 6-Month Look-Back and 12-Month Observation Periods Based on Intervention Start Dates

Key Considerations about Time

In selecting look-back and observation periods for pre/post metrics, users should consider their analytic goals, the context of the intervention being assessed, and the following:

- Picking longer date ranges will likely select a more representative sample but is likely to introduce more factors that can influence A1C change.
- For some analyses, having a look-back period and observation period of equal duration may be valuable.
- The amount of time between individual pre and post A1Cs may vary significantly. Date and time period selection should be driven by the intervention of interest and goals of reporting.
- Longer look-back and observation periods will reduce the number of participants excluded based on A1C availability—longer time periods provide more time for individuals to receive healthcare and receive an A1C lab test.
    - Shorter look-back and observation periods may create selection bias due to the expected cadence of A1C testing.

- The observation period must be greater than 90 days following the intervention start date since changes in A1C are not expected for at least three months following changes to lifestyle or treatment.
- Longer observation periods for interventions with greater duration and/or higher frequency, like receipt of home-delivered meals five times a week for one year, provide more time for the intervention to decrease A1C and are more likely to show change in diabetes control.
- Longer observation periods for interventions with shorter duration and/or lower frequency, like home-delivered meals three times a week for two weeks, could provide a longer window after the intervention concludes for A1C to change based on factors unrelated to the intervention.
- If intervention start dates for selected participants span an extended time period (e.g., multiple years), interpretation of pre/post changes may be more difficult, especially if the intervention evolved over that time span.

4.3 Selecting a Population of Interest

Users must define the population of interest that is the group for whom diabetes control will be assessed. The population of interest may be defined based on the demographic, clinical, and/or other characteristics required for reporting. For instance, a defined population may be all participants that received a particular type of service from a CBO.

4.4 Calculating Age

Users must calculate individual age as part of this metric. Individuals must have only one age calculated based on a single date in the measurement period to determine if each individual meets the denominator's exclusion criteria. There are several ways that age can be calculated, but a consistent approach should be used for all individual's included in this metric calculation.

The recommended approach is to calculate an individual's age on the selected intervention start date as follows:

$$Age = [Intervention\ Start\ Date] - [Date\ of\ Birth]$$

4.5 Selecting Pre/Post A1Cs

Based on the time components defined for the measurement period, users will select a pre-intervention A1C during the look-back period and an A1C during the observation period.

Selecting a Look-Back Period A1C

A single A1C result is required during the look-back period. When there are multiple A1C results during the look-back period, this should be the A1C with a result date closest to the intervention start date (i.e., the latest A1C result in the look-back period).

- Participants who do not have an A1C result in the look-back period cannot be assessed by the pre/post metrics.
- Best practice is to select the A1C that occurs as close to the intervention date as possible during the look-back period.
- Figure 2 illustrates this guidance and shows the potential impact of shorter look-back periods on inclusion.

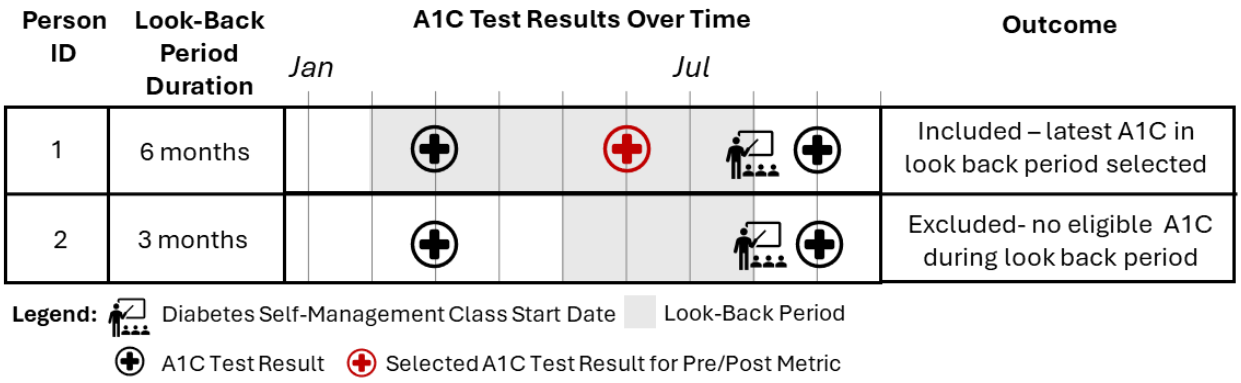


Figure 2. Pre-Intervention A1C Selection Example

Selecting an Observation Period A1C

A single A1C result is required during the observation period. This should be the A1C with a result date furthest away from the intervention start date (i.e., the latest A1C result in the observation period).

- Participants who do not have an A1C result in the observation period cannot be assessed by the pre/post metrics.
- Participants who do not have an A1C result greater than or equal to 90 days after the intervention start date within the observation period cannot be assessed. This is because A1C results from days 1–89 following intervention start reflect pre-intervention diabetes control, and those A1C results should be excluded.
- Figure 3 illustrates this guidance and shows the potential impact of shorter observation periods on inclusion.

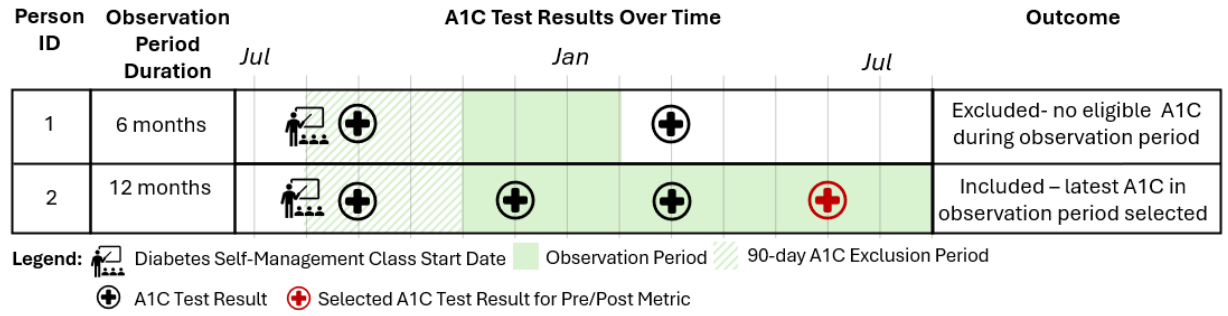


Figure 3. Post-Intervention A1C Selection Example

4.6 Defining the Denominator

Individuals in the denominator are those during the measurement period who:

- are in the defined population of interest,
- are 18 years or older,[11]

[11] Individuals under the age of 18 are excluded from the denominator to limit the influence of type 1 diabetes mellitus.

