

Measure Authoring Development Integrated Environment (MADiE) User Guide

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1 Introduction

Measure Authoring Development Integrated Environment (MADiE) is a software tool that redefines the electronic Clinical Quality Measure (i.e., eCQM, measure) development and testing process by making it a self-contained process that includes dynamic authoring and testing within a single application. MADiE has been further designed to provide an increasingly intuitive and easy-to-use interface by leveraging User Experience Research and Design philosophies. These philosophies continuously incorporate user feedback and iterative design to inform present and future development of MADiE.

1.1 Standards & Integration

MADiE has also been designed to integrate with the nationally recognized data standards that the Centers for Medicare & Medicaid Services (CMS) quality reporting programs use for expressing electronic Clinical Quality Measure (eCQM) logic for machine-to-machine interoperability. This integration provides enormous value to programs using eCQMs, federal policy leaders, and stakeholders, as it demonstrates MADiE's flexibility to facilitate evolving eCQM standards.

MADiE can generate measures following the Fast Healthcare Interoperability Resources (FHIR), [Quality Measure Implementation Guide \(QMIG\) STU 3.0.0](#), and [Clinical Quality Language \(CQL\) Normative Release](#). The QMIG specification provides direction for the metadata and framework of measures, while the CQL libraries provide the expression logic for calculating an eCQM. Additionally, MADiE can generate eCQMs containing the FHIR R4 and CQL which describe a measure and, programmatically convert both into an executable format that allows calculation of the measure directly from the specification. The currently supported models used within CQL for data interchange requirements are QI-Core and FHIR R4.

In addition to generating measures following the FHIR standard, MADiE also allows users to generate measures compliant with the Quality Data Model (QDM) and Clinical Quality Language (CQL).

Currently, all eCQMs are written using Clinical Quality Language (CQL) and the Quality Data Model (QDM) or Fast Healthcare Interoperability Resources (FHIR). With the release of MADiE, measure developers will transition their measures to QI-Core, utilizing MADiE's improved tools for constructing and testing QI-Core measures. Measure developers can also generate new QDM measures in MADiE.

1.2 Overview of Measure Development & Testing

In MADiE, measure developers can build eCQMs and evaluate their performance by building out measure logic, creating synthetic patient records (referred to as test cases), and testing those synthetic patient records against a measure's logic. That process allows measure developers to understand the behavior of a measure's logic under semi-realistic scenarios and whether a measure's logic encodes their intent, through a process of iteration and testing.

1.3 Purpose of this Guide

The purpose of this document is to further describe MADiE and provide step-by-step instruction for engaging with key functionality used to create QDM and QI-Core measures. Many key functionalities in MADiE are the same for QDM and QI-Core with the differences between the models highlighted. Functionality works the same for both models if this guide doesn't specify a difference between QDM and QI-Core.

2 System Requirements & Availability

MADiE is available 24 hours a day, 7 days a week and can be accessed with an internet browser. Chrome, Firefox, and Edge are recommended. MADiE may not be available during system maintenance. MADiE users will be notified by email about scheduled and unscheduled system maintenance.

MADiE does not support copying text from Microsoft Word and pasting directly into MADiE. Copying from Microsoft Word can add symbols, accented letters and characters from different languages into MADiE that will result in MADiE errors, including the inability to save.

3 User Account Creation

There are a few steps required in creating an account and gaining access to MADiE. New MADiE users must first create a HARP account then request access to MADiE in HARP as detailed in the following sections.

3.1 Creating a HARP Account

New users must have a HARP Account to log in to MADiE. To create a new HARP account, go to <https://harp.cms.gov/register> and complete the registration process to create your HARP account. Registration requires users to enter profile information, account information, and successfully complete proofing (identify verification). HARP uses a third-party service provided by Experian to verify user identities.

After creating your HARP account, set up two-factor authentication if you have not already done so by following these steps:

1. After logging in to [HARP](#), click on “Manage Two-Factor Devices.”
2. Add a device and follow the prompts.

3.2 Configuring Your HARP Account for MADiE

To complete HARP account setup for use with MADiE, follow the instructions in the MADiE Access Guide found in the Training & Resources tab of the [public website](#).

3.3 HARP Account Management

To update your HARP Profile including your password, name, email address, and phone number log in to [HARP](#) and click on “View / Edit Profile Information.”

4 Logging in to MADiE

To log in to MADiE, follow these steps:

1. In the MADiE login form, enter your HARP User ID
2. Enter your HARP password.
3. Click the “Sign In” button.
4. You will be presented with a two-factor authentication, as determined by your HARP profile setting. Enter the authentication and you will be logged into MADiE.

4.1 Application Timeout

A user will automatically be logged out of MADiE after 30 minutes of inactivity. After 25 minutes of inactivity, a warning message will be displayed, indicating that their session will expire if the user remains inactive. **Note:** MADiE does allow users to work in more than one website tab or window. However, inactivity in one will log users out in all open MADiE instances.

4.2 Long-term Account Inactivity

The MADiE-user role assigned to a MADiE user’s HARP account will be deactivated if a user has not logged into MADiE for 60 days. A warning email, notifying a user of such will be sent if a user has not logged into MADiE for 30 days.

4.3 Forgotten User ID or Password

If you experience trouble logging in to MADiE, check that you are using your personal HARP User ID and password and have had the MADiE user role assigned through HARP. If you have not completed that yet, follow the instructions in the MADiE Access Guide found in the Training & Resources tab of the [public website](#).

If you have forgotten your HARP ID or password, go to the [HARP Account Recovery page](#) to retrieve your HARP User ID or reset a password.

4.4 UMLS® Integration

For MADiE to function properly, MADiE must connect to the Value Set Authority Center (VSAC). VSAC is provided by the U.S. National Library of Medicine (NLM) in collaboration with the Office of the National Coordinator (ONC) for Health Information Technology and CMS. The VSAC provides downloadable access to previously created value sets and direct referenced codes and is actively incorporating new value sets for other use cases, new measures, and for updating existing measures.

4.4.1 Requesting License

To integrate with the Value Set Authority Center (VSAC) through MADiE, users are required to have a Unified Medical Language System© (UMLS) Metathesaurus License. To request a license and create a UMLS account, go to [UMLS Terminology Services Sign Up Page](#).

4.4.2 Connecting to UMLS/VSAC for Value Set Data

Once logged into MADiE, you can establish an active connection to the VSAC and retrieve value set data. Click on the ‘Connect to UMLS’ link in the upper right of the header on any MADiE page to connect. Upon clicking, a “Please sign in to UMLS” modal will appear. Enter the API key associated with your UMLS account to connect. If you do not know your API key, follow the “WHERE’S MY KEY?” instructions. Once connected, the Connect to UMLS link will now read “UMLS Active,” and the dot indicator will change from red to green. MADiE will retain your UMLS Active status and users will only need to log into UMLS in MADiE one time.

4.4.3 Signing out of UMLS/VSAC

MADiE retains the UMLS login and will not automatically sign users out. Should a user need to sign out of UMLS, they can do so. Select the drop-down arrow next to the UMLS Active button, then select Sign Out. Users will then be signed out of UMLS and can log in with a different API key.



Image: UMLS Sign Out Dropdown

5 Primary Navigation Header (White Header Bar)

The Primary Navigation Header is found at the top of every area in MADiE. It provides access to the following navigation and functionality that are always accessible:

1. **MADiE Logo:** The MADiE Logo (in the far left of the Primary Navigation Header) provides navigation to the Measures page (the initial landing page upon logging in), where both a user’s eCQMs and all other eCQMs entered into MADiE can be accessed.
2. **Measures:** The Measures link (the first link in the right half of the Primary Navigation Header) provides navigation to the Measures overview page (the initial landing page upon logging in), where both a user’s eCQMs and all other eCQMs entered into MADiE can be accessed.
3. **Libraries:** The Libraries link (the second link from the left in the right half of the Primary Navigation Header) provides navigation to the Libraries page, where both a user’s standalone CQL Libraries and all other CQL Libraries entered into MADiE can be accessed.
4. **Help:** The Help link (the third link from the left in the right half of the Primary Navigation Header) provides navigation to help and troubleshooting resources. This will navigate you away from MADiE, opening a new window.
5. **Connect to UMLS / UMLS Active:** When a user is not connected to the UMLS and thus not connected to the VSAC, the Connect to UMLS link (fourth link from the left in the right half of the Primary Navigation Header) is displayed. Clicking on the link opens a modal to connect as described in [section 4.4.2](#). When connected, “UMLS Active” is displayed instead.
6. **User Profile Dropdown / Sign Out:** The User Profile Dropdown (on the far right of the Primary Navigation Header) provides a link for a user to “Sign Out.”



Image: MADiE Primary Navigation Header

6 Measures Overview Page (Initial Landing Page)

The Measures overview page is where users land after logging in to MADiE. This page displays all QI-Core and QDM measures that have been added to MADiE, and further organizes the measures into two areas: My Measures and All Measures. The My Measures table displays measures that you own or that have been shared with you. Measures found in My Measures are measures that can be edited by you. The All Measures table displays all eCQMs entered into MADiE by all users. Most of the measures listed in All measures are likely to be view-only, since most measures are only editable by a limited number of users.

6.1 My Measures / All Measures Tables

My Measures and All Measures list measures in tables that also display the following information and interactive controls for each measure.

1. **Measure Name:** The Measure Name column displays the name of a measure.
2. **Version:** The Version column displays the version number of the measure listed. Measures that are currently in a draft state will show a blue tag ‘Draft’ beside the version number.
3. **Model:** The “Model” column displays the assigned model and version of the measure.
4. **Actions:** This column will contain one of the following buttons:
 - a. **Edit:** Draft measures the user owns or has share access to will have an Edit button. This allows users to open the measure for editing.
 - b. **View:** Versioned measures or measures the user does not own or have share access to will have a View button. This allows users to open the measure for view-only access.
5. **Filter Measures / Search:** Allows the user to search for a specific measure by typing in a measure’s name or eCQM Abbreviated Title.
6. **Measure Action Center:** Allows users to perform an action on a selected measure. See [section 6.1.1](#) for more detail.
7. **Measure selector:** Allows users to select one or more measures. Currently used to allow users to link two measures together.

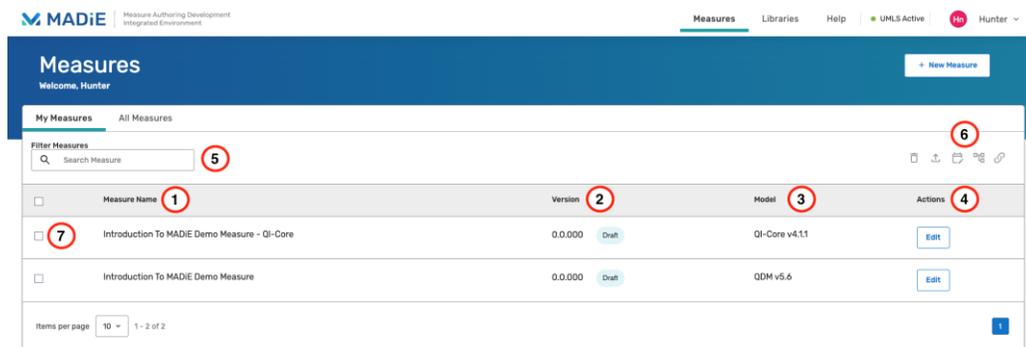


Image: My Measures Tab

6.1.1 Action Center

The action center in MADiE is where users can take different actions on a measure. First, select the measure, then users can select an option by clicking the icons in the action center. The available actions are:

1. **Delete:** Allows users to delete the selected measure. Only measures in a draft status may be deleted. Engaging Delete Measure will display a modal confirming if you would like

to remove the measure and all its test cases. **Note:** Only the measure owner can delete a measure.

2. **Export:** Allows users to export the selected measure. See [section 9](#)
3. **Draft:** Allows users to draft the selected measure. If the icon is disabled, the selected measure is not available to be drafted. See [section 6.3](#)
4. **Version:** Allows users to version the selected measure. If the icon is disabled, the selected measure is not available to be versioned. See [section 6.2](#)
5. **Associate:** Allows users to associate a QDM measure to a QI-Core measure, copying the CMS ID and optionally the metadata. Two measures must be selected for this icon to be enabled. See [section 6.4](#)



Image: Action Center Icons

6.2 Versioning a Measure

A Measure in a Draft state can be versioned by selecting “Version” from the “Actions” dropdown. A pop-up will appear where a user can select Major, Minor, or Patch version. The pop-up will also display the current version number, the future version number after versioning is complete, and a text area for the user to confirm the new version number. Users will need to type in the version number, and it will need to match what the tool will be updating the version number to in order to proceed. After typing the version number, click “Continue.” MADiE will now attempt to version the Measure. Measures that do not contain valid CQL or Population Criteria cannot be versioned. If the measure cannot be versioned an error message will appear, and the measure will not be versioned. If your measure had invalid Test Cases MADiE will prompt you to ensure you want to version the measure with invalid test cases present. If you select “Yes, Version My Measure,” the measure will be versioned with invalid test cases. If you select “No, I want to fix my Test Cases,” the measure version action will be canceled. If a measure can be versioned, then clicking “Continue” will take the user back to the My Measures tab where the versioned measure can be viewed.

Image: Create Version Modal

After a measure is versioned, the measure exports will be saved in the MADiE database. This means the version of the translator, liquid template (used to generate QI-Core human readable), and MADiE will be preserved in the exports. Should you need an export with newer versions of those tools, draft your measure and re-export. The new draft will utilize the most recent versions of all tools.

Should a user version their measure by accident or select the wrong version type, they can now request the versioned measure be reverted. To achieve this, navigate to the Training & Resources tab on MADiE public website under the MADiE Resources heading and download the file titled “MADiE Revert Measure Version Request Form”. Users will need the measure URL, Measure Name, Current Measure Version, Intended Measure Version, Set to Draft Version, and the HARP ID of the measure owner. Once the user fills this form out, they can submit it to the MADiE help desk by emailing to semanticbits-madie-help@icf.com. The help desk will then revert your versioned measure to the draft specified. If the measure owner is trying to revert a measure to a previous version that has already created a draft and made changes, all changes to that draft will be retained. The draft version will be reverted to the version specified, and then the owner may version to the correct version. **Note:** This draft will not be able to be exported. It will need to be up versioned to restore the ability to export the measure. All measure drafts after that point will be able to be exported.

Note: These request forms MUST be submitted via email and NOT submitted using the MADiE Jira Issue tracker as they contain HARP IDs.

6.3 Draft a Measure

A measure in a versioned state can be versioned if no other versions of that measure are currently in a Draft state. A user can draft a measure by selecting “Draft” from the “Actions” dropdown. A pop-up will appear where a user can change the Measures Name. This field is auto populated to the current versioned Measure Name. Users do not need to change the name; however, Measure Name is required before continuing. Once a user confirms the Measure Name, click “Continue.” A draft will now be created, and the user will be directed back to the My Measures tab where the new draft will be visible. From there a user can edit the measure.

For QI-Core measures only, an “Update Model Version” dropdown will also be present. This allows the user to update the QI-Core model version on draft of the measure. See [section 11](#) for more information

The image shows a modal window titled "Create Draft" with a close button (X) in the top right corner. Inside the modal, there is a "Required field" indicator. Below it, there are two fields:

- Measure Name**: A text input field containing "Introduction To MADiE Demo Measure - QI-Core". Below the input is a note: "Measure Name must contain at least one letter and must not contain \'.\' (underscores)".
- Update Model Version**: A dropdown menu with "QI-Core v6.0.0" selected and a downward arrow.

At the bottom of the modal, there are two buttons: "Cancel" and "Continue".

Image: Create Draft Modal

6.4 Associating CMS IDs and Copy Metadata

MADiE allows users to associate a CMS ID from a QDM measure to a QI-Core measure. This will allow users to specify the QI-Core measures is in the same measure family as the QDM measure. Since this feature will primarily be used while converting QDM measures to QI-Core measures, MADiE also allows users to specify if they want to copy metadata from their QDM measure to their QI-Core measure. **Note:** This copy must be done at the same time as the association, users will not be able to go back and programmatically copy the meta data after the association has occurred. If “Copy Metadata” was not checked users can manually copy the meta data at any time.

6.4.1 Associate CMS ID

To associate CMS IDs users must select two measures, one QDM and one QI-Core. The following must be true of the measures:

- The user **MUST** own both measures
- QDM measure **MUST** contain a CMS ID
- QI-Core measure must **NOT** contain a CMS ID
- QI-Core measure must be in draft state

If any of the above conditions are not met, the measures cannot be associated. After selecting two valid measures, users will select the “Associate CMS ID” icon above the measure table. A modal will appear providing the selected measures’ name, version, model, and the QDM measure’s CMS ID. Use this information to verify the correct measures are selected.

If the selected measures are the correct measures, clicking “Associate” will provide one final confirmation modal. **Note:** Prior to selecting associate, users should check the “Copy QDM Metadata to QI-Core measure” checkbox if the QDM measure metadata should be copied to the QI-Core measure. Refer to [section 6.4.2](#) for additional information. After the checkbox is selected users can continue on with the association. Click “Associate” and the QDM measure’s CMS ID will be associated with the QI-Core measure. After association, “FHIR” will be appended to the QI-Core measure’s CMS ID. After the CMS ID has been associated, users cannot edit the IDs. Should the CMS IDs have been associated in error please see [section 6.4.3](#) for the steps to take to delete a CMS ID from a measure.

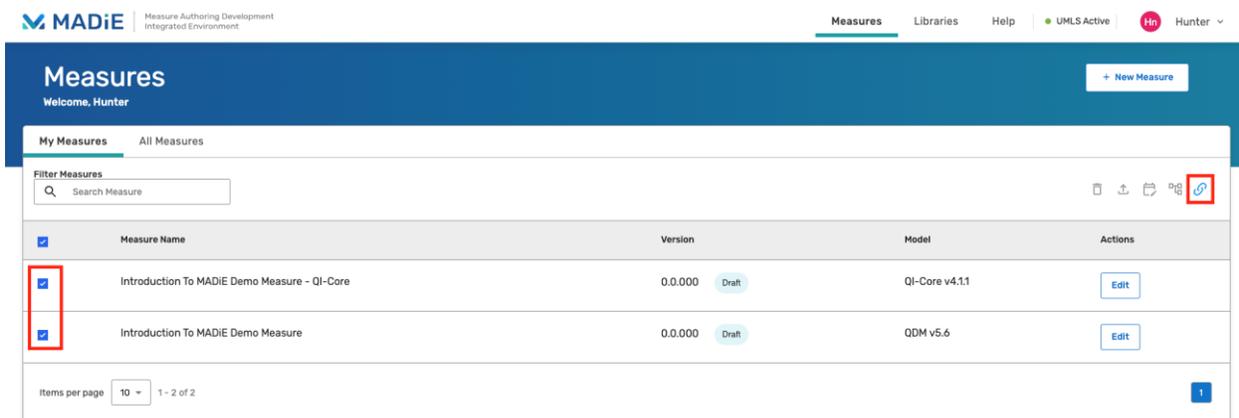


Image: Selecting Measures to Associate CMS ID

6.4.2 Copy Metadata

To copy the QDM metadata data to the QI-Core measure, users should follow steps laid out in [section 6.4.1](#) to associate the id. Prior to selecting associate, check the “Copy QDM Metadata to QI-Core measure.” After the checkbox is selected users can continue on with the association. The measure metadata will be copied over to the QI-Core measure.

Important notes:

1. This process must take place on initial association
2. Copying the metadata will overwrite any existing metadata already in the QI-Core measure
3. After copy, the QDM and QI-Core measure will retain their own copy of the data. Updates in one measure model will not impact the other measure model.

Name	version	model	CMS ID
Introduction To MADiE Demo Measure	0.0.000	QDM v5.6	1319
Introduction To MADiE Demo Measure - QI-Core	0.0.000	QI-Core v4.1.1	

Image: Associate CMS ID Modal

6.4.3 Delete CMS ID

CMS IDs can be deleted from the measure if it was generated in error or linked incorrectly as long as the measure is in a draft state and has never been versioned. To delete the CMS ID the measure owner must fill out the MADiE CMS ID Deletion Request Form file on the Training & Resources tab of the [public website](#). Fill in all the required information:

1. Measure Name
2. Model
3. Measure URL
4. Assigned CMS ID
5. Measure Owner
6. Measure Owner's HARP ID
7. Reason for request

After providing the required information listed above, email the completed form to semanticbits-madie-help@icf.com. This delete action is permanent and cannot be undone.