- have evidence of receiving at least one clinical service during the measurement period,
- have an intervention start date for an intervention of interest delivered during the measurement period,[12]
- have an indication of diabetes unrelated to pregnancy, and
- have at least one A1C result in both the look-back period and observation period.[13]

4.6.1 Denominator Exclusions

The denominator excludes any individual:

- without at least one A1C result that is >4% and <15%[14] during the look-back period that was recorded on or after the earliest date associated with an ICD-10 diagnostic code indicating diabetes unrelated to pregnancy during the look-back,[15] or
- without at least one A1C result that is >4% and <15% during the observation period that is more than 90 days after the intervention start date.[16]

While not required, users may elect to further refine their denominator by implementing one or more additional criteria, like excluding individuals who died during the measurement period.

4.7 Calculating the Numerator

Participants included in the denominator are aggregated into three potential numerator categories based on the calculated difference between the selected A1C results in the look-back and observation periods (see Section 4.5 for A1C selection guidance). These categories are as follows:

- **Improved A1C Control**: A change from pre- to post-intervention that is greater than or equal to 0.5% calculated as:

$$([Look-back\ Period\ A1C\ Result] - [Observation\ Period\ A1C\ Result\ ]) \geq\ 0.5\%$$

- **No Change in A1C Control**:[17] A change from pre- to post-intervention where the absolute difference is less than 0.5% calculated as:

$$-0.5\% < ([Look-back\ Period\ A1C\ Result] - [Observation\ Period\ A1C\ Result]) < 0.5\%$$

- **Degraded A1C Control**: A change from pre- to post-intervention that is less than or equal to - 0.5% calculated as:

$$([Look-back\ Period\ A1C\ Result] - [Observation\ Period\ A1C\ Result]) \leq\ (-0.5\%)$$

The population in each control category should be calculated as a proportion of the denominator (e.g., percent improved A1C control).

---

[12] Participants who received an intervention with no recorded dates cannot be included.

[13] Pre/post change in control cannot be assessed among participants with only one total A1C result.

[14] Values outside of this range are considered biologically implausible.

[15] Individuals may have one or more diabetes diagnostic codes during the defined measurement period; an A1C measured prior to documentation of a diabetes diagnosis cannot be used to assess control.

[16] Because A1Cs measure glycemic control over 90 days, A1C results in the post-intervention observation time period must be at least 90 days from the intervention start

[17] The absolute difference in A1C must be greater than 0.5% to be considered a medically relevant change.

4.8 Specifying Calculation Logic

The Pre/Post Change in Individual A1C metric calculation logic is described below; see Appendix D for calculation logic diagram. This logic should be applied after the population of interest and measurement period have been defined and patient matching and linkage has been completed.

1. Did the participant have an intervention start date? (Y/N)
    - If no, exclude.
    - If yes, proceed to next step.

2. Is the participant 18 years or older? (Y/N)
    - If no, exclude.
    - If yes, proceed to next step.

3. Did the participant have evidence of at least one clinical service in the look-back period? (Y/N)
    - If no, exclude.
    - If yes, proceed to next step.

4. Did the participant have one or more ICD-10 diagnostic codes indicating diabetes (E10, E11, and E13) in the look-back period? (Y/N)
    - If no, exclude.
    - If yes, proceed to next step.

5. Did the participant have an ICD-10 code indicating diabetes mellitus during or due to pregnancy (O24) during the measurement period? (Y/N)
    - If yes, exclude.
    - If no, proceed to next step.

6. Did the participant have one or more A1C results >4% and <15% constrained to codes in HbA1C Laboratory Test value set[10] in the look-back period? (Y/N)
    - If no, exclude.
    - If yes, proceed to next step.

7. Did the individual have at least one A1C recorded on or after the earliest date associated with an ICD-10 diagnostic code indicating diabetes (E10, E11, and E13) in the look-back period?
    - In no, exclude.
    - If yes, proceed to next step.

8. Did the participant have one or more A1C results >4% and <15% constrained to codes in HbA1C Laboratory Test value set[10] during the observation period(s) (i.e., qualifying A1C result)? (Y/N)
    - If no, exclude.
    - If yes, proceed to next step.

9. Did the participant have at least one qualifying A1C result in the observation period over 90 days after the intervention start date? (Y/N)
    - If no, exclude.
    - If yes, include the participant in the denominator.

10. What was the difference between the participant's look-back period A1C result and their observation period A1C result?
    - If the difference was greater than or equal to 0.5%, this participant's pre/post change in individual A1C control is classified as "Improved A1C Control." Calculate as proportion of denominator.
    - If the absolute difference was less than 0.5% (<0.5% and >(-0.5%)), this participant's pre/post change in individual A1C is classified as "No Change in A1C Control." Calculate as proportion of denominator.
    - If the difference was less than or equal to -0.5%, this participant's pre/post change in individual A1C control is classified as "Degraded A1C." Calculate as proportion of denominator.

5 Metric 3: Pre/Post Change in Diabetes Control Status

5.1 Metric Description

This pre/post metric compares two A1C results among adult participants diagnosed with diabetes—selecting A1C results from before and after an intervention to determine if participants experienced a change in one of three diabetes control categories derived from the American Diabetes Association (ADA) diabetes guidance on diabetes management. The Post-Intervention period control categories are then compared to the Pre-Intervention control categories to assess change in diabetes control category among participants. A change in diabetes control category post-intervention may indicate improved control, maintenance of control, or degradation in control.

5.2 Selecting a Measurement Period

The measurement period for this metric is the same as for Change in Individual A1C pre/post metric (See Section 4.2).

5.3 Selecting a Population of Interest

The population selection for this metric is the same as for Change in Individual A1C pre/post metric (See Section 4.3).