Note: These request forms **MUST** be submitted via email and **NOT** submitted using the MADiE Jira Issue tracker as they contain HARP IDs.

7 Adding Measures in MADiE

MADiE allows users to create new measures in MADiE. Both from scratch and recreating measures that have previously been in MAT.

7.1 Creating a New Measure

To create a new measure in MADiE, initiate the process by clicking on the + New Measure button in the upper right of the screen while on the Measures overview page. The New Measure creation modal will appear, prompting you to enter the following information:

1. **Measure Name:** The Measure Name is used to identify and refer to a measure. It is often descriptive of what the measure assesses.
2. **Measure CQL Library Name:** The Measure CQL Library Name is used to identify and refer to a CQL Library within a measure. When creating the Measure CQL Library Name, it must adhere to the following requirements:
 - a. The name must be unique and not match any other CQL Library Name in MADiE.
 - b. The first character must be a capitalized letter.
 - c. Other valid characters include alphanumeric characters. **Note:** QDM measures will also allow underscores “_”. Underscores can’t be used in QI-Core measures as they are NOT valid for QI-Core.
 - d. Spaces are not allowed.
 - e. Must be 64 characters or less
3. **eCQM Abbreviated Title:** The eCQM Abbreviated Title must be 32 characters or less.
4. **Experimental:** This checkbox allows user to specify the measure is experimental.
5. **Model:** The Model dropdown displays all available models and model versions that can be assigned to a measure currently supported by MADiE. Currently MADiE supports QI-Core v4.1.1, QI-Core v6.0.0, or QDM v5.6
6. **Measurement Period - Start Date/End Date:** The Measurement Period - Start Date/End Date fields establish the measurement period for the measure. Start and end dates must be entered in “mm/dd/yyyy” format. **Note:** MADiE will include additional precision when the dates are saved, although this precision will not be visible in MADiE. For example, Start Date is entered as 01/01/2024 MADiE will save the start date as 2024-01-01T00:00:00.000+00:00. Similarly, if the end date is entered as 12/31/2024 MADiE will save it as 2024-12-31T23:59:59.999+00:00. This will allow Measurement period to have additional precision and time zone offset to successfully execute measures.

Once the information above has been entered you have the option to:

1. **Cancel:** The Cancel button discontinues the creation of the new measure and closes the modal.
2. **Continue:** The Continue button saves the initial information entered in the New Measure creation modal and brings the user to the next screen, where the rest of the measure content can be populated.

The image shows a 'Create Measure' modal form with the following fields and callouts:

- 1:** Measure Name (text input field)
- 2:** Measure CQL Library Name (text input field)
- 3:** eCQM Abbreviated Title (text input field)
- 4:** Experimental (checkbox)
- 5:** Model (dropdown menu)
- 6:** Measurement Period - Start Date and Measurement Period - End Date (date input fields)

Buttons: Cancel, Continue >

Image: Create Measure Modal

7.1.1 Default CQL

MADiE will generate default CQL and add it to the measures CQL Editor tab on creation of a measure. This consists of required statements in the CQL as well frequently added elements.

Should something be added by default your measure does not need, you can navigate to the CQL Editor tab and delete the irrelevant CQL.

7.1.1.1 QDM Default CQL

For QDM measures, the default CQL includes the following:

- Library statement
- Using statement
- MATGlobalCommonFunctionsQDM library
- Value set statements for Ethnicity, ONC Administrative Sex, Payer Type, and Race value sets
- Parameter statement for Measurement Period
- Context statement
- SDE Definitions

7.1.1.2 QI-Core Default CQL

For QI-Core measures, the default CQL includes the following:

- Library statement
- Using statement
- CQMCommon, FHIRHelpers, QICoreCommon and SupplementalDataElements libraries
- Parameter statement for Measurement Period
- Context statement
- SDE Definitions

7.2 Recreating Measures Created in the Measure Authoring Tool (MAT) in MADiE

The MAT is deprecated and not accessible. That does not mean users cannot recreate untransferred measures in MADiE. Should you have a measure export from MAT, you can follow these steps.

1. Locate the measure package exported from MAT you wish to recreate in MADiE.
2. Login to MADiE.
3. Create a new measure (See [section 7.1](#)) using the data in the MAT measure export.
4. Open the new measure for editing.
5. Find the Human Readable file in the export and open the file.
6. Copy the data from the Human Readable into the corresponding data fields in the Details tab in MADiE.

7. Navigate to the CQL Editor tab.
8. Highlight all CQL created by default and delete it.
9. Find the measure CQL file in the export.
10. Open the CQL file in a text editor.
11. Select all and copy the CQL into the CQL Editor tab in MADiE.
12. Navigate to the Population Criteria tab.
13. Fill in the Populations, SDEs, and RAVs based off the measure export.
14. Your measure is now created in MADiE. You can export or create test cases as needed.

Note: If a measure from the MAT had a CMS ID, users will not be able to utilize the same ID in MADiE. Should the measure need a CMS ID, it will need to be generated in MADiE.

8 Viewing & Editing a Measure

Upon opening an existing measure or continuing from the New Measure creation modal, the measure content viewing/editing area is displayed. The viewing/editing area displays key content and functionality for the opened/newly created measure and additional areas to further view/edit the rest of a measure.

8.1 Measure Header

In the blue header area, the following information and functionality about the measure is displayed:

1. **Measure Name:** The Measure Name field displays the current name of the measure. The Measure Name is typically a brief description of the measure's focus and target population, providing an intuitive way to identify and refer to the measure. The measure name may be truncated if needed to fit the available space followed by ellipses. A tooltip will provide the full measure name if the user mouses over the ellipses.
2. **Measure Version:** The measure version can be found below the measure name
3. **Model Version:** The model and model version can be found below the Measure Name, between the measure version and measurement period.
4. **Measurement Period:** The measurement period can be found under the measure Name and to the right of the model and model version.
5. **Navigation Breadcrumbs:** Above the measure name are navigation breadcrumbs, indicating what area of MADiE is currently displayed and providing a way to navigate back to the measures page.
6. **Measure Actions Center:** On the right side of the blue header area is the Measure Action Center. This is present on all edit measure pages. Users can select an option by clicking the icons in the action center. The available actions are:

- a. Version or Draft: Allows users to version or draft a measure based on the user's access and. For information on how to version or draft a measure see [sections 6.2](#) and [section 6.3](#) respectively.
- b. Delete Measure:: Only measures in a draft status may be deleted. Engaging Delete Measure will display a modal confirming if you would like to remove the measure and all its test cases. **Note:** Only the measure owner can delete a measure.
- c. Export: Allows a user to attempt to export the measure. If a measure is unable to be exported, an error message will be displayed. For more information on measure exports see [section 9](#).



Image: Measure Header

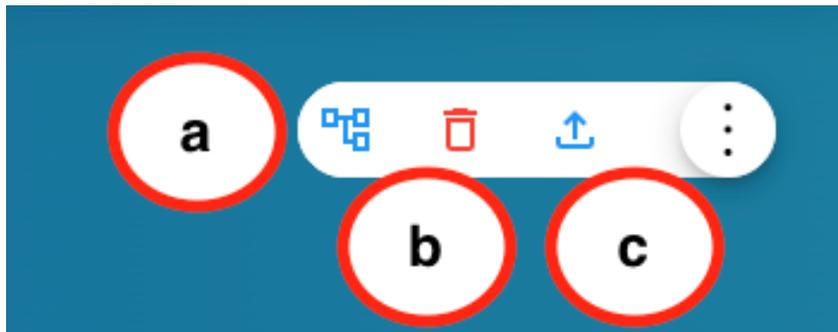


Image: Measure Action Center

8.2 Details Tab

The Details tab is displayed upon opening an existing measure. and consists of many subareas, described below.

8.2.1 General Information

The Information subarea of the Details tab contains mostly identifying information related to a measure. Content in this subarea includes:

8.2.1.1 Name, Version, & ID

1. **Measure Name:** The Measure Name field displays the current name of the measure. The Measure Name is typically a brief description of the measure's focus and target

population, providing an intuitive way to identify and refer to the measure. The measure name can be edited here.

2. **Measure CQL Library Name:** The Measure CQL Library Name field displays the current name of measure CQL library within the measure. Users often specify a name similar to that of the measure Name. The library name can be updated here. **Note:** This field must be 64 characters or less.
3. **Measure ID:** The Measure ID provides a unique identifier to reference the measure from which its versions and drafts originated. It is shared between all versions and drafts of the same measure, but unique between different measures. The Measure ID cannot be edited and is automatically generated by MADiE. If your measure was transferred from the MAT, the measure ID was retained.
4. **Version ID:** The Version ID provides a unique identifier to reference a specific version of a measure. Every time a new version of a measure is created, a new, unique identifier is assigned. The Version ID cannot be edited and is automatically generated by MADiE.
5. **eCQM Abbreviated Title:** The eCQM Abbreviated Title is a shorter name used to identify the measure. It can be edited here and must be 32 characters or less.
6. **CMS ID:** The CMS ID, also called the eCQM Identifier, is an assigned number unique to the versions and drafts of the measure. It will not be assigned to any other measure. The use of this field is optional. To assign a CMS ID, verify you are the measure owner, then select the blue 'Generate Identifier' link, you will be asked to confirm generation is wanted. FHIR CMS IDs will be appended with the term FHIR. If a measure was transferred from the MAT, the CMS ID was retained. Once a CMS ID has been generated, you will not be able to modify or remove it from any draft or version of that measure in the UI. If your CMS ID was generated in error, you can request it be removed from your measure. To do this, ensure there are no versions of your measure, fill out the MADiE CMS ID Deletion Request Form, found on the MADiE public website, then submit the completed form via email to semanticbits-madie-help@icf.com.

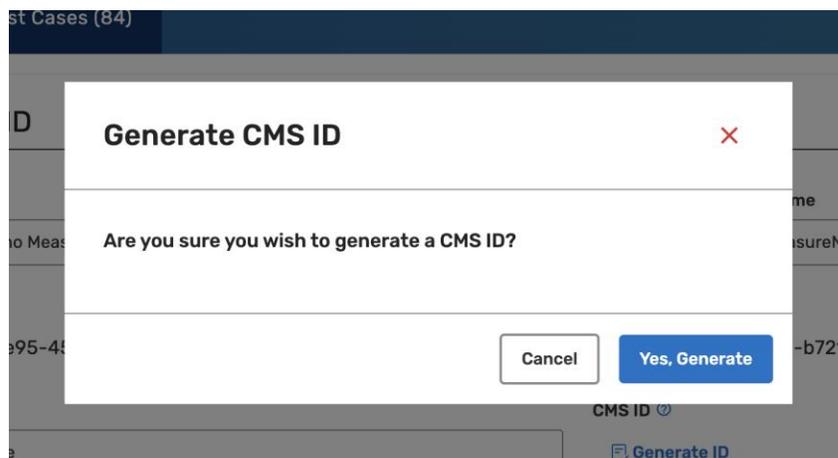


Image: Generate CMS ID Confirmation Modal

7. **Experimental:** The ‘Experimental’ field defaults to “No” for new measures, indicated by an unchecked checkbox. To specify the measure is experimental, check the checkbox.
8. **Endorsing Organization:** The Endorsing Organization consists of two fields. The first field is used to select the organization that endorses the measures, and the second field is used to enter the endorsing number. Endorsing Organization is not required. If no Endorsing Organization is selected, then the Endorsing Number must be blank. If an Endorsing Organization is selected, an Endorsing Number is required.
9. **CQL to ELM Translator Version:** The CQL to ELM Translator Version used to translate the measure is displayed here. If the measure is in a draft status, the text will say “Currently using CQL to ELM Translator Version” with the current translator version for the measure model displayed. If the measure is in a versioned status, the text will read “Versioned with CQL to ELM Translator Version” and the version MADiE was using when the measure was version. All exports will align to that version.

8.2.1.2 Model & Measurement Period

1. **Model:** The model field indicates the model used to create the measure. Currently QI-Core v4.1.1, QI-Core v6.0.0 and QDM v5.6 are the only supported models. After the measure is generated, the model cannot be changed.
2. **Measurement Period - Start Date/End Date:** The Measurement Period - Start Date/End Date fields establish the measurement period for a measure. **Note:** MADiE will include additional precision when the dates are saved, although this precision will not be visible in MADiE. For example, Start Date is entered as 01/01/2024 MADiE will save the start date as 2024-01-01T00:00:00.000+00:00. Similarly, if the end date is entered as 12/31/2024 MADiE will save it as 2024-12-31T23:59:59.999+00:00. This will allow Measurement period to have additional precision and time zone offset to successfully execute measures.

8.2.1.3 Steward & Developers

The Steward & Developers subarea indicates those organizations responsible for maintaining and contributing to the measure. Content in this subarea includes:

1. **Steward:** The Steward dropdown allows selection of the organization responsible for a measure’s content and maintenance. The Steward is also commonly referred to as the measure publisher. This field is required to export a measure. Only one organization can be selected
2. **Developers:** The Developers dropdown allows selection of the organization(s) that is/are responsible for authoring a measure. Choose the desired organization(s) from the dropdown menu. This field is required to export a measure.

Note: Organizations not included in the Steward/Developers dropdowns can be added by making a request to the [MADiE Helpdesk](#).

8.2.2 Measure Overview

8.2.2.1 Description

The Description subarea communicates the measure intent. Examples of Description content is available in the human readable files of published measures within the [eCQI Resources Center](#).

8.2.2.2 Rationale

The Rationale subarea describes why a measure is needed and includes content related to important criteria such as impact, gap in care and evidence. Example Rationale content is available in the human readable files of published measures within the [eCQI Resource Center](#).

8.2.2.3 Guidance (Usage)

The Guidance (Usage) subarea describes how to interpret or implement certain components of a measure. Implementers can reference Guidance (Usage) for additional information about the measure's data elements, logic, and timing. If Guidance (Usage) information is not being included for a measure, enter "None" into this field.

8.2.2.4 Definition (QDM Only)

Enter a definition or description of individual terms, if needed. For measures that do not have definition information, enter "None" into this field.

8.2.2.5 Clinical Recommendation

The Clinical Recommendation subarea includes a clinical recommendation statement or general advice regarding the measure and its content from the expert panel that created the measure. The clinical recommendation statement is a summary of relevant clinical guidelines or recommendations supporting the measure.

8.2.2.6 References (QDM Only)

Enter information that identifies bibliographic citations or references to clinical practice guidelines, sources of evidence or other relevant materials supporting the measure's intent and rationale. To add a reference, click the "+ Add Reference" button. A modal will be displayed. Select the reference type and then enter the reference text. Clicking "Save" will add the reference to the reference table. Users can continue adding references until all have been entered. The reference table will sort alphabetically, first by type and then by reference text.

To edit a reference, click the dropdown “Edit” icon on the reference to be edited. A modal will be displayed allowing users to update the reference information. Clicking “Save” will update the reference and reorder the references alphabetically.

To Delete a reference, click the dropdown “Delete” icon on the reference to be deleted. A confirmation dialogue is shown. Click “Cancel” to continue without deleting the reference and click “Yes, Delete” to permanently delete the reference from the measure.

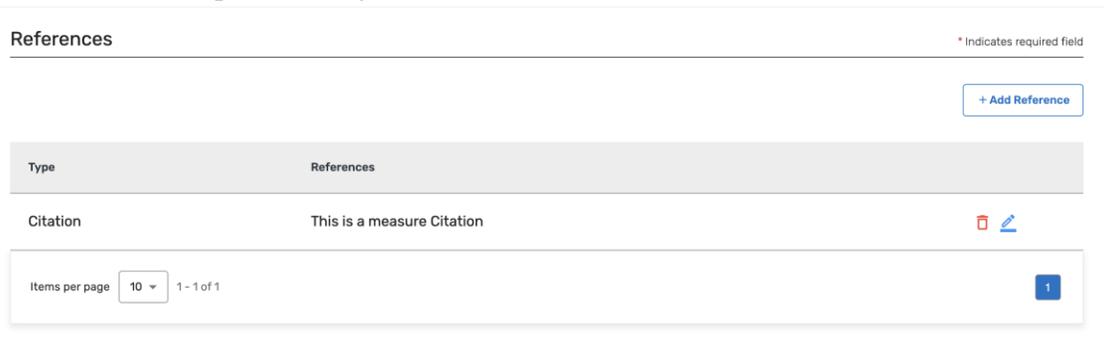


Image: Added Reference Table

8.2.2.7 Transmission Format (QDM Only)

The Transmission Format subarea allows users to enter URLs that provide the transmission formats that are specified for a reporting program. For measures that do not have transmission format information enter “None” into this field.

8.2.2.8 Measure Set (QDM Only)

A measure set is a unique grouping of measures that, when viewed together, provide a robust picture of the care within a given domain (e.g., cardiovascular care, pregnancy). For measures that do not have a measure set, enter “None” into this field.

8.2.3 Legal

8.2.3.1 Copyright

The Copyright subarea includes the organization(s) who own the intellectual property represented by the measure. For measures that do not have copyright information, enter “None” into this field.

8.2.3.2 Disclaimer

The Disclaimer subarea includes disclaimer information for a measure. For measures that do not have disclaimer information, enter “None” into this field.

8.3 CQL Editor Tab

MADiE's CQL Editor Tab is a split screen tab. The left half allows the users to edit the CQL directly by typing into an editor. The right-hand side displays screens where the user can search for and apply codes and value sets to the CQL.

Users wanting to edit in the CQL directly can select the bar dividing the two sides and drag it to the right. This will shrink the search and apply side. Users wanting to focus on searching for and applying codes or value sets can drag the divider to the left shrinking and even hiding the measure CQL. The value sets and code tabs are defaulted to closed; however, users can drag or select the arrow to access the tabs.

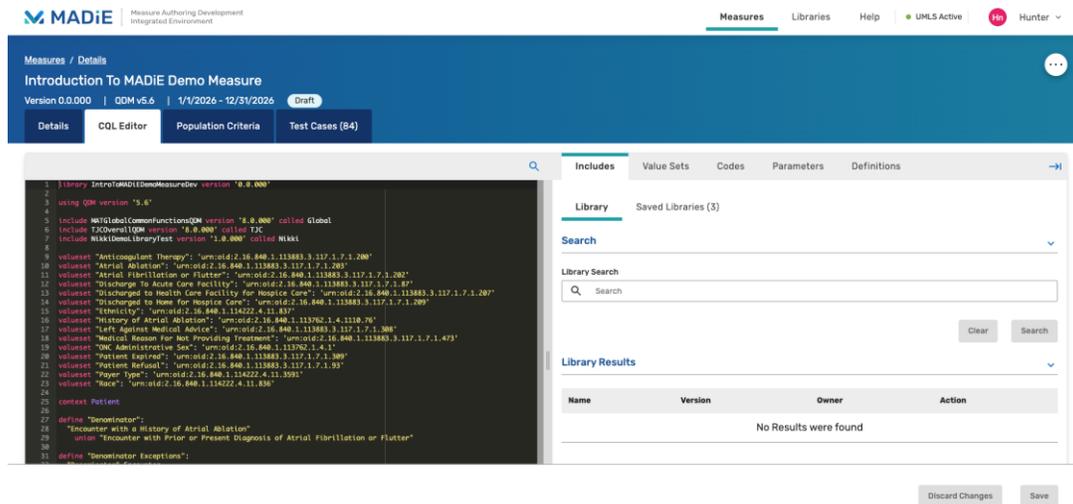


Image: CQL Editor Tab

8.3.1 CQL Editor

A measure's CQL, including Parameters, Definitions, and Functions can be viewed and edited in the CQL Editor tab (second tab from the left, next to Details, after opening a measure). All information except for the measure CQL Library Name and Version can be added, edited, and deleted.

All CQL must be entered in correct CQL syntax. When saving, any errors in the CQL will be displayed. CQL containing errors can be saved but may prevent dependent functionality from working properly (e.g., population criteria configuration, test case calculation, etc.). Make sure that the CQL is fully completed, and errors are resolved to ensure proper functionality of areas dependent on the CQL.

MADiE will validate that the CQL Using statement matches the value selected when the measure was created. If the Measure was created as a QDM measure the using statement must specify

“Using QDM.” If the measure was created as a QI-Core measure the using statement must specify “Using FHIR” or “Using QI-Core.” If the CQL does not contain the correct using statement MADiE will overwrite the value. If the using statement is missing completely MADiE will provide an error message prompting one to be added.

8.3.2 Find and Replace

The CQL Editor tab allows users to find specific phrases in the CQL by clicking the search icon or ensuring your cursor is in the Editor and press Ctrl+F or Cmd+F on the keyboard to open the Find & Replace window. Users can type a string in the Find text area and the editor will find all locations of the test. Use the arrow keys to navigate forward and backward between the elements. Clicking “All” will highlight all instances of the text.

If users wish to replace text, use the find function to find the text to replace. Then type in the replacement text in the “Replace with” text area. Clicking “Replace” will replace the current highlighted text and highlight the next instance of the word. Selecting “All” will replace every instance of the find text in the CQL. If the replace field is not shown in the pop-up, simply click the Plus button below the find text area and it will appear.

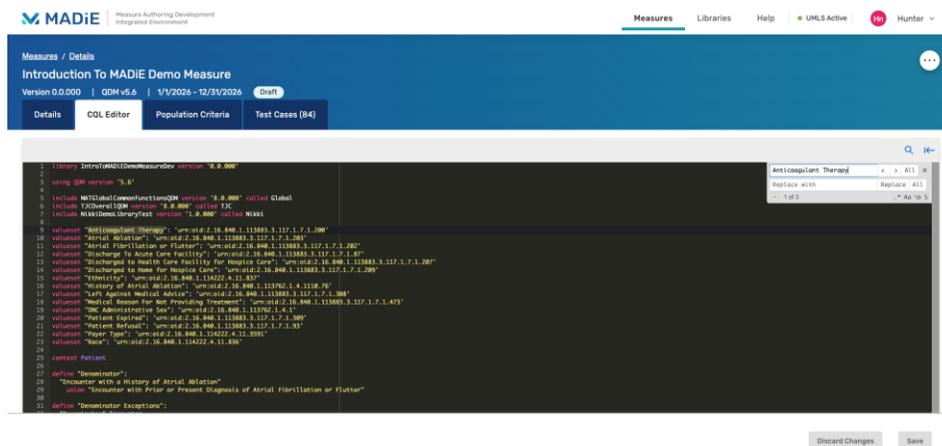


Image: Find and Replace Feature

The find feature also has extra features to help the user refine their search. The additional features include:

1. **RegExp Search:** Allows the user to use regular expression to search in the editor
2. **Case Sensitive Search:** the search takes the case of the word into account. The find defaults to being case insensitive
3. **Whole Word Search:** Searches on the whole word entered and does not look for partial match
4. **Search in Selection:** Searches in the visible section of the screen

Users can select one or more of these options to help refine their search.

Note: This find and replace functionality is available in standalone CQL libraries, CQL Editor and in the Measure creation CQL Editor.



Image: Find and Replace Close up

8.3.3 Includes Builder

MADiE allows users to search, view, and apply included libraries to the measure CQL by using an “Includes” builder. Users can also edit existing included libraries to update an alias or version number.

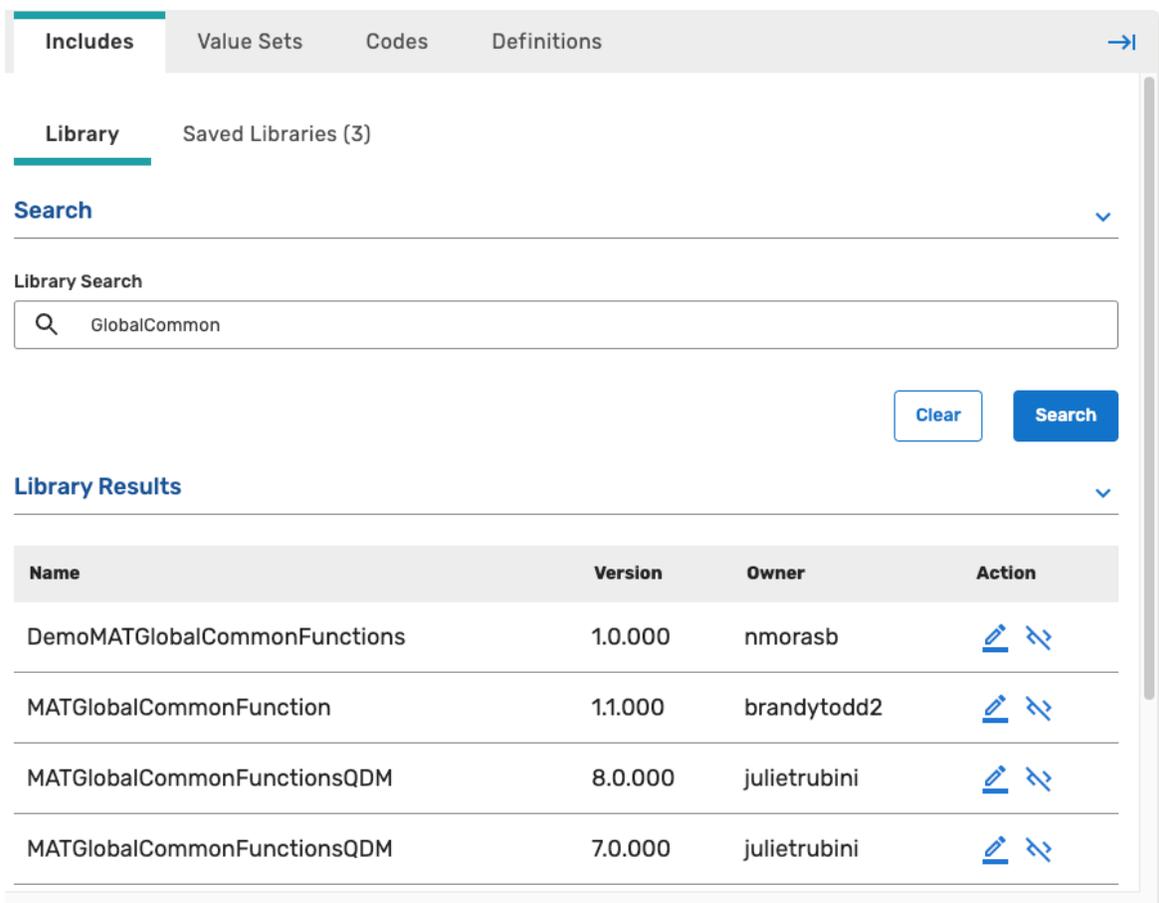


Image: Includes Builder Tab

8.3.3.1 Library Tab

This tab allows users to search for standalone CQL Libraries. To perform a search, users will enter a search term in the search field and click “Search”. Any versioned library that contains that text will be returned in the Library Results section.

The Library Results table contains the following data

1. **Library Name:** Displays the library’s full name
2. **Version:** Displays the version of the library. **Note:** All versions of that library will be returned in the search. Users should ensure they select the version they want to use.
3. **Owner:** Displays the library owner. Since libraries can have similar names, this allows users to ensure they are selecting the correct library
4. **Action Center:**
 - a. **Edit:** Opens a modal allowing the user to view the CQL, library name, and library owner. Users may also enter the Alias, select the version, and apply the library to the measure CQL.
 - b. **View:** Opens a modal allowing the user to view the CQL, library name, and library owner.

Name 1	Version 2	Owner 3	Action 4
DemoMATGlobalCommonFunctions	1.0.000	nmorasb	a   b
MATGlobalCommonFunction	1.1.000	brandytodd2	 
MATGlobalCommonFunctionsQDM	8.0.000	julietrubini	 
MATGlobalCommonFunctionsQDM	7.0.000	julietrubini	 
MATGlobalCommonFunctionsQDM	6.0.000	julietrubini	 

Items per page 1 - 5 of 12 1 2 3 Next >

Image: Library Results Table

To add an included library to the measure, select “Edit” from the action column. Once the edit modal opens, ensure the library is the correct library by verifying the name and owner. Users will then enter the alias your included library will have followed by selecting the version you want to include from the version dropdown. Finally, select “Apply”. MADiE will then add an include statement for that library to the measure CQL.

Details
✕

*Library Alias	Name	*Version	Owner
<input style="width: 100%;" type="text"/>	DemoMATGlobalCommonFunctions	1.0.000 ▼	nmorasb

```

1 library DemoMATGlobalCommonFunctions version '1.0.000'
2
3 using QDM version '5.6'
4
5 valueset "Emergency Department Visit": 'urn:oid:2.16.840.1.113883.3.117.1.7.1.292'
6 valueset "Encounter Inpatient": 'urn:oid:2.16.840.1.113883.3.666.5.307'
7 valueset "Intensive Care Unit": 'urn:oid:2.16.840.1.113762.1.4.1029.206'
8 valueset "Observation Services": 'urn:oid:2.16.840.1.113762.1.4.1111.143'
9 valueset "Outpatient Surgery Service": 'urn:oid:2.16.840.1.113762.1.4.1110.38'
10
11 parameter "Measurement Period" Interval-DateTime>
12
13 context Patient
14
15 define "ED Encounter":
16   ["Encounter, Performed": "Emergency Department Visit"]
17
18 define "Inpatient Encounter":
19   ["Encounter, Performed": "Encounter Inpatient"] EncounterInpatient
20   where "LengthInDays"(EncounterInpatient.relevantPeriod)<= 120
21   and EncounterInpatient.relevantPeriod ends during day of "Measurement Period"
22
23 - /*@description: Returns an interval of date values extracted from the input interval of date-time
24   values
25 @comment: This function returns an interval constructed using the 'date' extractor on the start
26 and end values of the input date-time interval. Note that using a precision specifier as part of a
27 timing phrase is preferred to communicate intent to perform day-level comparison, as well as for
28 general readability.*/
29 define function "ToDateInterval"(period Interval-DateTime> ):
30   Interval[date from start of period, date from end of period]

```

Cancel
Apply

Image: Edit Included Library Modal

8.3.3.2 Saved Libraries Tab

This tab allows the user to view any included libraries that have already been applied to the measure, either by using the included library builder or manually typing the statement.

The tab shows a table with the following information:

1. **Alias:** Displays the alias the user selected to reference the library in their CQL
2. **Name:** Displays the library's full name
3. **Version:** Displays the version of the library. **Note:** All versions of that library will be returned in the search. Users should ensure they select the version they want to use.
4. **Owner:** Displays the library owner. Since libraries can have similar names, this allows users to ensure they are selecting the correct library
5. **Action Center:**
 - a. **Delete:** Allows users to delete the included library
 - b. **Edit:** Allows users to edit the alias or the version of the library included. **Note:** Updating the Alias will result in errors in the measure CQL until all references to the old alias have been updated to the new alias.
 - c. **View:** Allows user to view the alias, name, version, owner, and CQL

Alias	Name	Version	Owner	Actions
Global	MATGlobalCommonFunctionsQDM	8.0.000	julietrubini	[Delete] [Edit] [Refresh]
TJC	TJCOverallIQDM	8.0.000	saguiar1219	[Delete] [Edit] [Refresh]
Demo	NikkiDemoLibraryTest	1.0.000	hunter.nicole	[Delete] [Edit] [Refresh]

Items per page 5 1 - 3 of 3

Image: Saved Libraries Tab

8.3.4 Value Set Search and Apply

MADiE allows users to search, filter and apply value sets to the measure CQL on the measure CQL Editor tab. To do this select the “Value Sets” tab on the right-hand side of the editor window. Three expandable sections will be present:

1. Search
2. Filter
3. Results

The search section will be expanded by default.

8.3.4.1 Value Set Search Section

A dropdown will be present to search by different categories. Users can select one to many of the following categories to help locate a value set

1. **Code** – Returns any value set with the given code
2. **Definition Version** – Can only be used with the OID/URL. Users must select both options to be able to search by definition version. This returns the value set matching the selected version
3. **Description** – Returns any value set matching the search description
4. **Keyword** – Returns any value set that has a value set-keyword extension matching the given keyword
5. **Name** – Returns any value set matching the name
6. **OID/URL** – Returns all versions of the value set matching that URL or OID
7. **Status** – Returns value sets that match the given status
8. **Title** – Returns any value set matching the title

For each category, the user selects a text area will populate on the screen for the user to enter their search criteria. After the user enters their desired search criteria the search button will become enabled. Clicking the search button will use APIs to connect to VSAC and return a list of value sets that meet the search criteria. The results will return in the Results sub section.

Important: These searches are done on a “starts with” match which means the value set you are searching for must start with your search criteria. For example, if your value set name is AnticoagulantTherapy a search for “Therapy” will not return your value set. A search for “Anticoagulant” will return your value set and others that start with the text “Anticoagulant.”

The image shows a web interface for searching value sets. At the top, there are two tabs: 'Value Sets' (which is selected and highlighted in blue) and 'Codes'. Below the tabs is a search section. It starts with a 'Search' label and a dropdown arrow. Underneath is a 'Search By Category' section with a dropdown menu currently showing 'Title'. Below that is a 'Search Title' section with a search icon and the text 'Anticoagulant' entered. At the bottom right of the search area, there are two buttons: 'Clear' (white with a blue border) and 'Search' (solid blue).

Image: Value Set Search for Title Starts With “Anticoagulant”

8.3.4.2 Filter Section

Users also have the ability to filter their search results by one or more of the following categories

1. Author
2. Composed Of
3. Definition Version
4. Effective Date
5. Last Review Date
6. Last Updated
7. OID/URL
8. Publisher
9. Purpose
10. Status
11. Title

After a user selects a category, a text area will be populated for the user to enter their filter criteria. After the user enters their desired filter criteria, the apply button will become enabled. Clicking the apply button will filter the results displayed in the table accordingly.

Image: Value Set Filter by OID

8.3.4.3 Results Section

Results from the users search and filter will appear in a table in the results section. The value sets' Title, Steward, OID, and Status will be displayed. Each value set will also have a select button to perform actions on the value set. Clicking “Select” will provide users with three options

1. **Apply** – Selecting this option will result in MADiE attempting to add the value set to the measure CQL displayed on the left-hand side. If the addition was successful, you will see the value set in the CQL as well as a success message. If the value set could not be added, an error message will be displayed.
2. **Edit** – Selecting this option will display a pop-up, allowing users to enter a suffix for their value set. A suffix must be numeric and a maximum of four numbers. After entering the suffix and selecting “Apply,” the modal will close and MADiE will attempt to add the value set and suffix to the CQL on the left-hand side. If the addition was successful, you will see the value set in the CQL as well as a success message. If the value set could not be added, an error message will be displayed.
3. **Details** – Selecting this option will display a pop-up with a JSON response containing information about the value set, i.e., profile, last updated, version, and purpose will be returned. Users can use this information to ensure they have selected the correct value set.

```

1 {
2   "resourceType": "ValueSet",
3   "id": "2.16.840.1.113883.3.117.1.7.1.200-20240206",
4   "meta": {
5     "versionId": "0",
6     "lastUpdated": "2024-02-05T11:09:28.000-05:00",
7     "profile": [
8       "http://hl7.org/fhir/StructureDefinition/shareable-valueset",
9       "http://hl7.org/fhir/us/cqmeasures/StructureDefinition/computable-valueset-cqfm",
10      "http://hl7.org/fhir/us/cqmeasures/StructureDefinition/publishable-valueset-cqfm"
11    ]
12  },
13  "tag": [
14    {
15      "code": "SUBSETTED",
16      "display": "subsetted"
17    }
18  ],
19  "extension": [
20    {
21      "url": "http://hl7.org/fhir/StructureDefinition/valueset-author",
22      "valueContactDetail": {
23        "name": "IJC EH Author"
24      }
25    },
26    {
27      "url": "http://hl7.org/fhir/StructureDefinition/valueset-keyWord",
28      "valueString": "SIK-03"
29    },
30    {
31      "url": "http://hl7.org/fhir/StructureDefinition/resource-lastRevDate",

```

Image: Value Set Details

If no results are found the results table will display “No Results were found.”

Important: After a value set has been applied, with or without a suffix, users must click “Save” for the CQL to be saved with the new value set. Users can add many value sets and make other edits to the CQL prior to clicking save but ensure “Save” is clicked prior to navigating away from the page for the edits to be saved.

The screenshot shows a table titled "Results" with a dropdown arrow in the top right corner. The table has four columns: Title, Steward, OID, and Status. Below the table, there is a pagination control showing "Items per page" set to 10 and "1 - 1 of 1". A blue button with the number "1" is visible in the bottom right corner of the table area.

Title	Steward	OID	Status
Anticoagulant Therapy	TJC EH Steward	urn:oid:2.16.840.1.113883.3.117.1.7.1.200	ACTIVE

Image: Value Set Results Table

8.3.5 Codes Search and Apply

This tab is selected by default. This tab has two sub tabs, Code and Saved Codes.

8.3.5.1 Code

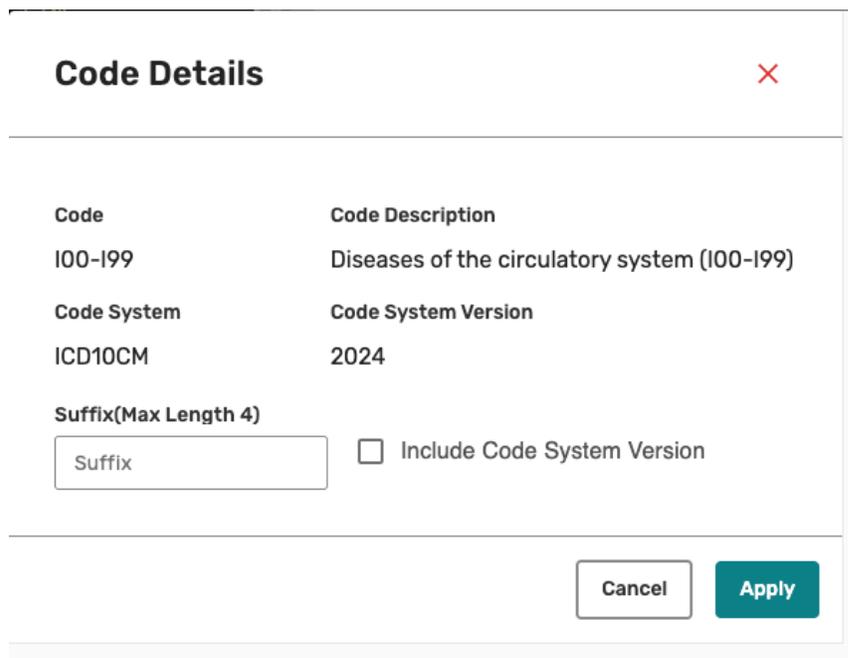
The Code tab is where users can search VSAC for a specific code. This tab has two collapsible sections, Code(s) and Results. Code(s) is where the user will enter information to add to the search. Three user entries are present:

1. **Code Systems** – This dropdown is used to select the code system the user is searching in, SNOMED, ICD10CM, etc. Only one code system can be selected at a time.
2. **Code System Version** – This dropdown is populated after the user selects a code system. It will list all relevant versions for the code system
3. **Code** – This is a text field for the user to enter the code they are searching for.

After filling out all three input fields and selecting “Search,” MADiE will query VSAC for the code.

Results are returned in a table in the results section. The Code, Description, Code System, and System Version are displayed. An action dropdown titled “Select” provides the user the following options:

1. **Apply** – Selecting this option will result in MADiE attempting to add the code to the measure CQL displayed on the left-hand side. If the addition was successful, you will see the code in the CQL as well as a success message. If the code could not be added an error message will be displayed.
2. **Edit** – Selecting this option will display a pop-up containing the information about the code, allowing the user to enter a suffix for the code. Suffixes must be numeric and a maximum of four numbers. The user can also select “Include Code System Version.” After entering a suffix and selecting “Apply,” the modal will close MADiE will attempt to add the code and suffix to the CQL on the left-hand side.