5.4 Calculating Age

The age calculation for this metric is the same as for Change in Individual A1C pre/post metric (See Section 0).

5.5 Selecting Pre/Post A1Cs

The A1C selection guidance for this metric is the same as for Change in Individual A1C pre/post metric (See Section 4.5).

5.6 Defining the Denominator

The denominator for this metric is the same as for Change in Individual A1C pre/post metric (See Section 4.6).

5.6.1 Denominator Exclusions

The denominator exclusions for this metric are the same as for Change in Individual A1C pre/post metric (See Section 4.6.1).

5.7 Calculating the Numerator

Participants included in the denominator are aggregated into three potential numerator categories based on the comparison of the diabetes control status category of the last A1C result in the pre-intervention look-back period to the diabetes control status category of the last A1C result that occurred more than 90 days after the intervention start date during the observation period.

Selected pre and post intervention A1C results are first categorized into the following diabetes control status categories:

- Diabetes Control Status Categories:
    - **Well Controlled:** A1C results <7% (less than 7%)
    - **Moderately Controlled**: 7%≤ A1C results <9% (greater than or equal to 7% and less than 9%)
    - **Not Controlled:** A1C results ≥9% (greater than or equal to 9%)

The change in a participant's diabetes control status is then categorized as follows:

- **Improved Diabetes Control Status**: Participants whose observation period A1C diabetes control status category (post-intervention) was in an improved diabetes control status category compared to their look-back period A1C (pre-intervention). This includes:
    - "Not Controlled" (pre) to "Moderately Controlled" (post)
    - "Not Controlled" (pre) to "Well Controlled" (post)
    - "Moderately Controlled" (pre) to "Well Controlled" (post)
- **No Change in Diabetes Control Status**: Participants whose observation period A1C diabetes control status category (post-intervention) was in the same diabetes control status category as their look-back period A1C (pre-intervention). This includes:
    - "Not Controlled" (pre) to "Not Controlled" (post)
    - "Moderately Controlled" (pre) to "Moderately Controlled" (post)
    - "Well Controlled" (pre) to "Well Controlled" (post)

- **Degraded Diabetes Control Status**: Participants whose observation period A1C diabetes control status category (post-intervention) was in a worse control status category compared their look-back period A1C (pre-intervention). This includes:
    - "Well Controlled" (pre) to "Moderately Controlled" (post)
    - "Well Controlled" (pre) to "Not Controlled" (post)
    - "Moderately Controlled" (pre) to "Not Controlled" (post)

The population in each control status category should be calculated as a proportion of the denominator (e.g., percent improved diabetes control status).

5.8 Specifying Calculation Logic

The Pre/Post Change in Diabetes Control Status metric calculation logic is described below; see Appendix E for calculation logic diagram. This logic should be applied after the population of interest and measurement period have been defined and patient matching and linkage has been completed.

1. Did the participant have an intervention start date? (Y/N)
    - If no, exclude.
    - If yes, proceed to next step.

2. Is the participant 18 years or older? (Y/N)
    - If no, exclude.
    - If yes, proceed to next step.

3. Did the participant have evidence of at least one clinical service in the look-back period? (Y/N)
    - If no, exclude.
    - If yes, proceed to next step.

4. Did the participant have one or more ICD-10 diagnostic codes indicating diabetes (E10, E11, and E13) in the look-back period? (Y/N)
    - If no, exclude.
    - If yes, proceed to next step.

5. Did the participant have an ICD-10 code indicating diabetes mellitus during or due to pregnancy (O24) during the measurement period? (Y/N)
    - If yes, exclude.
    - If no, proceed to next step.

6. Did the participant have one or more A1C results >4% and <15% constrained to codes in HbA1C Laboratory Test value set[10] in the look-back period? (Y/N)
    - If no, exclude.
    - If yes, proceed to next step.

7. Did the individual have at least one A1C recorded on or after the earliest date associated with an ICD-10 diagnostic code indicating diabetes (E10, E11, and E13) in the look-back period?
    - If no, exclude.
    - If yes, proceed to next step.

8. Did the participant have one or more A1C results >4% and <15% constrained to codes in HbA1C Laboratory Test value set[10] during the observation period(s) (i.e., qualifying A1C result)? (Y/N)
    - If no, exclude.
    - If yes, proceed to next step.

9. Did the participant have at least one qualifying A1C result in the observation period over 90 days after the intervention start date? (Y/N)
    - If no, exclude.
    - If yes, include the participant in the denominator.

10. What was the individual's last A1C result in the look-back period (pre-intervention)?
    - If the A1C result was <7%, this individual's pre-intervention diabetes control status is classified as "Well Controlled."
    - If the A1C result was ≥7% and <9%, this individual's pre-intervention diabetes control status is classified as "Moderately Controlled."
    - If the A1C result was ≥9%, this individual's pre-intervention diabetes control status is classified as "Not Controlled."
11. What was the individual's last A1C result in the observation period (post-intervention)?
    - If the A1C result was <7%, this individual's post-intervention diabetes control status is classified as "Well Controlled."
    - If the A1C result was ≥7% and <9%, this individual's post-intervention diabetes control status is classified as "Moderately Controlled."
    - If the A1C result was ≥9%, this individual's post-intervention diabetes control status is classified as "Not Controlled."
12. What was the difference between the participant's pre-intervention diabetes control status and their post-intervention diabetes control status?
    - If better, this participant is identified as having "Improved Diabetes Control Status." Calculate as proportion of denominator.
    - If the same, this participant is identified as having "Maintained Diabetes Control Status." Calculate as proportion of denominator.
    - If worse, this participant is identified as having a "Degraded Diabetes Control Status." Calculate as proportion of denominator.