The image shows a modal window titled "Code Details" with a close button (X) in the top right corner. The modal contains a table with the following information:

Code	Code Description
I00-I99	Diseases of the circulatory system (I00-I99)
Code System	Code System Version
ICD10CM	2024

Below the table, there is a section for "Suffix(Max Length 4)" with a text input field containing the word "Suffix". To the right of this field is a checkbox labeled "Include Code System Version". At the bottom right of the modal, there are two buttons: "Cancel" and "Apply".

Image: Code Details Editor Modal

If no results are found, the results table will display “No Results were found.”

Important: After a code has been applied, with or without a suffix, users must click “Save” for the CQL to be saved with the new code. Users can add many codes and make other edits to the CQL prior to clicking save, but “Save” must be clicked prior to navigating away from the page for the changes to be saved.

The screenshot displays a web interface for searching codes. At the top, there are tabs for 'Value Sets' and 'Codes'. Below the tabs, there are sections for 'Code' and 'Saved Codes'. A search bar contains '100-199'. Filters for 'Code Systems' (ICD10CM) and 'Code System Version' (2024) are visible. A 'Search' button is present. Below the search area, a 'Results' section shows a table with one row of results.

Code	Description	Code System	System Version	
100-199	Diseases of the circulatory system (100-199)	ICD10CM	2024	Select

Image: Code Search and Results Table

8.3.5.2 Saved Codes

Codes that have been added to the measure CQL via search and apply or manually typing into the CQL will be displayed in a table here. The table will display the Code, Description, Code System, System Version and have an action dropdown titled “Select.” Clicking the “Select” action dropdown will provide the users with the following options:

1. **Remove** – Selecting this option allows users to remove the code from the CQL. Clicking “Remove” will provide a pop-up ensuring that the user wants to delete the code. If the user wishes to move forward with deleting, they can click “Yes, Delete” and the code will be removed from the measure CQL. If the user decides the code should not be deleted, they should click “Cancel.” The pop-up will close, and the code will remain. **Note:** This will automatically save the measure CQL, and a save action will not be required.
2. **Edit** – This option allows users to edit the suffix associated with the code. A pop-up will open with information about the code and then a text area to enter a suffix. Suffixes must be numeric and a maximum of 4 numbers. In this pop-up, the user can also select to Include Code System Version. After entering a suffix, the user can click “Apply,” the pop-up will close and the code with a suffix will attempt to be added to the CQL on the left-hand side.

Code	Description	Code System	System Version
I00-I99	Diseases of the circulatory system (I00-I99)	ICD10CM	2024

Image: Saved Codes Table

8.3.6 Parameters Builder

This tab allows users to construct Parameters to be inserted into the measure’s CQL. Users must first enter the Parameter Name, followed by typing in the parameter’s logic into the expression editor. After the logic is specified, users can click “Clear” if they no longer want to add the parameter. Users can click “Apply” to insert the parameter into the appropriate location in the measure CQL. **Note:** Users must save the measure CQL for this change to be permanent.

Image: Parameters Tabs

8.3.6.1 Saved Parameters

This sub tab is where users can see the parameters already saved in their measure CQL. A table will be displayed with all the parameters listed. Users will have the ability to delete a parameter or edit a parameter from this table.

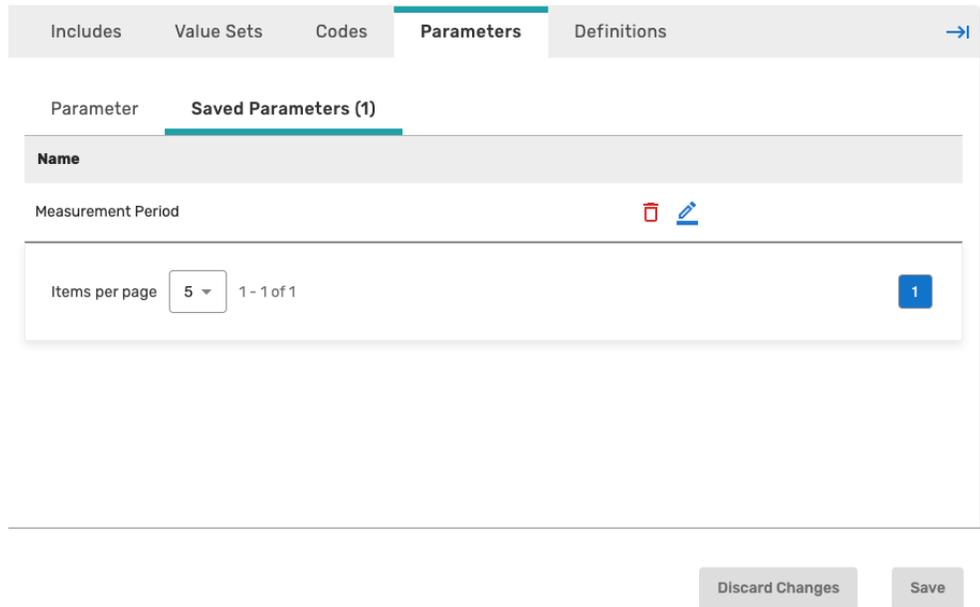


Image: Saved Parameters Sub Tab

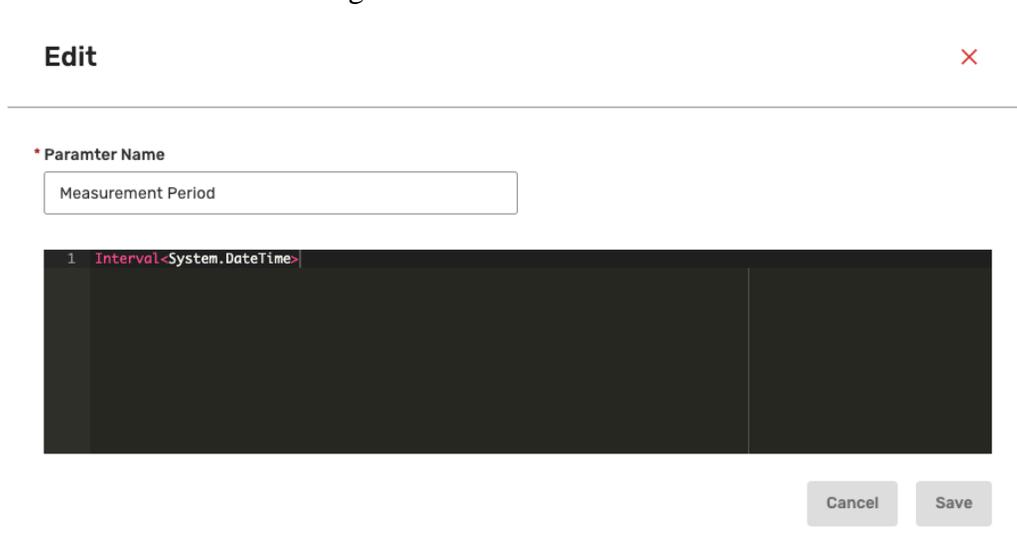


Image: Edit Parameter Modal

8.3.7 Definitions Builder

MADiE allows users to use the “Definitions” builder to help generate definitions as well as edit previously saved definitions.

The image shows a web-based interface for building definitions. At the top, there are navigation tabs: 'Includes', 'Value Sets', 'Codes', and 'Definitions'. The 'Definitions' tab is active. Below this, there are sub-tabs for 'Definition' and 'Saved Definitions (13)'. The 'Definition' section includes a text input for 'Definition Name', a text area for 'Comment', and an 'Expression Editor'. The 'Expression Editor' has a 'Type' dropdown, a 'Name' dropdown, and an 'Insert' button. Below the editor is a dark text area with a cursor. At the bottom right are 'Clear' and 'Apply' buttons.

Image: Definition Builder

8.3.7.1 Definitions Tab

This tab is where users will build their definitions. Users should enter their definition name and then choose to add a comment to be added to the CQL explaining what the definition is doing. Then users should move to the expression editor below. The expression editor contains a Type dropdown, Name dropdown, and a CQL Editor. First select a value from the type dropdown. After selecting a type, the Name dropdown will populate with relevant options. Select the Name relevant for your definition. Then select “Insert”. The CQL snippet will then be added to the editor where the cursor is. If the user has not clicked in the editor yet, it will be added to the bottom of the editor. Users can continue to repeat this process and type directly into the editor until the definition is complete. Finally, to apply the definition to the CQL, select “Apply” located below the editor. This will place the definition into the measure CQL at the bottom of the definitions. Users can continue to add definitions in this manner. When adding definitions is complete, the user must select “Save” for the CQL to be saved.

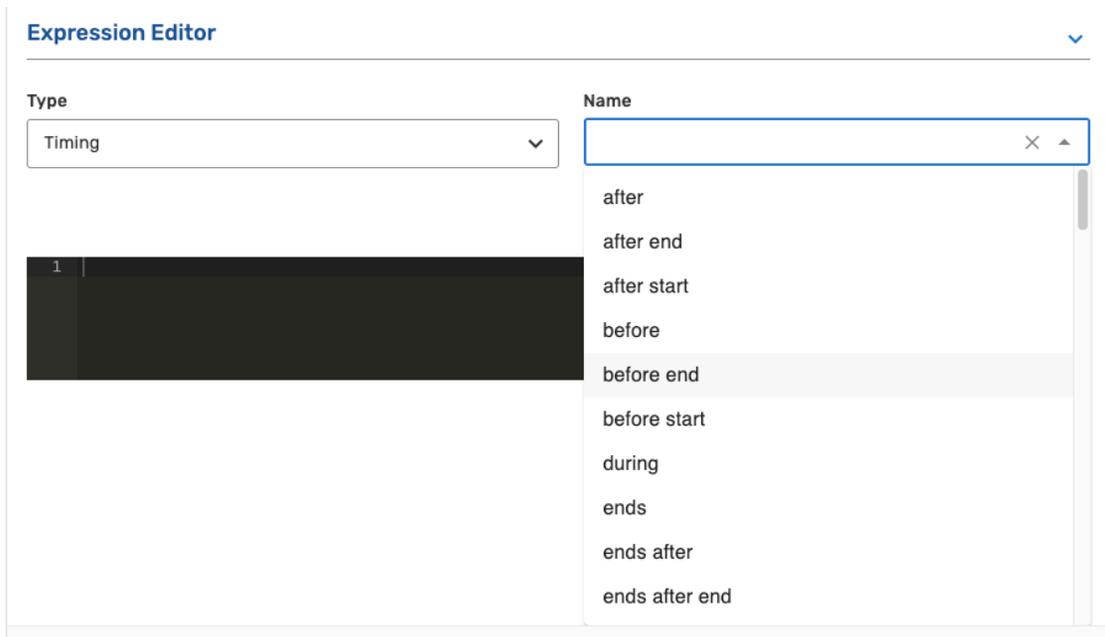


Image: Name Dropdown Options for Type Timing

8.3.7.2 Saved Definitions Tab

This tab will allow users to view and edit existing definitions in the measure CQL. It contains a paginated table that will show the definition name, definition return type, a delete button and an edit button.

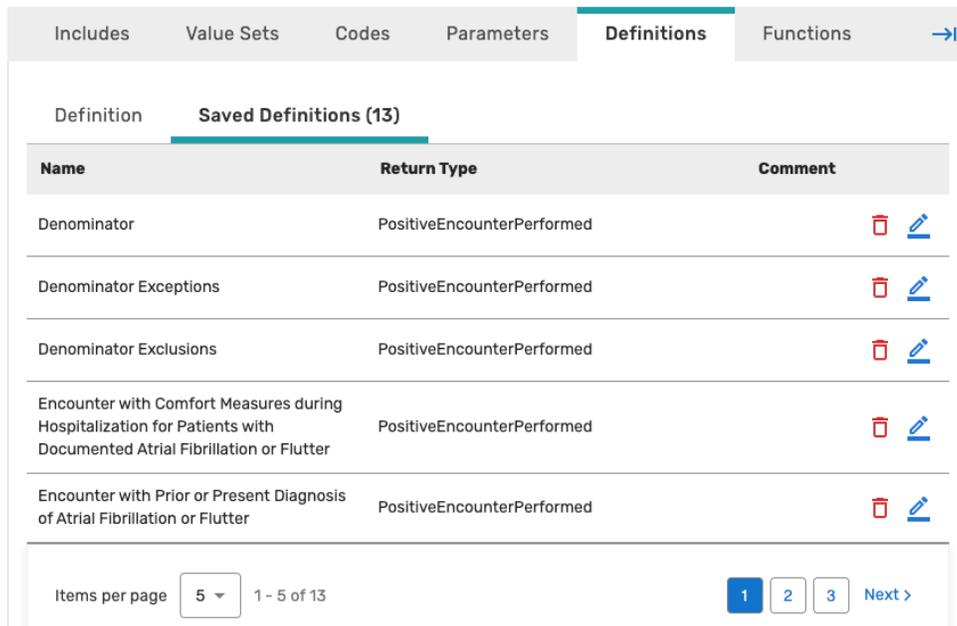


Image: Saved Definitions

To delete the definition, locate the correct definition, select the trashcan icon, and confirm the deletion by clicking “Yes, Delete”.

To edit a definition, locate the correct definition and select the pencil icon. This will open a definition modal and allow the user to edit the definition. Users can update the definition name, comment, and definition body. To edit the body users can either type in the small editor or select an item from the type dropdown, then name dropdown, and click “Insert”. This modal will also be where the user can find the definition return type.

Edit ✕

• **Definition Name** Return Type

Encounter with Comfort Measures during Hospitalization PositiveEncounterPerformed

Comment

Expression Editor ▼

Type Name

```

1  "Denominator" Encounter
2  with TJC, "Intervention Comfort Measures" ComfortMeasure
3  such that Coalesce(start of Global."NormalizeInterval"(ComfortMeasure.relevantDatetime, ComfortMeasure
   .relevantPeriod), ComfortMeasure.authorDatetime) during Global."HospitalizationWithObservation" (
   Encounter )

```

Image: Definition Edit Modal

Users that only have view access to a measure can open up the definition editor with view-only access. This allows users to gather more information about the definition but not edit it.

8.3.8 Functions Builder

MADiE allows users to use the Function tab to build both functions and fluent functions. Users can also edit existing functions on this tab.

The screenshot shows the 'Function builder' interface. It features a top navigation bar with tabs for 'Includes', 'Value Sets', 'Codes', 'Parameters', 'Definitions', and 'Functions'. The 'Functions' tab is active. Below this, there are sub-tabs for 'Function' and 'Saved Functions (1)'. The 'Function' sub-tab contains a form with the following fields:

- Function Name:** A text input field.
- Fluent Function:** A checked checkbox.
- Comment:** A text area.
- Arguments:** A section with a dropdown arrow.
- Name:** A text input field.
- Available DataTypes:** A dropdown menu.
- Buttons:** 'Clear' and 'Add' buttons.

Below the arguments section is a table with columns 'Name' and 'DataType', which is currently empty and displays the message 'No Results were found'. At the bottom of the interface are 'Discard Changes' and 'Save' buttons.

Image: Function builder

8.3.8.1 Functions tab

This tab allows users to construct a function or a fluent function. First, a user should enter the functions name. Next to the name is a check box to specify if this function will be a fluent function. To specify fluent function, leave the checkbox checked. If writing a normal function, uncheck the checkbox. Next, a comment can be added to provide more information about what the function will complete, the arguments to pass in, as well as the return. This field is optional. After adding a comment, users should next add any arguments. Start by adding an argument name followed by selecting the argument's datatype from the dropdown of available types. Should the type you need not be in the dropdown, you can select "Other". Users will then need to manually type the argument type in the other text field.

Arguments ▼

* **Name**

* **Available DataTypes** ▼

* **Other**
Other is required when dataType is Other.

Image: Arguments – Other DataType

After completing the argument, click “Add”. This will add the argument to the function. Users can continue to add arguments to the function until all arguments needed are listed in the argument table. Should an argument be added in error, it can be deleted by clicking the trashcan icon in the row in the arguments table. **Note:** fluent functions require an argument to be valid and for the function to be added to the CQL. For non-fluent functions, arguments are optional.

Name	DataType	✖
ValidEncounter	Encounter	✖

Items per page 1 - 1 of 1 1

Image: Added Arguments Table

The final step in creating a function is the expression Editor. Very similarly to definitions, the function expression editor contains a Type dropdown, Name dropdown, and a CQL Editor. First select a value from the type dropdown. After selecting a type, the Name dropdown will populate with relevant options. Select the Name relevant for your function. Then select “Insert”. The CQL snippet will then be added to the editor where the cursor is. If the user has not clicked in the editor yet, it will be added to the bottom of the editor. Users can continue to repeat this process and type directly into the editor until the function is complete.

Expression Editor ▼

Type: Name:

```
1 Interval[date from start of period, date]
```

Image: Function Expression Editor

Finally, to apply the function to the CQL, select “Apply” located below the editor. This will place the completed function into the measure CQL at the bottom of the functions. Users can continue to add functions in this manner. When adding functions is complete, the user must select “Save” for the CQL to be saved.

8.3.8.2 Saved Functions Tab

This tab is where the user can view, edit, and delete functions that already exist in the CQL. It contains a paginated table that shows function name, if it is a fluent function, all argument names and types, any comment added, and contains an icon for deleting and editing the function.

Function	Fluent	Argument Name	Comment
CalculateDate	Yes	"arg 1" "Boolean" "arg 2" "Date"...	
CalculateTime	-	period Interval	

Items per page: 1 - 2 of 2 1

Image: Saved Function Table

To delete a function, locate the correct function, select the trashcan icon, and confirm the deletion by clicking “Yes, Delete”.

To edit a function, locate the correct function and select the pencil icon. This will open a function modal and allow the user to edit the function. Users can update the function name, comment, any arguments, and function body. To edit the body users can either type in the small editor or select an item from the type dropdown, then name dropdown, and click “Insert”.

Edit ✕

* **Function Name**

CalculateTime Fluent Function

Comment

Arguments ▼

Name	Available DataTypes
<input type="text"/>	<input type="text"/>

Name	DataType	
period	Interval	<input type="button" value="✕"/>

Items per page 1 - 1 of 1

Expression Editor ▼

Type	Name
<input type="text"/>	<input type="text"/>

Image: Edit Function Modal

Users that only have view access to a measure can open up the function editor with view-only access. This allows users to gather more information about the function but not edit it.

8.4 Population Criteria Tab

Population Criteria varies depending on the Model of the Measure being edited.

8.4.1 QI-Core Population Criteria Tab

8.4.1.1 Criteria Sub Tab(s)

Population criteria for a measure can be added, configured, and managed in the Population Criteria tab (third tab from the left, next to CQL Editor, after opening a measure). In MADiE, measures may have multiple sets of population criteria (represented by Population Criteria 1, Population Criteria 2, etc.). To add additional population criteria, click the “Add Population Criteria” button below existing Criteria. Each population criteria can potentially have its own configuration for the following fields and subareas:

1. **Description:** The Description field describes a population criteria’s intent.
2. **Measure Type:** The Measure Type dropdown indicates whether the measure and population criteria configuration are used to examine a process, an outcome over time, a patient-reported outcome, or a structure measure such as utilization.
3. **Population Basis:** The Population Basis dropdown specifies the type of elements in the populations. **Note:** If a user changes the Population Basis for a specific Population, a warning will appear on save and if a user continues, Test Case expected values for that Population will be cleared.
4. **Scoring:** The Scoring dropdown indicates how calculation is performed for the measure. **Note:** If a user changes the Scoring for a specific Population, a warning will appear on save and if a user continues, the test case expected values for that Population will be cleared.
5. **Scoring Unit:** The Scoring Unit field defines the expected units of measure for the measure score.
6. **Populations:** The Populations subarea within a set of population criteria display configurable populations corresponding to the Scoring selected. Populations that may be displayed include:
 - a. Initial Population
 - b. Measure Population
 - c. Measure Population Exclusion
 - d. Denominator
 - e. Denominator Exclusion
 - f. Numerator
 - g. Numerator Exclusion
 - h. Denominator Exception
 - i. Observation

Note: If changes are made to any populations that have previously been included in the test cases they will be removed.

7. **Population Description:** For each population that is displayed a description field is also provided. They allow narrative about what the populations are measuring to be added. If these populations are left blank “None” will be added into the Human Readable and HQMF export.
8. **Stratifications:** The Stratifications subarea within a set of population criteria allows stratifications to be added, configured, and managed. Description fields are also included to communicate details about each stratification. If these descriptions are left blank “None” will be added into the Human Readable and HQMF export.

Users can add 0 to many Stratifications. The fields to enter two stratifications are shown by default. To add another, select “Add Stratification.” In the Stratification dropdown select the definition you wish to stratify. In the stratification association dropdown, select the population the stratification is associated to. Only valid populations will appear in the dropdown. The optional description field can be used to add a description for each stratification.

For Stratification associations, this is a multi-select field. By default, all valid populations will be selected. If not all populations are associated to that stratification, the user must unselect the irrelevant measure populations.

Image: QI-Core Stratifications

9. **Reporting:** The Reporting subarea includes the following:
 - a. **Rate Aggregation:** The Rate Aggregation field describes how to combine calculated information based on logic in each of several populations into one summarized result. For measures that do not have rate aggregation, enter “None” into this field.
 - b. **Improvement Notation:** The Improvement Notation dropdown provides direction for whether an increase or decrease in score is the preferred result. Improvement Notation is required for QI-Core measures

- c. **Improvement Notation Description:** The improvement notation description allows the user to specify additional information around improvement Notation. Example: “Increase of 30% indicates improvement”. During export of the measure, if improvement notation description is set, MADiE will automatically set the ADD extension with the information entered in this field.

The screenshot shows the MADiE interface for configuring a measure. The top navigation bar includes 'Measures / Details', 'Intro to MADiE - QI-Core', and version information. The main content area is titled 'Population Criteria 1' and contains several sections: 'Criteria 1' with an 'Add Population Criteria' button, 'Supplemental Data' and 'Risk Adjustment' tabs, and a 'Reporting' tab. The 'Reporting' tab is active and shows fields for 'Rate Aggregation' and 'Improvement Notation'. The 'Improvement Notation' section includes a dropdown menu for 'Select Improvement Notation' and a text input field for 'Improvement Notation Description' with the placeholder text 'Addition Information for Improvement Notation'. There are also 'Delete', 'Discard Changes', and 'Save' buttons at the bottom.

Image: Improvement Notation for QI-Core

8.4.1.2 Supplemental Data Tab

Supplemental data elements (SDE) are those that should be identified for each patient for whom the measure is applicable. This additional data can be used to evaluate disparities in care.

CMS defines four supplemental data elements for each measure (payer, ethnicity, race and ONC Administrative Sex). These are defined in the SupplementalDataElements standalone library. To include them in your measure, include the SupplementalDataElements library and in your measure CQL create definitions that reference the definitions in the library.

Any definitions created in the CQL workspace are available to be included in the measure as supplemental data elements if desired and can be viewed in the Definition multi select dropdown. Select all definitions that should become supplemental data elements. **Note:** MADiE limits users to select no more than 128 SDEs.

One SDE description exists per measure. Fill in the description value and save to set SDEs.

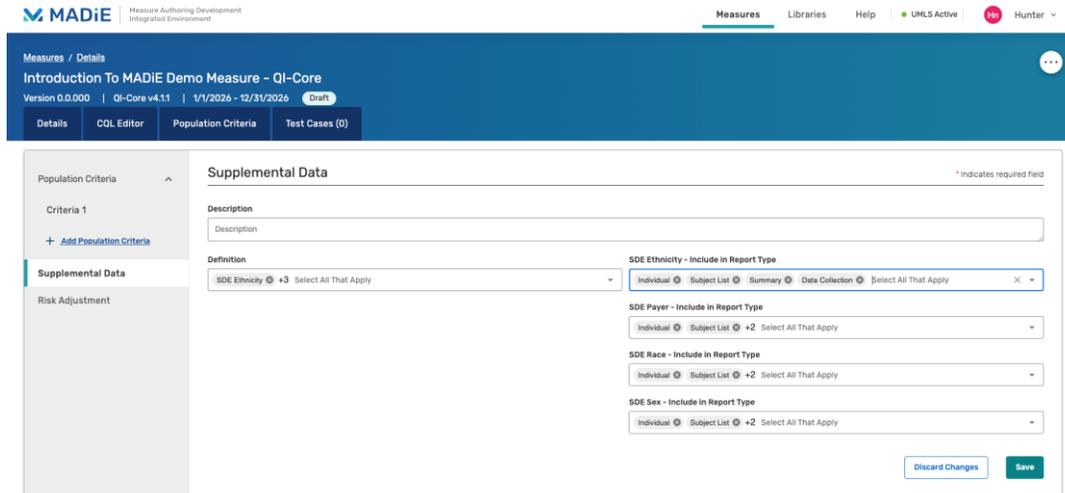


Image: Supplemental Data Tab

8.4.1.2.1 Include in Report Type (QI-Core Only)

For QI-Core MADiE allows users to specify what report type the SDE should be included in. The options are:

- Individual
- Subject List
- Summary
- Data Collection

After selecting an SDE to include in the measure, a multi select dropdown will appear with all four report types selected by default. If the SDE should not be included in one or more of the reports, uncheck the report it should not be included in. A multiselect dropdown for each selected SDE will be present. For more information on the Include in Report Type Extension please visit [HL7s listing](#).

8.4.1.3 Risk Adjustment Tab

Risk adjustment is the method of adjusting for clinical severity and conditions present at the start of care that can influence patient outcomes, making it difficult to make valid comparisons of outcome measures across providers.

Any definitions created in the CQL workspace are available to be included in the measure to be Risk Adjustment Variables (RAV) if desired and can be viewed in the Definition multi select dropdown. Select all definitions that should become Risk Adjustment Variables. **Note:** MADiE limits users to select no more than 128 RAVs.

One RAV description exists per measure. Fill in the description value and save to set RAVs.

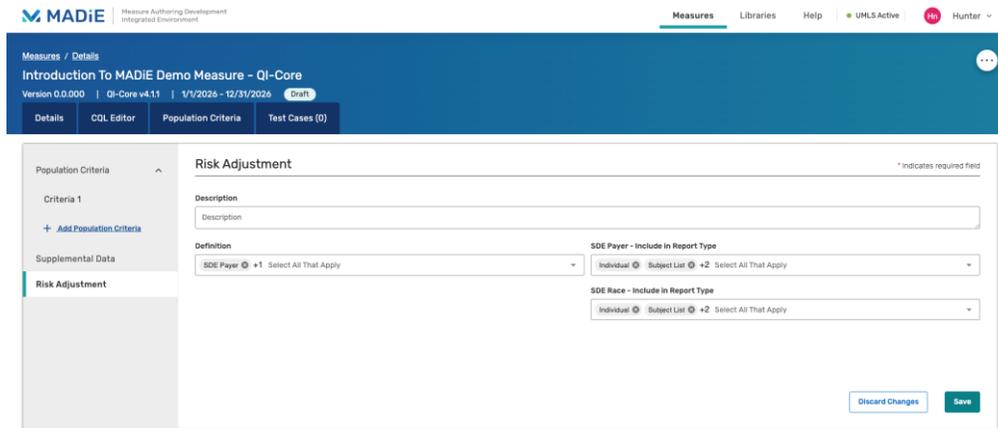


Image: Risk Adjustment Tab

8.4.1.3.1 Include in Report Type (QI-Core Only)

For QI-Core MADiE allows users to specify what report type the RAV should be included in. The options are:

- Individual
- Subject List
- Summary
- Data Collection

After selecting a RAV to include in the measure, a multi select dropdown will appear with all four report types selected by default. If the RAV should not be included in one or more of the reports, uncheck the report it should not be included in. A multiselect dropdown for each selected RAV will be present. For more information on the Include in Report Type Extension, please visit [HL7s listing](#).

8.4.2 QDM Population Criteria Tab

8.4.2.1 Base Configuration Sub Tab

In MADiE these elements are selected on the Base Configuration Sub Tab. Base Configuration has the following fields:

1. **Measure Type:** The Type dropdown indicates whether the measure and population criteria configuration are used to examine a process, an outcome over time, a patient-reported outcome, or a structure measure such as utilization.
2. **Scoring:** The Scoring dropdown indicates how calculation is performed for the measure. **Note:** If Scoring is changed, on save a warning will appear. If a user chooses to continue, the test case expected values will be cleared and the population fields on the Criteria Sub Tab will be reset.

3. **Patient Basis:** The Patient Basis specifies the type of elements in the populations. **Note:** If the Patient Basis is changed, on save a warning will appear. If a user chooses to continue, the test case expected values will be cleared.

8.4.2.2 Criteria Sub Tab(s)

In MADiE, measures may have multiple sets of population criteria (represented by Population Criteria 1, Population Criteria 2, etc.). To add additional population criteria, click the “Add Population Criteria” button below existing Criteria. Each population criteria can potentially have its own configuration for the following fields and subareas:

1. **Description:** The Description field describes a population criteria’s intent.
2. **Scoring Unit:** The Scoring Unit field defines the expected units of measure for the measure score.
3. **Populations:** The Populations subarea within a set of population criteria display configurable populations corresponding to the Scoring selected. For each population that is displayed a description field is also provided. The description allows narrative about what the populations are measuring to be added. Populations that may be displayed include:
 - a. Initial Population
 - b. Measure Population
 - c. Measure Population Exclusion
 - d. Denominator
 - e. Denominator Exclusion
 - f. Numerator
 - g. Numerator Exclusion
 - h. Denominator Exception
 - i. Observation

Note: If changes are made to any populations that have previously been included in the test cases the populations will be removed.

4. **Stratifications:** The Stratifications subarea within a set of population criteria allows stratifications to be added, configured, and managed. For each stratification that is displayed a description field is also provided. The description allows narrative to communicate details about each stratification.

Users may add one or more Stratifications, if applicable to the measure. The fields to enter two stratifications are shown by default. To add another, select “Add Stratification.” In the Stratification dropdown, select the definition you wish to stratify. Optional descriptions can be added for each stratification.

8.4.2.3 Reporting Sub Tab

The QDM Reporting sub tab includes the following:

- a. **Rate Aggregation:** The Rate Aggregation field describes how to combine calculated information based on logic in each of several populations into one summarized result. For measures that do not have rate aggregation, enter “None” into this field.
- b. **Improvement Notation:** The Improvement Notation dropdown provides direction for whether an increase or decrease in score is the preferred result. QDM measures have one additional option, which is “Other.” Users are also provided a text area to enter a description of the improvement notation for this measure. The text area is required when the user selects “Other” and is optional for the remaining available options

8.4.2.4 Supplemental Data Sub Tab

Supplemental data elements (SDE) are those that should be identified for each patient for whom the measure is applicable. This additional data can be used to evaluate disparities in care.

Any definitions created in the CQL workspace are available to be included in the measure as supplemental data elements if desired. These definitions can be viewed in the Definition multi select dropdown. Select all definitions that should become supplemental data elements.

Along with the multi select dropdown is a single text area for users to enter narrative around the measure’s SDEs. Select all definitions, enter any relevant narrative, and select “Save” to set SDEs.

8.4.2.5 Risk Adjustment Sub Tab

Risk adjustment is the method of adjusting for clinical severity and conditions present at the start of care that can influence patient outcomes, making it difficult to make valid comparisons of outcome measures across providers.

Any definitions created in the CQL workspace are available to be included in the measure as Risk Adjustment Variables (RAV) if desired and can be viewed in the Definition multi select dropdown. Select all definitions that should become Risk Adjustment Variables.

In addition to the multi select dropdown, there is a text area to enter narrative for the RAVs. Select all definitions, enter any relevant narrative, and select “Save” to set RAVs.

8.5 Test Cases Tab

Test cases for a measure can be added, edited, and managed in the Test Cases tab (fourth tab from the left, next to Population Criteria, when a measure is open). The Test Cases tab displays a table of all test cases that have been created along with Pass/Fail and coverage results. Above the table in the Test Cases tab, the following are displayed (see image below):

1. **Test Cases Passing Indicator:** The Test Cases Passing Indicator displays the percentage of test cases that are passing (i.e., have matching expected and actual values) as it relates to measure logic relevant to a measure's first set of population criteria. The indicator also shows the percentage as a fraction, displaying the number of passing test cases to the total number of test cases. Click the Run Test(s) button to calculate results. Clicking on this tab will show the Test Case Table List, see below for more details.
2. **Test Cases Coverage Indicator:** The Coverage Indicator displays the percentage of the measure logic that has been evaluated by the test cases as it relates to a measure's first set of population criteria. Click the Run All Tests button to calculate results. Clicking on the Coverage tab will show you code coverage highlighting.
3. **Delete All Button:** Allows a user to delete all test cases created for the given measure. This action cannot be undone. See [section 8.5.5.2](#) for more details.
4. **Import from MADiE Button:** Allows users to import test cases into MADiE for QI-Core measures. See [section 8.8.2](#) for more details.
5. **Import from Bonnie Button:** Allows users to import test cases into MADiE that have been exported from Bonnie prior to the decommissioning for QDM measures. See [section 8.8.1](#) for more details.
6. **+ New Test Case Button:** The + New Test Case button initiates the creation of a new Test Case.
7. **Run Test(s) Button:** The Execute Test Cases button initiates calculation of all test cases against measure logic related to the population criteria selected. The Test Cases Passing Indicator, Coverage Indicator, and individual test case, Pass/Fail results are updated. The Run Test(s) Button must be clicked each time to calculate new results.
8. **Export Test Cases Button:** Currently only available for QI-Core measures. Allows users to export test cases as a "Transaction Bundle" or a "Collection Bundle." See [section 8.6](#) for more details.
9. **Filter By Dropdown:** Works with the search field. Allows users to select what field the user wants to use to search. See [section 8.5.1](#).
10. **Search Field:** Free text area where the user can insert their search term to search. See [section 8.5.1](#).

The screenshot displays the MADiE interface for a QDM measure. At the top, it shows the measure name 'Introduction To MADiE Demo Measure' and its version '0.0.000'. The 'Test Cases (84)' tab is active, showing a summary of 98% passing (83/84) and 99% coverage. A table lists individual test cases with columns for Case #, Status, Group, Title, Description, Last Saved, and Action. Red circles are placed over various UI elements: 1 (Case #), 2 (Status), 3 (Group), 4 (Title), 5 (Description), 6 (Last Saved), 7 (Select button), 8 (Action buttons), 9 (Filter By dropdown), and 10 (Search field).

Case #	Status	Group	Title	Description	Last Saved	Action
84	Pass	DENEXPass	CMQdurEDEdeq1hrb4Obseq1hrBFEnc	Patient receives CMO during ED. ED ends 60 min before Obs start and Obs ends 60 min before inpatient start. Testing Ho... more	10/24/2024	Select
83	Pass	DENEXCEPass	MedRsnStartTmEQEncDisch	Patient did not receive anticoagulant on dc due to medical reason, but start date is eq end of OccurA	10/24/2024	Select
82	Pass	DENEXCEPass	MedRsnStartTmEQEncAdmTm	Patient did not receive anticoagulant on dc due to medical reason, but start date is eq start of OccurA	10/24/2024	Select

Image: Test Case List Page Actions – QDM Measure

The Test Cases table lists all the measure’s test cases and displays additional information about each test case including (see image below):

1. **Case #:** Each test case on a measure is given a Case #. These will begin with 1 on the oldest test case and continue until each test case has a unique number. The default sort order will be descending order on Case #.
2. **Pass/Fail/Invalid:** When the Run All Tests button has been clicked, the Pass/Fail column displays Pass or Fail for a test case, indicating if the test case’s expected values match actual values calculated. Pass/Fail results are no longer automatically calculated after opening a measure. The Run All Tests button must be clicked each time to calculate new results. If “Invalid” is displayed it means the test cases contained errors that need to be corrected before it can be executed successfully.
3. **Test Case Group:** The Test Case Group column displays the name of the test case group to which a test case may be assigned.
4. **Title:** The Title column displays the title of a test case.
5. **Description:** The Description column displays the description given to a test case.
6. **Last Saved** -The date the test case was last saved populates here.
7. **Actions:** The Actions column displays the Select button, which opens a test case to view and/or edit its content. It also contains any other actions you can perform on the test case.
 - a. **Edit/View** –
 - i. **Edit** - Users who own or have share access to the measure will have an Edit button. This allows users to open the test case for editing.

- ii. **View** - Users who do not own or have share access to the measure will have a view button. This allows users to open the test case for view-only access.
- b. **Export Transaction Bundle (QI-Core Only)** – Exports the transaction bundle for that specific test case.
- c. **Export Collection Bundle (QI-Core Only)** – Exports the collection bundle for that specific test case.
- d. **Clone Test Case**– Allows users to clone that test case. This feature will duplicate the test case, adding the test case unique id to the title to ensure unique test case name. The title can be edited on the Test Case Details tab. Invalid test cases cannot be cloned and the dropdown will not contain the Clone Test Case option.
- e. **Delete** – Allows user to delete the specified test case.
- f. **Shift Test Case Dates** – Allows users to shift the dates on the individual test case a specific number of years. See [section 8.5.7.2](#) for more information.

The screenshot shows the MADiE interface for a QDM measure. The table headers are as follows:

1	2	3	4	5	6	7
Case #	Status	Group	Title	Description	Last Saved	Action
84	Pass	DENEXPass	CM0durEDEDeq1hrb40bseq1hrB FEnc	Patient receives CMO during ED. ED ends 60 min before Obs start and Obs ends 60 min before inpatient start. Testing Ho... more	10/24/2024	Select
83	Pass	DENEXCEPPass	MedRsnStartTmEQEncDisch	Patient did not receive anticoagulant on dc due to medical reason, but start date is eq end of OccurA	10/24/2024	Select
82	Pass	DENEXCEPPass	MedRsnStartTmEQEncAdmTm	Patient did not receive anticoagulant on dc due to medical reason, but start date is eq start of OccurA	10/24/2024	Select

Image: Test Case List Page Table Headers – QDM Measure

Test Cases will appear with the Case # in descending order. Users can update the way the test case table is sorted based on Case #, Status, Group, Title, Description, and Last Saved. Clicking on the column to sort once will sort that column in ascending order. Clicking a second time will sort in descending order. Clicking a third time will return the table to the default sort.

8.5.1 Test Case Searching

Users can search test cases in MADiE by using the “Filter By” dropdown and the “Search” field. The Filter By dropdown is a single select dropdown that allows users to specify which test case

fields they want to search in. The options are Status, Group, Title, and Description. If no filter is selected all 4 fields will be searched.

After deciding on a filter option, the user should enter their search term in the Search text box. Once the search term is entered, users can hit enter on the keyboard or click the magnifying glass icon on the search. The Test Case table will then be updated with the results. The table will paginate and filter with the reduced results. To clear the search and see all test cases click the “x” in the search text area.

8.5.2 Creating a New Test Case

To create a new test case, initiate the process by clicking on the + New Test Case button in the upper right, below the blue header area. The Create New Test Case modal will appear, prompting you to enter the following information:

1. **Title:** The Title field is the name of your test case.
2. **Description:** The Description field communicates what the test case is testing. **Note:** Description can only contain 250 characters.
3. **Group:** Group field assigns a test case to a group that can be used to sort and organize the test case table according to your preferences.

Once the information above has been entered you have the option to:

1. **Cancel:** The Cancel button discontinues the creation of a new test case and closes the modal.
2. **Save:** The Save button saves the test case using the information entered into the Create New Test Case modal.

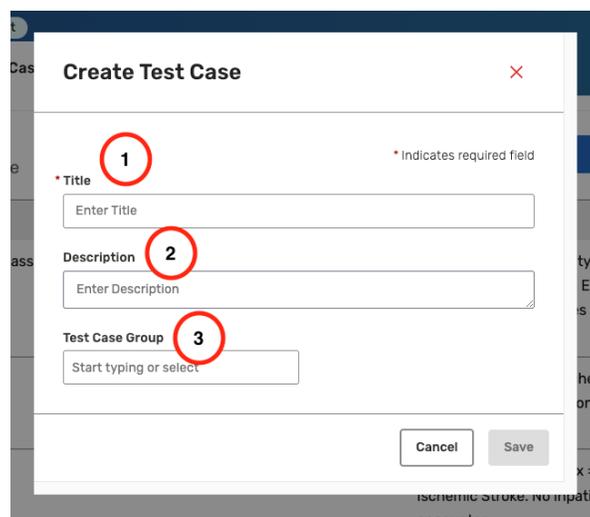
The image shows a 'Create Test Case' modal window. It features three input fields: 'Title' (with a red circle 1), 'Description' (with a red circle 2), and 'Test Case Group' (with a red circle 3). A red asterisk indicates required fields. At the bottom right are 'Cancel' and 'Save' buttons.