6 Limitations

This measure has the following limitations:

- This measure does not control for potential confounding factors that may impact diabetes control. Diabetes is a complex condition and individuals with diabetes are often receiving more than one intervention (e.g., medical, lifestyle). A1C results are influenced by many factors including the individual's age, previous medical history, medication adherence, and diabetes control goals.
- The measure does not include an external control group that would be necessary to demonstrate causality. While the interventions assessed by this diabetes control measure may show correlations between an intervention and changes in participants' A1C results, this measure does not suggest a causal relationship.
- The patterns of all individuals in a selected population may not be accurately represented by the aggregate estimates calculated by this diabetes control measure. For example, within a population where most individuals' diabetes control improved, there may be individuals whose diabetes control worsened.
- Data from healthcare providers that do not share data with the HIE are not included. As a result, the measure cannot evaluate the burden of diabetes for individuals unengaged with the healthcare system since the measure can only use data accessible by the implementing HIE.
- The denominator may be incomplete because laboratory and medication data are not used to infer a new or existing diagnosis of diabetes mellitus where one was not documented explicitly in the record using diagnostic codes.
- Selection bias may be introduced if participants with LOINC coded lab results are different from those with non-LOINC coded lab results. The diabetes control measure uses LOINC codes to identify A1C test results. As a result, some available but non-LOINC coded lab results will be excluded.
- Selection bias may be introduced based on patterns of A1C testing (e.g., quarterly, every six months, noncompliance) which impacts A1C availability. Individuals who do not have two A1C test results in the required time periods (e.g., look-back period and observation period) cannot be assessed for change.
- The nature and volume of intervention a participant gets during a specific timeframe can vary which may make interpretation of diabetes control metrics difficult. The CODI dose definition may be used to compute volume of services received during a specified timeframe, if desired, to help contextualize results.[18]

[18] Available at https://mitre.github.io/CODI/.

Appendix A Background Research Findings

This appendix summarizes findings from relevant diabetes literature, which provided measurement thresholds, intervals, and analytic approaches that informed measure development

Table A-1. Glycemic Control Studies and Measurement Methods of Interest

	Title	Summary	Measurement
1	Glycemic Targets: Standards of Medical Care in Diabetes—2023	The American Diabetes Association (ADA) recommends assessing glycemic status at least twice a year for patients with stable control and quarterly for those with recently changed therapy or unmet glycemic goals. A1C continuous glucose monitoring (CGM), and self-monitoring of blood glucose (SMBG) are used for this assessment. For nonpregnant adults, an A1C goal of <7% is recommended, and if using CGM, a time in range of more than 70% with time below range less than 4% is the goal. Individual patient factors may necessitate more or less stringent A1C goals.	**Threshold:** A1C of <7% (53 mmol/mol) **Baselined:** NA **Measurement Interval:** Biannual **Measurement Type:** Categorical attainment of threshold.
2	Type 2 Diabetes in the Real World: The Elusive Nature of Glycemic Control	This review examines published findings about diabetes treatment and resulting glycemic control rates. Despite the approval of 40 new treatment options for type 2 diabetes since 2005, only about half of patients with the condition are meeting their glycemic goals. There has been little change in the percentage of individuals achieving their target goals over the last decade.	**Threshold:** A1C of <7% (53 mmol/mol) **Baselined:** No **Measurement Interval:** Annual **Measurement Type:** Categorical attainment of threshold.
3	Glycemic Response and Attainment of A1C Goals Following Newly Initiated Insulin Therapy for Type 2 Diabetes	The study identified characteristics associated with glycemic response to newly initiated insulin therapy in 1,139 type 2 diabetic patients. The outcomes of interest were the proportion of patients achieving A1C <7% and mean change in A1C within 3-9 months. The mean A1C at insulin initiation was 8.2 vs. 9.2% among those who did and did not attain A1C <7%. Within a mean of 5 months, 464 (40.7%) patients attained A1C <7%. In multivariable analyses, pre-insulin A1C was responsible for nearly all the explained variance in A1C change. Each one percentage point of pre-insulin A1C reduced the probability of attaining <7% by 26% - suggesting that insulin initiation at lower A1C levels improves goal attainment and independently increases glycemic response.	**Threshold:** A1C of <7% (53 mmol/mol) **Baselined:** Yes **Measurement Interval:** 3-9 Months post baseline **Measurement Type:** Measured HbA1c change and attainment of threshold.

	Title	Summary	Measurement
4	Hemoglobin A1C testing frequency among patients with type 2 diabetes within a US payer system: a retrospective observational study	This study examined A1C testing frequency among type 2 diabetes patients within a US payer system and found many patients were not tested as per American Diabetes Association guidelines. More frequent A1C testing was associated with a higher likelihood of achieving glycemic control, but these findings were inconsistent and modest. The authors suggest that testing frequency alone is not driving these outcomes, but rather a combination of factors including baseline A1C levels, comorbidities, and age. Of the patients with both measures available, 71.0% had glycemic control at both baseline and combined follow-up.	**Threshold:** A1C of <8% (64 mmol/mol) **Baselined:** Yes **Measurement Interval:** Study variables of interest were measured over the following time periods: • follow-up period 1 (first 12 months post-index date) • follow-up period 2 (12–24 months following follow-up period 1) **Measurement Type:** Categorical attainment of threshold. Correlational Regression analysis (Unadjusted and multivariable logistic regression)
5	Nutritional Intervention in Patients with Type 2 Diabetes who are Hyperglycemic Despite Drug Treatment - Lifestyle Over and Above Drugs in Diabetes (LOADD) Study: Randomized Controlled Trial	This randomized control trail aimed to determine the extent to which intensive dietary intervention can influence glycemic control and risk factors for cardiovascular disease in patients with type 2 diabetes who are hyperglycemic despite optimized drug treatment. Participants received intensive individualized dietary advice (according to the nutritional recommendations of the European Association for the Study of Diabetes) for six months. The primary outcome measure was A1C and secondary outcomes included measures of adiposity, blood pressure, and lipid profile.	**Threshold:** A1C of <7% (53 mmol/mol) **Baselined:** Yes **Measurement Interval:** 6 Months post baseline **Measurement Type:** Measured HbA1c change and attainment of threshold. Analysis: Comparative (ANCOVA)

	Title	Summary	Measurement
6	Medically Tailored Meal Delivery for Diabetes Patients with Food Insecurity: a Randomized Cross-over Trial	This study tested whether a medically tailored meal delivery program could improve dietary quality in individuals with type 2 diabetes and food insecurity. Participants received home delivery of 10 meals per week for 12 weeks by a non-profit organization, Community Servings. The primary outcome was the Healthy Eating Index 2010 score (HEI), which represents dietary quality. Participants reported lower food insecurity, less hypoglycemia, and fewer days where mental health interfered with quality of life during the "on-meal" period.	**Threshold:** A1C of <8% (64 mmol/mol) **Baselined:** Yes **Measurement Interval:** 12 weeks post baseline or post intervention **Measurement Type:** Measured the individual HbA1c of participants on intervention and off intervention The study used linear mixed models to analyze HEI scores and generalized estimating equations to analyze secondary outcomes.
7	Healthy People 2030: Reduce the proportion of adults with diabetes who have an A1c value above 9 percent — D-03	Healthy People 2030 recommends that when people with diabetes have an A1C level above 9%, they may need more care and treatment. Clinical trials have shown that having A1C levels above 9% increases the risk of complications.	**Threshold:** 11.6% of adults with A1C of >9% **Baselined:** Yes (18.7%) **Measurement Interval:** 10 years **Measurement Type:** Percentage point improvement
8	eCQM Diabetes: Hemoglobin A1c (HbA1c) Poor Control (> 9%) | eCQI Resource Center (healthit.gov)	The Electronic Clinical Quality Measures (eCQM) program provides a measure definition for a diabetes control measure, calculated as the percentage of patients 18-75 years of age with diabetes who had an A1C>9% during the measurement period.	**Threshold:** Percent of diabetic adults with an encounter during the measurement period whose most recent A1C level (performed during the measurement period) is >9.0% or is missing or was not performed during the measurement period. **Baselined:** No **Measurement Interval:** Annual **Measurement Type:** Categorical attainment of threshold.

Appendix B ACL CODI Data Model Attributes Required to Compute Diabetes Control

This appendix defines the data attributes needed to compute the diabetes control measure organized by the CODI Data Model tables; attributes are identified in ALL CAPS as they are defined in the CODI Data Model Data Dictionary.[19] If you are not using the CODI Data Model, you will need to map the fields from your source system to the attributes defined below.

The following attributes from the DEMOGRAPHICS table are required to calculate age. Notably, patient identifiers needed to match or link patients are stored in the DEMOGRAPHICS table but are not listed below. This measure definition assumes that patient matching or linkage has already occurred.

Table B-1. DEMOGRAPHICS Table Data Elements for Measure Calculations

Attribute Name	Format	Value Set	Definition	Example Inputs	Measure Calculation Use (Metric)
PATID	Char	None	Arbitrary person-level identifier. Used to link across tables.		Primary Key
BIRTH_DATE	MM/DD/YYYY	None	Date of birth. Needed for the calculation of age.	12/09/1949	Age Calculation (all)

[19] Available at https://mitre.github.io/CODI/

The ENCOUNTER table stores information about clinical encounters. The following attributes can provide evidence of a documented clinical encounter.

Table B-2. ENCOUNTER Table Data Elements for Measure Calculations

Attribute Name	Format	Value Set	Definition	Example Inputs	Measure Calculation Use (Metric)
ENCOUNTERID	Char	None	Arbitrary encounter-level identifier used to link across tables.		Primary Key
PATID	Char	None	Arbitrary person-level identifier used to link across tables.		Foreign Key
ADMIT_DATE	MM/DD/YYYY	None	Encounter or admission date.	02/24/2024	Denominator (all): Evidence of documented clinical services
DISCHARGE_DATE	MM/DD/YYYY	None	Discharge date.	02/24/2024	Denominator (all): Evidence of documented clinical services

The CONDITION table stores information about a patient's diagnosed and self-reported health conditions and diseases. The patient's medical history and current state may both be represented. The following attributes may provide evidence of a diabetes diagnosis.

Table B-3. CONDITION Table Data Elements for Measure Calculations

Attribute Name	Format	Value Set	Definition	Example Inputs	Measure Calculation Use (Metric)
CONDITIONID	Char	None	Arbitrary identifier used to link across tables.		Primary Key
PATID	Char	None	Arbitrary person-level identifier used to link across tables.		Foreign Key
CONDITION	seven-character, alphanumeric	ICD-10	Some codes will contain leading zeroes, and different levels of decimal precision may also be present. This field is a character field, not numeric, to accommodate these coding conventions. Please populate the exact value of this diagnosis code, but remove any source-specific suffixes and prefixes. (Description updated in v3.1.)	E10.42	Denominator (all): Evidence of diabetes diagnosis
CONDITION_TYPE	CHAR	CONDITION_TYPE_TYPE	Condition code type.	10 for ICD-10	Denominator (all): Evidence of diabetes diagnosis

The DIAGNOSIS table stores diagnosis codes that indicate the results of diagnostic processes and medical coding within healthcare delivery. The following attributes may provide evidence of a diabetes diagnosis.

Table B-4. DIAGNOSIS Table Data Elements for Measure Calculations

Attribute Name	Format	Value Set	Definition	Example Inputs	Measure Calculation Use (Metric)
DIAGNOSISID	Char	None	Arbitrary identifier used to link across tables.		Primary Key
PATID	Char	None	Arbitrary person-level identifier used to link across tables.		Foreign Key
DX	seven-character, alphanumeric	ICD-10	Some codes will contain leading zeroes, and different levels of decimal precision may also be present. This field is a character field, not numeric, to accommodate these coding conventions. Please populate the exact value of this diagnosis code, but remove any source-specific suffixes and prefixes. (Description updated in v3.1.)	E10.42	Denominator (all): Evidence of diabetes diagnosis
DX_TYPE	Char	DX_TYPE	Diagnostic code type.	10 for ICD-10	Denominator (all): Evidence of diabetes diagnosis

The PROGRAM_ENROLLMENT table contains one record for each person who enrolls in a program. The following attributes may provide evidence of intervention start date.