Image: Create Test Case Model

After the test case is created, a Case # is automatically assigned.

8.5.3 Test Case Builder

Once a test case has been created, it can be opened for building by clicking on the test case's select button in the test case table. Once opened, the test case shows two panels on each side of the screen. The left panel contains the test case builder. The right panel contains Logic Calculation Highlighting information. See [section 8.5.4](#) for more information.

8.5.3.1 Test Case Breadcrumbs

In the upper left-hand corner of the edit test case page, directly below the measure tabs, users can click "Test Cases" to navigate back to the test case list page or click on the test case Breadcrumbs. The breadcrumb will list the "Test Case Number: Group – Title" for the current test case. The breadcrumb is a dropdown that will provide the user a list of all test cases in the measure. Users will be able to switch between the test cases here. Before switching to a different test case, ensure your test case is saved. If it is not, your changes will be lost.

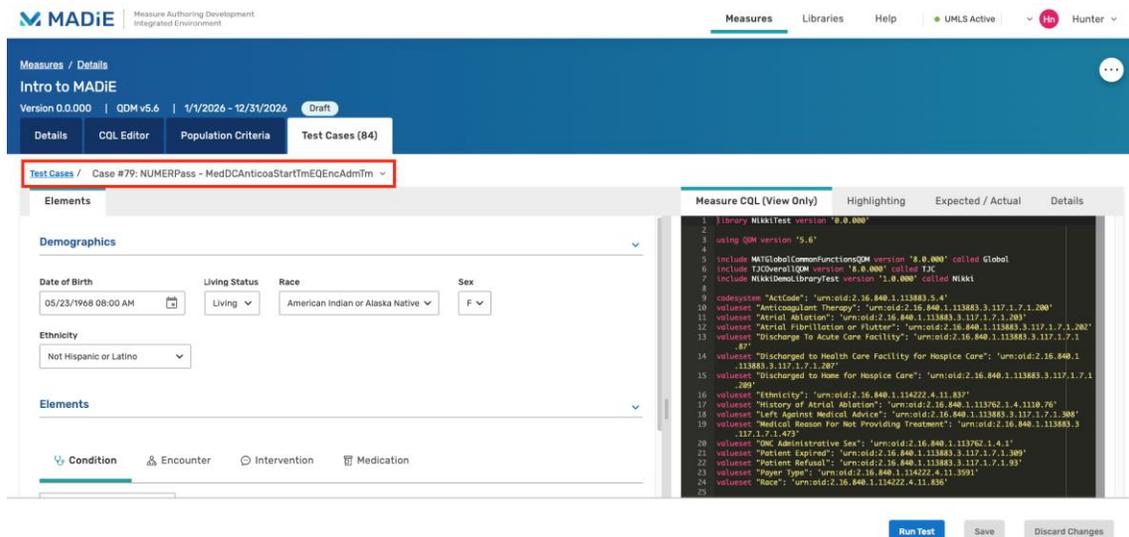


Image: Test Case Breadcrumb

8.5.3.2 JSON Editor (QI-Core Measures)

The JSON editor is only available for QI-Core measures. QDM measures do not have a standard JSON representation and JSON cannot be utilized for QDM measures in MADiE.

The JSON Editor is where the JSON logic of a test case can be viewed and edited. All information can be added, edited, deleted, and must be in correct JSON syntax. When saving, any errors in the JSON will be displayed. JSON files may contain errors and warnings. JSON containing errors can be saved but may prevent dependent functionality from working properly (e.g., test case calculation). JSON files containing just warnings can be saved and calculated.

Verify the JSON is complete, and errors are resolved to ensure proper functionality of areas dependent on it.

MADiE will validate the PatientID used for the patient throughout the test case JSON. When the test case JSON is saved MADiE will automatically add a PatientID for the patient if it was not included and will overwrite the PatientID if the PatientID used was inconsistent. This will be in UUID format. At this time, only the PatientID will be overwritten or added. No reference to the patient will be updated with the new PatientID.

The screenshot displays the MADiE web application interface. At the top, there's a navigation bar with 'Measures', 'Libraries', 'Help', 'UMLS Active', and 'Hunter'. Below this, a breadcrumb trail shows 'Measures / Details' and 'Introduction To MADiE Demo Measure - QI-Core'. The main content area is divided into two panes. The left pane, titled 'Test Cases', shows a JSON snippet for a patient resource with fields like 'resourceType', 'id', 'type', 'fullUrl', 'resource', 'profile', 'test', and 'extension'. The right pane, titled 'Measure CQL (View Only)', shows CQL code for a measure named 'IntroToMADiEQICoreDev version '9.0.000''. The CQL code includes library imports, version specifications, and various definitions for parameters and context. A 'Validation Errors' tab is visible on the right side of the CQL pane.

Image: QI-Core Test Case Editing

8.5.3.3 Test Case Validation (QI-Core v4.1.1)

QI-Core v 4.1.1 test case validations will display in the Validation Errors tab. Warning messages also display in this section. The section is expandable or collapsible by clicking on the text “Validation Errors”. To increase the size of your working area, select the divider and drag it to the left to make the section bigger or smaller.

Image: QI-Core v4.1.1 Validations

8.5.3.4 Test Case Validation (QI-Core v6.0.0)

MADiE does not perform validation on QI-Core v6.0.0 measure test cases at this time. This means your test cases successfully save despite having syntax errors, terminology errors, or utilize an invalid FHIR resource. MADiE will support this validation in the future.

8.5.3.5 User Interface (QDM Measures)

Currently, only QDM measures have a User Interface (UI) editor for test cases.

Since QDM does not have a standardized JSON format MADiE allows the user to build test cases via a UI. This UI allows the user to enter information about the Test Case via dropdowns, date time fields, and from form text fields.

8.5.3.5.1 Demographics

Demographics contains information about the Test Cases Demographics

- **Date of Birth** – Required fields where users enter the test case’s date and birth in “MM/DD/YYYY hh:mm aa” form. Users can either type the date and time manually or utilize the date time picker.
- **Living Status** – Dropdown allowing users to specify the living status of the test case
- **Race** – Dropdown allowing users to specify the Race of the test case. The contents of the dropdown are populated based on an VSAC expansion of value set 2.16.840.1.114222.4.11.836 (expansion version: eCQM Update 2023-05-04).
- **Sex** – Dropdown allowing users to specify the Sex of the test case.

- **Ethnicity** – Dropdown allowing users to specify the Ethnicity of the test case. The contents of the dropdown are populated based on a VSAC expansion of value set 2.16.840.1.114222.4.11.837 (expansion version: eCQM Update 2023-05-04).

8.5.3.5.2 Elements

The Elements section is where users will add the QDM Elements relevant to the measure. It is comprised of three different sections:

- Category tabs
- Elements Builder
- Elements Table

First, is a list of category tabs, i.e., Encounter, Medication, etc. Each measure will contain a different list of categories as only the categories utilized in the measure CQL will display. Each category lists the different elements that can be added to the Test Case. To see elements under different categories, click on the desired category. To add an element to the test case, click on that element's "+" button. This will open the element builder.

The element builder is where users will provide additional data about the element. It has a few sections:

- **Timing Section** – where users will enter any time information about the element, e.g., “Relevant Period – Start,” “Relevant Period – End,” etc.
- **Codes Tab** – where users will enter information about the primary code for the element. by selecting “Custom Code” or a code system that is utilized in the CQL of the measure.
 - **Custom** – two free text boxes will appear for the user to enter a custom code system and custom code.
 - **Existing Code System** – a dropdown containing all the available codes in that code system will appear for the user to select from.

After the user fills in or selects all fields the user will then select “Add” to add the code to the elements.

- **Attributes Tab** – where users will select from an attribute dropdown containing attributes that are relevant to the element. Selecting an attribute will populate the type dropdown. Users should select the type needed. Many times, only one type is available. Based on the type of attribute different UI elements will appear for the user to populate. Once all required fields are populated, select “Add” and the attribute will be added to the element. Users can add as many or as few attributes to the element that are needed. Note: If your attribute requires a Unit field, this must be entered with a valid UCUM unit. See [here](#) for a list of valid UCUM units. MADiE will attempt to provide a meaningful error message to help users pinpoint the correct unit if an invalid unit was entered.

At the bottom of this section is the Elements table. This table contains a row for each element added and a column for its Datatype, Value Set & Code, Timing, Attribute(s), and Actions. The number of columns for attributes is dynamic based on the number of attributes added to different elements. The table will become scrollable as the number of attribute columns grows. To edit the element, add or remove attributes, or adjust timing click on “Actions” and select “Edit.” To delete the element from the test case, click on “Actions” and select “Delete.” To clone an element, click on “Clone.” The cloned element will retain the same timing and attributes as the original element.

Test case edits will not be saved to the database until the user clicks the “Save” button. Prior to saving users can execute the test case by clicking "Run Test". If the user determines the test case requires updating, changes can be made prior to saving. After saving the test case, if the user makes updates, clicks "Run Test" and determines the updates are not desirable the user can click "Discard Changes".

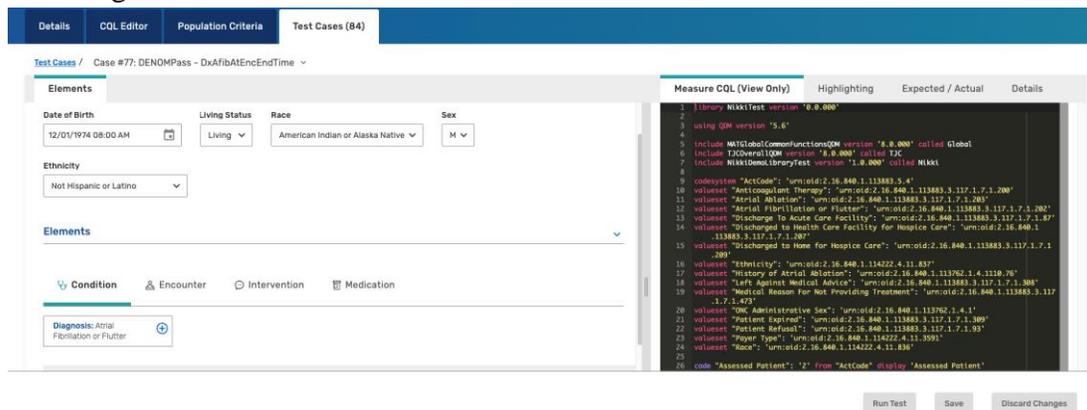


Image: QDM Test Case Elements Editor

8.5.4 Logic Calculation Highlighting Information

This section is found on the right side of the edit test case screen. It contains four sections, Measure CQL (View-only), Highlighting, Expected/Actual, and Details. The Test Case Builder on the left-hand side can be used to build test cases. See [section 8.5.3](#) for more information.

8.5.4.1 Measure CQL (View-only)

The right panel initially displays the measure CQL to aid in building the test case JSON. However, the measure CQL is view-only and cannot be edited in this area. CQL edits can only be made in the CQL Editor tab.

8.5.4.2 Highlighting

The Highlighting subarea (second link from the left in the right panel, next to the Measure CQL link) displays a test case’s highlighting results calculated against the measure CQL. The

highlighting subarea is view-only and cannot be edited. No highlighting will display until after clicking the “Run Test” button. Green and/or red highlighting is generated. Green highlighting indicates a passing result for any applicable lines of measure CQL, while red highlighting indicates a failing result for any applicable lines of measure CQL. Highlighting is broken down and displayed on separate tabs, one each for:

- Measure Populations (a list of the populations applicable to the measure)
- Definitions
- Functions
- Unused

Users can click through the tabs to get targeted highlighting information. If users would like to look at highlighting for a different Population Criteria, they will click the dropdown at the top of the section. It will open a list of Population Criteria, and users can select the population criteria they want to view. The “Run Test” button must be clicked each time a user would like to calculate new results.

The highlighting tab also contains a Results section for each definition. The Results section can be found directly below each definition and can be expanded and collapsed. It displays the results of the logic evaluated on the test case.

8.5.4.3 Expected/Actual

The Expected/Actual subarea (third link from the left, next to the Highlighting link, in the right panel) displays population criteria tables, where expected values for populations, stratifications, and observations within each set of population criteria can be configured. Upon clicking the “Run Test” button, Actual values are displayed along with pass/fail results for the test case across each set of population criteria. Updating the expected values will clear out any actual values that are displayed. Then the “Run Test” button must be clicked each time a user would like to calculate new results.

8.5.4.4 Details

The Details subarea (last link the right panel, next to the Expected/Actual link) displays:

1. **Title:** The Title field is the current name of a test case.
2. **Description:** The Description field communicates what a test case is testing and is auto populated with any Description field content entered during the creation of the test case. **Note:** Description can only contain 250 characters.
3. **Test Case Group:** The Test Case Group field assigns a test case to a group that can be used to sort and organize the test case table according to a user’s preferences. It is auto populated with any Test Case Group assignments entered during the creation of the test case.

8.5.5 Deleting Test Cases

8.5.5.1 Deleting an Individual Test Case

After a test case has been created, it can be deleted by clicking on the test case's select button in the test case table. Then select "Delete." A confirmation dialog is shown. Select "Cancel" to continue editing and "Delete" to permanently remove the test case. **Note:** Deleting test cases cannot be undone.

8.5.5.2 Deleting All Test Cases on a Measure

To delete all the test cases on the measure, select "Delete All" in the upper right of the test case table. A confirmation dialog is shown. Select "Cancel" to continue without deleting any test cases and "Yes, Delete" to permanently remove all the test cases associated with the measure. **Note:** Deleting test cases cannot be undone.

If users want to reset Case # on their test cases, they can do so by completing the steps to delete all test cases. When adding the test cases back in, Case # will begin at zero again.

8.5.6 Include Supplemental Data Elements in Test Case Calculation (QDM Only)

For QDM Measures MADiE will allow users to specify if they would like to include Supplemental Data Elements (SDE) in the test case calculation and code coverage highlighting. To include SDEs in calculations locate the Configuration section on the left hand side of the Test Case List page. Select the SDE tab. Update the "Include Supplemental Data" radio button to "Yes." Click Save. The SDEs will now be included in the calculation and coverage percentages. You can specifically see the SDE Highlighting on the highlighting tab of the Edit test case page.

Users that do not want to include SDEs in the measure calculation verify that the "Include Supplemental Data" radio button is set to "No."

8.5.7 Expansion Manifest Selection (QDM Only)

MADiE allows users to specify a Manifest to use with their measure's test case execution. To specify a Manifest, select the "Expansion" under the Configuration subtabs on the Test Case Tab. Here required radio buttons are available to select one of two options:

- **Latest** - this option uses the latest version of each value set available in VASC.
Note: This option includes value sets in a draft status and with inactive codes.
- **Manifest** - this option allows a user to select a specific manifest available in VSAC
Note:
 - VSAC Draft Manifests include value sets in a draft status
 - VSAC Active Release Manifests do not support draft value sets

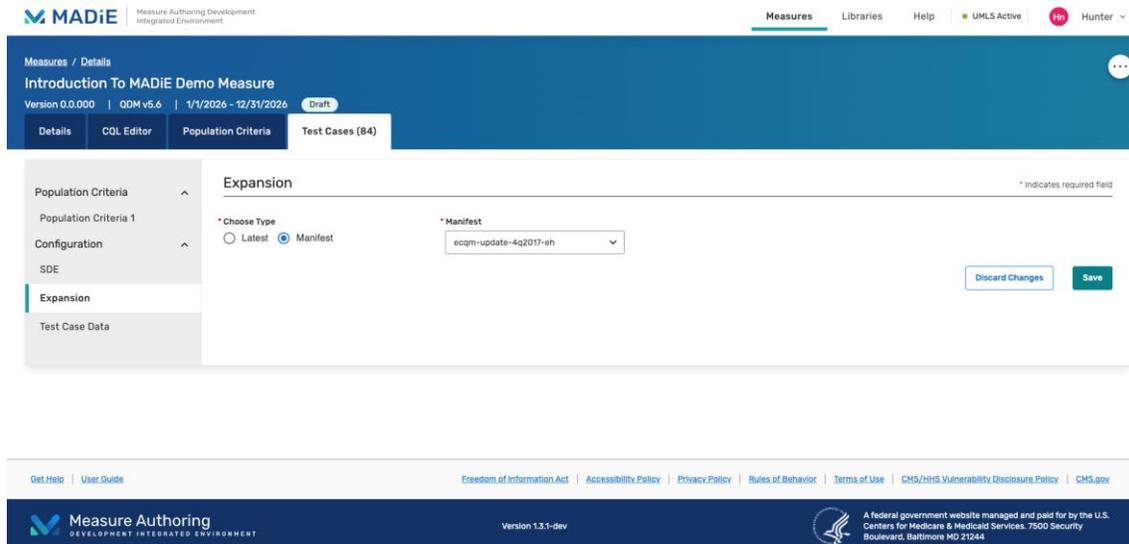


Image: Expansion Tab – Manifest Selected

8.5.8 Test Case Data

The test case data subtab is where users can shift test case dates for all test case in the measure. This feature will allow users to shift the test case dates year a specified number of years. For example, if a test case has a date of birth of 5/13/1976, a user can shift test case dates forward five years and the test case date of birth will be updated to 5/13/1981. This feature will be beneficial if the measurement period used for the measure is updated and all test case dates need to shift to fall within the measurement period.

8.5.8.1 Shift All Test Case Dates

To shift all test case dates, enter a number in the Shift Test Case Dates text area. This number can be positive to shift test case year forward, or negative to shift test case years backwards. After entering the number of years to shift dates in all test cases click “Save.” MADiE will attempt to shift all test case dates the specified number of years. If some test cases cannot be shifted, MADiE will skip those and provide a message indicating those dates could not be shifted. If all dates could successfully be shifted, then MADiE will display a success message.

If the date being shifted is February 29th and the date is shifted to a non-leap year, the date will become February 28th in the new year. For example, 2/29/24 shifted one year will become 2/28/25.

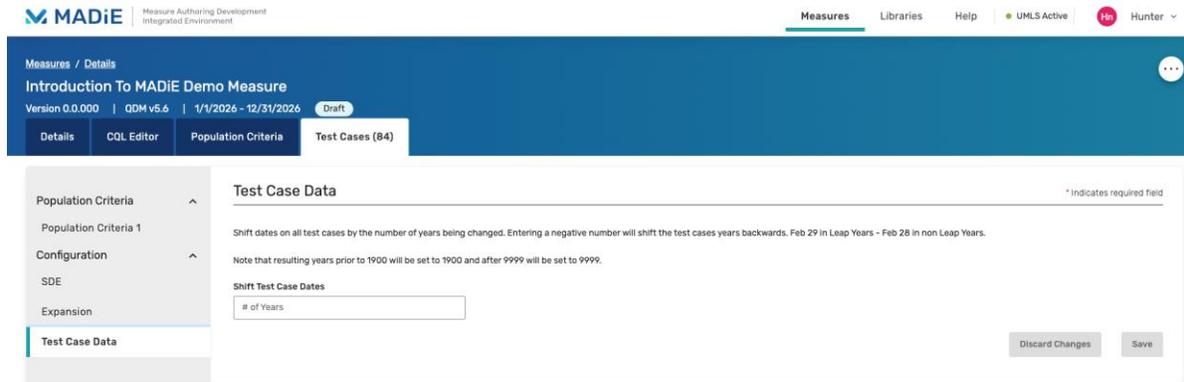


Image: Test Case Data Sub Tab

8.5.8.2 Shift Single Test Case Dates

MADiE also allows users to shift all dates in a single test case. This feature would be useful if users import test cases from another measure and need to update the test case dates to fall into the measure's measurement period.

To shift all dates in a single test case, locate the test case on the list page. Then open the action item dropdown and select "Increment Dates." A modal will pop-up displaying the test cases Group and Title. Ensure the correct test case was selected enter the number of years the test case dates need to be shifted in the text area. This number can be positive to shift the year used in the test case forward, or negative to shift the year used in the test case back. After entering the number of years to shift the test cases dates click "Save". MADiE will attempt to shift all dates in the test cases the specified number of years. If successful a success message will be displayed, if the dates could not be shifted an error message will display.

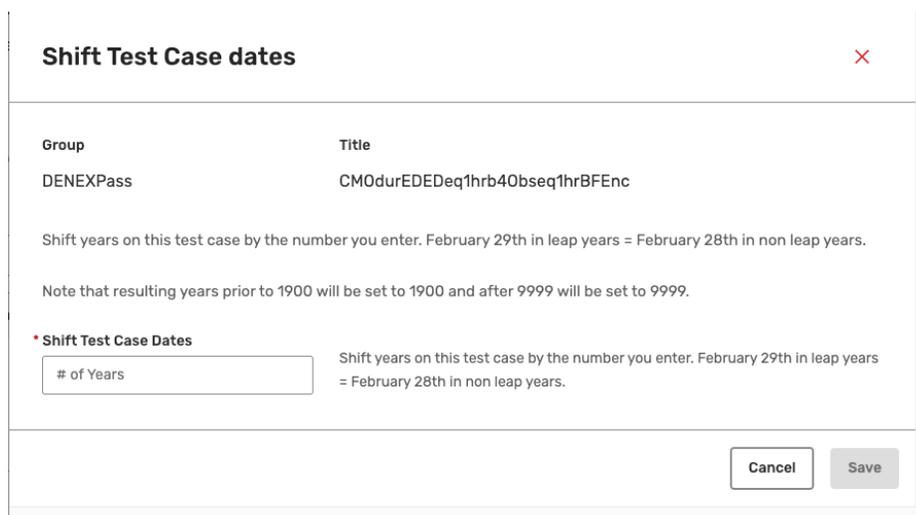


Image: Shift Test Case Dates - Single Test Case Date

8.6 Export QI-Core Test Cases

MADiE allows users to export QI-Core test cases as either transaction bundles or collection bundles. The test cases will be exported in a JSON format with information about the measure and expected values added into a Measure Report Resource in the JSON file.

8.6.1 Export Individual Test Cases

To export an individual Test Case, navigate to the Test Case List Page, select the Test Case you want to export, and click the Test Case action Icon and select “Export Transaction Bundle” to export the test case as a transaction bundle, or “Export Collection Bundle” to export the test case as a collection bundle. A .zip file will be created with the PatientID included in the folder name. The folder will contain the JSON file for the Test Case. The zip file will also include a read me file linking the PatientID to the Test Case Title and Test Case Group.

8.6.2 Export All Test Cases

To export all Test Cases associated with a measure navigate to the Test Case List Page and select “Export All Test Cases” at the top of the page. From the dropdown of options, select “Transaction Bundle” to export the test cases as a transaction bundle, or “Collection Bundle” to export the test cases as a collection bundle. A zip file will be created with a folder for each Test case named with the PatientID. Each folder will contain the JSON file for the Test Case Export. Also present in the zip file will be a read me file linking the PatientID to the Test Case Title and Test Case Group.

8.7 Export QDM Test Cases

MADiE allows users to export QDM test cases as either an Excel format or a QRDA format. To export either format, navigate to the Test Case List Page, select “Run Test(s),” select “Export Test Cases” and then select the format needed. The image below shows the correct order of button selection to request the export.

The screenshot shows the MADiE interface for a measure titled "Introduction To MADiE Demo Measure". The interface includes a navigation menu on the left with options like "Population Criteria", "Configuration", "SDE", "Expansion", and "Test Case Data". The main area displays test case results with a table and various action buttons. The "Export Test Cases" button is circled in red, and the "QRDA Excel" option is also circled in red.

Case #	Status	Group	Title	Description	Last Saved	Action
84	Pass	DENEXPass	CMOdurEDEDeqThrb40bseqThrBFEnc	Patient receives CMO during ED. ED ends 60 min before Obs start and Obs ends 60 min before inpatient start. Testing Ho... more	10/24/2024	Select
83	Pass	DENEXCEPPass	MedRsnStartTmEQEncDisch	Patient did not receive anticoagulant on dc due to medical reason, but start date is eq end of OccurA	10/24/2024	Select
82	Pass	DENEXCEPPass	MedRsnStartTmEQEncAdmTm	Patient did not receive anticoagulant on dc due to medical reason, but start date is eq start of OccurA	10/24/2024	Select

Image: QDM Test Case Export

8.7.1 Excel Export

When this format is selected an Excel file will be generated. The Excel file will contain a sheet titled “KEY” containing helpful information to understand the results and a sheet for each population in the measure. The population sheets will provide the expected and actual values, metadata about the test case, and results for every definition in the CQL.

8.7.2 QRDA Export

When this format is selected a zip file will be generated containing QRDA information about the test cases. The zip folder will include an “html” folder, containing an HTML file for each test case. The zip file will also contain a “qrda” folder, containing an XML file for each test case.

8.8 Import QI-Core Test Cases

MADiE allows users to import QI-Core test cases from a JSON format. Users can import an individual test case JSON that were exported from Bonnie FHIR or import multiple test cases for a measure that was exported from MADiE.

8.8.1 Import Individual Test Case JSON from Bonnie FHIR

MADiE allows users to import individual test case JSON that was exported from Bonnie FHIR. Bonnie is retired and test cases may no longer be exported. Bonnie test cases would need to have previously been exported from Bonnie to continue with importing to MADiE. Open the .ZIP file containing the test cases exported from Bonnie FHIR. The ZIP file shall contain one JSON test

case file whose name is the PatientID for that test case. Ensure these JSON files are saved outside the zip file before continuing. In order to import this JSON, follow these steps:

1. Log in to MADiE and open the measure you wish to import the test case to.
2. Create (see [section 8.5.2](#)) a new test case or open an existing test case to edit (see [section 8.5.3](#)).
3. Click “Import” in the button bar on the left side (see the image below).
4. MADiE will prompt you to select a file using the browser’s default selector. Select and open the individual test case JSON file that corresponds to the test case you are trying to create.
5. The JSON contained in the file will now be placed in the JSON editor on the left side of the screen, overwriting any JSON previously there.
6. As the JSON is added to the editor, QI-Core defaults are automatically added (see [section 10](#) for the QI-Core defaults that are added).
7. Set any other elements in the test case as needed.
8. Click “Save” to finalize importing the test case JSON and added defaults. **Note:** MADiE does not automatically add all required QI-Core elements, users may still need to add additional elements to be QI-Core compliant.

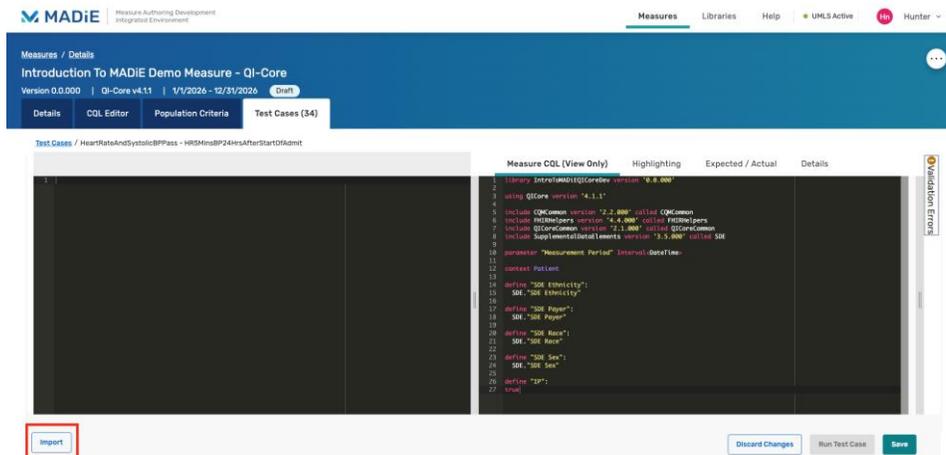


Image: QI-Core Test Case Edit Page – Import Button

8.8.2 Import Multiple Test Cases for a Measure from MADiE

MADiE allows users to import multiple test cases for a measure that was exported from MADiE, see [section 8.6.2](#) to learn how to export test cases from MADiE. Follow these steps to import multiple test cases for a measure:

1. Log in to MADiE and open the measure you wish to import the test cases to.
2. Navigate to the Test Case(s) tab.

3. Click the “Import from MADiE” button (see image below). **Note:** This button cannot be used to import test cases from Bonnie. See [section 8.8.1](#) to import test cases from Bonnie.
4. A Test Case Import screen will appear. Click the “Select Files” button.
5. MADiE will prompt you to select a file using the browser’s default selector.
6. Select and open the .ZIP file containing the test cases exported from MADiE. The structure of the file must be retained from the MADiE export (that is the ZIP file shall contain one folder for each test case whose name is the PatientID for that test case, and each folder shall contain one JSON test case file. A .madie file containing metadata on each test case will also be present).
7. Once you have selected a valid test case .ZIP file, click the “Import” button.
8. MADiE will replace the existing test case JSON with the imported JSON for all test cases whose PatientID’s match. Measure report information such as expected and actual values will not be updated during the import process for existing test cases, users will need to manually update those after the import is complete. Test cases that do not have a matching PatientID in the current measure will be imported as new test cases on the measure, including expected values. **Note:** The combination of Title and Group must be unique for the measure. Test cases that fail to import due to the Title and Group not being unique to the measure will be listed after the import processing is complete.

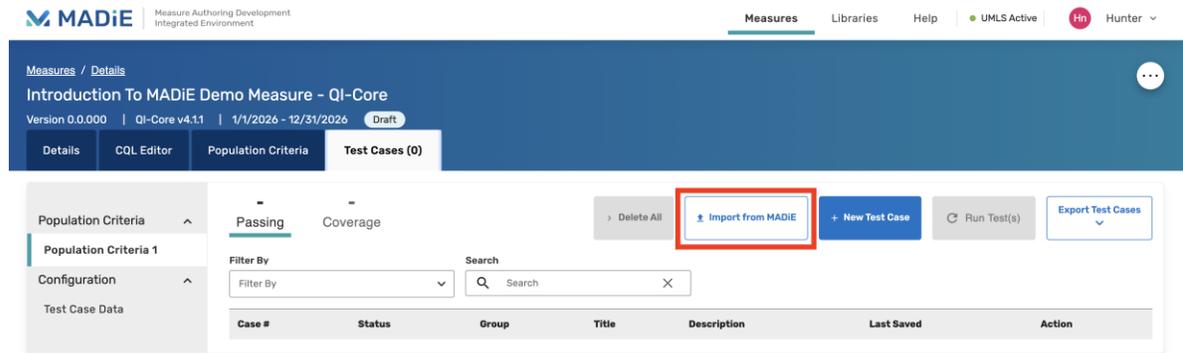


Image: QI-Core Test Case Tab – Import Test Cases from MADiE Button

Should the measure populations not match, expected values are not copied over, and a warning message will be displayed. Users can select the “Copy Test” icon, see screenshot below. Doing so will copy the warning and the test case IDs allowing users to copy it into a word document. This will allow users to see the test cases more easily they need to update to import expected values.

Measures / Details

Introduction To MADiE Demo Measure - QI-Core

Version 0.0.000 | QI-Core v4.1.1 | 1/1/2026 - 12/31/2026 | Draft

Details | CQL Editor | Population Criteria | Test Cases (34)

Following test case(s) were imported successfully, but the measure populations do not match the populations in the import file. The Test Case has been imported, but no expected values have been set.

- d899eebd-1919-4fd6-aad4-8fb2fd07b243
- 60b3c46c-421e-401a-874b-a9deada38081
- 443783af-53ae-46ed-a129-690aa58433d8
- 627490d4-t334-4b7b-aed9-f2ef421e-fb39

Population Criteria 1

Configuration

Test Case Data

Passing Coverage

Delete All Import from MADiE + New Test Case Run Test(s) Export Test Cases

Filter By Filter By Search Search

Case #	Status	Group	Title	Description	Last Saved	Action
34	N/A	HeartRateAndSystolicBPPass	HR5MinsBP24HrsAfterStartOf Admit	Enc. ends last day of MP (6/30). Systolic BP taken 5 mins after admit; heart rate evaluated 2 hrs after admit; heart rat... more	10/24/2024	Select
33	N/A	TemperatureFail	2Hours1MinAfterStartOfinpatient	Enc. first day of MP (7/1), age 65, had Medicare, temperature taken 2 hours 1 min after admission	10/24/2024	Select

Image: QI-Core Test Case Import Warning Message

8.9 Import QDM Test Cases

MADiE allows users to import test cases that were exported from Bonnie QDM in a JSON format. Ensure the JSON file is saved outside the zip file downloaded from Bonnie before continuing. Make sure you do not use the file with “_meta” in the title. Follow these steps to import multiple test cases for a measure:

1. Log in to MADiE and open the measure you wish to import the test cases to.
2. Navigate to the Test Case(s) tab.
3. Click the “Import from Bonnie” (see image below) button.
4. A Test Case Import screen will appear. Click the “Select Files” button.
5. MADiE will prompt you to select a file using the browser’s default selector.
6. Select and open the .JSON file containing the test cases previously saved.
7. Once you have selected a valid test case .JSON file, click the “Import” button.

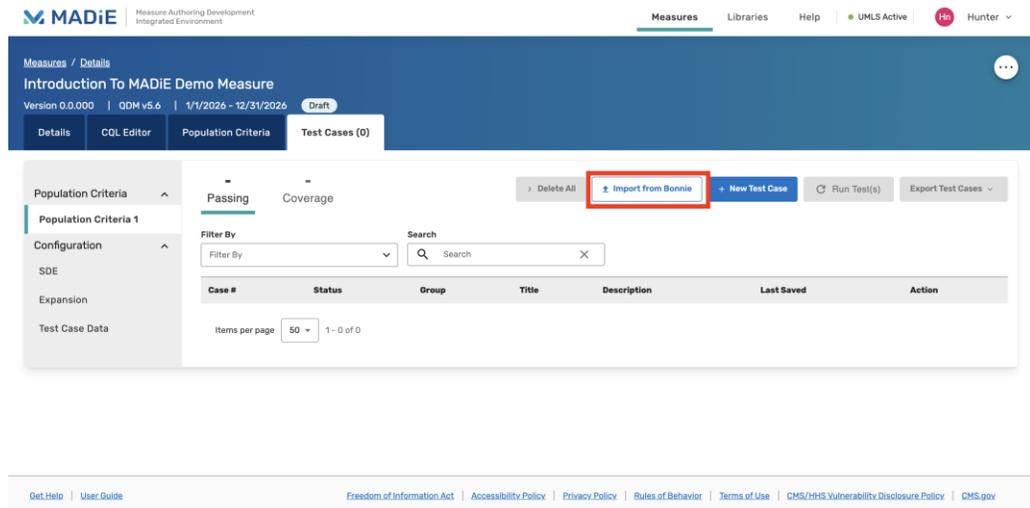


Image: QDM Test Case Tab – Import Test Cases from Bonnie Button

MADiE will then try to import your test cases. When importing QDM test cases MADiE uses the Family and Given fields in the JSON to create the Test Case Group and Title. These fields must be unique to the measure to successfully import the test case to the measure in MADiE. Test cases that fail to import due to the Family and Given not being unique to the measure will be listed after the import processing is complete. If the populations on the measure match the populations on the test case exactly, expected values will be set on import. Should they not match, i.e., your measure contains a denominator exclusion, and your test case does not, then no expected values will be transferred for that test case.

9 Measure Export

MADiE allows for most measures, QDM and QI-Core, to be exported by any user. To export a measure, navigate to the Measure List Page, and use the search function to find the measure you want to export. Check the checkbox of the correct measure and click the “Export” icon. At this time, only one measure can be exported at a time. A loading message will appear as MADiE generates the Export files. Measures do not need to be versioned to export but the measure needs to have the Measure Description, Measure Developers and Measure Steward populated, no errors in the CQL and the population criteria must be filled out. Test cases do not factor into the ability to export a measure. If a measure can’t be exported an error message explaining the issue will display. If a measure is successfully exported a success message will display and a zip file containing the measure package will be downloaded to the user’s computer.

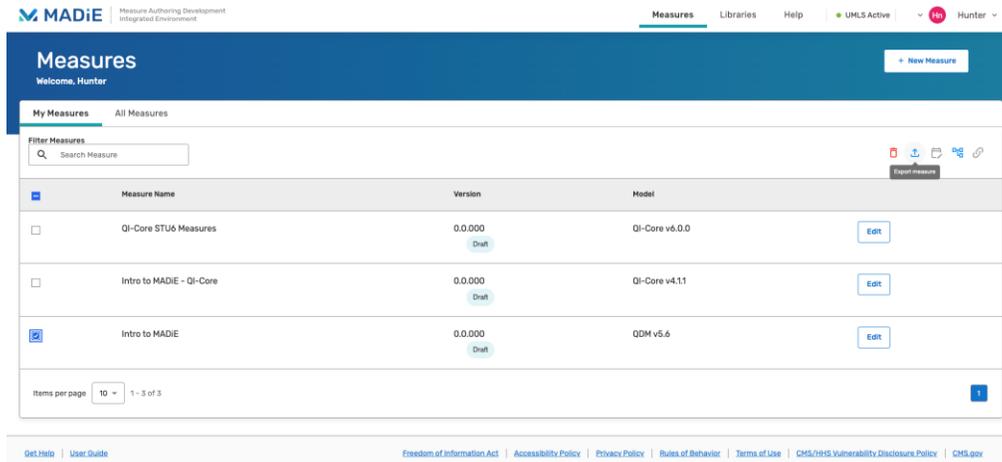


Image: Export Measure Functionality

9.1 QDM Exports

9.1.1 Files in Export

At this time MADiE only exports measures and included library data. No test case data is exported with the measure. The following files are included in the export zip file:

1. **Measure HTML:** This is the human readable representation of the measure.
2. **Measure HQMF:** The HQMF representation of the measure.
3. **CQL Folder**
 - a. **Measure CQL:** The CQL the user entered for the measure.
 - b. **CQL for all Included Libraries:** The CQL for any library that was included in the measure.
4. **Resource Folder**
 - a. **JSON file for all included libraries:** The JSON representation of any included library. These files will be prepended with “library”.
 - b. **XML file for all included libraries:** The XML representation of any included library. These files will be prepended with “library”.
 - c. **JSON file for the measure resource:** The JSON representation of the measure resource. These files will be prepended with “measure”.
 - d. **XML file for the measure resource:** The XML representation of the measure resource. These files will be prepended with “measure”.

9.1.2 File Naming Convention

The following naming convention is how MADiE names the QDM export files:

- Zip File: {eCQM Abbreviated Title}-v{MeasureVersion}-QDM V {ModelMajorVersion}.zip
- HTML File: {eCQM Abbreviated Title}-v{MeasureVersion}-QDM .html
- HQMF File: {eCQM Abbreviated Title}-v{MeasureVersion}- QDM .xml
- Measure CQL: {eCQM Abbreviated Title}-{MeasureVersion}.cql
- Included Library CQL: {libraryName}-{libraryVersion}.cql
- Included Library JSON: {libraryName}-{libraryVersion}.json
- Included Library XML: {libraryName}-{libraryVersion}.xml

9.2 QI-Core Exports

9.2.1 Files In Export

At this time MADiE only exports measure and included library data. No test case data is exported with the measure. The following files are included in the export zip file:

5. **Measure HTML:** This is the human readable representation of the measure.
6. **Measure JSON:** The JSON representation of the measure.
7. **Measure XML:** The XML representation of the measure.
8. **CQL Folder**
 - a. **Measure CQL:** The CQL the user entered for the measure.
 - b. **CQL for all Included Libraries:** The CQL for any library that was included in the measure.
9. **Resource Folder**
 - a. **JSON File for All Included Libraries:** The JSON representation of any included library.
 - b. **XML File for All Included Libraries:** The XML representation of any included library.