Table B-5. PROGRAM_ENROLLMENT Table Data Elements for Measure Calculations

Attribute Name	Format	Value Set	Definition	Example Inputs	Measure Calculation Use (Metric)
PROGRAM_ENROLLMENT_ID	Char	None	A primary key that uniquely identifies a row in the table.		Primary Key
PATID	Char	None	Arbitrary person-level identifier. Used to link across tables.	MRAG8308	Foreign Key
PROGRAMID	Char	None	A link back to the program this enrollment belongs to.	CTC	Foreign Key
ORGANIZATIONID	Char	None	A link back to the non-clinical organization that this enrollment belongs to.	MAC	Foreign Key
ENROLLMENT_DATE	MM/DD/YYYY	None	A date on which the enrollment was performed.	01/03/2024	May be used as Intervention Start Date (pre/post metrics 2 and 3)

The ASSET_ENROLLMENT table contains information for each unique asset enrollment for a person. The following attributes may provide evidence of intervention start date.

Table B-6. ASSET_ENROLLMENT Table Data Elements for Measure Calculations

Attribute Name	Format	Value Set	Definition	Example Inputs	Measure Calculation Use (Metric)
ASSET_ENROLLMENT_ID	Char	None	A primary key that uniquely identifies a row in the table.		Primary Key
PATID	Char	None	A link back to the demographic table.	MRAG8308	Foreign Key
ENROLLMENT_DATE	MM/DD/YYYY	None	A date on which the enrollment was performed.	01/03/2024	May be used as Intervention Start Date (pre/post metrics 2 and 3)
DELIVERY_START_DATE	MM/DD/YYYY	None	A date on which the individual who enrolled will start receiving asset. (ACL CODI note: CRISP prefers MM/DD/YYYY format)	01/03/2024	May be used as Intervention Start Date (pre/post metrics 2 and 3)
DELIVERY_END_DATE	MM/DD/YYYY	None	A date on which the individual who enrolled will stop receiving asset. This field may be blank if there is not a planned end to the service.	05/03/2024	
ASSET_ORANIZATIONID	Char	None	A link back to the organization that enrolled a person to receive assets	MAC	Foreign Key

The ASSET_DELIVERY table contains information about the delivery of assets associated with an asset enrollment; assets are resources transferred to an individual, like home-delivered meals. The following attributes may provide evidence of intervention start date.

Table B-7. ASSET_DELIVERY Table Data Elements for Measure Calculations

Attribute Name	Format	Value Set	Definition	Example Inputs	Measure Calculation Use (Metric)
ASSET_DELIVERY_ID	Char	None	A primary key that uniquely identifies a row in the table.	PL33472MC	Primary Key
PATID	Char	None	Arbitrary person-level identifier. Used to link across tables.	MRAG8308	Foreign Key
PROGRAM_ENROLLMENT_ ID	Char	None	A link back to the program enrollment that this asset delivery belongs to. An asset delivery should be linked to either a program or asset enrollment.	CTC	Foreign Key
ASSET_ENROLLMENT_ID	Char	None	A link back to the asset enrollment that this asset delivery belongs to. An asset delivery should be linked to either a program or asset enrollment.		Foreign Key
DELIVERY_START_ DATE	date	None	The first date the asset(s) was delivered.		May be used as Intervention Start Date (pre/post metrics 2 and 3)
DELIVERY_END_ DATE	date	None	The end date the asset(s) was delivered. For a single day, the entry may populate the same date for start and end.		

The LAB_RESULT_CM table contains quantitative and qualitative measurements. The following attributes may provide evidence of eligible A1C test results.

Table B-8. LAB_RESULT Table Data Elements for Measure Calculations

Attribute Name	Format	Value Set	Definition	Example Inputs	Measure Calculation Use (Metric)
LAB_RESULT_CM _ID	Char	None	A primary key that uniquely identifies a row in the table.	PL334MC	Primary Key
PATID	Char	None	Arbitrary person-level identifier. Used to link across tables.	MA8308	Foreign Key
ENCOUNTERID	Char	None	A link back to the program this enrollment belongs to.	CTC	Foreign Key
LAB_LOINC	Char	LOINC	A date on which the enrollment was performed.	01/03/2024	Denominator (all): Evidence of eligible A1C result; Numerators (all): Eligible A1C results used to calculate control categories and change in control
SPECIMEN_DATE	MM/DD/ YYYY	None	Date specimen was collected.		Select labs that fall within the Measurement Period (all)
RESULT_DATE	MM/DD/ YYYY	None	Result date.		Select labs that fall within the Measurement Period (all)
RESULT_UNIT	Char	None	Converted/standardized units for the quantitative result.		Denominator (all): Evidence of eligible A1C result; Numerators (all): Eligible A1C results used to calculate control categories and change in control
RESULT_NUM			Standardized/converted result for quantitative results.		Denominator (all): Evidence of eligible A1C result; Numerators (all): Eligible A1C results used to calculate control categories and change in control

The ORGANIZATION table contains information for each organization sending or receiving referrals, collecting patient-reported outcomes, offering programs (e.g., diabetes prevention program) or assets (e.g., home-delivered meals). The attributes below can help define the population of interest based on participation in a particular organization's intervention.