9.2.2 File Naming Convention

The following naming convention is how MADiE names the QI-Core export files:

- Zip File: {eCQM Abbreviated Title}-v{MeasureVersion}-FHIR V {ModelMajorVersion}.zip
- HTML File: {eCQM Abbreviated Title}-v{MeasureVersion}-FHIR.html
- JSON File: {eCQM Abbreviated Title}-v{MeasureVersion}- FHIR.json
- XML File: {eCQM Abbreviated Title}-v{MeasureVersion}- FHIR.xml
- Measure CQL: {eCQM Abbreviated Title}-{MeasureVersion}.cql
- Included Library CQL: {libraryName}-{libraryVersion}.cql
- Included Library JSON: {libraryName}-{libraryVersion}.json
- Included Library XML: {libraryName}-{libraryVersion}.xml

10 QI-Core Defaults

QI-Core requires many attributes when a user includes a given resource into their test case JSON. Many of these required elements are not commonly included in a measure, resulting in the measure developers having to manually add the attributes. To alleviate some of the additional time that would require MADiE now adds some required QI-Core elements as default values on import of the individual test cases. See [section 8.8.1](#) for instructions in how to import an individual test case. Coverage and Practitioner are resources that are always added, the rest of the attributes are added only if the resource is present in the JSON file and the attribute is not. No existing attributes will be overwritten.

10.1 Added Default Values

Resource	Attribute	Default Value
QICoreCondition	Condition.subject	Reference to current test case
QICoreCondition	Condition.category	- Encounter Diagnosis if condition is referenced by encounter - Problem List otherwise
QICoreCoverage	Coverage.beneficiary	Reference to current test case
QICoreCoverage	Coverage.payor	Reference to Default Organization
QICoreCoverage	Coverage.status	active
QICoreDevice	Device.patient	Reference to current test case
QICoreEncounter	Encounter.status	finished
QICoreEncounter	Encounter.subject	Reference to current test case
QICoreMedicationAdministration	MedicationAdministration.subject	Reference to current test case
QICoreMedicationRequest	MedicationRequest.intent	order
QICoreMedicationRequest	MedicationRequest.status	active
QICoreMedicationRequest	MedicationRequest.subject	Reference to current test case
QICoreMedicationRequest	MedicationRequest.requester	Reference to the default Practitioner
QICoreObservation	Observation.subject	Reference to current test case
QICorePractitioner	Practitioner.identifier	123456
QICorePractitioner	Practitioner.name.family	Evil
QICorePractitioner	Practitioner.name.prefix	Dr
QICoreProcedure	Procedure.status	completed
QICoreProcedure	Procedure.subject	Reference to current test case
QICoreServiceRequest	ServiceRequest.intent	order
QICoreServiceRequest	ServiceRequest.status	active
QICoreServiceRequest	ServiceRequest.subject	Reference to current test case

10.2 Default Organization

The Default Organization in MADiE is set to Blue Cross Blue Shield of Texas. We've set the address to P.O. Box 660044, Dallas, TX 75266-0044. With the phone number 972-766-6900

11 Model Version Updates (QI-Core Only)

MADiE supports multiple versions of QI-Core, specifically v4.1.1 and v6.0.0. Users can create new measures or libraries in either model version or switch between them while drafting. Users should use the version that best fits their development needs. Only one draft version of a measure or library per model can be created at a time, regardless of version. This means users can not actively work on a draft QI-Core v4.1.1 measure and a draft QI-Core v6.0.0 of the same measure.

To update the model version, the measure or library must first be in a versioned status. If you need help with versioning a measure, see [section 6.2](#), or to version a library see [section 14](#). Then follow the steps to begin to draft the measure or library. The Create Draft pop-up will allow users to update the measure name as well as the model version. It will default to the current model version. Users can select a different version from the dropdown. Clicking continue will update the measure model version, the using statement, and the test case validation used.

Important Note: MADiE does not auto convert any measure, library, or test case logic when the model version changes. Users will likely see errors in their CQL and Tests cases specifying things that need to be updated for the new model version.

Measure: Create Draft Modal

12 Measure Ownership

12.1 Adding or Removing Share Access for a Measure

Currently, MADiE does not contain self-service functionality to add or remove share access to measures. To add share access to a measure and all test cases for the measure, the measure owner must complete the Share Request tab in the MADiE Add or Remove Measure and Library Sharing Request Form located on the Training & Resources tab of the [public website](#) and submit it via email to the Helpdesk at semanticbits-madie-help@icf.com. To remove share access to a measure and all test cases for the measure, the measure owner or a user the measure is shared with must complete the Unshare Request tab in the MADiE Add or Remove Measure and Library Sharing Request Form located on the Training & Resources tab of the [public website](#) and submit it via email to the Helpdesk at semanticbits-madie-help@icf.com.

****This form must be submitted via email and NOT submitted using the MADiE Jira Issue tracker as it contains HARP IDs**

Please consider the following before submitting a request:

1. All existing and future measure versions and drafts will be shared or unshared.

2. Once a measure is shared or unshared, all of its test cases are also shared or unshared, since MADiE consolidates measure creation and testing functionality into a single tool.
3. Once a measure is shared, those who have access must coordinate to avoid overwriting each other's work. Overwriting prevention will not be immediately available and all users that the measure is shared with will have access to the measure and its test cases without restriction.

If you want to update who your measure is shared with, take the following steps:

1. Verify the measure ID in MADiE.
2. Review who the measure and test cases should be shared with
3. Collect the HARP IDs of the MADiE users with which the measure and test cases are to be shared or unshared.
4. Complete the MADiE Add or Remove Measure and Library Sharing Request form found on the MADiE public website
 - a. For Sharing: complete the Share Request tab
 - b. For Unsharing: complete the Unshare Request tab
5. Email the completed form to semanticbits-madie-help@icf.com.

12.2 Transferring Measure Ownership

Currently, MADiE does not contain self-service functionality to Transfer measures. To transfer a measure ownership and all test cases for the measure, the measure owner must complete the MADiE Measure or Library Ownership Transfer Request Form located on the Training & Resources tab of the [public website](#) and submit it via email to semanticbits-madie-help@icf.com.

**This form must be submitted via email and NOT submitted using the MADiE Jira Issue tracker as it contains HARP IDs.

The current owner needs to approve the request to transfer, so it is recommended, when possible, that the current measure owner send the email request.

Once the request is processed, the new user will own the measure and all measure versions. The privileges of the initial owner are now passed to the new measure owner. The new measure owner will have the ability to draft, version, delete, and share. The initial owner will no longer have those privileges. All share privileges previously set will remain present.

12.3 Measure Ownership Permissions

The following table depicts different measure actions and what user has permissions to complete that action.

Measure Action	Owner	Shared User	No Share Access
View a Measure	X	X	X
Edit Measure Meta Data	X	X	
Edit Measure CQL	X	X	
Edit Measure Population Criteria	X	X	
View a Test Case	X	X	X
Edit Test Cases	X	X	
Shift Test Case(s) Dates	X	X	
Version or Draft a Measure	X	X	
Deleting a measure	X		
Export a Measure	X	X	X
Export Test Case(s)	X	X	X
Import Test Case(s)	X	X	
Link QDM to QI-Core Measure	X		
Request Share access through the help desk	X		
Request Unshare access through the help desk	X	X	
Request Measure Owner Transfer through the help desk	X		

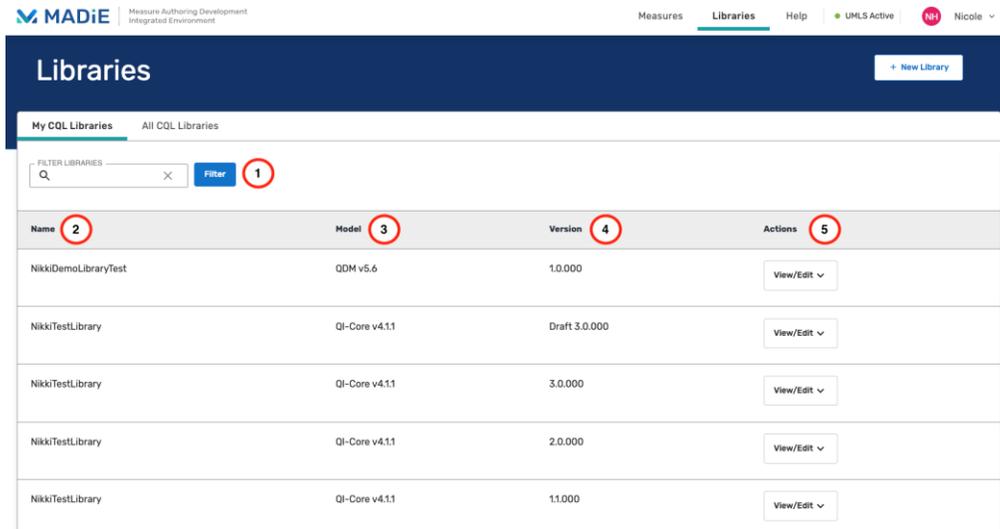
13 Composite Measure Support

At this time, MADiE does not support Composite Measures for QDM or QI-Core measures.

14 Libraries Overview Page

The Libraries Overview page displays all standalone CQL Libraries that have been added to MADiE and further organizes the CQL Libraries into tables in two areas: My CQL Libraries and All CQL Libraries. The My Libraries table displays a list of CQL Libraries you own or have been shared with you. The All Libraries table displays all CQL Libraries in the system. Both areas also include:

1. **Search:** The Search field can be used to find a specific CQL Library by Library Name.
2. **Library Name:** The Library Name column displays the name of a CQL Library.
3. **Model:** The Model column displays the model and model version of a CQL Library.
4. **Version:** The Version column displays the assigned version number of the library. Libraries that are in draft state will display a blue “Draft” tag beside its version number.
5. **Actions:** The Actions column provides access to two options:
 - a. **View/Edit:** The View option opens a selected CQL Library.
 - b. **Version:** The Version option creates a version or draft of a selected CQL Library.



The screenshot shows the 'Libraries' page in MADiE. At the top right, there are navigation links for 'Measures', 'Libraries', 'Help', 'UMLS Active', and a user profile for 'Nicole'. Below the header, there are tabs for 'My CQL Libraries' and 'All CQL Libraries'. A search bar with a 'Filter' button is present, with a red circle '1' around it. Below the search bar is a table with the following columns: 'Name' (with a red circle '2'), 'Model' (with a red circle '3'), 'Version' (with a red circle '4'), and 'Actions' (with a red circle '5'). The table contains five rows of library data, each with a 'View/Edit' button in the Actions column.

Name	Model	Version	Actions
NikkiDemoLibraryTest	QDM v5.6	1.0.000	View/Edit
NikkiTestLibrary	QI-Core v4.1.1	Draft 3.0.000	View/Edit
NikkiTestLibrary	QI-Core v4.1.1	3.0.000	View/Edit
NikkiTestLibrary	QI-Core v4.1.1	2.0.000	View/Edit
NikkiTestLibrary	QI-Core v4.1.1	1.1.000	View/Edit

Image: Library Overview Page

A standalone CQL Library cannot be included into a measure unless it is in a versioned state. However, please note that once a standalone CQL Library has been versioned, it cannot be edited. To make any changes, a new draft of that standalone CQL library must be made.

15 Creating a New CQL Library

To create a new CQL Library, initiate the process by clicking on the “+ New Library” button in the upper right of the screen while on the Measures page. The New Library creation modal will appear, prompting you to enter the following information:

1. **Library Name:** The Library Name is the name of the standalone CQL library. The CQL Library Name must be unique within MADiE, start with an alpha-character followed by an alpha-numeric character(s) and must not contain spaces. **Note:** QDM measures will also allow underscores “_”. Underscores can’t be used in QI-Core measures as they are NOT valid for QI-Core.
2. **Model:** The Model dropdown assigns an available Model and Model version to the CQL library. QI-Core v4.1.1, QI-Core v6.0.0, and QDM v5.6 are currently available for library creation.
3. **Description:** The Description field describes the intent of the CQL Library.
4. **Publisher:** This is the organization responsible for the library content and maintenance. Choose the desired organization from the dropdown menu. **Note:** Organizations not included in the Publisher dropdown can be added by making a request to the [MADiE Helpdesk](#).

Once the information above has been entered you have the option to:

1. **Cancel:** The Cancel button discontinues the creation of a new CQL library and closes the modal.
2. **Continue:** The Continue button saves the new CQL library using the information entered into the New Library creation modal and opens the newly created CQL Library for further editing.

Create Library ×

* Indicates required field

* **Library Name** 1
Library name must start with an upper case letter, followed by alpha-numeric character(s) and must not contain spaces or other special characters

Enter a Cql Library Name

* **Model** 2
Model

* **Description** 3
Description

* **Publisher** 4
-

Cancel Continue >

Image: Create Library Modal

16 Viewing & Editing a CQL Library

Upon opening an existing CQL Library or continuing from the New Library creation modal, the CQL Library content viewing/editing area is displayed. The viewing/editing area displays key content for the opened/newly created CQL Library and additional areas to further view/edit the rest of the CQL Library.

16.1 CQL Library Header

In the blue header, the following information and functionality about a CQL Library is displayed:

1. **CQL Library Name:** The CQL Library Name is displayed below the Navigation Breadcrumbs and above the Model, Model Version, and measurement period.
2. **Model & Version:** The model and model version are displayed below the CQL Library Name.
3. **Last Update Date:** The date when the CQL Library was last updated is displayed below the CQL Library Name and to the right of the model and model version.
4. **Navigation Breadcrumbs:** Above the CQL Library Name are navigation breadcrumbs, indicating what area of MADiE is currently displayed and providing a way to navigate back to the Libraries page.

16.2 CQL Editor (for Standalone CQL Libraries)

Below the blue header and in the left panel is the CQL Editor where a Standalone CQL Library logic including Parameters, Definitions, and Functions can be viewed and edited. All information except for the measure CQL Library Name and Version can be added, edited, and deleted.

All CQL must be entered in correct CQL syntax. When saving, any errors in the CQL will be displayed. CQL containing errors can be saved but may prevent dependent functionality from working properly (e.g., measures including the library). Make sure that the CQL is fully completed, and errors are resolved to ensure proper functionality.

16.3 CQL Library Details

Below the blue header and in the right panel are where the CQL Library Details can be edited, including:

1. **Library Name:** The Library Name is the name of the standalone CQL library. The Library Name displays the name entered when the CQL Library was created or last edited by anyone with access. CQL Library Names must be unique within MADiE, start with an alpha-character or underscore followed by an alpha-numeric character(s) or underscore(s) and must not contain spaces.
2. **Description:** The Description field describes the intent of the CQL Library.
3. **Publisher:** This is the organization responsible for the library content and maintenance. Choose the desired organization from the dropdown menu. **Note:** Organizations not included in the Publisher dropdown can be added by making a request to the [MADiE Helpdesk](#).
4. **Experimental Checkbox:** The Experimental Checkbox can be selected if a CQL Library is Experimental.

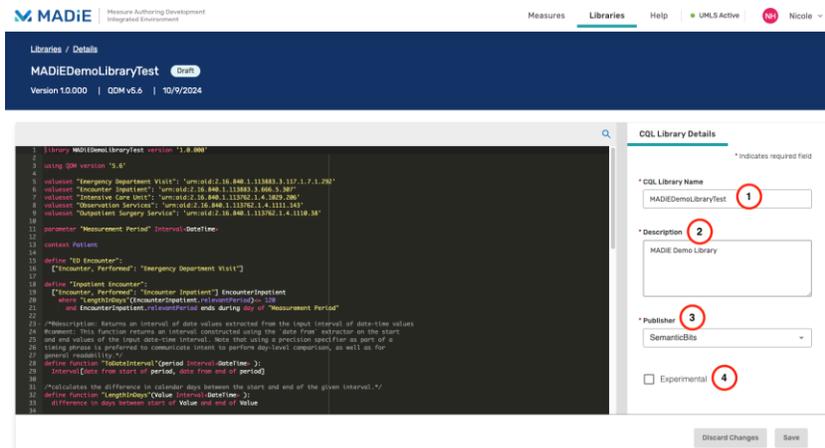


Image: CQL Standalone Library Workspace

17 Library Ownership

17.1 Adding or Removing Share Access for a Library

Currently, MADiE does not contain self-service functionality to add or remove share access to libraries. To add share access to a library, the library owner must complete the Share Request tab in the MADiE Add or Remove Measure and Library Sharing Request Form located on the Training & Resources tab of the [public website](#) and submit it via email to the Helpdesk at semanticbits-madie-help@icf.com. To remove share access to a library, the library owner or the user the library is shared with must complete the Unshare Request tab in the MADiE Add or Remove Measure and Library Sharing Request Form located on the Training & Resources tab of the [public website](#) and submit it via email to the Helpdesk at semanticbits-madie-help@icf.com.

****This form must be submitted via email and NOT submitted using the MADiE Jira Issue tracker as it contains HARP IDs**

Please consider the following before submitting a request:

1. All existing and future library versions and drafts will be shared or unshared.
2. Once a library is shared, those who have access must coordinate to avoid overwriting each other's work. Overwriting prevention will not be immediately available and all users that the library is shared with will have access to the library without restriction.

If you want to update who your library is shared with, take the following steps:

1. Verify the library ID in MADiE.
2. Review who the library should be shared with
3. Collect the HARP IDs of the MADiE users with which the library is to be shared or unshared.

4. Complete the MADiE Add or Remove Measure and Library Sharing Request form found on the MADiE public website
 - a. For Sharing: complete the Share Request tab
 - b. For Unsharing: complete the Unshare Request tab
5. Email the completed form to semanticbits-madie-help@icf.com.

17.2 Transferring Library Ownership

Currently, MADiE does not contain self-service functionality to Transfer Libraries. To transfer ownership of a Library, the Library owner must complete the MADiE Measure or Library Ownership Transfer Request Form located on the Training & Resources tab of the [public website](#) and submit it via email to semanticbits-madie-help@icf.com. **This form must be submitted via email and NOT submitted using the MADiE Jira Issue tracker as it contains HARP IDs.

The current Library owner needs to approve the request to transfer, so it is recommended, when possible, that the current Library owner send the email request. Once the request is processed, the new user will own the library and all library versions. The privileges of the initial owner are now passed to the new library owner. The new library owner will have the ability to draft, version, and delete. The initial owner will no longer have those privileges.

17.3 Library Ownership Permissions

The following table depicts different measure actions and what user has permissions to complete that action.

Measure Action	Owner	Shared User	No Share Access
View a Library	X	X	X
Edit Library Meta Data	X	X	
Edit Library CQL	X	X	
Version or Draft a Library	X	X	
Deleting a Library	X		
Request Share access through the help desk	X		
Request Unshare access through the help desk	X	X	
Request Library Transfer through the help desk	X		

17.4 Deleting a Draft Library

MADiE allows users to delete a draft library. Library drafts can be deleted by selecting “Delete” from the View/Edit dropdown on the My Libraries list. Engaging Delete will display a modal

confirming if you would like to delete the library. **Note:** Only the library owner can delete the library.

18 Feedback and Support

An issue tracker and feedback email list are available to support the resolution of issues and to answer questions related to the MADiE application. The MADiE issue tracker is available on the [ONC Jira System](#).

MADiE users should create a ticket in the issue tracker to report bugs, ask questions, or to request new features. To add an issue, users must create a login account in the Jira system. Once an issue has been entered, the MADiE team will review and prioritize it.

CMS Web Application Firewall (WAF) Errors can occur in MADiE. WAF errors occur when the attempted action (i.e., saving or exporting) is rejected by the CMS Security policy, blocking further action by the user. This can happen when doing any work within MADiE. If a WAF error is encountered, a pop-up message will display notifying the user they have encountered a WAF error, and they should contact the help desk. A support ID will be included in the pop-up. When a Support ID is provided in the error message, users should include that in the support ticket to help facilitate resolution by CMS.

Acronyms

Acronym	Definition
CMS	Centers for Medicare & Medicaid Services
CQL	Clinical Quality Language
CQM	Clinical Quality Measure
eCQM	Electronic Clinical Quality Measure
FHIR	Fast Healthcare Interoperability Resources
IP	Initial Population
JSON	JavaScript Object Notation
MADiE	Measure Authoring Development Integrated Environment
MAT	Measure Authoring Tool
NLM	National Library of Medicine
ONC	Office of National Coordinator for Health Information Technology
QI-Core	Quality Improvement Core
QDM	Quality Data Model
QMIG	Quality Measure Implementation Guide
UMLS	Unified Medical Language System
VSAC	Value Set Authority Center
XML	Extensible Markup Language