Table B-9. ORGANIZATION Table Data Elements for Measure Calculations

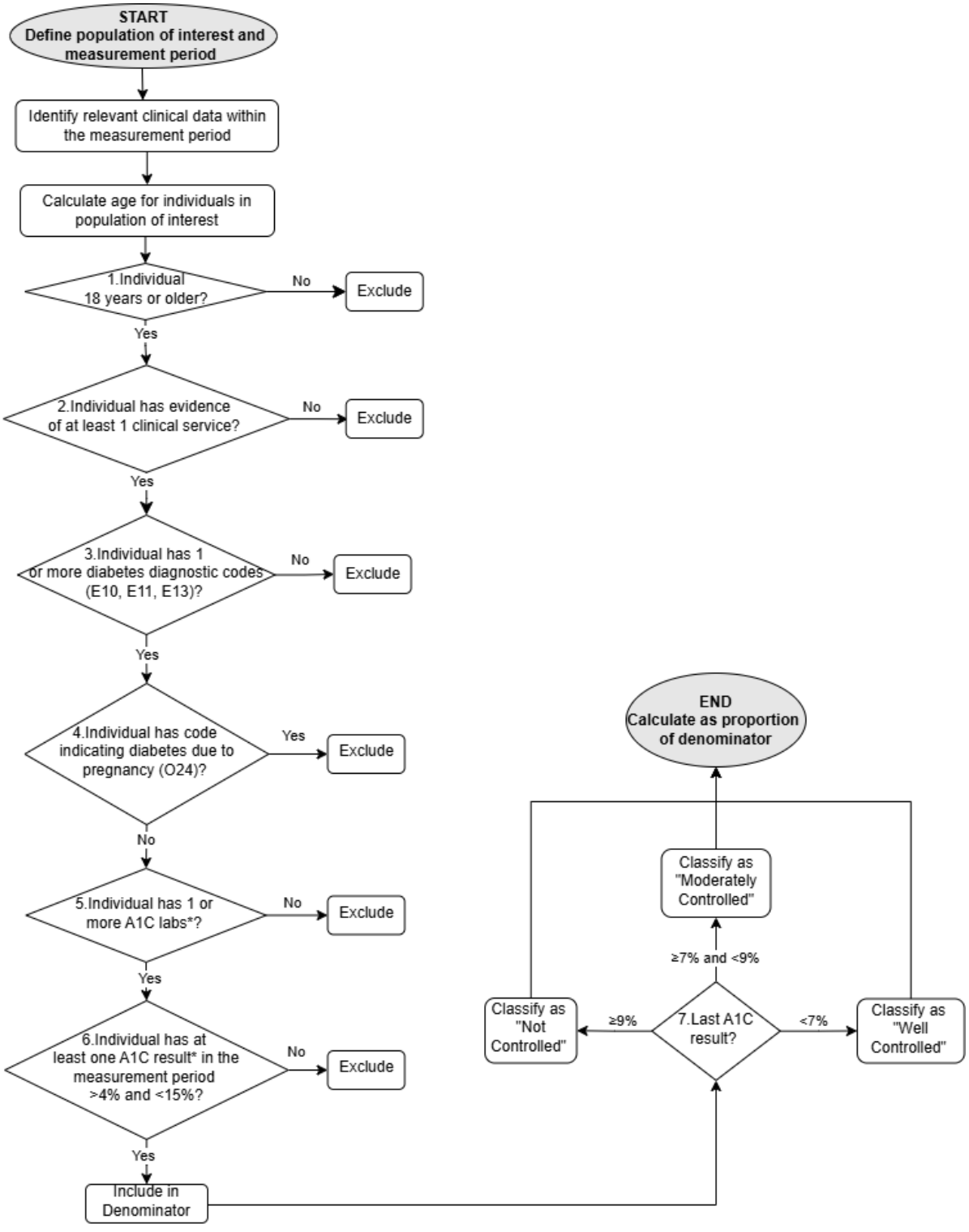
Attribute Name	Format	Value Set	Definition	Example Inputs	Measure Calculation Use (Metric)
ORGANIZATIONID	Char	None	A primary key that uniquely identifies a row in the table.	PL33472MC	Primary Key
ORGANIZATION_NAME	Char	None	Name of organization.	01/03/2024	May help define population of interest (all)

The PROGRAM table contains information for each distinct program. A program comprises a collection of interventions intended to produce a particular outcome. The attributes below can help define the population of interest based on participation in a particular program.

Table B-10. PROGRAM Table Data Elements for Measure Calculations

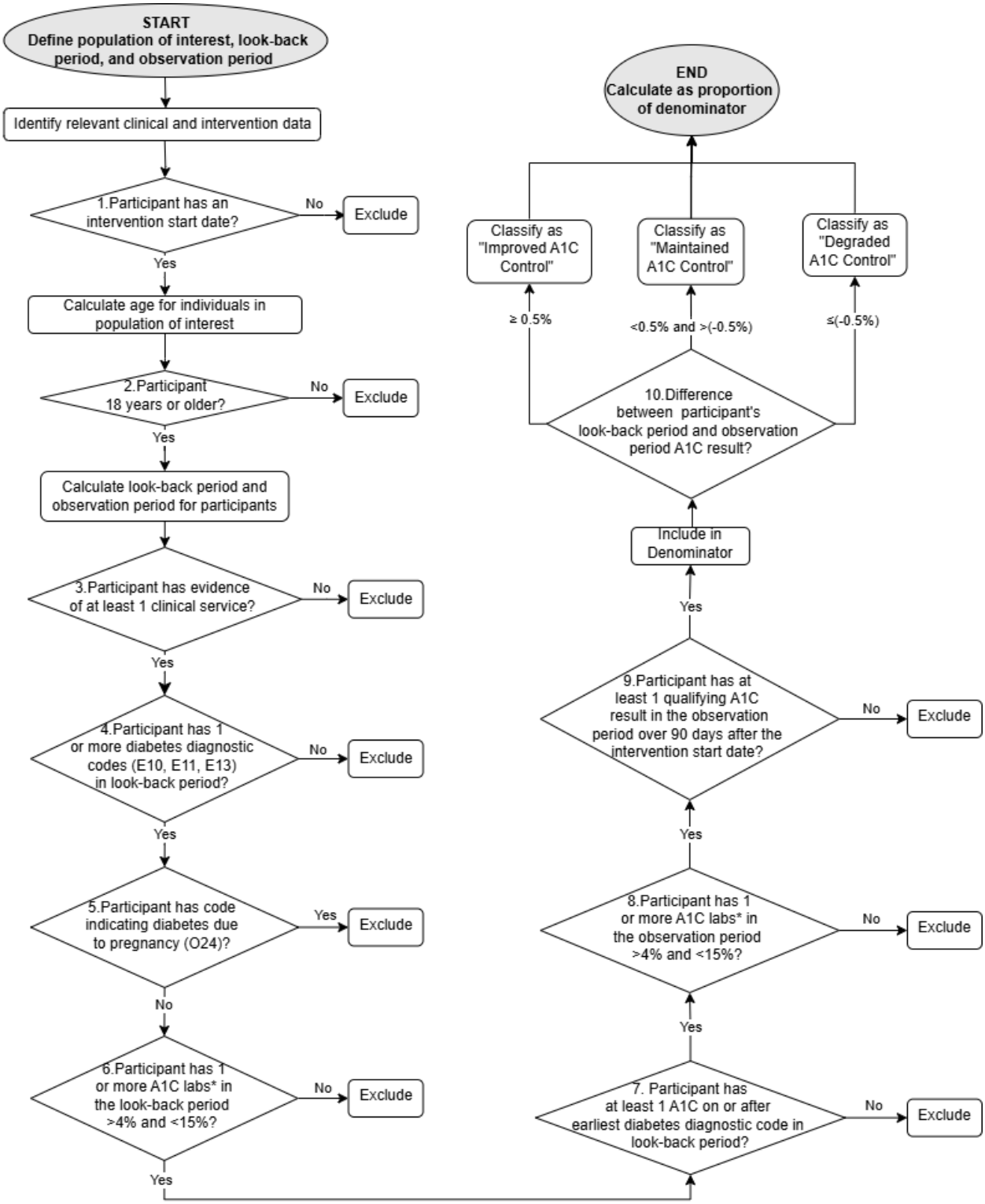
Attribute Name	Format	Value Set	Definition	Example Inputs	Measure Calculation Use (Metric)
PROGRAMID	Char	None	A primary key that uniquely identifies a row in the table.	PL33472MC	Primary Key
PROGRAM_NAME	Char	None	A name of the program (e.g., Congregate meal program).	Diabetes Self-Management Program	May help define population of interest (all)
PROGRAM_ORGANIZATIONID	Char	None	A link back to the organization that is offering the program..	MAC	Foreign Key

Appendix C Diabetes Control Surveillance Metric Calculation Logic Flow Chart



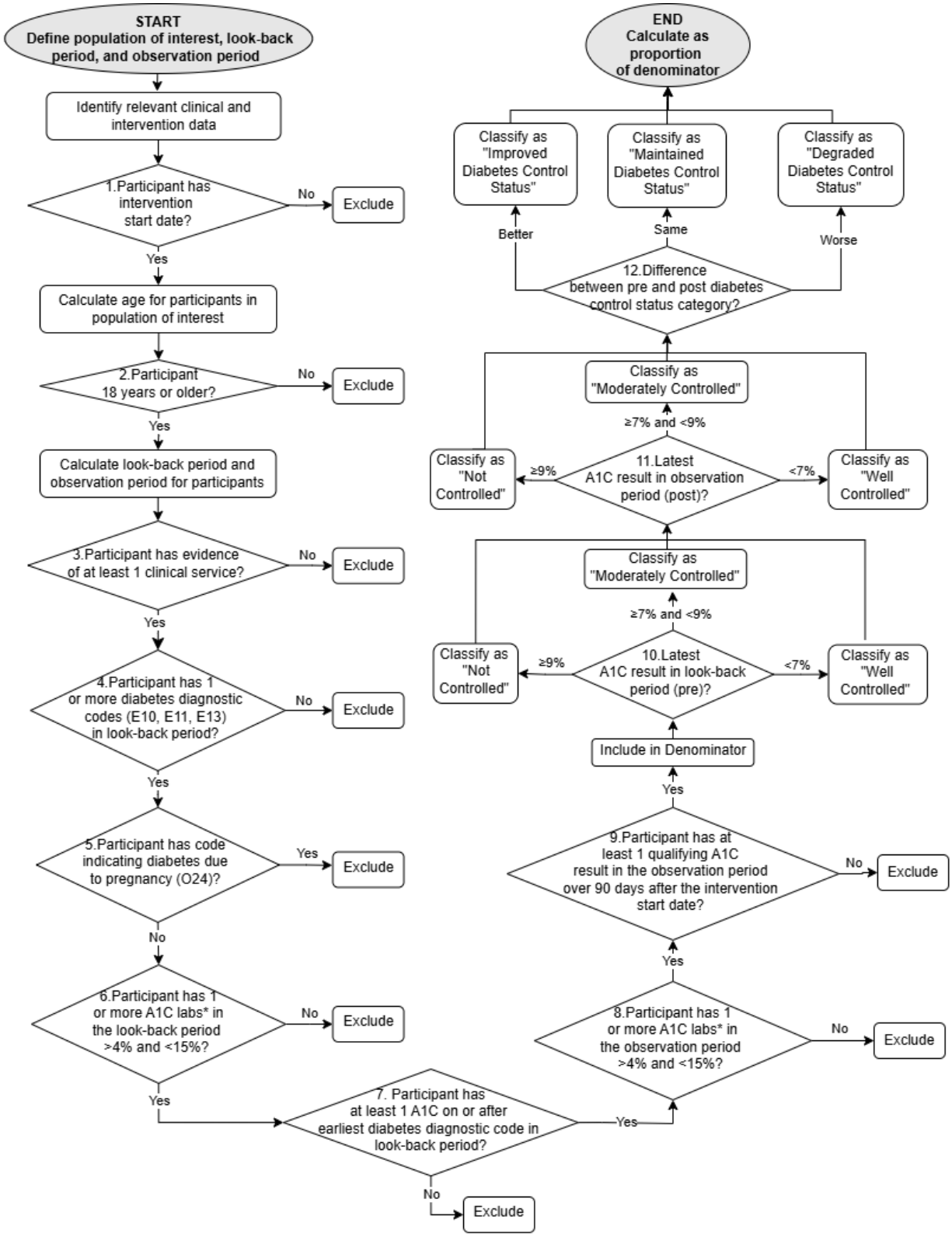
*A1C labs constrained to code in HbA1C Laboratory Test value set: VSAC OID 2.16.840.1.113883.3.464.1003.198.12.1013

Appendix D Pre/Post Change in Individual A1C Metric Calculation Logic Flow Chart



*A1C labs constrained to code in HbA1C Laboratory Test value set: VSAC OID 2.16.840.1.113883.3.464.1003.198.12.1013

Appendix E Pre/Post Change in Diabetes Control Status Metric Calculation Logic Flow Chart



*A1C labs constrained to code in HbA1C Laboratory Test value set: VSAC OID 2.16.840.1.113883.3.464.1003.198.12.1013

Appendix F Acronyms and Abbreviations

Term	Definition
ACL	Administration for Community Living
ADA	American Diabetes Association
CODI	Community and Clinical Data Initiative
CRISP	Chesapeake Regional Information System for our Patients
HIE	Health Information Exchange
HIPAA	Health Insurance Portability and Accountability Act
LOINC	Logical Observation Identifiers, Names, and Codes